

# **ICCREM 2020**

## **Intelligent Construction and Sustainable Buildings**

Proceedings of the International Conference on Construction and Real Estate Management 2020

Stockholm, Sweden  
24 – 25 August 2020

### **Editors:**

**Yaowu Wang**  
**Thomas Olofsson**  
**Geoffrey Q. P. Shen**

ISBN: 978-1-7138-1952-3

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

Copyright© (2020) by American Society of Civil Engineers  
All rights reserved.

Printed with permission by Curran Associates, Inc. (2020)

For permission requests, please contact American Society of Civil Engineers  
at the address below.

American Society of Civil Engineers  
1801 Alexander Bell Drive  
Reston, VA 20191  
USA

Phone: (800) 548-2723  
Fax: (703) 295-6333

[www.asce.org](http://www.asce.org)

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2633  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# Contents

## *Intelligent Construction and Construction Informatization*

<b>Construction Industry Credit Dynamic Monitoring and Credit Repair .....</b>	<b>1</b>
Zhe Song and Yaowu Wang	
<b>Quality of Time-Dependent Data Segments of Experiments on Thermal Sensation Using Immersive Virtual Environments.....</b>	<b>8</b>
Girish Srivatsa Rentala and Yimin Zhu	
<b>Lifting Path Planning of Mobile Cranes Based on RRT Algorithm .....</b>	<b>22</b>
Ying Zhou, Endong Zhang, and Hongling Guo	
<b>Identifying the Impact Factors of BIM Cross-Organizational Collaborative Innovation.....</b>	<b>30</b>
Xiaoying He, Weirui Xue, Xiaolong Xue, and Liang Wang	
<b>Automation in Extraction and Sharing Information between BIM and Project Management Databases .....</b>	<b>37</b>
Lingzi Wu, Zuofu Li, and Simaan Abourizk	
<b>Construction Workers' Behavior Assessment Using 3D Visualization and Fuzzy Logic Method.....</b>	<b>47</b>
Jingwen Wang, Xinming Li, SangHyeok Han, and Mohamed Al-Hussein	
<b>Risk Prediction of Expressway PPP Project Based on PSO-SVM Algorithm .....</b>	<b>55</b>
Azhi Wan and Jun Fang	
<b>Comprehensive Design Collaborative Dynamic Mechanism and Owner Incentive .....</b>	<b>64</b>
Jun Fang, Dingyuan Wu, and Yue Zhai	
<b>Optimum Design of Construction Site Layout Based on SLP Method and Genetic Algorithm .....</b>	<b>71</b>
Wenle Lai, Yan Fu, Rongyan Li, and Jingjun Lin	
<b>Investment Risk Assessment Method of PPP Project Based on QPSO-LSSVM .....</b>	<b>84</b>
Yue Zhai, Jun Fang, and Xiaolong Zhang	
<b>Reflection on Intelligent Construction Based on BIM: Take a Residential Building as an Example .....</b>	<b>93</b>
Fei He, Yangzhi Yan, and Kunhui Ye	
<b>Application Research of BIM in Prefabricated Building Information Cooperation of China.....</b>	<b>100</b>
Yangzhi Yan, Fei He, Haoyu Li, and Kunhui Ye	

<b>An Algorithm for Optimizing the Location and Type Selection of Attached Tower Cranes Based on Value Engineering</b> .....	<b>106</b>
Jingjun Lin, Yan Fu, Rongyan Li, and Wenle Lai	
<b>Calgary Low Density Residential Infill Development Strategy Analysis</b> .....	<b>118</b>
Ning Han	
<b>Research on Evaluation Model for Urban Intelligent Transport System</b> .....	<b>129</b>
Fengping Xue and Bo Xue	
<b>Safety Risk Assessment of Bridge Construction Based on Risk Coupling Mechanism</b> .....	<b>140</b>
Xiaopeng Ren and Junwu Wang	
<b>Research on Disaster Risk Assessment of Deep Foundation Pit Engineering Based on Grey Clustering</b> .....	<b>148</b>
Huan Qiao and Junwu Wang	
<b>Research on Risk Evaluation Index System of City Regional Railway Operation Safety Based on SEM</b> .....	<b>155</b>
Liuqun Dong and Xian Liu	
<b>Simulating the Lighting Electricity Consumption of Hotel Building: A Case from China</b> .....	<b>163</b>
Xingshuo He, Yu Yang, and Yuan Chang	
<b>Analysis of the Influence of Age on Human Thermal Comfort</b> .....	<b>170</b>
Boshuai Dong, Chunjing Shang, Ming Tong, and Jianhong Cai	
<i>Green Construction and Sustainable Buildings</i>	
<b>Research on Safety Evaluation of Prefabricated Building Construction Based on Analytic Hierarchy Process</b> .....	<b>177</b>
Bo Li, Yaowu Wang, and Yuanxin Lu	
<b>Optimizing Allocation for Emergency Resources in Natural Disasters</b> .....	<b>184</b>
Ruining Ma and Qingpeng Man	
<b>Process Platforms for Onsite Assemblies: A Case Study of Work Break Down Structures in SMEs</b> .....	<b>190</b>
Raafat Hussamadin, Alexander Holm, Sofia Riglert, Linn Ramos B. Blidstål, and Gustav Jansson	
<b>Combining a Ground Floor Timber Structure with a Modular Building System in Urban Environments</b> .....	<b>198</b>
Emanuel Johansson, Linus Andersson, Wiktor Dahlbom, and Gustav Jansson	

<b>Public Art, Public Sphere, and Urban Development in the Chinese Metropolis .....</b>	<b>206</b>
Han Cheng, Julian Worrall, and Amit Srivastava	
<b>Research on Chinese Brand Building of Major Projects under the Background of the Belt and Road.....</b>	<b>216</b>
Xuetong Wang, Jiayi Xiao, and Dixi Xian	
<b>Barriers Affecting the Adoption of Green Building Technologies: Architects’ Perspectives .....</b>	<b>224</b>
Singsing Wong and Yenching Voon	
<b>Building Energy Efficiency Related Knowledge Mining Based on Natural Language Processing.....</b>	<b>231</b>
Dingyuan Ma, Bingqing Zhang, and Xiaodong Li	
<b>Research on Ultra-Low Power Energy-Saving Green Buildings Pluripotent Complementary Measures .....</b>	<b>238</b>
Xiaoxin Ding, Kai Liu, Wen Shi, and Xiaoyu Wang	
<b>Research on the Application of Low Impact Development in Green Infrastructure.....</b>	<b>249</b>
Chao Wang	
<b>Investigating the Critical Success Factors for Small Contractors to Implement Sustainable Construction .....</b>	<b>255</b>
Wenque Liu, Ming Shan, Bongang Hwang, and Junming Lye	
<b>Study on Frost Resistance of Recycled Aggregate Concrete Mixed with Rubber Powder .....</b>	<b>262</b>
Lin Tian	
<b>Critical Factors Identification of New-Type Community Governance in the Context of Rural Revitalization Strategy in China.....</b>	<b>268</b>
Guobin Wu, Xueli Zhang, Ling Li, and Bingsheng Liu	
<b>Assessment for Safety Capacity of Metro Construction Workers Based on SPA .....</b>	<b>275</b>
Xuting Chen and Junwu Wang	
<b>Study on Game Model of Risk Sharing in PPP Project of Underground Pipe Gallery .....</b>	<b>284</b>
Zhenwu Shi and Yingqi Song	
<b>Research on the Strategy of Rural Toilet Reconstruction in Heilongjiang Province Based on the Concept of Sustainable Development.....</b>	<b>294</b>
Shuhong Zhang and Mengxi Gao	

<b>An Optimization Model of Population Distribution from the Perspective of Sustainable Development</b> .....	<b>304</b>
Chen Lu and Zhiwei Yu	
<b>Perception and Acceptance of Sponge Campus Renovations: A Survey Based Analysis from China</b> .....	<b>314</b>
Yanfen Wang and Yuan Chang	
<b>A BIM-LCA Integrated Environmental Impact Assessment for Prefabricated Concrete Residential Buildings</b> .....	<b>321</b>
Zhiye Huang, Jingliang Xu, and Yuan Song	
<b>Literature Review on Determining Criteria of Optimal City Scale</b> .....	<b>330</b>
Yanju Liang and Zhiguo Gao	
<b>Research Progress and Enlightenment on Urban Space Mismatch</b> .....	<b>337</b>
Jiao Yang, Deheng Zeng, and Panpan Xu	
<b>Effects of City Scale’s Expansion on Urban Residents’ Income Growth: Based on the Empirical Evidence of CHIP 2009</b> .....	<b>353</b>
Yanju Liang and Zhiguo Gao	
<i>Project Management and Construction Industrialization</i>	
<b>Literature Characteristics and Knowledge Mapping Analysis of Domestic Prefabricated Construction Buildings Research</b> .....	<b>360</b>
Ying Li and Qingpeng Man	
<b>Construction Progress Control System of Assembled Building Based on BIM</b> .....	<b>368</b>
Tianqi Zhang and Qingpeng Man	
<b>Evaluating the Critical Failure Factors for Implementing Residential Modular Integrated Construction Projects</b> .....	<b>379</b>
Ibrahim Yahaya Wuni and Geoffrey Qiping Shen	
<b>Research on Government Regulation of Prefabricated Construction Building Promotion Process Based on Evolutionary Game Theory</b> .....	<b>390</b>
Xiaoqian Liu, Shoujian Zhang, Dawei Li, and Tao Yao	
<b>Subject Model of Public Engineering Project Based on Tripartite Game</b> .....	<b>399</b>
Ruijie Qiu, Shoujian Zhang, Zhi Sun, and Shenwu Yang	
<b>The Bibliometric Analysis of Prefabricated Construction Buildings in China Based on the CNKI’s Documents</b> .....	<b>405</b>
Cheng Chen and Liangbao Li	
<b>Capacity Building for the Major Infrastructure System</b> .....	<b>410</b>
Ting Luo, Xiaolong Xue, and Weirui Xue	

<b>The Guarantee System for the Smooth Shifting of Mega-Projects from Construction to Operation: Evidence from the Hong Kong-Zhuhai-Macao Bridge Project in China .....</b>	<b>418</b>
Minggong Zhang, Xiaolong Xue, and Jinwen Zhang	
<b>Financial Impact Assessment of Construction Delay in BOT Infrastructure Projects .....</b>	<b>425</b>
Supattaradech Kasemsukh and Nakhon Kokkaew	
<b>Modelling an Extension Decision of BOT Transportation Infrastructure: A Risk-Adjusted Approach.....</b>	<b>435</b>
Nakhon Kokkaew and Apichai Rakprasong	
<b>Have the Ideas Been Deliberated or Dictated? Group Decision Making in Construction Project Management .....</b>	<b>445</b>
Fock-kui Kan and Abdul-Ghani Khalid	
<b>The Applicability Assessment of Current Construction Quality and Safety Standards to PC Building .....</b>	<b>453</b>
Yikun Su, Yanwei Yang, Dawei Li, and Tao Yao	
<b>Research Status and Trend Analysis of Complex Engineering Risk Management under Complexity Perspective .....</b>	<b>459</b>
Shuling Chen, Xuan Qin, and Ren Qiao	
<b>Research on Social Capital's Participation in the Construction Mode and Risk of Affordable Housing .....</b>	<b>471</b>
Jingyu Zheng and Wei Wang	
<b>A Case Study on BIM-Enabled Operation and Maintenance Management for Rail Transit Projects in China .....</b>	<b>478</b>
Zhujing Zhang, Guangbin Wang, Zhefeng Zhou, Xiaoyu Wang, and Min Zhu	
<b>The Relationship between Fixed Asset Investment and Economic Growth of Three Industries in Shenzhen .....</b>	<b>487</b>
Yumin Shu, Rui Wang, and Zhongying Qi	
<b>Study on Procurement Supplier Selection of Engineering Project under Supply Chain Environment .....</b>	<b>494</b>
Hui Wang	
<b>Research on Government Compensation Mechanism of Public Rental Housing in Public Private Partnership Mode .....</b>	<b>501</b>
Ruolin Qi, Zuwu Shen, and Junwu Wang	
<b>Study on Reasonable Investment Income Interval of Sewage Treatment PPP Projects .....</b>	<b>513</b>
Hui Wei, Jun Fang, and Jun Hu	

<b>Research on Supervision and Incentive Strategy of Infrastructure PPP Project in the Yangtze River Economic Zone .....</b>	<b>522</b>
Hui Huang and Jun Fang	
<b>Influence of Governmental Governance Maturity on Megaproject Performance .....</b>	<b>531</b>
Zhao Zhai and Ming Shan	
<b>Defining Vulnerability of Complex Construction Projects from the Wittgenstein Family-Resemblance Philosophy .....</b>	<b>538</b>
Ren Qiao, Xuan Qin, and Shuling Chen	
<b>Project Management Strategies to Improve Productivity: Case of Singapore .....</b>	<b>547</b>
Yushan Li, Ming Shan, Bongang Hwang, and Jiaen Chua	
<b>Application Plan of Low-Power Wide-Area Internet of Things Technologies in Prefabricated Building Construction .....</b>	<b>554</b>
Zhansheng Liu, Yu Chang, and Shuangcheng Liu	
<b>Research on Restricting Factors and Countermeasures on the Promotion of Prefabricated Construction in China .....</b>	<b>568</b>
Xueshan Sun and Lipeng Wei	
<b>Analysis of the Evolutionary Equilibrium Strategy of Infrastructure Engineering Safety Supervision Based on Prospect Theory .....</b>	<b>574</b>
Yi Wu	
<i>Construction Industry and Knowledge Management</i>	
<b>Research on Evaluation of Building Construction Safety Supervision Ability of Third-Party Enterprise under Purchase Service Mode.....</b>	<b>583</b>
Yang Yang, Shoujian Zhang, Zhi Sun, and Shenwu Yang	
<b>Research on the Efficiency Evaluation of Beijing Real Estate Industry Based on Improved DEA Model.....</b>	<b>592</b>
Xiaowen Sun and Lixin Sun	
<b>Intrinsic Factors Influencing the Bid/No-Bid Decision of Pakistani Contractors .....</b>	<b>602</b>
Ahsen Maqsoom, Iram Shaheen, Hassan Asshraf, Hafiz Zahoor, and Sufian Younas Khan	
<b>Factors Causing the Time Delay in Projects: Empirical Evidence from Pakistani Construction Industry .....</b>	<b>611</b>
Ahsen Maqsoom, Muhammad Umer, Rafiq Muhammad Choudhry, Hafiz Zahoor, and Mubeenul Basharat	
<b>Cause, Effect, and Alleviation of Stress for Project Management Practitioners in the Built Environment: A Conceptual Framework .....</b>	<b>622</b>
Xiaohua Jin, Sepani Senaratne, Srinath Perera, Ye Fu, and Luke Antala	



<b>Emotional Factors on Residential Well-Being in Densely Populated Cities .....</b>	<b>632</b>
Xintong Wei, Guangtian Zou, and Kin Wai Michael Siu	
<b>Understanding Stakeholders' Concerns of Age-Friendly Communities at Briefing Stage: A China Study .....</b>	<b>639</b>
Liqun Xiang, Tao Yu, Yongtao Tan, Xin Jin, and Geoffrey Shen	
<b>Framework to Investigate Knowledge Sharing through Social Networks in Australian Construction Industry .....</b>	<b>651</b>
Sepani Senaratne, Xiaohua Jin, and Srinath Perera	
<b>Rational Thinking on Land Allocation for Urban Indemnificatory Housing .....</b>	<b>658</b>
Mengya Lv, Ke Lu, and Guomin Li	
<b>Analysis of Influencing Factors of Effective Teaching Evaluation in MOOCS Classroom Based on the DEMATEL Method .....</b>	<b>666</b>
Jingkuang Liu, Xuotong Wang, Dong Wang, Yedang Liu, and Xuezhu Cui	
<b>Influence Relationship between Project Members' Well-Being at Work and Knowledge Sharing Behavior: An Empirical Study from China .....</b>	<b>677</b>
Guodong Ni, Funing Gao, Zhenmin Yuan, Yaning Qiao, Yongliang Deng, and Na Xu	
<b>Research on Production Efficiency of Construction Industry Based on Cobb-Douglas Production Function.....</b>	<b>697</b>
Xingdong Jiao	
<b>Evolutionary Game between Developers and Governments in the Development of BIM Technology .....</b>	<b>704</b>
Yuhan Liu	
<b>Research on Influencing Factors of Construction Enterprise Social Responsibility Behavior Differences in Countries along the Belt and Road.....</b>	<b>712</b>
Xuotong Wang, Guanqiao Zhang, and Dixi Xian	
<b>A Study on the Influencing Factors of Stock Price Change of Real Estate Listed Companies in China.....</b>	<b>719</b>
Ling Chen and Xiuling Ke	
<b>Research on Human Resource Management Innovation of Real Estate Enterprises in the Big Data Era.....</b>	<b>736</b>
Zhenxiang Shi	
<b>Research on Financial Risk Early Warning of Real Estate Enterprises.....</b>	<b>742</b>
Yuqing Zhang and Yanru Gao	
<b>Research on Capital Risk Prevention of Real Estate Enterprises .....</b>	<b>751</b>
Xuejun Hou and Junna Feng	

<b>International Market Selection of Chinese Construction Companies from the Perspective of Cultural Distance .....</b>	<b>758</b>
Ran Gao, Jing Wu, Hao Wang, and Sainan Lyu	
<b>Establishment of Evaluation Index for Creative Cities: Application in Chengdu, China.....</b>	<b>766</b>
Yan Liu and Zixuan Luo	
<b>The Mechanism of Industrial Upgrading to Reduce the Dependence of Economy on Real Estate .....</b>	<b>775</b>
Lin Zhu and Zijing Wu	
<b>The Research on Risk and Management of Real Estate Investment Trusts in China .....</b>	<b>781</b>
Ling Chen, Xiru Huang, and Zhenping Wu	
<b>Study on Evaluation Method of the Total Asset Value of National and Provincial Highway Infrastructure .....</b>	<b>793</b>
Jie Zhu, Ming Chen, and Qianrong Lei	
<b>Study on the Obstacles and Solutions of Small Town Construction .....</b>	<b>804</b>
Feiyan Zhao, Shouguo Chen, and Jiapeng Yang	
<b>Analysis on Safety-Affecting Factors of Prefabricated Construction Projects with Dematel-ISM.....</b>	<b>808</b>
Chao Lu and Junwu Wang	
<b>Neighboring Behavior and Social Adaptation of Low-Income Groups: The Mediating Role of Mental Health.....</b>	<b>815</b>
Xiaoqian Zu, Yongxiang Wu, Yue Wu, Zhenduo Zhang, and Jixiang Wang	
<b>Research on the Brain Drain of Construction Enterprises and Countermeasures .....</b>	<b>824</b>
Aihua Shen, Yingjie Wang, and Xiaozhuang Yang	
<b>Critical Factors for Knowledge Sharing in Communities of Practice.....</b>	<b>832</b>
Meng Wei, Shengyue Hao, and Xu Ren	
<b>Research on Responsive Measurement of Talents Training Mode of Engineering Management Majors in Financial and Economic Universities.....</b>	<b>840</b>
Bin Du, Yulong Li, and Guijun Li	