

# Development of International Project Risk Index (IPRI)

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**Abstract:** Since the mid-2000s, Korean large-sized construction companies have pursued in earnest to expand their business to global construction market in surroundings that domestic market have a continuous and long-term stagnation. However, during last a few years, they have experienced the serious financial loss from international projects. In the meantime, for the sound improvement of Korean construction industry, many stakeholders long for efficient early warning signals to generally monitor and track the potential risks of international projects. In this study, we introduce an International Project Risk Index (IPRI), which is derived from massive data provided by large-sized companies, and expect to provide the practitioners and decision makers as an aid to proactively cope with the change of the potential risks. The outcomes from the IPRI can be utilized to prepare a timely management strategy and to establish an appropriate government support regulation.

**Keywords:** early warning signals, International Project Risk Index (IPRI), Korean construction industry

## I. INTRODUCTION

Korean construction market is still in the long-term stagnation since the early and mid 2000s. Concurrently, global construction market is increasingly expanded and Korean large-sized construction companies have more opportunities to obtain the orders (Kim, 2013). Unfortunately, many companies have experienced large financial loss from international projects during the last a few years (Lee and Yoo, 2013). This has negatively impacted on the company operation and forced the decision makers to look for effectively monitoring aids to support the appropriate response. However, there are few approaches that they can utilize in assisting a decision for strategic and timely management. Also, in spite of the efforts of the Korean government's financial and regulatory support, large-sized construction companies are autonomously seeking for an efficient plan to minimize the potential loss and to maximize a chance to achieve the planned profit.

## II. OBJECTIVES AND SCOPE

This study introduces one of realistic monitoring indicators, called the International Project Risk Index (IPRI), which was derived from the massive project progress data and reliable reports published by the Financial Supervisory Service. The data is covered from 1998 to 2015 year and extracted from 500 pdf files of companies' financial statements with a data mining technique. The IPRI points out the trend of potential risks involved in ongoing international projects at a specific quarter, and can be classified into 11 categories under the considerations of project types, regions, and project sizes. The project types are defined as buildings, infrastructure, plant/power, and others. The regions fall into three categories such as Middle East and Africa (MENA), Asia Pacific, and America/Europe. Also, project sizes are subdivided into the less than \$0.1 billion, between \$0.1 and

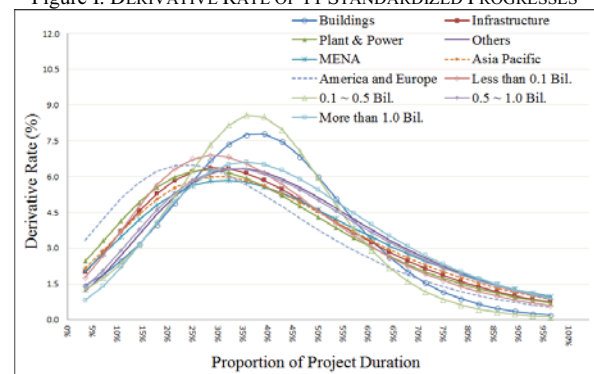
\$0.5 billion, between \$0.5 and \$1.0 billion, and more than \$1.0 billion. In this study, the standardized progress plan for projects in these categories was derived from the high-quality historical progress data. The presented IPRI is intended to monitor proactively and quantitatively the amount of the potential risks derived from the ongoing projects and to support the realistic policies in the government level. The primary goal of the IPRI is to encourage the Korean construction companies to expand and diversify their market domain.

## III. OUTCOMES AND EXPLANATION OF THE IPRI

### A. Concept of the IPRI estimate

The IPRI is oriented and estimated by the gap between the standardized progress and actual data. The standardized progress for 11 categories was produced from 296 historical projects that were finished at or around the initially planned completion time. As presented in Figure I, the standardized progresses are slightly skewed to the left. This implies that most of the completed projects are speedily progressed at the early period and that the characteristic of the project duration pressured by the clients has been reflected on the skewed curves.

Figure I. DERIVATIVE RATE OF 11 STANDARDIZED PROGRESSES



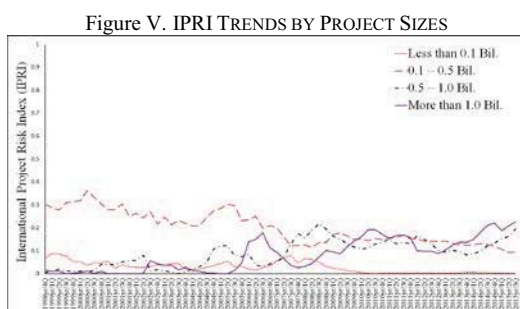
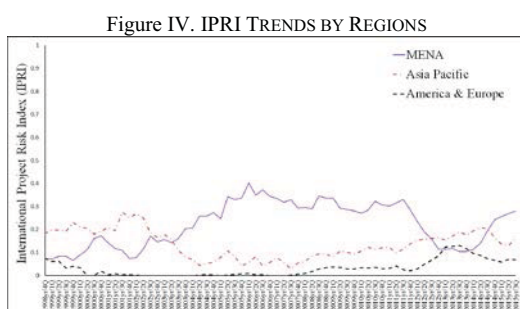
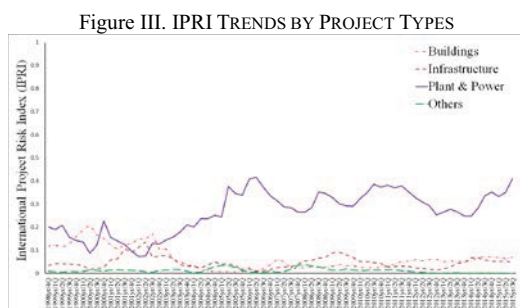
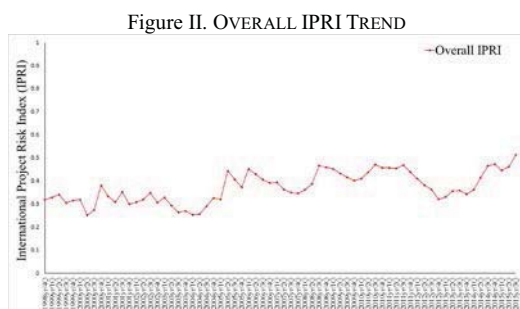
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Using these curves, we have computed the IPRI with the actual progress data both of the completed and ongoing projects at a specific period.

### B. Results of the IPRI

We presented the overall IPRI and the IPRI trends for 11 categories. The IPRI of each large-sized company can be in addition estimated, but blinded due to its own confidentiality. Figure II and Figure III furnishes the overall IPRI and the IPRI trends about buildings, infrastructure, power/plant, and other types. Figure IV provides the outcomes of MENA, Asia Pacific, and America/Europe. Finally, Figure V shows the practitioners and decision-makers with the IPRI trends according to the project size, which has been classified with four groups.

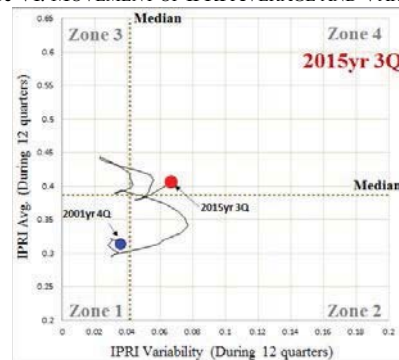


Based on these IPRI trends, power/plant projects with more cost than 0.5 billion in the MENA need to be promptly managed by the proactive response and strategy. Also, the absolute value of the IPRI on y-axis is gradually increasing, and this indicates that the advanced risk management capability is systematically required.

### C. Perspectives through the IPRI

Figure VI presents the tracking of the average and standard deviation values of the IPRI during each 12 quarters. From 4<sup>th</sup> quarter in 2001, these values are moving to the Zone 4, which means the case that absolute size gets bigger and the fluctuation is larger. Most of construction companies need to avoid the Zone 4, and make greater efforts for moving to the Zone 1. There are the diverse factors to cause the increasing and change of the IPRI in executing projects. Also, construction companies have a limitation to find and eliminate all internal and outer risk factors. However, quickly recognizing the size and variability of the potential risks is possible by the developed IPRI.

Figure VI. MOVEMENT OF IPRI AVERAGE AND VARIATION



## IV. IMPLICATIONS

This study introduced the IPRI that can be usefully applied to monitoring and tracking the potential risks in the industry level. The construction companies can utilize it to timely management strategy and the construction-related governments can employ the outcomes to establish an effective and valid financial support policy and regulatory. In summary, the results have the potentials to provide project managers or decision makers with quantitative early warning signals for helping them take a timely management action, and to assist the governments in establishing the realistic financial support plans.

## REFERENCES

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