

**CRITICAL SUCCESS FACTORS FOR CONSTRUCTION
ORGANIZATIONS IN INDIA**

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**CRITICAL SUCCESS FACTORS FOR CONSTRUCTION
ORGANIZATIONS IN INDIA**

by

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CERTIFICATE

This is to certify that the thesis entitled “**Critical Success Factors for Construction Organizations in India**”, being submitted by **Mr. Kamalendra Kumar Tripathi** 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 my supervision and guidance. The thesis work, in my 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.

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ABSTRACT

Ensuring success in the construction business is the aim of the owners and top management of construction organizations. Previous research indicates that the presence of certain factors in an organization makes it more successful than organizations without those factors. Because the construction business is one of the riskiest businesses in the world, the identification of such factors and adoption of these factors in the work ethic of the company is of vital importance for the owner/top management. Also, like any other organization, it has become essential for organizations in the construction industry to measure their performance effectively for long-term survival in today's competitive business environment. Therefore, it is imperative for a construction organization to know about various performance measurement factors to evaluate its performance.

Traditionally, construction organizations with a track-record of successful project completion have been considered to be successful construction organizations. However, while construction projects may have been successful, it is not always the case that the construction organization is also successful. They may even fail and go bankrupt in the near future. Therefore, there is a need to think about the success of a construction organization at a corporate level, rather than focusing only on success at the project level. Although the identification of success factors at the project level has been studied, it has not been investigated properly at the organization level. Therefore, it is important to identify the relevant factors for the success of construction at the level of the organization.

This study presents the factors that contribute to the success of construction organizations that operate in India. The research method involved seeking responses from experts in the construction industry through a questionnaire survey. A total of 106 experts

from 90 different organizations were included in the survey. Factor analysis and structural equation modeling of responses, which were related to 30 success attributes, enabled the extraction of five significant success factors, which are: *experience and performance, top management competence, supply chain and leadership, availability of information flow and resources, effective cost control measures*. Similarly, the factor analysis and structural equation modeling of responses that were related to 20 performance attributes enabled five significant performance factors to be extracted: *profitability and asset management, satisfaction of key stakeholders, predictability of cost and time, environment, health, and safety (EHS), and quality consciousness*. The top management's competence emerged as the most critical success factor when stepwise regression analysis of the success factors was performed against various performance factors. The relative weights of each success and performance factor were assigned using a fuzzy preference relation, for which the opinions of 18 experts from 18 different construction organizations were sought. These relative weights were used to develop a computer program in VB.net to measure the success of the construction organizations against various performance factors.

The outcomes of the study will help construction organizations to efficiently manage their resources and to develop a strategy to help them succeed in the construction business. They could provide excellent value addition to professionals working in the field of construction management, by enabling them to focus on fewer factors rather than attending to numerous factors for the optimum result. The identification of success factors will provide an opportunity for construction organizations to enhance their success by addressing weak or problem areas, the significance of which was not previously known to them.

सारांश

निर्माण व्यवसाय में सफलता सुनिश्चित करना मालिकों और निर्माण संगठनों के शीर्ष प्रबंधन का उद्देश्य है। पिछला शोध इंगित करता है कि संगठन में कुछ कारकों की उपस्थिति उन कारकों के बिना संगठनों की तुलना में अधिक सफल बनाती है। चूंकि निर्माण व्यवसाय दुनिया के सबसे जोखिम भरे व्यवसायों में से एक है, ऐसे कारकों की पहचान और कंपनी के कार्य नैतिकता में इन कारकों को अपनाना मालिक / शीर्ष प्रबंधन के लिए अत्यधिक महत्वपूर्ण है। साथ ही, किसी भी अन्य संगठन की तरह, निर्माण उद्योग के संगठनों के लिए आज के प्रतिस्पर्धी कारोबारी माहौल में दीर्घकालिक अस्तित्व के लिए प्रभावी ढंग से उनके प्रदर्शन को मापने के लिए यह आवश्यक हो गया है। इसलिए, एक निर्माण संगठन के लिए अपने प्रदर्शन का मूल्यांकन करने के लिए विभिन्न प्रदर्शन माप कारकों के बारे में जानना जरूरी है।

परंपरागत रूप से, सफल परियोजना पूर्ण होने के ट्रैक-रिकॉर्ड वाले निर्माण संगठनों को सफल माना जाता है। अगर निर्माण परियोजनाएं सफल रही हो तो हमेशा ऐसा संभव नहीं होता कि निर्माण संगठन भी सफल हो। वे असफल हो सकते हैं और निकट भविष्य में दिवालिया भी हो सकते हैं। इसलिए, परियोजना स्तर पर सफलता पर ध्यान केंद्रित करने के बजाय समष्टिगत स्तर पर निर्माण संगठन की सफलता के बारे में सोचने की आवश्यकता है। हालांकि परियोजना स्तर पर सफलता कारकों की पहचान का अध्ययन पहले किया गया है, लेकिन संगठन स्तर पर इसकी पहचान ठीक से नहीं की गई है। इसलिए, संगठन के स्तर पर निर्माण की सफलता के लिए प्रासंगिक कारकों की पहचान करना महत्वपूर्ण है।

यह अध्ययन उन कारकों को प्रस्तुत करता है जो भारत में संचालित निर्माण संगठनों की सफलता में योगदान देते हैं। इस शोध को करने में निर्माण उद्योग के विशेषज्ञों से प्रश्नावली सर्वेक्षण के माध्यम से प्रतिक्रिया मांगी गयी थी। सर्वेक्षण में ९० विभिन्न संगठनों के कुल 106 विशेषज्ञ शामिल किए गए थे। जब ३० सफल विशेषताओं का विश्लेषण 'कारक विश्लेषण' और 'संरचनात्मक समीकरण प्रतिरूपण' (ऐस.सी.एम) द्वारा किया गया तो ५ महत्वपूर्ण सफल कारक उद्धरित हुए, जिनके नाम: 'अनुभव और प्रदर्शन', 'शीर्ष प्रबंधन क्षमता', 'आपूर्ति श्रृंखला और नेतृत्व', 'सूचना प्रवाह और संसाधनों की उपलब्धता', 'प्रभावी लागत नियंत्रण उपाय' है। इसी प्रकार, 20 प्रदर्शन विशेषताओं का विश्लेषण 'कारक विश्लेषण' और 'संरचनात्मक समीकरण प्रतिरूपण' द्वारा किया गया तो ५ महत्वपूर्ण प्रदर्शन कारक उद्धरित हुए, जिनके नाम: 'लाभप्रदता और संपत्ति प्रबंधन', 'प्रमुख हितधारकों की संतुष्टि', 'लागत और समय का पूर्वानुमान', 'पर्यावरण, स्वास्थ्य और सुरक्षा' (ई.एच.एस), और 'गुणवत्ता की चेतना'। 'शीर्ष प्रबंधन की क्षमता' सबसे महत्वपूर्ण सफलता कारक के रूप में उभरी जब सफलता कारकों के चरणबद्ध प्रतिगमन विश्लेषण विभिन्न प्रदर्शन कारकों के साथ किया गया। प्रत्येक सफलता और प्रदर्शन कारक के सापेक्ष वजन को एक 'अस्पष्ट वरीयता संबंध (एफ़.पि.आर)' का उपयोग करके निर्धारित किया गया था, जिसके लिए 18 विभिन्न निर्माण संगठनों के 18 विशेषज्ञों की राय मांगी गई थी। विभिन्न प्रदर्शन कारकों के सापेक्ष वजनों का उपयोग करके निर्माण संगठनों की सफलता को मापने के लिए वीबी. नेट द्वारा एक कंप्यूटर प्रोग्राम विकसित किया गया।

अध्ययन के नतीजे, निर्माण संगठनों को कुशलतापूर्वक अपने संसाधनों का प्रबंधन करने और निर्माण व्यवसाय में सफल होने के लिए एक रणनीति विकसित करने में मदद करेंगे। अध्ययन के नतीजे निर्माण प्रबंधन के क्षेत्र में काम कर रहे पेशेवरों के लिए उत्कृष्ट मूल्यवर्धन प्रदान कर सकते हैं, जिससे उन्हें अनुकूलतम परिणाम के लिए कई कारकों में ध्यान देने के बजाय कम कारकों पर ध्यान केंद्रित करना पड़े। सफलता कारकों की पहचान निर्माण संगठनों को कमजोर या समस्या क्षेत्रों को संबोधित करके अपनी सफलता को बढ़ाने के लिए अवसर प्रदान करेगी, जिसका महत्व पहले उन्हें ज्ञात नहीं था।

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LIST OF ABBREVIATION

AHP	Analytical Hierarchy Process
AMOS	Analysis of Moment Structure
ANN	Artificial Neural Network
ANP	Analytical Neural Process
BAI	Builders Association of India
BLK	B.L. Kashyap
CAAR	Compounded Annual Growth Rate
CB	Covariance Based
CCCL	Consolidated Construction Consortium Ltd
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CFPR	Consistent Fuzzy Preference Relation
CIDC	Construction Industry Development Council
CIL	Coal India Limited
CPWD	Central Public Works Department
CREDAI	Confederation of Real Estate Developers Association of India
CSF	Critical Success Factor
DEA	Data Envelopment Analysis
ECVI	Expected Cross Validation Index
EHS	Environment, Health, and Safety
ENR	Engineering News Record
EPC	Engineering, Procurement, and Construction
EPS	Earnings per Share

ESRC	Economic and Social Research Council
FDI	Foreign Direct Investment
FPR	Fuzzy Preference Relation
GDP	Gross Domestic Product
GFI	Goodness of Fit Index
GOF	Goodness of Fit
HR	Human Resource
IFI	Incremental Fit Index
INR	Indian Rupees
IPO	Initial Public Offering
ISO	International Organization for Standardization
IT	Information Technology
KMO	Kaiser-Meyer-Olkin
KPI	Key Performance Indicator
L&T	Larsen and Toubro
MES	Military Engineering Services
MPR	Multiplicative Preference Relation
MR	Multiple Regression
NCR	National Capital Region
NTPC	National Thermal Power Corporation
OE	Organizational Effectiveness
P/E	Price to Earning
PF	Performance Factor
OHS	Occupational Health and Safety
OHSAS	Occupational Health and Safety Assessment Series

OHSMS	Occupational Health and Safety Management System
OLIS	Ownership, Locational, Internalization, and Speciality
PLS	Partial Least Square
PMC	Project Management Consultants
PWD	Public Works Department
QMS	Quality Management System
RII	Relative Importance Index
RMSEA	Root Mean Squared Error of Approximation
ROA	Return on Assets
ROC	Return on Capital
ROE	Return on Equity
SCO	Shop Cum Offices
SEM	Structural Equation Modeling
SF	Success Factor
SMART	Simple Multi-Attribute Rating System
SRCC	Spearman's Rank Correlation Coefficient
STV	Subject to Variable
SWOT	Strengths, Weaknesses, Opportunities and Threats
TLI	Tucker-Lewis Index
TQM	Total Quality Management
UIL	Unity Infraprojects Limited
UK	United Kingdom
US	United States
USA	United States of America
VB	Variance Based
VP	Vice President