

**AN ANALYSIS OF RISKS FACED BY FOREIGN
CONSTRUCTION FIRMS IN INDIA AND THEIR
EFFECT ON PROJECT PERFORMANCE**

ROUZBEH MADDAH



**DEPARTMENT OF CIVIL ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY DELHI
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by

ROUZBEH MADDAH

Department of Civil Engineering

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CERTIFICATE

This is to certify that the thesis entitled “**An Analysis of Risks Faced by Foreign Construction Firms in India and Their Effect on Project Performance**”, being submitted by Rouzbeh Maddah to the Indian Institute of Technology Delhi for the award of the degree of Doctor of Philosophy is a bonafide record of the research work carried out by him under our supervision and guidance. The thesis work, in our opinion, has reached the requisite standard, fulfilling the requirements for the degree of Doctor of Philosophy.

The contents of this thesis, in full or in parts, have not been submitted to any other University or Institute for the award of any degree or diploma.

Prof. A.K.JAIN
(Professor)
Department of Civil Engineering
Indian Institute of Technology Delhi
Hauz Khas, New Delhi 110016 (India)

Prof. K.N.JHA
(Professor)
Department of Civil Engineering
Indian Institute of Technology Delhi
Hauz Khas, New Delhi 110016 (India)

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Rouzbeh Maddah

ABSTRACT

The internationalization of the business environment and the development of communication between nations has provided a significant opportunity for construction companies to spread their scope of work beyond their home country borders. However, prior to stepping into the global construction market, a construction firm should identify the risks, and analyze their influence on the project goals. Moreover, a construction firm should be equipped with proper mitigation measures to cope with those risks. These mitigation measures should be relevant to the characteristics of the host country.

Countries have different characteristics in terms of socio-cultural environments, geopolitical status, financial situations, economic conditions, and their governing rules and regulations. The risk prevalence and its level of influence on the project goals are specific to the host country characteristics. Therefore, in order to be more precise in analyzing the influence of the risks on the project goals, such analysis should be carried out in view of the characteristics of a particular host country.

This study has considered India as the host country, in order to investigate the international construction firms' risk in the Indian construction market. This investigation is based on the perception of the foreign construction firms operating in India and covers risk identification, risk evaluation, and risk mitigation (response). The ultimate criteria of this study for which the effect of risks have been analyzed are cost, time, and overall performance of the international construction projects carried out in India. Although the project performance in Indian construction market is not at a satisfactory level, the Indian construction market has proven to be an attractive market for foreign construction firms.

The Indian construction market is a lucrative market for international construction firms due to its huge population, and economic growth (Ling and Hoi 2006). The ever-growing population of India promises the growing demand for infrastructure and housing projects. Meanwhile, the Indian government welcomes foreign direct investment in the fields of township development, housing, commercial premises, hotels, resorts, and infrastructure facilities. The majority of the demand for construction facilities in India are given a response by the domestic construction firms, however, there is a need for the technical, and managerial know-how of the foreign construction firms as well.

Although India can offer an attractive construction market to the international construction firms, there are a variety of risks that foreign construction firms face in India. The risks which are incorporated in this study can be broadly classified as: project-related risks, host country related risks, and risks associated with shortcomings of the Indian project stakeholders (i.e. Indian supplier, Indian partner, Indian labor, Indian subcontractor, and the Indian client). These risks are subject to various analysis in order to measure their prevalence (as perceived by foreign construction firms), and also their influence on the project goals. In order to fulfill the objectives of the study, the following steps have been taken.

At the initial stage, a total of 98 completed projects carried out by foreign construction companies in India were identified. A list of major risk attributes was identified through the literature and expert's opinion. The project-wise questionnaire survey was conducted in order to measure the prevalence of the identified risks, and also to evaluate the cost and time performance of the international sample projects. Based on the collected responses, the factor analysis revealed the latent properties of the risk attributes. Therefore, a total of nine risk factors emerged namely: (1) poor inter-partner relationship, (2) adverse host country condition, (3) partner incompetency, (4) client incompetency, (5) unavailability of resources, (6) adverse project condition, (7) labor underperformance, (8) subcontractor incompetency, and (9) poor relationship with client. Subsequent to identification of the risk factors, the multiple regression analysis was applied in order to measure the direct influence of the risk factors on the cost and time performance based on their regression coefficient and their prediction capacity. Findings revealed the critical risk factors with respect to cost and time performances. The risk factors namely: adverse project condition, subcontractor incompetency, adverse host country condition, client incompetency, and partner incompetency are relatively and respectively have the highest influence on cost performance while, the risk factors such as: unavailability of material and resources, adverse project condition, poor inter-partner relationship, client incompetency, adverse host country condition, subcontractor incompetency, labor underperformance, and partner incompetency showed a considerable influence on the time performance.

This study further identified the causal interrelationship among the risks, and also identified the vulnerabilities and their indirect influence on the project goals (cost, time, and overall performance). For this purpose, the risk path models affecting the project

goals were hypothesized. Further, the structural equation modeling was used to validate the interrelationships between the risks and to measure the path coefficients. The structural equation modeling could confirm the existence of six vulnerabilities affecting the project goals. These vulnerabilities are: (1) adverse host country condition, (2) project complexity, (3) subcontractor incompetency, (4) client incompetency, (5) unclarity of agreement between partners, and (6) partner incompetency. The vulnerabilities were ranked based on their effect on the project goals. The findings revealed that vulnerabilities such as: adverse host country condition, project complexity, and subcontractor incompetency are having the highest effect on the international projects' goals in India.

In the last stage, this study proposed a total of 91 risk mitigation measures for the identified risk factors. Further, the effectiveness of these mitigation measures in the Indian context was evaluated by means of a questionnaire survey and application of the Delphi method.

The results are expected to help foreign construction firms to focus on fewer and more critical risks, which may affect their project goals; and to adopt apt measures in order to mitigate those risks. Findings of this study are drawn based on the perception of foreign construction firms operating in India. This study has contributed to the body of the knowledge by identifying risk paths toward foreign construction firms in India and also evaluating the extensive risk mitigation measures with respect to their applicability in the Indian context.

सार

व्यापारिक वातावरण के अंतर्राष्ट्रीयकरण और राष्ट्रों के बीच संचार के विकास ने निर्माण कंपनियों को अपने देश की सीमाओं से परे अपने काम के दायरे को फैलाने का एक महत्वपूर्ण अवसर प्रदान किया है। हालांकि, वैश्विक निर्माण बाजार में कदम रखने से पहले, एक निर्माण फर्म को चाहिए जोखिमों की पहचान करें, और परियोजना के लक्ष्यों पर उनके प्रभाव का विश्लेषण करें। इसके अलावा, एक निर्माण फर्म को उन जोखिमों से निपटने के लिए उचित शमन उपायों से लैस होना चाहिए। ये शमन उपाय मेजबान देश की विशेषताओं के लिए प्रासंगिक होने चाहिए।

सामाजिक-सांस्कृतिक वातावरण, भू-राजनीतिक स्थिति, वित्तीय स्थितियों, आर्थिक स्थितियों और उनके शासी नियमों और विनियमों के संदर्भ में देशों की अलग-अलग विशेषताएं हैं। परियोजना के लक्ष्यों पर जोखिम की व्यापकता और इसका प्रभाव मेजबान देश की विशेषताओं के लिए विशिष्ट है। इसलिए, परियोजना के लक्ष्यों पर जोखिमों के प्रभाव का विश्लेषण करने में अधिक सटीक होने के लिए, एक विशेष मेजबान देश की विशेषताओं को देखते हुए इस तरह के विश्लेषण किए जाने चाहिए।

इस अध्ययन में भारतीय निर्माण बाजार में अंतर्राष्ट्रीय निर्माण फर्मों के जोखिम की जांच करने के लिए भारत को मेजबान देश माना है। यह जांच भारत में कार्यरत विदेशी निर्माण फर्मों की धारणा पर आधारित है और इसमें जोखिम की पहचान, जोखिम मूल्यांकन और जोखिम न्यूनीकरण (प्रतिक्रिया) शामिल है। भारत में किए गए अंतर्राष्ट्रीय निर्माण परियोजनाओं की लागत, समय और समग्र प्रदर्शन इस अध्ययन के अंतिम मानदंड हैं जिनके लिए जोखिमों के प्रभाव का विश्लेषण किया गया है। हालांकि भारतीय निर्माण बाजार में परियोजना का प्रदर्शन संतोषजनक स्तर पर नहीं है, लेकिन भारतीय निर्माण बाजार विदेशी निर्माण फर्मों के लिए एक आकर्षक बाजार साबित हुआ है।

भारतीय निर्माण बाजार अपनी विशाल आबादी और आर्थिक विकास के कारण अंतर्राष्ट्रीय निर्माण फर्मों के लिए एक आकर्षक बाजार है (लिंग और होई 2006)। भारत की बढ़ती आबादी, बुनियादी ढांचे और आवास परियोजनाओं की बढ़ती मांग का वादा करती है। इस बीच, भारत सरकार टाउनशिप विकास, आवास, वाणिज्यिक परिसर, होटल, रिसॉर्ट, और बुनियादी सुविधाओं के क्षेत्र में प्रत्यक्ष विदेशी निवेश का स्वागत करती है। भारत में निर्माण सुविधाओं की मांग के बहुमत को घरेलू निर्माण फर्मों द्वारा प्रतिक्रिया दी जाती है, हालांकि, विदेशी निर्माण कंपनियों के तकनीकी, और प्रबंधकीय ज्ञान की भी आवश्यकता है।

यद्यपि भारत अंतर्राष्ट्रीय निर्माण फर्मों के लिए एक आकर्षक निर्माण बाजार की पेशकश कर सकता है, लेकिन भारत में विदेशी निर्माण फर्मों के सामने कई तरह के जोखिम हैं। इस अध्ययन में शामिल किए जाने वाले जोखिमों को मोटे तौर पर वर्गीकृत किया जा सकता है: परियोजना से संबंधित जोखिम, मेजबान देश से संबंधित जोखिम, और भारतीय परियोजना हितधारकों (यानी भारतीय आपूर्तिकर्ता, भारतीय साझेदार, भारतीय श्रम, भारतीय उपमहाद्वीप, और) की कमियों से जुड़े जोखिम; भारतीय ग्राहक)। इन जोखिमों को विभिन्न विश्लेषणों के अधीन किया जाता है ताकि उनकी व्यापकता (जैसा कि विदेशी निर्माण फर्मों द्वारा माना जाता है) को मापें, और परियोजना के लक्ष्यों पर उनका प्रभाव भी। अध्ययन के उद्देश्यों को पूरा करने के लिए, निम्नलिखित कदम उठाए गए हैं।

प्रारंभिक चरण में, भारत में विदेशी निर्माण कंपनियों द्वारा किए गए कुल 98 पूर्ण परियोजनाओं की पहचान की गई। साहित्य और विशेषज्ञ की राय के माध्यम से प्रमुख जोखिम विशेषताओं की एक सूची की पहचान की गई थी। परियोजना-वार प्रश्नावली सर्वेक्षण का आयोजन पहचान किए गए जोखिमों की व्यापकता को मापने के लिए किया गया था, और अंतर्राष्ट्रीय नमूना परियोजनाओं की लागत और समय के प्रदर्शन का मूल्यांकन करने के लिए भी किया गया था। एकत्रित प्रतिक्रियाओं के आधार पर, कारक विश्लेषण में जोखिम विशेषताओं के अव्यक्त गुणों का पता चला। इसलिए, कुल नौ जोखिम कारक सामने आए: (1) खराब अंतर-साझेदार संबंध, (2) प्रतिकूल मेजबान देश की स्थिति, (3) साझेदार अक्षमता, (4) ग्राहक अक्षमता, (5) संसाधनों की अनुपलब्धता, (6) प्रतिकूल परियोजना की स्थिति, (7) लेबर अंडरपरफॉर्मंस, (8) सब-कॉन्ट्रैक्टर अक्षमता, और (9) क्लाइंट के साथ खराब संबंध। जोखिम कारकों की पहचान के बाद, उनके प्रतिगमन गुणांक और उनकी भविष्यवाणी क्षमता के आधार पर लागत और समय के प्रदर्शन पर जोखिम कारकों के प्रत्यक्ष प्रभाव को मापने के लिए कई प्रतिगमन विश्लेषण लागू किया गया था। निष्कर्षों ने लागत और समय के प्रदर्शन के संबंध में महत्वपूर्ण जोखिम कारकों का पता लगाया। जोखिम कारक अर्थात्: प्रतिकूल परियोजना की स्थिति, उपमहाद्वीप की अक्षमता, प्रतिकूल मेजबान देश की स्थिति, ग्राहक की अक्षमता, और साझेदार अक्षमता अपेक्षाकृत अपेक्षाकृत कम होती है और क्रमशः लागत प्रदर्शन पर सबसे अधिक प्रभाव पड़ता है, जबकि जोखिम कारक जैसे: सामग्री और संसाधनों की अनुपलब्धता, प्रतिकूल परियोजना हालत, खराब अंतर-साझेदार संबंध, ग्राहक अक्षमता, प्रतिकूल मेजबान देश की स्थिति, उपमहाद्वीप अक्षमता, श्रम अधिरचना और साथी अक्षमता ने समय प्रदर्शन पर काफी प्रभाव दिखाया।

इस अध्ययन ने आगे जोखिम के बीच कारण अंतरसंबंध की पहचान की, और परियोजना लक्ष्यों (लागत, समय और समग्र प्रदर्शन) पर कमजोरियों और उनके अप्रत्यक्ष प्रभाव की भी पहचान की। इस उद्देश्य के लिए, परियोजना के लक्ष्यों को प्रभावित करने वाले जोखिम पथ मॉडल परिकल्पित थे। इसके अलावा, संरचनात्मक समीकरण मॉडलिंग का उपयोग जोखिमों के बीच अंतर्संबंधों को मान्य करने और

पथ गुणांकों को मापने के लिए किया गया था। संरचनात्मक समीकरण मॉडलिंग परियोजना लक्ष्यों को प्रभावित करने वाली छह कमजोरियों के अस्तित्व की पुष्टि कर सकता है। ये भेद्यताएँ हैं: (1) प्रतिकूल मेजबान देश की स्थिति, (2) परियोजना की जटिलता, (3) उपमहाद्वीप अक्षमता, (4) ग्राहक अक्षमता, (5) भागीदारों के बीच समझौते की अस्पष्टता, और (6) साझेदार अक्षमता। परियोजना लक्ष्यों पर उनके प्रभाव के आधार पर कमजोरियों को रैंक किया गया था। निष्कर्षों से पता चला है कि कमजोरियाँ जैसे: प्रतिकूल मेजबान देश की स्थिति, परियोजना की जटिलता और उपमहाद्वीप की अक्षमता भारत में अंतर्राष्ट्रीय परियोजनाओं के लक्ष्यों पर सबसे अधिक प्रभाव डालती हैं।

अंतिम चरण में, इस अध्ययन ने पहचान किए गए जोखिम कारकों के लिए कुल 91 जोखिम शमन उपायों का प्रस्ताव किया। इसके अलावा, भारतीय संदर्भ में इन शमन उपायों की प्रभावशीलता का मूल्यांकन एक प्रश्नावली सर्वेक्षण और डेल्फि पद्धति के अनुप्रयोग के माध्यम से किया गया था।

परिणामों से उम्मीद है कि विदेशी निर्माण कंपनियों को कम और अधिक महत्वपूर्ण जोखिमों पर ध्यान केंद्रित करने में मदद मिलेगी, जो उनके परियोजना लक्ष्यों को प्रभावित कर सकते हैं; और उन जोखिमों को कम करने के लिए उचित उपायों को अपनाने के लिए उ मदद मिलेगी। भारत में कार्यरत विदेशी निर्माण फर्मों की धारणा के आधार पर इस अध्ययन के निष्कर्ष निकाले गए हैं। इस अध्ययन ने भारत में विदेशी निर्माण फर्मों की ओर जोखिम के रास्तों की पहचान करके योगदान दिया है और भारतीय संदर्भ में उनकी प्रयोज्यता के संबंध में व्यापक जोखिम शमन उपायों का मूल्यांकन भी किया है।

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