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## **What role can contract law play in making risky technological projects safer and less expensive?**

The 8<sup>th</sup> ROFF-SAMRISK seminar entitled “**Complex Projects: Legal Risks, Contracts, and Insurance**” took place in Oslo 19-20 August 2011 and was funded by the Research Council of Norway under its SAMRISK programme (see [www.forskningsradet.no/samrisk](http://www.forskningsradet.no/samrisk)). The seminar gave the opportunity to social scientists, lawyers, engineers, and planners to discuss the importance of sound contracting for the mitigation of risks emerging from large and complex technological and construction projects. The hosting institution was ROFF, the Center for Risk and Insurance Research at BI, the Norwegian Business School (see [www.bi.no/roff](http://www.bi.no/roff)). The event was organized by professors Johannes Brinkmann (BI, Norwegian Business School), Alexandros-Andreas Kyrtis (University of Athens), and Bjørn FASTERLING (EDHEC Lille).

Behind the projects which lead to the construction of large scale infrastructure or industrial operations we can always find contracts, without which the configuration of tasks and the accountability of the actors involved would have been impossible. In this sense, the success or failure of such projects rests significantly on issues of contract design and monitoring. Contracts define and structure many of the crucial parameters associated with risk management. Large scale complex and risky projects are part of our life. In many cases we experience their positive impact, as in infrastructure that enhance environmental, economic and social sustainability or initiatives associated with the development and delivery of national health services; but unfortunately in other cases, large scale projects can have significantly negative impacts, such as as in the case of the explosion of offshore oil drilling rigs, or in the nuclear crisis that followed the Fukushima earthquakes.

When an oil drilling rig explodes, a dam collapses, a mining operation triggers negative environmental or social impacts, or a nuclear plant contaminates a significant

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<sup>1</sup> Primary responsibility for this article in the order mentioned, based more or less on the participants' summaries of their presentations.

part of a geographical region for many generations to come, error or misconduct are regarded as significant factors in spite of the unpredictable or accidental circumstances. In hindsight, we tend to make engineers or managers responsible for perceived avoidable risks associated with such negative impacts. But we turn our attention here to an examination of how contract law can affect project design, operation and the allocation of risk. And when an impressive infrastructure project, like a railway tunnel that radically changes the connectivity of places, attracts our interest or our admiration because of the travelling conveniences, rarely do we give credit to the role of contract law in risk allocation issues related to these projects. In cases of disasters, persons with legal responsibilities typically take on a number of quite different roles. Not infrequently, they are characterized in the popular press as the ugly defenders of the culprits, or alternatively, the crusading champions of the victims' interests.

We suggest here that there is a crucial if largely invisible role played by contract law and lawyers in technological and construction projects or in the processes of the resolution of organizational problems. The purpose of this seminar is to shed light on this under-studied dimension of large scale complex projects. All presentations at the 8<sup>th</sup> SAMRISK seminar revolved around the idea that the risk of doing the wrong thing, at the wrong moment, and at the wrong place in the case of large and complex projects, can be the result of the way contract law has structured and addressed the risk dimensions of such projects. The inappropriate use of legal frameworks and the deficient design of the contracts can result in failures: technical failures, financial failures, as well as failures related to insurance issues (such as difficulties to define claims and liabilities after an industrial accident, or difficulties of convincing for the insurability of projects and installations). Similar complications can be observed whenever the architectures of contracts exploiting legal opportunities and limitations are not reasonably aligned with business, technical and operational requirements. Under certain circumstances, the latter can result in the exposure of businesses, societies, and the environment to excessive risks which can be traced back to the legal environment and to concrete legal practices. Experts call these risks 'legal risks'. There is a connection between project risks and legal risks.

Below are brief summaries of the papers presented and discussed at the Seminar.

*The Gotthard Base Tunnel Project*

Perhaps no one could show the connection between risk and contract more eloquently than the keynote speaker of this seminar, Heinz Ehrbar, the Chief Construction Officer of the Gotthard Base Tunnel and a member of the executive management of the Lucerne based Swiss company AlpTransit Gotthard Ltd.. Based on his hands on experience leading the project, Mr. Ehrbar discussed the planning and risk management dimensions associated with the construction of the longest railway tunnel in the world. Mr. Ehrbar's talk which addressed a number of relevant theoretical issues created the ideal platform for discussion at the Seminar of the main issues exploring the relationship between contracting and project risk management. Mr. Ehrbar pointed out that underground constructions such as the Gotthard Base Tunnel have inherent high risks for several reasons: firstly, they are very long structures, and this implies that any probable mistakes during construction have enormous consequences for all other following steps. Secondly, the features of the main construction material, which is the ground itself, can never be regarded as satisfactorily predictable. Underground structures have often a lengthy construction time which leads to a high likelihood of project changes or changes of the legal boundary conditions. And finally, underground structures require large investments relying on complex schemes of project finance. Risk management procedures should therefore be part of the daily business on all levels of the project organisation in any underground construction project. Moreover, risk management in large construction projects should take account of various project requirements (occupational health, environmental protection, the completion of all legal aspects, costs within budget, construction time within the agreed schedule, fulfilment of the required quality standards and optimal processes and project organisation in all different project phases). According to Mr. Ehrbar, key risk management lessons flowing from the construction of the Gotthard Base Tunnel include:

- 1) The definition of a clear risk policy by the owner at the beginning of the project is a must;
- 2) risk management must start at the earliest possible stage of the project because the potential effect of management decisions is bigger in the early project phases and related to lower costs than in later project phases;

- 3) for underground construction it's better to use simple but commonly accepted risk management processes than complicated, sophisticated or even different systems within the same project;
- 4) time and money should be invested in the elaboration of detailed risk registers at the earliest possible stage;
- 5) risk management is not a matter of the back office, but of all partners of the project who should be involved in the risk management process according to the corresponding project phase;
- 6) risk management is mainly a matter of thinking and not of calculation;
- 7) risks have to be allocated and shared between the different partners based on a fair policy to avoid extra costs;
- 8) each risk needs its mitigation and monitoring measures and clear responsibilities;
- 9) two thirds of the additional costs caused by internal risks with options for handling (design changes, legal disputes etc.), and only one third of the additional costs were caused by external risks with no or only a small room for action (such as worse e.g. ground conditions, natural disasters).

As Mr. Ehrbar has shown, all of these nine points defining the range of the lessons learned from the Gotthard Base Tunnel mega-project are related to contracting. A vast number of contracts were put in place for the purpose of regulating both the construction and the risk management projects. This complex contractual architecture required meticulous management of contracts which presupposes a tight collaboration between engineers, managers and lawyers.

### *Mega Urban Transport Projects*

Similar insights, issues, ideas and practices arise with respect to other construction mega-projects or from large urban development projects. Professor Harry T. Dimitriou's and Dr. E. John Ward's presentations focused on aspects of decision-making in the planning, appraisal and delivery of Mega Urban Transport Projects (MUTPs) and their impacts. Drs. Dimitriou and Ward, both teaching staff at the University College London and the leading members of the OMEGA Centre for Mega Projects in Transport and Development, used extensive material from their research and discussed results concerning lessons for decision-makers based on three UK case studies and an international comparative study of Mega Urban Transport Projects in Europe, USA and Australasia. The three UK case studies presented at the seminar

included: The Channel Tunnel Rail Link, a high speed link between London and the Channel Tunnel; the Jubilee Line Extension, an extension of the Jubilee Line Tube Line from Westminster in Central London to East London via the Docklands and Canary Wharf; and the M6 Toll Road, a motorway link around the north and eastern edge of the West Midlands conurbation.

On the basis of the experiences drawn from various projects they illustrated that decision making must be related to risk, uncertainty, complexity and the power of context. They also highlighted a number of lessons with high relevance for practitioners. Since Mega Urban Transport Projects (MUTPs) are frequently major 'agents of change', the research programme contends that such projects not only need to be judged against a broader set of criteria, but also need to be more 'robust' in light of the fast pace of change of the 21<sup>st</sup> Century. The test of such robustness, it is argued, is best assessed against the successful treatment of risk, uncertainty and complexity in decision-making and their treatment of context. Although this presentation did not explicitly stress legal issues, it showed clearly the contract law challenges associated with such complex environments.

#### *Enterprise Risk Management*

Different complexities have been revealed by a talk focusing on Enterprise Risk Management as a critical aspect of the financial profile of projects. The topic of the paper prepared by Paul Klumpes (EDHEC Lille), Abhay Abhyankar (University of Edinburgh), Pengguo Wang (Bristol University), and Liyan Tang (Canterbury University) was the financial management aspect of risk mitigation strategies adopted by non-financial multinational enterprises. The financial projects they implement embed risk management elements in schemes of project finance. Accounting disclosures concerning derivative usage and the quality of earnings and cash flows play a significant role. The analysis used data from a sample of large European and US firms. The authors of this paper suggest that with the increase in global competition and trade, multinational firms are becoming increasingly concerned about the relationship between their investment and financial and risk management policies, as they are more internationally oriented and geographically diversified than smaller firms. Flowing from this, they propose that multinational firms are much more likely to benefit from managing their diversified operations via derivative usage and sophisticated financial risk management procedures. Analysis of cross-sectional

variation in derivative usage also permits further analysis of the links between such practices and overall variations in firms' earnings and their cost of capital. In contrast to previous research, this is the first study to identify incentive problems as an alternative justification for the use of derivatives, insurance captives, and alternative risk transfer methods by multinational firms. It is also the first to undertake a direct comparison of the determinants and nature of derivative usage by US and EU-based multinationals.

This is also the first study to identify corruption, regulatory quality, and accounting practices as being an integral part of these choices, and extends its analysis to include the speculative trading of derivatives and the link between project finance and insurance, mostly in the form of insurance captives. Thus, this presentation provided a number of new insights into old issues concerning the determinants of derivative usage and their broader venture risk management implications. Overall, the study on which the presentation was based finds a fairly robust relationship between on the one hand the propensity to use derivatives, insurance captives and alternative risk transfer methods, and on the other hand various financial characteristics of firms. A general conclusion one could draw is that this study reveals among other things hidden aspects of the impact of financialization (i.e. of putting emphasis on non-operative profits) as a main feature of corporate strategies on project finance and on the management of project risks.

#### *Political risk insurance*

Professor Kernaghan Webb from the Department of Law and Business of Ted Rogers School of Management (Ryerson University, Toronto), discussed the connection between political risk insurance and contracting in the mining industry. The purpose of his paper was to explore the nature of political risk insurance (PRI) contracts in the context of mining projects in developing countries, and in particular, to explore the linkages between PRI and corporate social responsibility (CSR) policies and practices in the mining sector. More specifically, his objective was to examine if and how PRI providers factor CSR policies and practices of applicants in their initial decisions to provide PRI, how CSR factors are reflected in the terms of PRI contracts, and how failure to exercise good CSR practices by recipients of PRI may affect insurance coverage. One of the main points made by Dr. Webb is that on the one hand, mining projects can be viewed as potentially significant sources of FDI, but on the other

hand, the significant economic, environmental, and social impacts associated with mining projects has attracted considerable critical attention from some governments, affected communities, investors, and others. The presentation explored how good CSR practices which minimize risk to companies and communities can be or is rewarded through the PRI contract mechanism. Analysis by Dr. Webb suggests that PRI and CSR can be characterized as two different but interrelated and largely complementary mechanisms for proactively managing politically risk, that can be (and have been) used in tandem by PRI providers and by the mining sector. Research for this paper also revealed that many public PRI providers are integrating CSR criteria and considerations into PRI screening, contract terms and implementation. As the Professor Webb noted, both PRI and CSR are rapidly evolving and inter-connected concepts deserving of considerable further study.

### *Transparency*

As Professor Bjørn FASTERLING (EDHEC-Lille) pointed out, earlier research has demonstrated that cost- and benefit forecasts for large infra-structure projects are often faulty, which is explained by delusion and strategic misrepresentation of information. Increased transparency has been proposed not only to improve accountability towards the public or, as the case may be, towards private investors but also to improve the quality of information that is available to decision-makers. Dr. FASTERLING's paper and presentation picked up the theme from here on and evaluated legal disclosure mechanisms which can assure a production and dissemination of information that enables more accurate forecasts, thereby reducing forecast risk. As Dr. FASTERLING suggests, effectiveness of liability rules for wrongful- or non-disclosure is rather restricted in this context. Widening disclosure obligations is not always an option either, since this could amplify the complexity of available information exacerbating harmful information asymmetries rather than reducing them. Dr. FASTERLING also proposed that ideal 'legal disclosure mechanisms' are such that could trigger and ascertain a 'participative' process of information refinement that is set at an early stage of a project's development. Such 'participative' processes would include expert peer reviews of disclosed forecasts, as well as procedures, by which an interested public could challenge disclosed information and demand better explanations by project promoters and other decision-makers. Such regimes, however, do not only require considerable means to maintain a peer review process, but also

presuppose that the interested public assumes a more active role at the early stage of project's development than is the case today.

*Risks as a consequence of compliance pressure*

The management of information and knowledge required for planning and contracting and the legal risks failures in information management can imply was also the topic of a paper by Professor Alexandros-Andreas Kyrtis (University of Athens). Legal risks in complex projects, although predominantly associated with lack of legal certainty, can also result from excessive legal certainty and the unreflective acceptance of pressures for compliance, according to him. Such conditions can create mismatches, or dis-alignments, between real processes and rigid rules. A sense of legal certainty can be a counterproductive aspect of the dynamics of projects, especially if the legal environment in which techno-organizational actions are embedded does not correspond to the appropriate cognitive environment which can drive engineering solutions. Such problems due to reliance on legal certainty by technical staff can be traced back to their simplified understanding of the potentials and constraints emerging from formal contracts defining tasks and procedures. Engineers are often inclined to underestimate the significance of legal issues which require flexible thinking, not because of a lack of awareness of their relevance, but because of a trust to 'legal mechanisms' they are not inclined to question. In the same sense they often trust scientific and technological expertise without taking into consideration human aspects of project dynamics. Engineers, albeit experts in their field, are called upon to interpret and implement contracts, which they typically understand from the perspective of (in the best case) informed laypersons. Under these circumstances their knowledge is complemented by the perception of legal regimes and the risk that non-compliance to these may imply. Whereas for the legal experts legal risk perception is related to the contradictions of law and the processes of its construction, as well to the competence of coping with often messy procedural matters, legal risk perception among technologically minded users and interpreters of legal codes, typically relates to trust in what they see as idealised and stable mechanics of legal codes. Risk is then associated to deviations from these 'mechanics'. In this respect the way in which organizational stakeholders of complex projects understand the contractual matrices defining the project tasks can be of paramount importance. Moreover, the way project managers understand legal implications of special purpose financial vehicles, or of

insurance underwriting, can significantly influence the conditions of risk management. Legal language, financial language, and insurance language of liabilities, reshape the language and the mindsets of engineers originating predominantly from physics and mathematics. The speaker also stressed that the problems which may arise from this can take different forms at various stages of the shaping of the multilevel process of a project. At the phases of bidding and contracting problems can be quite different as in the phases of planning and design. Moreover, there can be also significant differences between what we can observe in situations that are regarded as normal and situations that are regarded as crisis ridden. In his concluding remarks Dr. Kyrtis stressed that the search for overall engineering solutions often pose challenges which are distinct from the ones planners and designers are facing whenever they have to invent incremental and local solutions with corrective impact on the final outcome of projects.

#### *Health service projects*

A different landscape of ideas drawing on socio-legal studies was presented by a London academic with interdisciplinary credentials. Dr. Pauline Allen, a lawyer and organizational analyst from the London School of Hygiene and Tropical Medicine, showed in very lucid terms the value of contract theory for the analysis of projects in the health services. This presentation, by drawing on the in-depth knowledge of real cases for the English National Health Services (NHS), showed also the affinity between projects, like the planning and operation of hospitals, to large and risky techno-organizational projects. The canvas on which the arguments were woven was a story with a well structured narrative texture: after the establishment of the NHS internal market in April 1991, the NHS became a split organisation in which purchasers bought clinical services from hospitals. Both purchasers and hospitals continued to be owned and run by the state. Contracting became a key governance mechanism for co-ordinating the work of purchasers and hospitals, and ensuring that the expected volumes of care were delivered in line with cost and quality requirements. The study conducted by a research team at the London School of Hygiene and Tropical Medicine examined contractual governance, in terms of the use of contracts to manage relationships and the purchase of NHS services, as well as its practice and its limitations. Dr. Allen and her collaborators carried out two case studies of contracting practices in local health economies. Each case study involved a

mix of observation of meetings, interviews with key personnel and analysis of documents. Data collection took place from late 2007 to summer 2009. They found that, as legal and economic theory predicts, it is people's actual behaviour, rather than formal written rules, that shapes contractual relations. The English National Health Services used national template contracts which imposed a measure of standardisation and set limits on the scope for local variations in the nature of agreements between commissioners and providers. While in principle, a prospective payment tariff system was used in order to allocate financial risk mainly to purchasers, the research found that commissioners did not always reimburse strictly on tariff and that price negotiation and block contracts (shifting financial risk to the hospitals) could still appear. Financial penalties in the national contract template were a key tool supporting national targets. But, in practice, these penalties were not imposed. Good relationships have been crucial in keeping organisations on track in the face of problems, particularly financial shortfalls. Rules and performance management cannot take the place of trust and co-operation, which need to be built over time.

#### *New internet top-level domains*

Two more talks from a legal perspective expanded this discussion in contracting into highly interesting domains. Dr. Tobias Mahler (Norwegian Research Centre for Computers and Law) focused on contractual issues arising in the context of projects for Internet top-level domains. His novel approach departs from the simple but highly relevant observation that internet top-level domains such as .com, .org, .de and .uk are central for the functioning of the Internet. He made the observation that so far, their number has been very limited, but this will change in the near future. After years of discussions, the Internet Corporation for Assigned Names and Numbers (ICANN) is opening up the application process for new generic top-level domains (gTLDs). Proposals are likely to include both genuinely generic names such as .music, .bike or .bank and geographic names and abbreviations such as .berlin, .paris and .nyc. In addition, several major corporations are expected to register their brand names as top-level domains. Applying for a new gTLD can be quite costly, since an applicant has to disburse *inter alia* a substantial application fee and possible costs of an auction, in addition to start-up costs. Applicants therefore need to carefully assess and manage risks related to the project of introducing a new gTLD. From the applicant's perspective, relevant risks can be related to the business model, to the applicant's

financial situation or to operational, technical and legal issues. The assessment of legal risks – which is the key focus for this paper – is essential for any applicant, for at least two reasons. First, it is in the interest of the applicant to identify and manage legal risks in an early phase when cost-efficient proactive action is still possible. In addition, all applicants even need to include a contingency plan in their applications, and the quality of this plan will count for the application's success. This explicitly includes the relevance of any regulation, law or policy that might impact the project. Applicants are evaluated based on a scoring system, and in order to achieve the highest score, they must show that they have thoroughly identified the key risks and the chances that each will occur, including legal risks.

#### *Legal problems related to technological innovations*

Dr. Christian Lahnstein, a legal expert working at Munich Re, the largest reinsurance company in the world, focused on legal and ethical problems arising from technological innovations and their impact which these might have on both formal and informal contractual relationships. At the outset of his talk he drew attention to the interesting fact that this is a problem we encounter not only in modern industrial societies, but in pre-industrial societies as well. He illustrated this with an example from a technological project aimed at improving the water supply of the city of Toledo in sixteenth-century Spain. The project failed because of the resistance of local interests by the owners of mules carrying water in cans from the river. He juxtaposed this example with the complications arising from the resistance to innovative technological projects in modern democratic industrial societies. Under these socio-economic and political regimes it is not only the configuration of economic interests that play a role. Risk consciousness, as expressed in the application of the precautionary principle, but also in the application of tort law, can under certain circumstances hamper the execution of complex technological projects. Dr. Lahnstein gave examples from cases such as the Stuttgart railway station project where the opposition groups have been accused of boycotting a project that had presumably overcome all the legal hurdles. He referred to the German Administrative Procedures Act (Section 51) which provides for concluded procedures to be re-opened if a new factual or legal situation arises or new evidence becomes available. This sensible principle was not applied in the case in question only because there happened to be a historically based special provision in railway law. However, if emphasis had

been put on the precautionary principle, this would have allowed future (suspected, hypothetical) risks to be included in the considerations. From a theoretical point of view Lahnstein referred to the connection of this legal issue to the sociology of risk. The point he made here was that one may contest Ulrich Beck's thesis that modern technology risks are getting out of control. But it can scarcely be disputed that technological developments are not subject to democratic control and that democracies are very weak whenever they have to impose the adjustment of investment plans by state regulation. Control of investments exercised by risk regulation is the current practice at least in western democracies. Another example presented was that of genetic engineering. As he asserted, the failure of green genetic engineering in Europe may be explained, in part, by the fact that political arguments, disguised as risk arguments, resulted in prohibitive risk regulation. A further dimension of uncertainty derives from tort law. Complex infrastructure projects can involve long-term occupational and environmental risks.

The first question here is to what extent liability risks defined and limited through state regulation and contract design (e.g. by means of clean-up agreements) can be disclosed prior to project commencement or after its termination. The second question Dr. Lahnstein drew attention to was the following: What kind of legal action should be regarded as preferable, and who should carry the liability for unforeseeable development risks? Dr. Lahnstein pointed to the problem of "retroactivity", where new standards of care (either legislative or jurisprudential) are applied to old situations and thus raise the complexity of the processes of attribution and allocation of liability insurance among multiple parties over long periods of time.

#### *Final remarks*

The general conclusion that can be drawn from these presentations is that, the complexities of large projects and risky ventures cannot be managed in a reasonably efficient manner without equally efficiently designed and monitored contractual arrangements. However, the questions underlying all these discussions -- namely, whether contracts and contract lawyers can help make complex and risky technological projects safer and less expensive, and whether schemes of project finance and project insurance policies could have a significant effect on risk management-- defy easy answers. The thesis that contracts should be well aligned with business and project requirements can be regarded, on the basis of the conceptual

frameworks and the evidence presented in this seminar, as undisputable. However, this alignment does not seem to be offering more than the necessary conditions of sound contract and project risk management. What the sufficient conditions could be is a matter in need of further research. Drawing on the insights presented, it is very probable that the improvement of the link between contract management and project risk management would require the recognition of the role of law and of legal experts. But it is also worthwhile wondering whether successful ventures would further require a genuine convergence between the perspectives adopted by engineers and others involved in hands-on project design and implementation and the ‘legal engineers’ of the contractual antecedents of project management.