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Research on competency model of project manager Under EPC mode

（Thesis submitted for the degree of Executive Doctorate in Business Administration）

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ABSTRACT

The EPC general contracting model first appeared in the United States in the 1980s, and is one of the main contracting methods for large-scale engineering projects. In order to gain greater advantages in the fierce international competition, more and more enterprises are adopting the EPC general contracting model to promote project implementation. In China, the EPC general contracting model has also been widely applied and promoted, becoming an important model for engineering general contracting enterprises to gain competitive advantages in the market. With the widespread application of the EPC general contracting model and the increasing market demand, enterprises are facing an increasingly severe competitive environment. In order to stand out in this competition, enterprises need to continuously improve their technical and management capabilities. In terms of management, enterprises need to have a high-quality management team with advanced production technology and management capabilities. Analyzing the competency characteristics of project managers is one of the key issues in the EPC general contracting model project management system, as project managers play an important role in the overall project performance. Studying its composition and structure has important theoretical and practical significance for improving project success rate and management efficiency.

Under the EPC general contracting model, project managers, as a special group of project managers, not only need to meet the knowledge and skills requirements of general project managers, but also must possess other specific knowledge and skills. These specific knowledge and skills include a deep understanding and mastery of engineering design, procurement, construction, and investment, as well as familiarity with relevant laws, regulations, and standards. Therefore, when selecting project managers under the EPC general contracting model, the requirements are stricter and the standards are higher. However, there is currently no systematic research on the competency requirements and standards for project managers in the EPC general contracting model. Therefore, for enterprises, attention should be paid to summarizing the competency requirements and standards of project managers

under the EPC general contracting model through in-depth research on relevant literature and practical cases, in order to guide the selection and training of project managers in enterprises. This article aims to provide a new theoretical framework and methodological system for the selection, appointment, reeducation, and self-career planning of project managers in the future EPC general contracting model.

This article analyzes and summarizes the relevant theories of competence, introducing systems theory, personality trait theory, person job matching theory, and individual organization matching theory. After summarizing the basic theories and research methods of competency models, this article further analyzes the construction approaches, data collection methods, model testing methods, and their predictive effects on project performance of competency models. This article adopts the key event interview method to design and develop a competency survey questionnaire based on behavioral description. Exploratory factor analysis is used to extract competency features and establish a competency model. Subsequently, confirmatory factor analysis was used to test the construct validity of the competency model. Finally, the project performance variable is introduced to test the effectiveness of the competency model and project performance rules, in order to verify whether the obtained competency model can have a predictive effect on project performance. The purpose of this study is to improve the theoretical framework of the competency model and explore its practical application value, providing support for enterprises to improve their human resource management level and promote organizational innovation and development.

This article designs an initial questionnaire based on relevant literature and key event interview results, aiming to explore the competency characteristics of project managers in the EPC general contracting mode. There are a total of 24 items that reflect the competency characteristics required for the position of project manager in the EPC general contracting mode. For preliminary valid questionnaire data, project analysis and exploratory factor analysis methods are used to extract and identify key competency factors. The competency model for project managers in the EPC general contracting model consists of 4 dimensions and 22 competency characteristics. The reliability analysis of the initial questionnaire also showed good overall and hierarchical reliability. Based on a formal questionnaire, an

empirical survey was conducted on on-the-job EPC general contracting mode project managers. Based on the results of exploratory factor analysis, a competency dimension model for EPC general contracting mode project managers was established. To further validate the accuracy and reliability of the model, confirmatory factor analysis was used to test multiple models. The fit between the empirical data and the constructed model is good, indicating that the four-dimensional models (comprehensive quality, management ability, interpersonal relationships, and basic skills) are aggregated at a higher level into the competency factors of project managers in the EPC general contracting mode. On the basis of the four-dimensional models, a multi factor oblique intersection model and a second-order model were also established to verify the dimensions and relationships of competency from different perspectives. The research results confirm that there are indeed four important dimensions of project manager competency in the EPC general contracting model, and provide theoretical support and empirical basis for different types of competency models. The confirmatory factor analysis results also show that:

1) The EPC general contracting mode project manager competency model is composed of four dimensions: comprehensive quality, management ability, interpersonal relationship, and basic skills, which have an impact on it. The degree of influence of these four dimensions on competency is in descending order: interpersonal relationship, basic skills, comprehensive quality, and management ability.

2) In the dimension of interpersonal relationships, the degree of influence of each competency characteristic on competency is in descending order: team building, service spirit, relationship building, organizational coordination, listening, and affinity.

3) In the dimension of basic skills, the degree of influence of each competency characteristic on competency is in descending order: project management knowledge, experience and experience, professional basic knowledge, and foreign language ability.

4) In the dimension of comprehensive quality, the degree of influence of each competency characteristic on competency is in descending order: professional ethics and industry standards, pressure and atmosphere management, achievement orientation, physical fitness,

flexible innovation, and adaptability.

5) In the dimension of management ability, the degree of influence of each competency characteristic on competency is in descending order: risk resistance ability, system thinking and integration ability, communication ability, decision-making ability, conflict management ability, influence and motivation ability, and negotiation ability.

In the EPC general contracting model, the selection of project managers and performance management are crucial for the success of the project. By comparing the similarities between project management and competency performance management, it was found that both emphasize achieving project goals and maximizing benefits. Therefore, it can be considered that the selection and performance management of EPC project managers are closely related to project management, and project management theory should be used to guide and practice. This article conducts a study on the performance standards of EPC general contracting mode projects. Based on literature review and survey research results, it is concluded that this standard should be composed of 7 factors in total from two dimensions: management performance and organizational performance. Among them, management performance includes meeting quality standards, completing according to budget, meeting safety management requirements, and completing the project within the agreed time. On the other hand, organizational performance includes good social relationships, more opportunities for cooperation, and alignment with organizational strategy. By establishing such project performance standards, project management can be effectively combined with organizational goals, thereby better achieving project goals and promoting organizational development. On the basis of project performance evaluation standards, an EPC general contracting project manager competency project performance model was established. Based on questionnaire survey data, structural equation model calculations were conducted, and the results showed that:

1) Management performance is more effective in reflecting project performance than organizational performance;

2) In the management performance dimension, the degree of impact of each element on

project performance is in descending order: completion within budget, completion within agreed time, compliance with quality standards, and compliance with safety management requirements;

3) In the dimension of organizational performance, the impact of each element on project performance is ranked in descending order: in line with organizational strategy, good social relationships, and more opportunities for cooperation.

4) The EPC general contracting model project manager competency model established in this article has a predictive effect on project performance and a significant impact on high project performance.

Keywords: EPC General Contracting Mode, Project Manager, Competency, Competency Model, Project Performance

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