

# Construction Risk Management through Insurance in the Ethiopian Federal Road Projects

Getachew Yilma Debela

Ethiopian Roads Authority Research and Development Team Leader, P.O. Box 1770, Ras Abebe Argay Street, Addis Ababa, Ethiopia

## Abstract

Risk management is now widely accepted as a vital tool in the management of projects. If one cannot control a risk through a business practice or transfer that risk to someone else through an indemnification clause, then he should manage that risk through insurance. However, there has been no in depth analysis of the practices of construction risk management through insurance in the Ethiopian road projects. Therefore, the objective of this study was to conduct an assessment of construction risk management practices through insurance and to address this gap and contribute to the knowledge base of construction risk management in Ethiopia. Through detail literature review major risk factors and insurance policies were identified in the construction industry and through questionnaire survey these factors then ranked in terms of the importance of the factors for each of the parties involved in road projects, using relative importance index. Kendall's coefficient of concordance was used to measure the degree of agreement of the rank correlation between the respondents. The study revealed that delay in payment to contractor for work done is ranked first important risk, injury to property is rated first as most important insurable risk and bid bond is ranked first as most used insurance policy in the Ethiopian road sector.

**Keywords:** Client, Consultant, Contractor, Insurance, Insurability, Liability, Risk Management and Road Construction

## 1. Introduction

The Ethiopian Roads Authority (ERA) as a Government implementing agency has been administering huge budget every year which is allocated to the road infrastructure development in the country, however, this immense government investment of capital to the road sector is not free from challenges. The review of the implementation of the Road Sector Development Program (RSDP) shows that road projects in Ethiopia encounters a number of challenges including time and cost overrun risks (Tessema, 2009).

The construction industry, perhaps more than most of other industries, is overwhelmed by risks. If these risks are not dealt with satisfactorily, there is a maximum likelihood of cost overruns, time delays and low quality, resulting in dissatisfaction of clients and the public at large (Nadeem, 2010). It is, therefore, important to reduce losses in terms of monetary or life with efficient management of construction projects by clients, contractors and consultants. Application of various project management techniques have to be made from the conception to the completion stage, which include managing various risks associated with project in its every stage.

Construction work involves the production of a long lived capital product. It is the result of a complex interaction of design, construction, finance, law and insurance. This interaction involves a wide range of risks, and one of the fundamental ways of dealing with risk is through insurance (Gould, 2003). The potential severity of accidents and the frequency with which they occur require that contractors and consultants protect themselves with a variety of complex and expensive insurance coverage. Without adequate insurance protection, the contractors and consultants would be continuously faced with the monetary possibility of serious or even ruinous financial loss (Abebe, 2000).

Construction insurance is a major method of managing risks in the construction industry. Its primary function is to transfer certain risks from clients, contractors, subcontractors and other parties involved in the construction project to insurers to provide contingent funding in time of difficulty. Construction insurance plays an increasingly important role in assuring the success of projects, with insurers sharing losses resulting from natural disasters and other contingencies. Insurance is, of course, only one means of managing risks associated with projects. It needs to be put into context and understood that not every risk can be insured against, insured against adequately or insured for a price that is acceptable.

Therefore, the aim of this study work was to evaluate the risk management practices of the client (ERA), contractors, consultants and insurance companies in the Ethiopian road construction industry through the provisions of insurance.

## 2. Objectives and Scope of the Research

The general objective of this study is to review the risk assessment and allocation practices of parties involved in the Ethiopian Federal road projects and to discuss the significance and importance of construction risks management of projects under taken by client (ERA), contractors, consultants and insurance companies.

The specific objectives of the study were:

1. To examine the sources of insurable construction risks perceived to be encountered in the Ethiopian road construction industry, and the types of construction insurance policies employed in managing them;
2. To assess the practices of risk management by the client (ERA), contractors, consultants and insurance companies in road construction projects;
3. To highlight the laws set by the Ethiopia government to regulate the insurance business and regulatory requirement in relation to insurance transaction; and
4. To recommend management strategies to insurance companies, contractors, consultants as well as the client (ERA) in the use of insurance as a risk transfer too in the road construction industry.

### 3. Construction Project Risk Management

The subject of risk, its assessment, allocation and management in construction projects has been developed and applied on an increasing scale over the last twenty years (Bunni, 2003). Despite increasing efforts to assign risks clearly and contractually on the basis of sound risk allocation principles, it appears that some risks are best managed jointly by synergizing the experiential knowledge, resources and sustained efforts of all major project participants (Flanagan, 1993).

It is not difficult to anticipate the typical and common risks of the project based on a previous experience, but it requires analysis to determine the significance of the risk on the project objectives and to take proactive actions to minimize risk effect (Berliner, 1985). According to Nadeem (2010), the track record of construction industry is very poor in terms of coping with risks, resulting in the failure of many projects to meet time schedules, targets of budget and sometimes even the scope of work.

#### 3.1 Definition of Risk

The word risk is quite modern; it entered the English language in the mid-17th century, coming from the French word *risqué* and in the second quarter of the 18th century the Anglicized spelling began to appear in insurance transactions (Flanagan, 1993). The Oxford Advanced Learners Dictionary [2010] defines risk as the possibility of something bad happening at some time in the future; a situation that could be dangerous or have a bad result.

Bowen (2005) stated that despite the largely negative connotation of risk that prevails today, it has to be conceded that one person's risk may be another's opportunity to profit. PMBOK guide fifth edition also describes risk as an uncertain event or condition that, if it occurs, has a positive or negative effect on a project's objective. Risk can travel in two directions: the outcome may be better or worse than originally expected (Raftery, 1994). Chapman (2003) has also defined risk as an exposure to the possibility of economic and financial loss or gain, physical damage or injury, or delay as a consequence of the uncertainty associated with pursuing a particular course of action.

In the context of insurance, however, for a risk to be acceptable by an insurer, it has to be a "pure risk" which means it has the downside of the effect only (opportunity for loss only). The PMI's project management book of knowledge [2013] describes risk management as the systematic process of identifying and analyzing and responding to project risk as depicted in Figure 1.

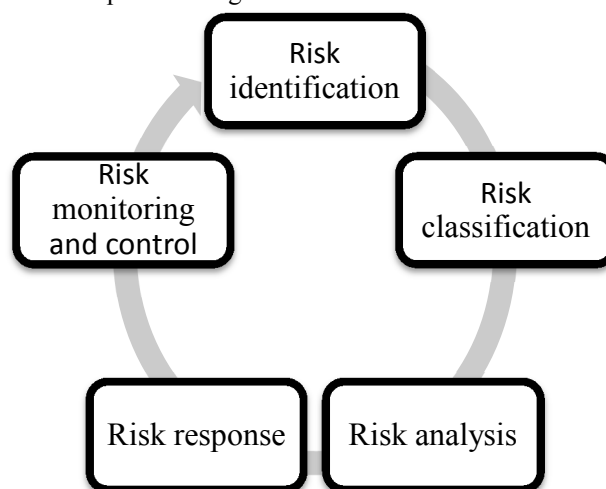


Fig 1: Risk Management Framework (Source: PMI PMBoK, 2013).

#### 3.2 Principles of Risk Allocation in Construction

The process of determining and allocating risk is fundamentally linked to the drafting of the conditions of contract, which is effectively the choice of standard form of conditions of contract and any amendments thereto (Premaraj,

2005). Risk allocation in any contract affects cost, time, quality, and the potential for disputes, delays, and claims (FHWA, 2006).

The purpose of a contract is to establish the rights, duties, obligations and responsibilities of the parties and to allocate the risk (Pritchett, 1996). Contracts are part of a legal system that seeks to balance freedom and control, and dispense justice and they are perceived as an efficient method of protecting the interests of the parties participating in commercial transactions (ERA-SMEC, 2008).

According to Article 1675 of the Civil Code of Ethiopia, a contract is an agreement whereby two or more persons as between themselves create, vary or extinguish obligations of a proprietary nature.

It was early attempted to formulate an acceptable formula for risk allocation by Prof Max Abrahamson (Abrahamson, 1984). It was said that a party should bear a construction risk where:

- It is in his control, i.e., if it comes about it will be due to wilful misconduct or lack of reasonable efficiency or care; or
- He can transfer the risk by insurance and allow for the premium in settling his charges to the other party and it is most economically beneficial and practical for the risk to be dealt with in that way; or
- The preponderant economic benefit of running the risk accrues to him; or
- To place the risk on him is in the interests of efficiency (which includes planning, incentive, innovation) and the long term health of the construction industry on which that depends; or
- If the risk eventuates, the loss falls on him in the first instance, and it is not practicable or there is no reason under the above four principles to cause expense and uncertainty, and possibly make mistakes in trying to transfer the loss to another.

#### 4. Definition of Insurance

Insurance is a social device, in which a group of individuals (called “insured”) transfer risk to another party (called the “insurer”) in order to combine loss experience, which permits statistical prediction of losses and provides for payment of losses from fund contributed (premiums) by all members who transferred risk (Pritchett, 1996).

Article 654(2) of the Commercial Code of Ethiopia [1960] (Code, 1960) provides a legal definition of insurance as follows:

An insurance policy is a contract whereby a person, called the insurer, undertakes against payment of one or more premiums to pay to a person, called the beneficiary, a sum of money where a specified risk materializes.

In construction contract perspective, construction insurance can be defined as a contract whereby the insurance company seeks to provide coverage and indemnify the construction contractor or the client against a potential peril, loss, damage, or liability that arises from the performance of the construction work (Eschemuller, (2009).

#### 4.1 Principles of Insurance

Due to the specific nature of insurance agreements and construction insurance is no exception; certain legal rules apply, irrespective of the jurisdiction where the agreement is made (CACC, (2004). These rules can be distinguished throughout the wording of the three documents associated with such an agreement, namely: the proposal form, the policy and any endorsement issued, either with the policy or subsequently.

Generally accepted insurance rules are summarized as follows:

**4.1.1 Utmost good faith contract:** Unlike the purchaser of ordinary goods, who is under no obligation to give any information to the seller, the purchaser of insurance must furnish to the insurance company any information it requires and volunteer any further facts relating to the risks for which cover is being sought.

According to Gould(2003), the majority of the disputes in the area of good faith relate to material facts which may affect the risk and may be classified as;

- Physical facts – concerning the likelihood of loss or the degree of loss; or
- Moral hazards – concerning whether the insured is a fit person to insure, because for example, the insured has a criminal record for dishonesty.

Article 668 of the Commercial code of Ethiopia with regard to utmost good faith contract states that the policy shall be of no effect where the beneficiary intentionally concealed facts or made false statements and such concealment or false statements cause the insurer wrongly to appreciate the risks to be insured so that, had he been aware of the truth, the insurer would not have entered into the policy or would have imposed terms less favorable to the beneficiary. The insurer shall retain all premiums paid.

**4.1.2. No financial profit:** As a contract of indemnity, an insurance policy is intended to place the insured, after a loss event covered by it, in the same financial position as that which existed immediately prior to the event. Therefore, except in limited circumstances, profit is not allowed as a result of an insured event and it is generally accepted that to allow profit would be against the interest of society (Bunni, 2003).

Under Article 665 and Article 678, the Commercial code of Ethiopia states that a contract for the insurance of an

object is a contract for compensation and the insurer's liability shall not exceed the amount specified in the policy. Hence, the compensation shall not exceed the value of the object insured on the day of the occurrence

**4.1.3. Insurable interests:** A fundamental requirement of insurance law is that the insured must have an insurable interest in the subject matter of the insurance. An insurable interest is an interest which is recognized and enforceable at law and it may be legal or equitable, a proprietary right or a contractual right. An insurable interest is not required under general contract law, but it is necessary under insurance contracts (Gould, 2003).

**4.1.4. Subrogation:** Subrogation is the complimentary principle of indemnity. The principle of subrogation provides the insurer with two benefits (Gould, 2003):

- To stand in the shoes of the insured and avail himself of all the rights and remedies available to the insured against the third parties and the action by the insurer is brought in the insured's name and the third party can raise any defenses which would have been available against the insured; and
- To recover from the insured any benefit received by the insured from third parties which reduces the loss covered by the insurance.

Article 683(1) of the Commercial code of Ethiopia (Code C. , 1960) indicates the right of subrogation of the insurer as: the insurer who has paid the agreed compensation shall substitute himself to the extent of the amount paid by him for the beneficiary for the purpose of claiming against third parties who caused the damage.

**4.1.5. Contribution:** If an insured subject matter is covered against a peril for the benefit of an insured party by more than one policy, and if that peril eventuates into a loss, the insured cannot recover from more than one insurer. In that event, an insurer, having paid a claim, can seek a contribution from other insurers liable for the same loss to contribute towards the payment made (Bunni, 2003). The right of contribution under the Ethiopian case is specified under Article 681 of the Commercial code of Ethiopia.

**4.1.6. Proximate cause:** The principle of proximate cause is implied into contracts of insurance and requires the insured to show that the loss was caused by an insured peril. Proximate cause means the effect of the common, dominant or real cause of the loss and will be a question of facts in each case. The principle may of course be modified or even excluded by the contract (Gould, 2003).

**4.1.7. Warranties:** A warranty is a term of the insurance policy which if broken entitles the insurer to terminate the contract from the time of the breach regardless of whether the breach is material. In the law of insurance the term "warranty" is therefore used in a similar sense to that more readily associated in general contract law with the term "condition". Breach of a warranty justifies the injured party's refusal to further performance (Gould, 2003).

**4.1.8. Fortuity:** The principle of fortuity is fundamental to the basic concept of insurance and the grant of coverage. Insurance responds to risk, rather than losses that were planned, intended or anticipated by the insured (Karen, 2011). The term "fortuitous" means accidental, unintentional or unexpected.

Article 663(3) of the Commercial code of Ethiopia confirms that intentional damages are not covered in insurance policy as: Notwithstanding any provision to the contrary, risks arising out of the intentional default of the beneficiary shall not be covered by the insurance.

## 4.2 The Insurability of Risks

Insurable risk means a risk, which can be covered by insurance. Not all risks are insurable and while the principle of the equitable contribution of many for the benefit of an individual suffering a loss is the cornerstone of insurance philosophy, certain limitations must be put on that principle to make the insurance transaction viable (Bunni, 2003).

For a risk to be acceptable by an insurer it has to be a pure risk which means it has the down side of the effect only opportunity for loss only; speculative risks are not covered by traditional insurance. Moreover, it has to be sudden and accidental, with statistics available for insurers to simulate past events and generate a creditable premium (Junying, 2006).

Insurable risks are defined by FIDIC and CII together as follows (FIDIC, 1986):

1. The principle of insurance is based on the theory of probability and, therefore, there must be an element of uncertainty relating to the matter to be insured, i.e. accidental or fortuitous in character.
2. An insurable risk should preferably be measurable in quantitative terms and in such a way that the theories of probability and the law of large numbers may be used. Without this stipulation, the premium required to insure the risk could not be scientifically calculated. Insurance becomes lottery in the absence of such calculations. It is, however, important to note that, if the extent of the risk is unquantifiable, it is the assessment of the premium and not the insurability that is in question.
3. An insurable risk should preferably be such that it is acceptable to the insurance market through appropriate risk selection methods. The objects insured must be numerous enough and homogeneous enough to allow sufficient selection.
4. An insurable risk should preferably be such that one can determine whether loss has in fact occurred and the cause of the resultant damage. The extent of the damage should also be capable of assessment.

### 4.3 The Uninsurability of Risks

The insurance industry as a whole is increasingly confronted with risks where for reasons of principle and capacity doubts as to whether they can or should cover. This increase of risks at the limit of insurability is due to social and accumulated problems, advancing technology and concentration of values, increased complexity and exposure of numerous risks (Berliner, 1985). It is important to note that the responsibility and liability for damage to property and/or personal injury emanating from uninsurable risks must be clearly defined in any contract. Bunni (2003) classified uninsurable risks with four categories as outlined hereunder:

**4.3.1. Foreseeable risks:** An insurer will argue that if a contractor stores cement in an uncovered condition during a rainy season, then any damage caused is foreseen to be inevitable and, thus, is not the liability of the insurer. On the other hand, if the cement was stored in a watertight shed and the roof of the shed blows away under severe wind, then the contractor will argue that this is unforeseen damage.

**4.3.2. Unquantifiable risks:** A consequential economic risk is unquantifiable, even in a certain circumstance. It is, therefore, very rarely covered. However, the word 'consequential' must not be confused with 'consequence' as in risks resulting as a consequence of defective design, material and/or workmanship because these risks are quantifiable and their limit is the value of the contract which is insured. Such damage resulting from, or occurring as a consequence of these defects is insurable and the intention of a good insurer must always be clear in this respect. Insurance policies must be written in clear and precise language at all times but more especially so when dealing with this issue because, otherwise, it could result in a dispute if repair to a resultant damage is costly.

**4.3.3. Political risks and risks on an international scale:** War is a good example of these risks that are normally uninsurable. The reason is that the principle of the contribution of many for the benefit of an individual suffering loss breaks down in such a situation, unless governmental institutions carry out the insurance.

**4.3.4. Causation:** To prove the cause of any damage on a project is to establish the responsibility and liability for it and to establish whether or not the damage is covered through the provisions of the insurance contract. If such a cause cannot be proven for any particular risk, the risk becomes uninsurable.

### 4.4 Type of Construction Insurances

Construction insurance encompasses all contracts of indemnity within the activities of the construction industry where insurance is chosen as the medium through which liabilities are shifted. It involves not only many branches of insurance but also many disciplines and professions (Bunni, 2003). Table 1 shows insurance policies usually issued for each party in connection with construction.

Table 1: Typical Insurances on a Construction Project: (Source Bunni [2003])

Professional Team	Owner	Contractor
Liability Insurance	Liability Insurance	Liability Insurance
1. Employer's Liability	1. Employer's Liability	1. Employer's Liability
2. Public Liability	2. Public Liability for limits in excess of that stipulated in the contract or in respect of liability not indemnified by the Contractor	2. Public Liability
3. Professional Indemnity	3. Public Liability for Non-negligence	3. Public Liability for Non-negligence
	Property Insurance	
	4. Insurance for any part of the works taken over or used or occupied prior to completion	4. Professional Indemnity, if design work is carried out by Contractor
	Decennial Insurance	Property Insurance
	5. Decennial cover policy	5. Contractors All Risks
		Marine Insurance
		6. Marine Transport policy
		Other Transport Insurance
	7. Motor Insurance	

#### 4.4.1 Property Insurance

This insurance mainly provides protection to the works and any material, equipment and machinery connected with it. It is generally transacted through what has become known as Contractors' All Risks Insurance Policy or Erection All Risks Insurance Policy. In general, however, unless a risk is specifically excluded from the policy, it is considered to be included in the cover provided (Code C. , 1960). In the case of Ethiopia, property insurance is regulated in the Commercial Code of Ethiopia [1960] under Article 654(2) to Article 675.

Table 2: Property Insurance and Liability Insurance: *Source Bunni [12]*

Type of Insurance	Coverage	Transaction
Property Insurance	Provide protection to the works and any material, equipment and machinery connected with it	<ul style="list-style-type: none"> <li>• Contractors' All Risks Insurance Policy</li> <li>•Erection All Risks Insurance Policy</li> </ul>
Liability Insurance	Provide protection to the insured party against specific legal liabilities to which he may become exposed as a result of activities culminating in bodily injury and/or property damage.	<ul style="list-style-type: none"> <li>•Employer's Liability: towards employees</li> <li>•Public Liability: towards third parties who are not partly to the insurance contract</li> <li>•Professional Indemnity Insurance: towards the design professional</li> </ul>

#### 4.4.2 Liability Insurance

Liability insurance is intended to provide protection to the insured party against specific legal liabilities to which he may become exposed as a result of activities culminating in bodily injury and/or property damage [8]. Liability insurance under the Commercial Code of Ethiopia (Code C. , 1960) is discussed under Article 654(2) to Article 685. To illustrate some of the Liability insurances commonly issued are;

- Compulsory (Liability) Motor Insurance; (in case of car accident or collision on road);
- Employer's Liability Insurance; (to compensate the employer in case of the worker's negligence who injures third party ); see also Article 2130 of the Civil Code;
- Professional Liability Insurance/Professional Indemnity Insurance;(in case of Engineer's or Architect's liability towards its client);and
- Workmen's Compensation Policy; (to cover the liability of the employer to the worker as per the Labor Law.

#### 4.4.3 Professional Indemnity Insurance

As its name suggests, this insurance indemnifies an insured for amounts which the insured becomes legally liable to pay as a result of any actual or alleged negligent act, error or omission in the conduct of its business or profession [4].

Professional indemnity insurance (PII) covers professionals, such as architects, engineers and other consultants, and claims against them arising out of the professional services they provide (CACC, (2004). Typically the cover includes, and claims may arise from the services involved where they include: a breach of professional duty; negligence; bodily injury and property damage arising from service negligence; fraud/dishonesty other than a company director's dishonesty; infringement of intellectual property; breach of duty/confidentiality; defamation; and loss of documents.

There are two methods of assessing the extent of professional indemnity insurance cover. The first is a *Simplified Method* that applies for conventional consultancies not related to construction. The simple approach is to base the level of cover on the fee to be paid. The more comprehensive approach is the *Risk Assessment Based Method* which addresses the particular risks associated with the type and nature of the professional service involved.

#### 4.4.4 Decennial Insurance

Decennial insurance is generally transacted to cover the liability of those involved in construction for latent defects in the stability of the structure and for major defects in the weather shield for ten years. The ten-year cover matches the limitation period in respect of the stability and major defects in the structure or of an important part thereof in certain jurisdictions (Code C. , 1960). Article 3282 of the Civil Code of Ethiopia demands for the provision of such insurance for public construction works like road works as per the concept of the Law of Administrative Contract of the Civil Code as it states;

- (1) Unless otherwise provided, the contractor shall be liable to the administrative authorities for the defects of construction of the works during ten years from the day on which they have entered into possession of works.
- (2) The warranty shall not be due, however, in respect of the defects which were apparent at the time of the final acceptance of the works.
- (3) The warranty shall apply to such defects only as prevent the work from being used for the purpose mentioned in the contract or as render such use more onerous or less profitable.

#### 4.5 Insurance Regulation and Companies in Ethiopia

Following the 1994 insurance proclamation, which brought to an end to the monopoly of the insurance business by the state owned insurer for 19 years, the private sector once again got an opportunity to engage in insurance business and a number of private insurance companies established (Zelege, 2007). Currently, the Ethiopian

insurance industry consists of 16 insurance companies (1 public and 15 private). In line with Proclamation No.746/2012(Insurance Business Proclamation), the National Bank of Ethiopia has the powers and duties as stated in the proclamation to regulate insurance companies including:

- Licensing insurance companies and insurance auxiliaries ;
- Conducting continual on-site and off-site supervision and monitoring;
- Taking intervention measures, depending on the findings of supervision and monitoring;
- Ensuring the existence of sound and stable insurance industry ;and
- Protection of the interests of policyholders.

### 5. Research Methodology

In consideration of the nature of the study, qualitative research method was selected and the study was carried out using a three phase approach in order to achieve the objectives.

The first stage was to undertake a detail literature search on previous publications on risk management especially insurance as a major risk transfer tool in the construction industry. Many literature sources were reviewed to identify risk factors on construction projects and insurance policies applicable to the construction sector. In this respect, fifty risk factors and eighteen insurance policies were identified for further ranking for road projects in the perspective of client, contractors, consultants and insurance companies.

In the second phase, questionnaires were developed to address the objectives and the questionnaires were structured in three main parts in order of sequence as follows:

- (a) The first set of questions was to categorize respondents to different parties in the road construction industry. That is to classify them under the role of client, consultants, contractor as well as insurers.
- (b) Background information –collecting the personal data of respondents, their experience in the road construction industry.
- (c) General perception of risk management–collecting the respondents’ familiarity with the concept of risk management and insurance practices in the Ethiopian Federal road construction projects. The set of questions under the section was to ask respondents on the following:
  - To identify major risks factors in the Ethiopian Federal road construction industry;
  - To identify insurable risks and the types of insurance policies mostly used in the road construction industry; and
  - To identify the role of insurance as a means of managing risks.

The results of the questionnaires were analyzed using statistical techniques and the results used to form basis for conclusions and recommendations. The methods of analysis used in analyzing the data were: Relative Importance Index (RII) and Weighted Average Method. Finally, Kendall’s coefficient of concordance, represented by the symbol W, was used to measure the degree of agreement of the respondents.

$$W = 12S/m(m^2 - 1), \quad 0 \leq W \leq 1.0$$

Where,

W= Kendall’s coefficient of concordance

$$S = \sum_{i=1}^n (R_i - R)^2$$

m =the number of risk factors

R = average of the ranks assigned to the nth factor being ranked

R<sub>i</sub> =the assigned rank by an individual judge to one factor

n = Number of Judges

The formula for relative importance index is:

$$\frac{\sum W}{S \times N} \quad 0 \leq \text{INDEX} \leq 1$$

Where;  $\sum W$  = The summation of the weighting given to each factor

S = Maximum score = 5

N = Total number of firms that responded in the sample

For each factor the weighted average was achieved by adding the products as shown in the formula below:

(a)The RII of each group and

(b)The proportion of the total respondents

$$\text{Weighted Average} = \frac{n_1 RII(1)}{N} + \frac{n_2 RII(2)}{N} + \frac{n_3 RII(3)}{N} + \frac{n_4 RII(4)}{N}$$

Where; n<sub>1</sub> = No of respondents for client

- n2 = No of respondents for consultants
- n3 = No of respondents for insurance companies
- n4 = No of respondents for contractors
- RII = Relative importance index for client
- RII =Relative importance index for consultants
- RII = Relative importance index for insurance companies
- RII = Relative importance index for contractors
- N = The number of respondents groups

## 6. Analysis of Results

The target population for this study was selected based on their experience in road construction and insurance provisions for road projects. In this respect, a total of 59 questionnaires were sent to the potential respondents in the road construction industry. Out of the 45 respondents, 57.78% had 6 to 10 years of experience ; 31.11% had more than 10 years of experience and only 11.11% of the respondents had 5 or less years of working experience.

Table 3: Overall survey response level

Group	Questionnaire Distributed	Questionnaire Returned	Percentage Returned (%)
Client(ERA)	12	10	83.33
Consultants	14	10	71.43
Insurance Companies	16	13	81.25
Contractors	17	12	70.59
Total	59	45	76.27

The survey result achieved an overall response rate of 76.27%. The analyses of the survey respondents revealed the following key observations:

1. The respondents conduct risk analysis at different stages of the project and the overall response rate shows that 31% during construction phase, 28% at the end of final design and 25% at the time of tendering conduct risk analysis respectively. To this end, 34% of the contract groups just add a percentage to budget/cost to cope with uncertainties that is followed by 25% use of various mathematical tools such as sensitivity analysis, net present value etc.
2. The survey revealed that 70% of the response rate of the client considers insurance provision in the selection of contractors and consultants, 40% of consultants and 67% of contractors consider insurance provision in the selection of sub-contractors and consultants. On the other hand, 53% of the respondents show no response for the purchase of insurance as part of a risk management tool but only 47% of the overall respondents purchase insurance as part of their construction risks management. To this connection, the contracting parties were asked on their interaction with insurance companies on risk identification, allocation and insurance policies before signing contract. The survey revealed that 75% of the response rate shows that there is no interaction with insurance companies.
3. The respondents were asked on the problems/concerns with the provision of insurance, the overall response shows that lack of knowledge in insurance accounts 33%, complex policy language 29%, rising cost of premiums 13% and impact of reinsurer cost on the premium 9% respectively. In this relation, 84% of contract group confirmed that insurance companies do not visit the project site before and during the construction of road projects and 77% of insurance companies admitted that they do not visit the project site before or after the issuance of insurance policies.
4. Consultants were asked whether they provide or not professional indemnity insurance for the service they deliver throughout the period of the service to protect their companies and professionals from liabilities. 80% of the respondents confirmed that they do not have effective professional indemnity insurance for their service. Only 20% of the respondents confirmed that they have professional indemnity insurance.
5. The insurance companies were asked on how they fix a typical insurance policy premium. 46% of respondents fix the insurance premium based on the location of the project while 38% based on contract amount of the project and 16% of respondents use previous experience in fixing the premium.
6. By applying mean score ranking and using Kendall concordance test the ten major risk factors; the ten most used insurance policies and the ten most insurable risks are identified. Accordingly, delay in payment to contractors for work done, injury to property and bid bond are ranked first risk factor, insurable risk and mostly used insurance policy respectively.



Table 4: Major risk factors, insurable risks and most used insurance policies

NO	Ten most important risk Factors	Ten most important Insurable risks	Ten most used insurance policies
1	Delay in Payment to contractor for work done	Injury to property	Bid bond
2	Shortage of materials in the market	Theft	Performance bonds and guarantee
3	Shortage of liquidity	Strikes and labor disputes	Contractor's all risk
4	Poor site management and supervision	Materials damage during transportation	Plant and Equipment Insurance
5	Inadequate contractor experience	Injury to person	Motor insurance to cover vehicles
6	Delays in subcontractors work	Heavy rain	Goods in transit/Transport floater
7	Inadequate managerial skills	War	Third party insurance
8	Unforeseen ground conditions	Fire	Fire perils insurance on premises and contents
9	Fluctuations (changes in cost)	Weather	Workers compensation insurance
10	Long waiting time for approval of drawings	Earth quake	Employers' liability insurance

## 7. Conclusions

Based on the results from the analysis, the following major conclusions have been derived and summarized:

1. The client (ERA) mainly uses the opinion of external consultants as the number one method of risk identification. The consultants and contractors, on the other hand, mainly use site visit as number one method of risk identification. By past experience or analysis of prior projects was ranked as second most used risk identification method by consultants and contractors.
2. Contractors mainly conduct risk analysis at the time of tendering. Most of the contract groups just add a percentage to budget/cost to cope up with uncertainties rather than implementing mathematical risk analysis tools to quantify risks.
3. Most of the respondents have encountered accidents in the road construction projects they were involved, however; the contracting parties mainly provide insurance coverage to road projects to meet the demand of the client rather than to avoid possible risks.
4. Majority of the respondents from consultants involved in the road projects have confirmed that they do not have effective professional indemnity insurance for the service they deliver and their firms. It is noted that the method of calculation for coverage of professional indemnity insurance is simple method of calculation based on the service contract amount and the period of service.
5. The main problems/concerns identified with the provision of insurance in the road construction projects are mainly lack of knowledge in insurance and complex policy language of insurance to apply for road construction industry.
6. The interaction among the contract groups in the identification and management of risks with insurance companies is insignificant. As a result, it is noted that the insurance premium is fixed mainly based on the location of the project and the contract amount of the road project.

## 8. Recommendations

In order to achieve appropriate risk management practice in the road sector, the following management strategies are recommended:

1. Right from the planning stage to the completion of projects, the client is recommended to involve the consultants, contractors and insurance companies to discuss and share expertise in risk management process of projects.
2. The client is suggested to engage experts to ensure that insurance policies are specifically designed according to the nature of a project, the types of procurement and construction contract than adopting standard policy words that are forwarded by the insurance companies.
3. The client is advised to reinforce the requirement of professional indemnity insurance for the service of consultants throughout the service period of a project. The client is also recommended to review the terms of references for design and supervision services to include construction insurance expert services to give support during the design and supervision of road projects.
4. Design and supervision consultants are recommended to protect their professionals and firms by providing adequate professional indemnity insurance coverage to the service they deliver from legal liabilities arising

from their professional error, omissions and negligence of their employees. It is also advised to make mandatory through regulation to hold professional indemnity insurance as a firm when any consultant requests for a new license from the concerned authority.

5. The insurance companies in collaboration with the client and consultants are advised to develop a manual based on risks assessed method that involved in the service and the works to fix the extent of professional indemnity insurance coverage instead of following a simple calculation method.
6. Insurance companies are suggested to assign experienced Engineers to visit project sites that are familiar with the type of projects, be experienced in risk identification and analysis to avert risks and it is advisable to be involved in the risk identification, allocation and drafting of insurance policies before and during construction.
7. Contractors need to be innovative and have the ability to negotiate with the insurers to improve the conditions of the insurance policies, as well as, to obtain best premium reduction through implementing proper loss control and risk management measures by deploying experienced professionals in the area of risk management and insurance.

**About the Author:** the Author is an employee of the Ethiopian Roads Authority and currently he is an Mphil research student at the University of Birmingham in the department of Civil Engineering, UK. He is a graduate of Master in Civil Engineering from Addis Ababa University department of Civil and Environmental Engineering in 2014 and a graduate of Bachelor of Science in Civil Engineering from Jimma University, Ethiopia in 2007. His area of expertise and research interest is in construction contract and procurement.

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