Matrix of Risks Distribution
World Bank

RISK DISTRIBUTION METHODOLOGY

This paper addresses the identification of risk generically rather than on a specific or a quantative basis.

The allocation of risk is based upon a review of a number of road projects which review considered issues on a country specific basis taking into account the law, practice, customs and economics associated with the project and the country. The risks are common to many of the projects reviewed (and many others) but the solutions adopted will be case specific.

The approach is based on practical experience of producing risk registers or matrices in a number of countries and on a number of different projects.

The purpose of the analysis is to inform users of the World Bank Infrastructure and Law Web-Site of the key risks associated with Road Projects and to form the basis of addressing those risks in the Concession Agreement. The groupings of risk have been synthesized from a larger set of risks.

Having identified the risks it will be then necessary to consider the effect on the Project. Internationally many projects have been developed using special purpose companies (SPCs) who raise finance on a limited recourse finance basis. The effect of this is that the SPCs are heavily geared (have high borrowings as against the equity base). This usually results in more competitive pricing as the cost of debt is usually lower that the returns associated with equity by equity providers – usually the shareholders in the SPC.

The lenders to the SPC will not seek guarantees for payment of the loans from shareholders and will look only to the income stream from the Project for the payment of interest and repayment of capital (debt service). Accordingly they will be concerned as to any event which may either:

- result in an increase in cost; or
- result in a decrease in revenue.

An increase in cost could be either:

- an increase in capital cost; or
- an increase in revenue expenditure.

Thus the risks left with the Concessionaire must be capable of being managed by the Concessionaire. By and large design and construction risk can be passed down to the design and construct contractor and operations and maintenance risk can, to a degree, be assumed by the operations and maintenance contractors. Certain risks can be borne by the insurance market.

It is within these concepts that the risk register has been prepared and a chronological/ cluster approach has been adopted. Even though there may be a low probability of a risk occurring, if the effect would be serious on a Project, it is then necessary to consider whether both the risk and the outcome can be managed by a Concessionaire. However no monetary evaluation has been included as the purpose behind the risk register is to apply the allocation of risk within the terms of a Concession Agreement.

At a further stage in the process for specific projects when greater information becomes available regarding the nature of risk factors to the actual line of the road and other relevant information which is Project Specific, it may be possible to adopt static risk dealing models [Monte Carlo] or other models which require a probability distribution.

The placing of risk on a Concessionaire within the terms of a Concession Agreement does not release the State and its agencies from the impact of events. In most jurisdictions the State has "public service obligations" to the inhabitants of the State and in most jurisdictions this includes, to a level as reasonably practicable, the safe and secure use of roads and may as a consequence result in an adverse economic effect where important transport links cease to be available or are constrained.

As the concepts behind any Project is to put into practice – namely the corridor is identified and the geo-technical issues become better understood, - so the process of risk can become more refined. Other risks would continue to be assessed as part of the procurement process. Further developments in the law may either increase or decrease the challenges faced in implementing a Project.

For every allocation of risk there is a cost implication even though it may be difficult to quantify the monetary effect. A risk held by the State has a cost implication so the issue becomes:

- is it practicable for the risk to be transferred to the Concessionaire; and if so

- what is the cost or price which the Concessionaire will take into account when making its proposal.

From this it will be seen that risk assessment continues through the evolutionary process and, indeed, forms part of the control mechanism for evaluating proposals. Where the public sector uses a gateway procedure to decide whether a Project should go ahead with the private sector i.e. whether a Concession Agreement should be executed once the tender procedure is completed, then a key issue is whether the proposals received offer value for money.

There are, on the current basis of procuring projects, many risks which are held by the State and the State may hold historical evidence which will reveal the costs of holding these risks such as: -

- land identification and assembly,

- traffic usage,

- long term design and construction risk,
- long term operation and maintenance risk and
- whole life costs.

In many jurisdictions the experience with early toll road concessions has been unsatisfactory through a combination of usage and revenue risk. As a consequence traffic risk is not just a matter of pricing of the risk – the private sector may be unable to accept the risk because the lenders will not be prepared to advance funds.

Similarly lenders will, more often than not, require that land assembly and acquisition has been completed as the risk of delay in construction and therefore in completion and revenue earning is too great unless there is clear legal precedent allowing either the Concessionaire to accumulate the Land or the State is known to have sufficient funds to meet the delay claims if the land is not assembled to meet the requirements of the Project.

As indicated previously the lenders primary concern will be loss of revenue and the ultimate loss of revenue is caused by termination of the Concession Agreement. Fair terms for compensation are dependent on whether the cause is:

- Concessionaire Default;
- Grantor Default; or
- No Default

but will assist in lowering the risk factor contained in the margin over cost of funds quoted by the Lenders.

Matrix of Risks Distribution
World Bank

Type of Risk	Risk	Description[1]	Cost driver	Allocation			Treatment
				Grantor	Conc're	Shared	
Design Risk	Feasibility Approvals and consents with State responsibility	These include: • Environmental approvals: Should Project Concession Agreement only be signed once approvals are received. State to decide if procurement process should start before or after the Detailed Design approvals are received. Feasibility Study should address; • Archaeological issues; • Utilities e.g. water, electricity, oil, telecom; • What is the width requirement of the corridor; • Approvals for complementary facilities such as service areas.	Construction cost				
Design Risk	Detailed Design approvals and consents	Application for detailed building approvals from regulatory authority-may be local or regional authority unless legislation retains consents for State.	Construction Costs				Usually the detailed design will be prepared by the Concessionaire or its contractors. Delay in approvals and consents could lead to cost increases/cancellation of Project.
Design Risk	Working (Construction) Drawings Delay in final approval of detailed design	Drawings required for construction on site.	Construction Cost				Could result in increased cost of design or delay of the project, Overall design will be agreed prior to financial close. The design submitted as part of the proposal process ought to be sufficiently advanced. Where Grantor approves detailed design then compensation if unreasonable delay in approvals.

Type of Risk	Risk	Description[1]	Cost driver	Allocation			Treatment
Design Risk	Changes in design and construction standards during the Construction Period		Construction Cost				This depends upon the reason for the change. If the original design was deficient then Concessionaire's risk. If required by competent authority where no default by Concessionaire then difficult for Concessionaire to take the risk.See also changes below.
Site Risk	Land acquisition within right-of-way		Construction Cost				Will some of the land required for execution of works in accordance with functional design still have to be assembled by the State
Site Risk	Obtaining consent to use additional land (permanent additional right-of-way)		Construction Cost				May not be practicable because of delay caused in obtaining additional consents but
	• Identified prior to commercial close: land required by all bidders, assuming State agrees						If a Concessionaire needs more land for the project before financial close and Grantor agrees with it, then it is Grantor's responsibility. Otherwise, it is the Concessionaire's responsibility.
	• Identified prior to commercial close: land required by Concessionaire						
	• Identified after commercial close						
Site Risk	Obtaining Ministerial or owner consent to use additional land (temporary use of land for construction purposes)		Construction Cost				Is land essential or just desirable. If former then may be State risk if only State can exercise compulsory purchase / acquisition rights.
Site Risk	Procuring fill sites and other offsite land required	Specific	Construction Cost				Again is it practicable for Concessionaire to acquire these siyes. In some jurisdictions issues as to environmental consents and taxes may apply
Site Risk	Access risks	Access to the Corridor from local roads or worksites.	Construction Cost				Access risk relates to existing connecting roads to the Project Site. If volume risk is included and users don't have access to the Project, then this would be a relief event. If no volume risk, then not relevant. ***[Note: However, risk of damage to access roads*** * excessive load should be Concessionaire risk * normal loads should be road authority's risk.
Site Risk	**Site Security**	Protection from interference	Construction Cost				Who has power to evict protestors? This will

Matrix of Risks Distribution
World Bank

Type of Risk	Risk	Description[1]	Cost driver	Allocation			Treatment
							normally determine management of protestor risk unless it can be shown that security was deficient.
Site Risk	Cultural/archaeological/ heritage		Construction Cost				Need to look at legislation and how it works.
Site Risk	Environmental		Construction Cost				Pre-existing will be State Risk unless remediation can be assessed in advance.
Site Risk	Geotechnical and ground/soil conditions		Construction Cost				Will surveys be available during tender period? Are there existing records from which Concessionaire can gain sufficient information to ascertain conditions?
Site Risk	Past mine workings		Construction Cost				If relevant can be a significant risk because of potential for large scale collapse.
Site Risk	Water/air/soil pollution – unknown pre-existing		Construction Cost				As remediation costs can be very substantial particularly if special processes necessary to treat the waste it should not be assumed that Concessionaire can bear this risk.
Site Risk	Undisclosed Latent defects (Existing infrastructure)		Construction Cost but possibly Life Cycle Cost				If infrastructure would have to be replaced in due course, this risk could be just a time shifting of expenditure from O&M Period to Construction Period Subject to further confirmation of the major structures, inherited infrastructure and nature of the project.
Construction Risk	Quality assurance and quality control		Construction Cost				Responsibility of the Concessionaire
Construction Risk	Achieving Construction Standards and Specifications		Construction Cost				Note: • Standards: requirements by regulatory authorities • Specifications: requirements for the project
Construction Risk	Fit for purpose manuals, approvals and statutory certificates		Construction Cost				
Construction Risk	Cost overrun and delay not caused by a relief or compensation event		Construction cost				
Construction Risk	Delays caused by agencies other than State (e.g. utilities)		Construction Cost				This assumes that permits and authorizations have already been awarded. This is a Concessionaire risk as long as the delay could have been managed and was under the control of the Concessionaire. Otherwise, this would be a relief event.

Matrix of Risks Distribution
World Bank

Type of Risk	Risk	Description[1]	Cost driver	Allocation			Treatment
							For utilities, right-of-way, environmental, archaeological, etc. (i.e. where Grantor must obtain permits), Grantor will facilitate discussions but position will be governed by agreement reached between Grantor and the relevant utility or authority.
Construction Risk	Delays caused by State	Failure by the State to perform its obligations	Construction Cost				Mechanism required to both allow extensions of time to the Concessionaire to complete it construction obligations and grant compensation to the Concessionaire. In extreme cases may give rise to termination..
Construction Risk	Delays due to State's changes		Construction and possibly O&M cost				Any change initiated by Grantor as defined in the Concession Agreement. This may have capital cost implication but could also affect revenue and O&M costs. Concessionaire should have right of veto if safety or design warranties would be affected by change. Grantor should not assume that Concessionaire will be able to raise additional funding for the change so may have to make capital payment during construction.
Construction Risk	Delays due to Concessionaire changes		Construction and possibly Performance Payents/Tolls				Change in requirements initiated by the Concessionaire. Grantor should be able to veto if changes would mean that its requirements not met.
Construction Risk	Labour disputes		Construction Cost				Concessionaire risk unless political.
Construction Risk	Labour and material availability		Construction Cost				Unless due to State/Grantor Intervention. Need to consider import risks such as customs clearance and whether monopoly suppliers.
Construction Risk	Project management / integration / delay		Construction Cost				Assumes project management by the Concessionaire. May be shared risk if the new structure is dependant upon work being completed by the public sector.
Construction Risk	Time and costs to satisfy commissioning		Construction Cost				Completion requirements: This will depend upon the law custom and practice in the host country. In some jurisdictions the parties can appoint an independent engineer to certify completion but in other jurisdictions the law requires that the road can only be opened after certain officials have accepted the commissioning or other tests.
Construction Risk	Damage to works, however caused except as excluded		Construction Cost				Insurable. Concessionaire to seek damages from liable party. If Grantor or other government

Matrix of Risks Distribution
World Bank

Type of Risk	Risk	Description[1]	Cost driver	Allocation			Treatment
							agency causes damage when exercising rights to the project road, they would be liable but may be covered by insurance and would only pay the deductable or excess on the insurance.
Construction Risk	Damage/injury to third parties		Construction Cost				Should be covered by insurance and will be at risk of Concessionaire unless caused by Grantor or other government agency.
Construction Risk	Damage/loss to utilities identified by Grantor		Construction Cost				In some jurisdictions the Grantor enters into agreements with utilities and then transfers the benefit of that agreement to the Concessionaire. In other jurisdictions only the utility company can carry out work on its own utilities.
Construction Risk	Damage/loss to utilities not identified by State		Construction Cost				If the utility company has not identified the utilities, then it ought to be responsible for the costs associated to damages however Grantor may have to assume preliminary liability but not unknown for Concessionaire to take the risk even though it may not know that the utility is either not identified or not located where shown.
Construction Cost	Adequacy of insurance		Construction Cost				See comments on Uninsurable Risks below
Construction Risk	Sub-contractor insolvency		Construction Cost				Concessionaire will bear the risk
Construction Risk	Latent defects (New infrastructure and disclosed defects with existing infrastructure)		Construction Cost but possibly Life Cycle Cost				Concessionaire should be liable and should remove defects. If latent defect not found till some years into O&M Period then issue as to whether there can still be recovery under the Construction Contract.
Construction Risk	Water/air/soil pollution – known pre-existing or arising from work		Construction Cost				Hazardous waste subject to audit, likely to be transferred to Concessionaire as can be priced for.
Construction Risk	Patent infringement		Construction Cost				Does Government hold patent or licence for any commonly used construction techniques? Otherwise Concessionaire risk.
Construction Risk	Cost associated with works for Railways, Canals etc.		Construction Cost				Subject to review of arrangements reached between Grantor and Railway/canal Company. In some jurisdictions dealing with railways can be time consuming and costly..
Construction Risk	Defective materials		Construction Cost				Responsibility of Concessionaire.
Construction Risk	Injunctions against construction: due to alignment		Construction Cost				If corridor chosen by Grantor the Grantor assumes responsibility.

Matrix of Risks Distribution
World Bank

Type of Risk	Risk	Description[1]	Cost driver	Allocation			Treatment
Construction Risk	Injunctions against construction: due to Concessionaire failure		Construction Cost				Concessionaire risk
Construction Risk	Workplace Health and Safety		Construction Cost				Concessionaire risk
Construction Risk	Construction security (bonding by subcontractors)		Construction Cost				Concessionaire should have adequate bonding in place for subcontracts as required by their funders
Construction Risk	Workmen's liens		Construction Cost				In some jurisdictions sub-contractors can attach a lien against construction assets and where this applies Concessionaire should protect Grantor through a bond.
Construction Risk	Disputes between designer/contractor/professional team		Construction Cost				Lenders will often require lump sum turn-key contracts so as to avoid this eventuality. If they do accept another approach they will often require significant standby funds to cover contingencies which may be 20% of expected out-turn cost.
Force Majeure Risk	**Natural disaster, terrorism, war**		Construction Cost				Depends upon the availability of insurance. In some jurisdictions war and similar would be borne by the Grantor.
Force majeure Risk	Intensive or extended event leading to termination		Construction Cost				Again turns on extent of insurance. Payment by Grantor would be off-set by amount of insurance received.
Force Majeure Risk	Weather		Construction Cost				Significant weather may be a relief event. Consultancy team to suggest scope and legal team then to develop definition.
Force majeure Risk	Weather		Life Cycle Cost and/or Performance Payment/Toll				Performance Specification should detail what weather conditions should be Planned for.
Force Majeure Risk	Force Majeure during operations		O&M Cost and possibly Performance Payment/Toll				If insurable should be born by Concessionaire but relief whist effect of Force Majeure applies.
Force Majeure Risk	Uninsurable risks (throughout the concession)		O&M Cost and possibly Performance Payment/Toll				International guidance is that the public sector retains risk that insurance is not available at commercial rates or that certain risks become uninsurable. In practice, due to difficulties in the insurance market post 9/11, the international market is adopting a risk sharing mechanism for increases in insurance costs above 50% and / or uninsurable risks.
Force Majeure	Political Force Majeure		Government				Consider:

Matrix of Risks Distribution
World Bank

Type of Risk	Risk	Description[1]	Cost driver	Allocation			Treatment
Risk			Budget				● nuclear explosion; ● chemical contamination; ● war or terrorism; ● sonic shock waves.
Revenue Risk	Availability of road		Performance Payment/Toll				Unless non availability due to act of Grantor or a risk for which grantor has responsibility then at risk of Concessionaire but may be insured risk.
Revenue Risk	Volume risk		Performance Payment/Toll				Confirm applicability of tolls vs. performance payment.. Where traffic forecasts weak Grantor may assume some risk e.g. if tolled through minimum volume guarantee
Revenue Risk	Underperformance caused by Utilities		Performance Payment/Toll				Concessionaire and Grantor to initiate discussion with utilities. Costs arising should be Concessionaire's. Relief event, if Concessionaire demonstrates all actions undertaken to solicit utility remedy.
O&M Risk	Increased maintenance due to traffic volume		Life Cycle Cost				Risk being shared in the event that there will be some element of performance payment which provides a partial hedge. Banks would conduct their own due diligence and usually use sensitivity analysis and monte carlo simulation to price this risk.
O&M Risk	**Incorrect estimates and cost overruns**		Life Cycle Costs				Concessionaire should have based its proposals on properly budgeted estimates.
O&M Risk	Actual operating and maintenance costs higher than anticipated	Specific	Life Cycle Costs				If inflation higher than expected then Performance Payment/Toll should allow recovery through indexation. Otherwise at risk of Concessionaire.
Performance Risk	**Equipment used becomes prematurely obsolescent**		Life Cycle Cost				If changes required to make systems compatible with other systems of Grantor then Grantor's change-otherwise Concessionaire risk.
Performance Risk	Labour and material availability		Life Cycle Costs				Concessionaire risk
Performance Risk	Interface with sub-contractors		Life Cycle Cost				Concessionaire risk
Performance Risk	Change in scope of service specifications by public sector		Life Cycle Cost and/or Performance Payment/Toll				Losses in income or increased expenditure should be borne by Grantor
Performance Risk	Expansion for traffic accommodation at ramps		Life Cycle Cost and/or				The Concessionaire would conduct its own due diligence and traffic studies to price this risk.

Matrix of Risks Distribution
World Bank

Type of Risk	Risk	Description[1]	Cost driver	Allocation			Treatment
	and interchanges due to traffic growth, or signalization		Performance Payment/Toll				While some “carve outs” may exist, the initial position will be affected by the amount of payments by the Grantor or projected earnings from tolls. There is a risk that if funds have not been raised at the initial financial close then Concessionaire may subsequently be unable to raise funds.
Performance Risk	Future interchanges or additional lanes		Life Cycle Cost and/or Performance Payment/Toll				Consider what enabling works should be carried out during the construction period to allow these additional works to be carried out. Otherwise see expansion immediately above.
Performance Risk	Damage caused by unauthorised tyres e.g. spikes		Life Cycle Costs				Need to discuss how this can be policed
Performance Risk	Damage/injury to third parties		O&M Cost				Unless caused by Grantor or other Government Authority.
Performamnce Risk	Damage to works, however caused, except as excluded		Life Cycle Cost				Insurable. Concessionaire to seek damages from liable party. If Grantor or other government agency causes damage when exercising rights to the project road, they would be liable. Refer definition of force majeure which will be developed by the legal adviser.
Performance Risk	Water/air/soil pollution		O&M Cost				If directly caused by Concessionaire: Concessionaire risk. If not under the control of the Concessionaire, then relief event and remedy to be covered by say insurance provider of the entity that caused the pollution, and this should be dealt with by the Concession.
Performance Risk	Third party claims and accidents		O&M Cost				Unless caused by Grantor at risk of Concessionaire and should be insured against.
Performance Risk	Overloaded Vehicles		Life Cycle Cost				How can this be priced and will weighbridges be part of the Design?
Performance Risk	Increased legal load limits		Life Cycle Cost and possibly Performance Payment/Toll				Should be treated as change in law but may not be practicable to retro-fit road to take heavier loads so restrictions on vehicle weight may have to be introduced.
Performance Risk	Traffic accidents		O&M Cost				Traffic accidents: If Concessionaire. responsible: Concessionaire cost; otherwise Liable party pays. This refers to one off claims arising from traffic accidents which are pursued by an injured party.

Matrix of Risks Distribution
World Bank

Type of Risk	Risk	Description[1]	Cost driver	Allocation			Treatment
							Overall safety, could be a bolt-on to the payment mechanism via an annual safety review and adjustment.
Performance Risk	Off road incidents		Performance Payment/Toll				Incidents that affect the operations of the road but are not related to traffic accident. If Concessionaire. responsible: Concessionaire cost; otherwise Liable party pays.
Performance Risk	Meeting handback standards		Life Cycle Cost				Concession should set out hand back provisions. Provision for income to Concessionaire to be put into an escrow account or bond to be issued. Funds or bond released when necessary work to put project into appropriate condition has been carried out.
Performance Risk	Workplace Health and Safety		O&M Cost	● ●			Including emergency measures
Performance Risk	Obtaining and maintaining licenses to comply with regulatory requirements		O&M Cost and possibly Performance Payment/Toll				Responsibility of Concessionaire unless improper refusal to grant or renew.
Performance Risk	Labour disputes		O&M Cost and possibly Performance Paymen/Tollt				Risk of Concessionaire
Performance Risk	Vandalism		O&M Cost				If graffiti is to be an issue then this should be dealt with initially as construction finishes could take into account need to easily clean off graffiti.
Performance Risk	Development Around Project Site Requiring Further Over Bridges or Under Passes or other Demographic Changes		Life Cycle Costs				Concession should allow for grantor's changes post construction but cost to be underwritten by Grantor. Suggest Concessionaire be required to put works out to competitive tender.
Performance Risk	Traffic Management		Performance Payment/Toll				Depends on scope of police involvement.
External Risk	Changes in standards		Life Cycle Cost				May be treated as change in law.
Other Market Risk	Base interest rates to Financial Close		Life Cycle Cost				If there is a period between commercial close i.e. project agreements are signed and financial close i.e. when financing documents are signed and conditions precedent to draw down are met then risk of interest changes usually taken by public

Matrix of Risks Distribution
World Bank

Type of Risk	Risk	Description[1]	Cost driver	Allocation			Treatment
							sector in so far as payment will be based on interest rates at financial close.
Other market Risk	Interest spread risk to Financial Close		[Life Cycle Cost				Typically interest rate risk, pre-financial close, is borne by the Grantor as it is the Government that sets fiscal and monetary policy. Transferring this risk does not provide value for money as there is an inherent uncertainty around closing which may be out of the Concessionaire's hands and they will price the risk at a high level.
Other market Risk	Currency fluctuations		Life Cycle Cost				If debt is denominated in local currency and earnings are in local currency then- no exchange risk. If in other currency then risk arises.
Other Market Risk	Inflation on Construction Costs		Construction Cost				Note this depends upon construction period but usually risk of Concessionaire.
Other market Risk	Inflation on Operation, Maintenance, Rehabilitation	S	Life Cycle Cost				If performance payments then should be adjusted by CPI.
Other Market Risk	Refinancing (if no 2 stage financing)						For refinancings (not originally planned), refinancing gains shared 50-50% but note in some countries there is no sharing with public sector even though this reduces value for money.
Other Market Risk	Costs of finance on change requirements		Life Cycle Cost				This should be included in the change procedure but Concessionaire may not always be able to raise additional funding.
Political Risk	Public sector budgeting cycles		Life Cycle Cost				This refers to problems associated with annual budget cycles in the public sector. It is the uncertainty that arises when government's budget is determined on a cycle basis. This effectively prevents the public sector from making optimum whole life costing decisions. Where it exists it will be identified as a likely significant bank concern.
Political Risk	Change in law • General • Discriminatory		Life Cycle Cost				Breaking down change in law risk into its two key components. Concessionaires may require a cap on general change in law which would result in some degree of risk share, but otherwise discriminatory changes should give rise to compensation to the Concessionaire. In some cases change in law is addressed under Concession Law.
Political Risk	Change in taxation • General • Discriminatory		Life Cycle Cost				Breaking down change in taxation risk into its two key components. Namely general Taxation and Specific. Approach will be affected by Change in

Matrix of Risks Distribution
World Bank

Type of Risk	Risk	Description[1]	Cost driver	Allocation			Treatment
							Law Provisions or where relevant by provisions in the Concession Law.
Political Risk	Constraints on Foreign Investors after investment						If introduced after concession let then should appear as discriminatory change of law.
Default Risk	Termination		Government Budget				Termination on Concessionaire and Grantor default, and force majeure to be considered. If mature market then options on termination for Concessionaire are wider because balance of term of contract could be auctioned off and after reimbursing Grantor for costs of disposal balance of monies should be paid toe lenders/Concessionaire. Where no market then issue as to whether Lenders should only get back part of debt and if so what percentage. For each ground for termination process and compensation during construction and operations will need to be addressed.
Strategic Risk	Change in Ownership of Concessionaire						Consider consent required from Grantor until construction completed. Should there be a class of industries who should not be owners.
Strategic Risk	Conflict of Interest Among Shareholders of Concessionaire						Pre-Tender and Tender documents should set out proposals for governance of Concessionaire.