Journal of Civil Engineering and Environmental Technology
Print ISSN: 2349-8404; Online ISSN: 2349-879X; Volume 2, Number 13; July-September, 2015 pp. 51-55

http://www.krishisanskriti.org/jceet.html

EPC & EPCM: The Misunderstood Construction Contracts

Abhishek Raj Singh[1] and Sanjay Tiwari[2]

[1]Scholar, Dept. of Civil Engineering Madhav Institute of Technology & Science, Gwalior, M.P.
[2]Dept. of Civil Engineering Madhav Institute of Technology & Science Gwalior, M.P.
E-mail: [1]0131mce001@gmail.com, [2]sanjaymits2@gmail.com

Abstract—*Equally the utilization of EPC contracts is becoming more predominant in the construction industry, it appears appropriate to spotlight some of the differences between Engineer, Procure, Construct contracts (EPC) and Engineer, Procure, Construction Management (EPCM) contracts.Both these types of contracts have been practiced to some extent in Indian market, nevertheless, mostly in the vitality and infrastructure sectors. The party's rights and obligations in EPC and EPCM contracts differ substantially and in that place is much confusion in the market between these two types of contracting methods. Thus, to clarify the difference between the two project delivery methods literature was reviewed &somematerialcomponents was taken into account toillustratethedifferencesbetweenEPCandEPCMagreement.*

Keywords*: Construction, Contract, Risk, EPC, EPCM*

1. INTRODUCTION

An owner, developer, or even project manager (Owner, for simplicity's sake) with a billion-dollar budget should, from its vantage point, be able to get what it desires.Unfortunately, it is not invariably thus.The trio of choices between time, cost, and quality lead mega project Owners to attempt to balance the potential combinations of strict quality control, tight completion schedule, and lowest initial and long-term outlay for their desired facility.The well-advised Owner will consider what contractual arrangement best suits the mega project; two major choices are (1) between the EPC (engineering, procurement, and structure) and the EPCM (engineering, procurement, and construction management) contract models, and (2) Between the lump-sum, turnkey, and cost-reimbursable (with or without spending caps) approaches.Ownerscananddomixandmatchthesebasictypesofcontracts,butgenerallytheypairEPCwitha lumpsum,andEPCMwithcostreimbursable[1].Acknowledgingthateverygeneralizationbegetsanexceptionandthatagreementsarenegotiatedwithanalmostinfinitenumberofvariations,significantdifferencesandsimilaritiesmaystillbedrawnbetweenEPCandEPCMagreements,particularlywiththetypesof payment (lumpsumorcost reimbursable) inmind [2].

Experienced or properly advised Owners know that contracts should clearly allocate the major risks anticipated in a task.Withenoughexperienceortherightadvice,suchOwnerswillpairtherisks(ofcostoverrun,latercompletion,andperformanceshortfallsorsub-paroperations,forinstance)withrewardscommensuratewiththeparticulardangersandwiththeabilityofthepartyinquestiontoeffectivelymanagetherisk.Noformofcontractsuitsallcontingencies,muchlessallprojects [3].However,understandingwhatanEPCorEPCMagreementcandofortheOwnerandtheprojectwillenabletheOwnertobestmatchitsgoalswiththecontractemployedtoreachthem.

Thispaperexaminescontractualmeans to allocaterisks,butOwnersmayalwaysemploymethodsoutsideanEPCorEPCMagreementtocoverthe contingenciesarisingina megaproject.

Before comparing and contrasting the EPC and EPCM forms, it is significant to observe that the risks typically allocated in a public works project (where lump-sum agreements often are involved) are spoken differently by many private (and some very deep-pocketed public) Owners.MegaprojectsforindustrialandevencommercialOwnersnowareapproachedthroughcost-reimbursementcontractsmoreoftenthannot[4].PublicOwnersstillfeelmoreathomewiththecertaintyofafixed-priceagreement.PerhapstheentrepreneurialspiritofprivateOwnersortheaversionofmanylargepublicOwnerstopubliccriticismfordelaysandcostoverrunsexplainsthepolarizationofusingthesetwopaymentmethodologies [5].

2. OVERVIEW OF EPCCOMPAREDTOEPCM

Inmany instances, the EPC agreement functions as aturnkey contract.Whateverthescopeofthework,beitanentirerefineryoramoderate additiontoanexistingplant,theContractorwilldesignthefacility,buildthestructuresfromfoundationtotrim,buyandinstalltheequipment,performallremainingconstruction,testallmajorandminorequipmentandoperations,traintheoperators,andhandoverthecompletedrawingsandoperationsmanuals[6].Ofcourse,the Ownersmaycreatemanyvariationsonthistheme,suchasorderinglong-

leadtimeequipmentfortheEPCContractor.However,thecoreofthe EPCagreementisthatthesameentityisresponsiblefor all oftheoperations from creationtocertificationofcompletion.The entitycan subcontract out vastamounts ofthework,anditcertainlydoesnotmanufacturetheequipmentorcreatethematerials.Itmayhirealmost allofthelaborfortheprojects.Nonetheless,theEPCContractorperformsallthework,directlyorindirectly,andrepresentstheOwnerasinglepoint ofresponsibility.

TheEPCMagreementdepartsfromtheEPCcontractbyremovingtheconceptofsoleresponsibilityfortheprojectandsubstitutingasingle contractor(theEngineer)todesigntheprojectandtoendeavortocauseothers(suppliersandcontractors)toequipandconstructit.Bearing inmindthemanyvariationspossiblewithsuchanagreement,theessenceofan EPCM isa service(engineering the work and administering itsconstructionbyothers)ratherthanproviding,throughdirecteffort s,afinishedproject [7].OwnersmaycontractdirectlywiththeEPCMsuppliersandcontractors,ormayhavetheEngineerdosoontheirbehalf.Ownersmayproceedwithacompletecost-reimbursableproject,designedandadministeredbytheEPCMEngineer,ortheymaytransferallofthecontractstotheEPCMEngineers evenobtainamaximumprojectcost,coupledwithincentives and variable paymentsforservices,atsomepointaftertheworkhasbegun.However,theEPCMagreementstillisnotan EPCcontract,despitesome similarities.TheEngineerstill curtailsitsprojectrisk,inkeepingwithprovidingservicesandnotacompleteproject.

TheEPCMagreementcandomanythings,butitismostreadilyadapted toaprojectinwhichtheOwnerwantsarepresentativeof itsinterestsandanentitytotaketheleadindesigningtheproject [8].Asmaybeapparent,an Owner wishinga greater rolein procuring theequipment,inselectingcontractorsfordistinctpartsofthework, andinretainingmoreprojectcontrolshouldconsidertheEPCMapproach.BecausetheEPCMEngineeractsonbehalfoftheOwneranddirectlyinvolvestheOwnerinmakingmajordecisionsthroughoutthe project,theservicenatureofEPCMcomesthrough.Suchservicerequiresanequalmeasureofresponsibilityandresponsivenessfromthe Owner,toprovidethestrategicdecisions(onmattersregardingmajorequipment,crucialcontractors,andproactiveinteractionwithgoverningauthorities,for example).

Bydirectlyinvolvingitself,theOwnerintheEPCMagreementtends tofavorcost-reimbursablepayments,perhapswithincentivesandrestrictions,toavoidpayingtheEngineerforrisksthattheOwnerhasretained.

PaymenttermsforanEPCcontracttypicallyarelumpsum,although therearemanyvariationsonhowcomponentsoftheworkarepriced. TheOwnerandContractormayagreetopaythestipulatedpriceinregular,equalmonthlypaymentsoverthelifeoftheproject,toprovide a predictablecashflow.Alternatively,apercentageofcompletionformulamaybepreferred.Pricingofmajorequipmentmayallowforpaymentatsetstages(suchasatplacementoftheorder,completionatthe factory,arrivalatthesite,andmechanicalcompletion).

Acomparisonofsomematerialcomponentsillustratesthedifferencesbetween EPCandEPCMagreement.

- **Costand Schedule**

AnOwnerprimarilyworriedaboutstayingwithinitsinitialcapitalexpenditurebudgetandmeetingitsprojectschedulelikelywillprefer theEPCcontractform [2].AcardinalpointoftheEPCarrangementisthattheContractorpromisesagivenresult—thecompletedproject—withinastipulatedtimeandforanagreed-uponprice.Becauseofthesecentralissuesofcostandschedule,EPC contractsoftenhaveverycompletedefinitionsofmechanicalandsubstantialcompletion,aheavilynegotiatedcontractschedule,andveryexplicitstatementsofwhatconstitutesaforcemajeureeventorabasisforachangeinprice [9].Atleastconceptually,theOwnershouldbepreparedtogivetheContractorconsiderablelatitudeonthemethodsandmeansofconstruction,numbersofcraftsmenandamount/typeofconstructionequipment,andwagesandotherincentivestoassemble,retain,andmotivatethe workforce and the subcontractors.

AnEPCMagreementisnotaswellsuitedfordemandingandobtaining aprojecton time andonbudget [2]. The Engineer ordinarily commitstouseitsbesteffortstoachievethosegoals,butdoesnotpromisethateitherthecostortheschedulewillbeexactlywhattheOwner wishes.Thatsaid,someOwnersandEngineersexploretheouterboundariesofwhatisagoalandwhatisaguaranteebywayofbudgetandschedule.Thus,anOwnermayincentivizetheEngineertokeepcostsdownsothattheOwner’sbudgetgoal(andperhapstheEngineer’scost estimate)willbemet [2].Likewise,theEPCMagreementmaycontainbonusesformeetingorexceedingcompletiondatemilestones.Also,theOwnerandEngineermayagreeinadvancethatatadesignatedpointintheproject,the Engineerwillissueeitheraguaranteeoftheprojectprice,thecompletiondate,orboth.ItisuncommoninanEPCMcontractforpriceorcompletiondatetobeguaranteedupfrontbytheEngineer.Again,theOwnerisbuyinga service, notabsolutepromises of performance. In theory atleast,savingstotheOwnerresultingfromkeepingtheprojectfromrunningoverbudgetorbehindscheduleshouldbecarefullyconsidered.TherationalOwnerverywellmayacceptthesterisks,toavoid payingforthecontingenciesanEPCContractorwouldincludeforthem,and,perhaps,toexercisemorecontrolovertheproject’squalityandstandards(forexample,bypickingsubcontractors,suppliers,materials,andequipmentproactively,whileleavingthedesign largely uptothe Engineer).

Alongwith quality, the cost and timeliness of a project are the maincomponentsofriskthatmustbeallocatedclearly.Whencostandscheduleareparamount,theOwnershouldconcentrateonanEPCagreement [10].WhentheOwnercanabsorbsomeflexibilityinthepriceorthetiming,thenanEPCMagreementmaybettersuittheprojectbecauseit allowstheOwnertocarrymorerisk,onthe“bet”thattheoverallprice

willbelower,andtheOwnerwillmaintainmorecontroloverthedetailsofthefacility(through, for instance,activeparticipationinselecting thesubcontractorsandsuppliers).

- **Defective Workvs. Defective Services**

AnOwnerupsetwithdefectsinitsprojectwouldpresenttheContractorwithaclaimfordefectivework(EPCagreement),whileconfrontingtheEngineerwithaclaimfordefectiveservices(EPCMagreement).Asfurtherdiscussedinthispaper,theContractorwarrantstheadequacyofthecompletedworkandtheEngineeronlywarrantssomethingtotheeffectthatitsservicesmeetacarefullydefinedstandardofgoodengineeringpractices [11].

Theremediesforbreachofwarrantybestillustratethetwocontracts. UnderanEPCagreement,theOwnerwillreceiveareplacementforthedefectivework;underanEPCMcontract,theEngineermostoftenwillre-performtheservices[12].NegotiationofanEPCMagreementrequirescarefulconsiderationregardingwhat,ifany,replacementofthework(ascontrastedwitharevised design,forexample),willberequired.Otherwise,thereplacementdesignmaybeallthedisappointedOwnerwillhavetoshowforavitalcomponentthatfailedandthatmustberebuiltandretested,atgreatexpenseandwithseriouslossoftime.The comparisoniscentraltothetwotypesofagreements.

TheEPCagreementwithalump-sumpricelendsitselftoenforcementofwarrantiesthatpertaintoreplacementofdefectivework.Tobespecific,regardlessofwhythework isimproper(e.g.,design,wrongequipmentprovided,improperinstallation,mistakenplacementofthework,damagetothecontrols),the Contractorwithaturnkeyresponsibilitynormallywillberequiredtoredothedefectivework,retestittoturnoverstatus,andabsorballthecostsofsuchrepair,butusuallynottheindirectcostsofinterruptionordelay [13].SuchfullresponsibilitymatcheswiththelumpsumapproachthatOwnersoftenequatewithEPCcontracts.

TheEPCMcontractoftencontemplatesacost-reimbursementmodelofpayment,usuallywithincentivesforsavingmoney,finishingontime,andprovidingdemonstrablequality.Whendefectiveserviceisidentifiedbytheowner,causingportionsofthe projecttoberepaired,theOwnermustpayfortherebuiltwork.Atfirst,itmayseemlikeapoorbargainfortheOwnerto haveproceededwithan EPCM agreementwhen significantdefectsarediscovered [14].Afterall,theEngineeroftenisonlyresponsibleforproducingabetterdesign,notnecessarilyfixingthedamagetotheprojectcaused byacontractorfollowingthedefectivesetof plans. For trulylargeproblems,theOwnerprobablywishesforthecomfortofasinglepointofresponsibilityprovidedbyanEPCagreement.Nevertheless,formanyfacilities,theinevitabledefectscomingtolightmaynotspellcatastrophe.TheOwnerwiththeEPCagreementcanexpecttopayasignificant,andlargelyinvisible,premiumtotheContractorforwarrantyworkandreplacementdesign,procurement,andconstruction [9].EithertheContractororitssubcontractorswillprotectthemselvestosomeextentagainstfuturewarrantyclaims.Thus,theOwnerhaspaidforthecostofatleastsomerework,whetheritisneededornot.A projectwithcomparativelyfewdefectsmayrepresentahiddencostoverrunfortheOwnerusinganEPCagreementbecauseoftheanticipatedwarrantycostsbuiltintothelump-sumprice [13].TheEPCMOwner,correspondingly,“paysasitgoes”forreplacementsandrework.TheEPCMOwnermaypayless,overall,foractualrepairstoactualdefects.TheOwneralsomaydecidetolivewith the problemwhen confronted with“optional”reworkfordefectsnotcentraltothe project’soperations.

- **Change Orders and Changes to the Contract**

MuchasOwnerswishthattherewouldbenochangeordersineitheranEPCoranEPCMagreement,changeisinevitable.InEPCcontracts,Ownersareoftenreluctanttorecognizethattherareexceptionstotheepcscopeofwork,therearereasonableassumptionsastoconditions,and,notwithstandingeverythingelse,and therecanbechangesincontractprovisions.Hence,changeclauses,force-majeureprovisions,andscheduleupdatesandmonitoringarestandardintheEPCcontractforanymegaproject.TheEPCContractoroftenhasadifficulttaskconvincingtheOwnerthatsomethingnewisachangeoflaw,anexceptiontothescopeofthework,oranunforeseenandunusualcondition [15].Theconceptofalump-sumpriceforaturnkeyproject,whichoftenaccompaniestheEPCagreement,makesforOwnerskepticism.OwnerscanconcludethatbecausechangesthatmaketheconditionsoftheworkmorefavorabletotheContractorarenevershared,whyshouldallthenewsregardingvariationsinthe circumstancesbebadnewsfortheOwner’sbudget?FromtheOwner’svantagepoint,perhapsnowhereistheunderlyingdifferencebetweenEPCandEPCMclearerthanintheproponsity forchanges.

WithanEPCM,theOwnershouldexpectchangeorders,especiallyinthescopeofthework.Noonehasacceptedtheriskofdeliveringanentire plantforone sumofmoney.More than likely, the Ownerwill haveagreedtopaycarefullydefinedcostsplusafee,withcertaininceptives,preciselytotakeontheriskofunknownconditions,rathertha npayanEPCContractortofoldthemintoitsall-encompassingbudget.Indeed,theEPCMagreementoftencontemplatesmechanismsforcostvariables [16].Thedesignmaybepittedagainstlaterestimatesofcost,forevaluationofdesignadequacy,beforemajorequipmentisorderedorsignificantworkproceeds.Contractsforconstructionmaybeletinphases,astheworkprogressesandcostsarebetterunderstood.Forward-lookingpricingmechanismsmaybeincludedintheEPCMagreement,suchasincreasingordecreasingtheproject’sscope,dependingonprogressagainsttheOwner’sprojectbudget.Variationsarealmostpresumedwithan EPCMagreement,especiallyonebasedonreimbursementofcosts.Theflexibilityofbuyingdesignservices andthen lettingthe restoftheprojectin wavesorpiecescarriesahighlevelofchange-orderrisk.Likewise,notplacingonepartyatriskforthewholeprojectmeansthatpricevariationswithinthecomponentpartsareexpected,andthesensibleOwnercreatesreservestomeetthecontingenciesthatotherwisemightbetheproblemoftheEPCContractor.

WithanEPCMagreement,theOwnerhasnoentitytowhichitcanlookfora broadprojectassumptionofrisk.Forexample,theEPCContractor mightbewillingtocontract forsubsurfaceconditions, for enoughmoneyandwithenoughtimetostudythesite [17].TheEPCMEngineerwouldalmostneverwarrantthatitsdesignthoroughlyencompassesallunknownconditionsoranticipatesall subsurfacefactors.Consistentwithdividedresponsibilityandsomemeasureofdirectcontractingwithconsultantsandcontractors,the EPCMagreementeasestheOwner'sassumptionofrisksformanymattersancillary,yetvital,tothecorework [18].SubsurfaceconditionsareatleastarguablywithintheEPCContractor'sscopeofrisk.Notsofortheservice-orientedEngineer.Likewise,theusual,lettingofmultipleagreementsforpiecesoftheprojectlendsitselftocontractingout theinvestigationofthe site orthesubsurface work todistinctentities.Thus,anEPCMagreementlogicallyfitswithasiteinvestigationcontractlet to aseparate entity,and with stand-aloneagreements withcontractorsperformingdistinctaspectsofthework.Suchdivisionofresponsibility,withtheservice-orientedEngineerrepresentstheOwneronsite,rarelyresultsinanyonebuttheOwneracceptingtheriskofchangedconditions.Nonetheless,theOwneralsoshouldkeepitssavingsinmindbasedonvariouspartiesnotpricingintotheiragreementstheriskofsubsurfaceconditionsandothersourcesofchangeorders.Inshort,acost-reimbursablecontractis muchmorelikelytobefoundintheEPCM,andwillincludeprovisionsforchangeorders,orsimplyadditionalscopeaddedtotheprojectandpaid fortimeandmaterialswork.

- **LiabilityLimits**

Undercurrentfinancialconditions,theremaybeEPCContractorswillingtoworkwithgreaterriskandhigherlimitsofexposureforaprojectbeinglate,notperformingasdesigned,orcostingtoomuch.Thatsaid,thenormhasbeen,andlargelystillisinthemindsofmostmegaprojectfirms,thattheEPCContractorexpectsalimitationonitsliabilityfordelaysindeliveryandforperformanceshortfalls.MostEPCagreementshavecappedtheContractor'stotalliabilityataspecificamount,regardlessofcause,andoftentherehavebeenseparatecapsofexposureforparticularrisks.Forexample,liquidateddamagesfordelaymighthavealimit,measuredindaysorintotalassessmentofpenalties,andtheoverallcapmightbesomehighernumberthatexplicitlycoversallrisks.Performanceguarantees almostalwayscomewithpricingmechanismstomeasurethecost totheContractorforfailing to achieve thedesiredoutputs, or failingtoconsumeonlythespecifiedinputs.

Most Owners aremore willing tocaptheexposureofanEPCMEngineer,inlightofthefactthattheEPCMEngineerprovidesservicesratherthanacompletedproject.Limitingliabilitytotheamountofavailableinsurance,forexample,iscommoninEPCMagreements.Inmostsituations,however,Ownersshouldnotbesatisfied withlimitingliabilityrisktotheamountofthefee.

InbothEPCandEPCMagreements,thepartiesgenerallyhaveconsideredwaiversofcertainclassesofdamages,inadditiontoacaponliability.Thus,waiversoflostprofits,ofindirectcostsofdelay,orofopportunitiesforfeitedbypoorperformancearecommoninbothsuchcontracts.Ownerswouldbewelladvisedtoinsistonthelimitationsofrecoverabledamagesbeingmutual.Granted,thebusinessoftheOwnerdiffersfromthatoftheContractorortheEngineer,buttheOwneralsostandstolosemuchmore.Thus,thelostprofitsonanoilplatformdelayedayear,apowerplantpushedpastthepeakdemandsofasummer, orasmelter,notoperatingasdesignedto probablydwarftheconsequencestotheContractorortoanEngineer ofaprojectbeingshelvedorcancelledduetoradicalchangesinindustryneeds.Inthisauthor'sexperience,acancelledfacilityreflectsmoreloss(duetochangedmarketconditions,forinstance)totheOwnerthantoadisappointedContractororEngineer,andthus,liabilitylimitationsalmostalwaysimpacttheOwnerdisproportionately.That,arguably, iswhy reciprocityisonly fair.

- **SecurityforPerformance**

Inaworldoffinancialfragility,everyoneisinterestedinprojectfinancialsecurity.Ownersofmegaprojectslonghaveexactedsecurityforperformanceofcontractobligations.Typically,theEPCContractor isexpectedtopostsomecombination of aletter of credit,aparentcompanyguarantee,aperformancebond,apaymentbond,and/orinsuranceforavarietyofhazards.Retentionontheamountofthecontractperformed,toensurecompletionofwork,alsoactsasasecuritydevice.HowmuchdoOwnerspostbywayofsecurity?Notmuch,andnotnearlyenoughintheeyesofmanyprojectparticipants.Ataminimum,greaterdisclosureofprojectfinancescanbeexpectedbothatthestartandthroughoutthecourseofperformance.Canlettersofcreditfromthe Ownerbeexpected,forthecurrentmonth'swork,forinstance?Notnecessarily,butsomeonewillaskandnegotiatewiththatinmind.Likewise,guaranteesbeyondlimitedornon-recourseprojectfinancingremainapossiblesubjectfornegotiation.

TheEPCMEngineerputsupfarlesssecuritybecauseitscommitmentistoprovideservicesratherthanafinishedproject.Infact,evenretentionmayseemunwarrantedtomanyEngineers.Generally,Owners mostlyrelyupontheveritablecarrotofbonusesandincentivepayments,ratherthanthestickofinstruments ofsecurity.

3. CONCLUSION

Mega projects vary by industry, by public-private ownership, by risk of technology and development, and by a host of other elements.No single contract form, even those as flexible and developed as the EPC or the EPCM models, will suffice for every demand.Thesepointsofcomparisonshouldhelpinsortingoutthequalitiesthatan Ownermaywanttoincludeinitsultimateagreement.PartiesworkingwiththatOwner,aswellastheirattorneys,needtokeepthesesubjectsofriskallocationinmind,iftheprojectistosucceedandiftheyplantomoveontothenextbigundertakinginahighlycompetitiveenvironment.Thecancellationofmegaprojectsand thepostponementofmanymoremakeallpartiesmoredependenton "gettingit right"whentheyare able towork together.

REFERENCES

[1] Vermeulen, N. (2010). Governance of complex procurements in the offshore oil & gas industry.

[2] Loots, P., &Henchie, N. (2007, November). Worlds Apart: EPC and EPCM Contracts: Risk issues and allocation. Article, pp. 1-16.

[3] Cunningham, T. (2013, September 25). CHOOSING AN APPROPRIATE MAIN CONTRACT FOR BUILDING WORK IN THE REPUBLIC OF IRELAND- An Overview. Dublin Institute of Technology.

[4] Galloway, P. (2009). Design-Build/EPC Contractor's Heightened Risk—Changes in a Changing World. JOURNAL OF LEGAL AFFAIRS AND DISPUTE RESOLUTION IN ENGINEERING AND CONSTRUCTION, 7-15.

[5] Flyvbjerg, B., &Garbuio, M. (2009). Delusion and Deception in Large Infrastructure Projects Two Models for Explaining and Preventing Executive Disaster. California Management Review, vol. 51, no. 2, 170-193.

[6] Namara, C. M. (1999). Project Management. St. Paul,, Minnesota.

[7] De Villiers, T. J. (2005, December). AN INTEGRATED PROJECT TEAM STRATEGY IN THE SOUTH AFRICAN MINING AND MINERAL COMMODITY INDUSTRY. JOHANNESBURG: UNIVERSITY OF JOHANNESBURG.

[8] Baloyi, L. M. (2013, November). Project Manager's Degree of Technical Knowledge in Projects. M.Phil [Unpublished]. JOHANNESBURG: UNIVERSITY OF JOHANNESBURG.

[9] Hosie, J. (2007). Turnkey contracting under the FIDIC Silver Book:What do owners want? What do they get? Jonathan Hosie and the Society of Construction Law.

[10] Bora, P. (2009, November). Bankability Structuring Epc Contracts. EXCON 2009 Special, pp. 132-136.

[11] Glover, J. (2008, April 23). Liability for Defects in Construction Contracts - who pays and how much? pp. 1-22.

[12] Parsons, W. (2012). Contract Number: SOR-PMC+FEED-11-1007.

[13] PEGASUS GLOBAL HOLDINGS INC. (2014, MAY 23). KEMPER COUNTY IGCC PROJECT.

[14] Nugent, J., & Ellis, T. (2008, July). Construction & Engineering Legal Update. London: Mayer Brown International LLP.

[15] Hosie, J. (2015). EPC Contracts Controlling cost blowouts on mining developments. The Mayer Brown Practices.

[16] Levy, S. M. (2006). Design-Build Prpject Delivery.McGrawHill.

[17] PEng, J. O., &PEng, G. J. (2010). Lump Sum Contracting on Western Canadian Oil and Gas Capital Projects: Industry Opinion. Alberta Finance And Enterprise.

[18] KPMG, J. M. (2011). EPC Industry in India: Issues & Challenges. KPMG.