

27th Annual Conference of the International Group for Lean Construction (IGLC 2019)

Dublin, Ireland
1 – 7 July 2019

Volume 1 of 2

ISBN: 978-1-5108-9927-8

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© (2019) by International Group for Lean Construction (IGLC)
All rights reserved.

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

For permission requests, please contact International Group for Lean Construction (IGLC)
at the address below.

International Group for Lean Construction (IGLC)
www.iglc.net

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
Web: www.proceedings.com

TABLE OF CONTENTS

VOLUME 1

LAST PLANNER® SYSTEM AND PLANNED PERCENT COMPLETE: AN EXAMINATION OF INDIVIDUAL TRADE PERFORMANCES	1
<i>William Power , Darrin Taylor</i>	
CHANGING BEHAVIORS UPSTREAM TO ACHIEVE EXPECTED OUTCOMES	13
<i>Sulyn Gomez, Raymond Huynh, Paz Arroyo, Glenn Ballard, Iris Tommelein , Patricia Tillmann</i>	
IMPROVING THE LEARNING OF DESIGN MANAGEMENT OPERATIONS BY EXPLOITING PRODUCTION'S FEEDBACK: DESIGN SCIENCE APPROACH	25
<i>Joonas Lehtovaara, Olli Seppänen , Antti Peltokorpi</i>	
LEAN DESIGN MANAGEMENT IN A MAJOR INFRASTRUCTURE PROJECT IN UK	37
<i>Bruno Mota, Clarissa Biotto, Athar Choudhury, Simon Abley , Mike Kagioglou</i>	
PROPOSAL OF A MODEL FOR MEASURING VALUE IN THE DESIGN PROCESS	49
<i>Zulay Giménez, Claudio Mourgues, Luis F. Alarcón , Harrison Mesa</i>	
PROJECT VALIDATION – A NOVEL PRACTICE TO IMPROVE VALUE AND PROJECT PERFORMANCE	63
<i>David Grau, Fernanda Cruz-Rios , Rachael Sherman</i>	
AN AHP APPROACH FOR SELECTING AND IDENTIFYING OFF-SITE CONSTRUCTION SYSTEMS	73
<i>Hayyan Zaheraldeen, Hiam Khoury , Farook Hamzeh</i>	
FROM CHECKLISTS TO DESIGN PROCESS SUPPORT SYSTEMS: INITIAL FRAMING	83
<i>Ergo Pikas, Lauri Koskela, Josef Oehmen , Bhargav Dave</i>	
RISK MANAGEMENT IN PROCUREMENT OF BLUE-GREEN ROOFS – A PROJECT OWNER PERSPECTIVE	97
<i>Erlebd Andenaes, Berit Time, Olav Torp, Tore Kvande , Jardar Lohne</i>	
BEST VALUE PROCUREMENT – EXPERIENCES FROM THE EXECUTION PHASE	109
<i>Emil Fløvik Nygård, Paulos Wondimu , Ola Lædre</i>	
BEST VALUE PROCUREMENT FROM A CONTRACTOR POINT OF VIEW	121
<i>Emilie Sofie Lesjø, Paulos Abebe Wondimu , Ola Lædre</i>	
THE PREVAILING PROCUREMENT SYSTEM AS A SOURCE OF WASTE IN CONSTRUCTION: A CASE STUDY	133
<i>Saad Sarhan, Christine Pasquire, Alan Mossman , Alan Hayes</i>	
APPLICATION OF BIM DESIGN MANUALS: A CASE STUDY	145
<i>David Fürstenberg , Ola Lædre</i>	
IDENTIFYING BARRIERS IN LEAN IMPLEMENTATION IN THE CONSTRUCTION INDUSTRY	157
<i>Sevilay Demirkesen, Nadia Wachter, Svenja Oprach , Shervin Haghsheho</i>	
BUILDING A LEAN CULTURE: ENGAGING THE VALUE STREAM	169
<i>Cory Hackler, Erika Byse, Thais Da C. L. Alves , Dean Reed</i>	
DEVELOPING A TOOL TO ASSESS WORKERS' UNDERSTANDING OF LEAN CONCEPTS IN CONSTRUCTION	179
<i>F. R. Hamzeh , R. M Albanna</i>	
TEAM HEALTH: A MEASURED APPROACH TO COLLECTIVE LEARNING	191
<i>Anthony Muñoz, Jean Laurent , Chris Dierks</i>	
PILOTING THE DEPLOYMENT OF ISO 18404 IN THE CONSTRUCTION SECTOR, AN APPROACH TO ORGANISATIONAL TRANSFORMATION	203
<i>Steven A. Ward , Simon Caklais</i>	
CASE STUDY IN THE APPLICATION OF THE LAST PLANNER® SYSTEM	215
<i>Maria Ryan, Christy Murphy , Jason Casey</i>	
INTEGRATED LEAN AND BIM PROCESSES FOR MODULARISED CONSTRUCTION – A CASE STUDY	227
<i>Kevin McHugh, Bhargav Dave , Ray Craig</i>	
COMBINING LEAN AND AGILE PROJECT MANAGEMENT IN A MULTI-PROJECT ENVIRONMENT: CASE STUDY IN A RETAIL COMPANY	239
<i>Douglas C. Hamerski, Carlos T. Formoso, Eduardo L. Isatto , Cristian A. Cevallos</i>	
EFFECTS OF IPD IN NORWAY – A CASE STUDY OF THE TØNSBERG PROJECT	251
<i>Sarah Hermine Fossum Simonsen, Maren Holte Skoglund, Atle Engebø, Bjørn Edmund Varegg , Ola Lædre</i>	

CAPABILITY-BUILDING COMPETITION IN CONSTRUCTION: CASE STUDY REINTERPRETATION.....	265
<i>Peter Berg , Dean Reed</i>	
WHEN A BUSINESS CASE IS NOT ENOUGH, MOTIVATION TO WORK WITH LEAN.....	275
<i>Randi Christensen, Stephen Greenhalgh , Anja Thomassen</i>	
SINGULARITY FUNCTIONS TO ENHANCE MONITORING IN THE LAST PLANNER SYSTEM.....	287
<i>Ali Ezzeddine, Lynn Shehab, Farook Hamzeh , Gunnar Lucko</i>	
COMBINING TAKT PRODUCTION WITH INDUSTRIALIZED LOGISTICS IN CONSTRUCTION.....	299
<i>Müge Tetik, Antti Peltokorpi, Olli Seppänen, Ari Viitanen , Joonas Lehtovaara</i>	
WORK STRUCTURING FOR FLOW.....	311
<i>Nelly P. Garcia-Lopez, Martin Fischer , Luis F. Alarcón</i>	
IMPROVING FLOW IN CONCRETE CONSTRUCTIONS BY AVOIDING SPATIAL CONFLICTS BETWEEN POUR CYCLES.....	323
<i>Paul Häringer , André Borrmann</i>	
ESTABLISHING A LINK BETWEEN THE LAST PLANNER SYSTEM AND SIMULATION: A CONCEPTUAL FRAMEWORK.....	335
<i>Mohammed A. Abdelmegid, Vicente A. González, Michael O'Sullivan, Cameron G. Walker, Mani Poshdar , Luis Fernando Alarcón</i>	
SMART DATA - DEALING WITH TASK COMPLEXITY IN CONSTRUCTION SCHEDULING.....	347
<i>Svenja Oprach, Dominik Steuer, Viktoria Krichbaum , Shervin Haghsheno</i>	
ENTHUSIASM FOR LEAN.....	359
<i>Tom Richert , Joanna McGuffey</i>	
BUILDING AND SUSTAINING A CULTURE WITH A MINDSET FOR DISRUPTIVE PERFORMANCE: A CASE-STUDY FROM BISPEVIKA NORWAY.....	369
<i>Lars Kristian Hunn , Håkon Fyhn</i>	
DIFFUSION OF LEAN CONSTRUCTION IN SMALL TO MEDIUM-SIZED ENTERPRISES OF HOUSING SECTOR.....	383
<i>Mani Poshdar, Vicente A. Gonzalez , Ricardo Antunes, Nariman Ghodrati, Milad Katebi, Stanislaw Valasiuk, Hamzah Alqudah , Saeed Talebi</i>	
THE POWER OF LEAN PRINCIPLES.....	393
<i>John Skaar</i>	
LESSONS LEARNED ON TEACHING CHOOSING BY ADVANTAGES.....	405
<i>Paz Arroyo, Randi Christensen, Annett Schöttle , David Long</i>	
IMPLEMENTING TAKT PLANNING AND TAKT CONTROL INTO RESIDENTIAL CONSTRUCTION.....	417
<i>Joonas Lehtovaara, Iina Mustonen, Petteri Peuronen, Olli Seppänen , Antti Peltokorpi</i>	
BUFFER MANAGEMENT IN TAKT PLANNING – AN OVERVIEW OF BUFFERS IN TAKT SYSTEMS.....	429
<i>Janosch Dlouhy, Marco Binninger , Shervin Haghsheno</i>	
THE BEAUTY OF A PHASE-OVERLAPPING LAST PLANNER SYSTEM® WITH INCORPORATED TAKT.....	441
<i>Annett Schöttle , Claus Nesensohn</i>	
CAN A TAKT PLAN EVER SURVIVE BEYOND THE FIRST CONTACT WITH THE TRADES ON-SITE?.....	453
<i>Otto Alhava, Vili Rinne, Enni Laine , Lauri Koskela</i>	
ORGANISATIONAL AND CULTURAL PRECONDITIONS FOR EXTENDING THE USE OF TAKT-TIME PLANNING.....	467
<i>Lars Andersen , Håkon Fyhn</i>	
TEACHING TARGET VALUE DESIGN: A SIMULATION.....	479
<i>Ganesh Devkar , Jyoti Trivedi , Devanshu Pandit</i>	
SUSTAINABLE TRANSIT-ORIENTED DEVELOPMENT: A ‘TARGET VALUE’ PLANNING & DEVELOPMENT STRATEGY.....	491
<i>Christy P. Gomez , N. Rameson</i>	
USING TVD SIMULATION TO IMPROVE COLLABORATION.....	503
<i>Muktari Musa, Christine Pasquire , Alan Hurst</i>	
DEVELOPMENT AND TESTING OF AN INNOVATIVE ARCHITECTURAL PROGRAMMING SIMULATION AS A PRECURSOR TO TARGET VALUE DESIGN.....	515
<i>Fatemeh Solhjoui Khah, Zofia K. Rybkowski, A. Ray Pentecost, James P. Smith , Robert Muir</i>	
PLANNING THE BIM PROCESS IN AEC PROJECTS.....	527
<i>Marie Styrvold, Vegard Knotten , Ola Lædre</i>	

IMPROVING CONSTRUCTION MANAGEMENT PRACTICE IN THE GIBRALTAR CONSTRUCTION INDUSTRY	539
<i>Emmanuel I. Daniel, Daniel Garcia, Ramesh Marasini, Shaba Kolo , Olalekan Oshodi</i>	
TAKT TIME PLANNING IN PORSCHE CONSULTING, THE BOLDT COMPANY AND VEIDEKKE	551
<i>Matthias Helgi Gardarsson, Ola Lædre , Fredrik Svalestuen</i>	
PROCESS VERSUS OPERATIONS WORKFLOW – MAKING THE CASE FOR CONTINUOUS MONITORING OF CONSTRUCTION OPERATIONS	563
<i>David Grau, Amin Abbaszadegan , Rizan Assanair</i>	
COMPARING LEAN MANAGEMENT PRINCIPLES AND EVOLUTIONARY DESIGN IN NATURE	573
<i>Malek Ghanem, Rania Albanna, Ralph I. Hage , Farook R. Hamzeh</i>	
THE GENERAL CONTRACTOR RESPONSE TO PLATFORM ECOSYSTEMS	583
<i>Svenja Oprach, Felix Sonnabend , Shervin Haghsheho</i>	
HOW STOCHASTIC COST ESTIMATES COULD BE APPLIED IN RELATION TO TARGET VALUE DESIGN	595
<i>Olav Torp</i>	
LEAN DESIGN PROCESS FOR FORMWORK ENGINEERING	607
<i>Chien-Ho Ko , Jiun-De Kuo</i>	
A FRAMEWORK FOR UNDERSTANDING THE DYNAMIC NATURE OF VALUE IN DESIGN AND CONSTRUCTION	617
<i>Salam Khalife , Farook Hamzeh</i>	
PERFORMANCE MEASUREMENT IN LEAN PRODUCTION SYSTEMS: AN EXPLORATION ON REQUIREMENTS AND TAXONOMIES	629
<i>Karina B. Barth, Carlos T. Formoso , Marcus P. Sterzi</i>	
ECONOMICS OF USING A DISTRIBUTION CENTER FOR A RENOVATION HOUSING PROJECT	641
<i>Zakaria Dakhli, Steven Lagier, Laure Ducoulombier , Zoubeir Lafhaj</i>	
THE DEVELOPMENT AND USE OF LAST PLANNER® SYSTEM (LPS) GUIDANCE	651
<i>Vince Hackett, Peter Harte , Jorge Chendo</i>	
COMPARATIVE ANALYSIS OF PROJECT PERFORMANCE BETWEEN DIFFERENT PROJECT DELIVERY SYSTEMS	663
<i>Michael W. Ibrahim , Awad S. Hanna</i>	
IMPLEMENTING LEAN VISUAL TOOLS ON THE CLOSEOUT PHASE OF A GLOBALSCALE INDUSTRIAL PROJECT	675
<i>Mohammad Reza Farzad , Vhybirt A. Cameron</i>	
BIM FOR PRODUCTION: BENEFITS AND CHALLENGES FOR ITS APPLICATION IN A DESIGN-BID-BUILD PROJECT	687
<i>Paula Mota, Fernanda Machado, Clarissa Biotto, Ricardo Mota , Bruno Mota</i>	
OPTIMIZING MATERIAL-RELATED COSTS USING DYNAMIC SITE LAYOUT AND SUPPLY CHAIN PLANNING	699
<i>Sarah Abou Dargham, Sena Assaf, Karim Faour , Farook Hamzeh</i>	
LEAN, AUTOMATION AND MODULARIZATION IN CONSTRUCTION	711
<i>Sara Gusmão Brissi , Luciana Debs</i>	
TOWARD LEAN MANAGEMENT FOR DIGITAL FABRICATION: A REVIEW OF THE SHARED PRACTICES OF LEAN, DFMA AND DFAB	725
<i>Ming Shan Ng , Daniel Mark Hall</i>	
MODULARITY IN THE CONSTRUCTION INDUSTRY: A SYSTEMATIC MAPPING STUDY	737
<i>Marcelle Engler Bridi, Eliká Deboni Ceolin, Ariovaldo Denis Granja , Carlos Torres Formoso</i>	

VOLUME 2

DECIDING BETWEEN PREFABRICATION AND ON-SITE CONSTRUCTION: A CHOOSING-BY-ADVANTAGE APPROACH	749
<i>Krishna Chauhan, Antti Peltokorpi, Rita Lavikka , Olli Seppänen</i>	
EXPLORING INTERDISCIPLINARY COLLABORATION IN THE DETAILED DESIGN PHASE OF CONSTRUCTION PROJECTS	761
<i>Mona Salam, Perry Forsythe , Catherine Killen</i>	
SOFT ELEMENTS IN COLLABORATIVE PROJECT DELIVERY METHODS	773
<i>Atle Engebø, Åsmund Skatvedt , Olav Torp</i>	

A CONCEPTUAL EXPLORATION OF A COLLABORATIVE ENVIRONMENT IN THE CONSTRUCTION INDUSTRY WHEN WORKING WITH TEMPORARY SOCIO-TECHNICAL PROCESSES	785
<i>Ida M. Tvedt</i>	
DOES CHOOSING BY ADVANTAGES PROMOTE INCLUSIVENESS IN GROUP DECISION-MAKING?	797
<i>Annett Schöttle, Randi Christensen , Paz Arroyo</i>	
CONTRACTING FOR COLLABORATION IN CONSTRUCTION	809
<i>David Willis , Thais Da C. L. Alves</i>	
BIM-BASED CONSTRUCTION PROGRESS MEASUREMENT OF NON-REPETITIVE HVAC INSTALLATION WORKS	819
<i>Patrick Dallasega, Andrea Revolti, Camilla Follini, Christoph Paul Schimanski , Dominik Tobias Matt</i>	
INDOOR TRACKING OF CONSTRUCTION WORKERS USING BLE: MOBILE BEACONS AND FIXED GATEWAYS VS. FIXED BEACONS AND MOBILE GATEWAYS	831
<i>Erez Dror , Jianyu Zhao, Rafael Sacks , Olli Seppänen</i>	
DIGITIZING LEAN CONSTRUCTION WITH BUILDING INFORMATION MODELING	843
<i>Jakob Von Heyl , Selim-Tugra Demir</i>	
PREDICTING PERFORMANCE INDICATORS USING BIM AND SIMULATION FOR A WALL ASSEMBLY LINE	853
<i>Ryan Brown, Beda Barkokebas, Chelsea Ritter , Mohamed Al-Hussein</i>	
SITE LAYOUT PLANNING THROUGH BIM VISUALISATION – A CASE STUDY	865
<i>Paramjit Singh LotaI , Jyoti Trivedi</i>	
CONCEPTUAL FOUNDATIONS FOR A NEW LEAN BIM-BASED PRODUCTION SYSTEM IN CONSTRUCTION	877
<i>Christoph Paul Schimanski, Gabriele Pasetti Monizza, Carmen Marcher , Dominik T. Matt</i>	
EVALUATING THE LEAN-ENABLING COMPETENCIES OF CLIENTS	889
<i>Yara Daoud, Carla Ghannoum, Soheila Antar , Farook Hamzeh</i>	
THE INTRODUCTION OF AI IN THE CONSTRUCTION INDUSTRY AND ITS IMPACT ON HUMAN BEHAVIOR	903
<i>Marte H. Schia, Bo C. Trollsås, Håkon Fyhn , Ola Lædre</i>	
IMPLEMENTATION OF INTEGRATED PROJECT DELIVERY IN LEBANON: OVERCOMING THE CHALLENGES	917
<i>Sarah Abou Dargham, Makram Bou Hatoum, Mohammad Tohme , Farook Hamzeh</i>	
A CASE STUDY ON IMPROVING STANDARDIZATION IN THE CONCEPTION PHASE BY DEVELOPING TOOLS AND PROTOCOLS	927
<i>Martin Michaud, Daniel Forgues, Julien Meyer , Claudiane Ouellet- Plamondon</i>	
COMPARING LEAN CONSTRUCTION WITH EXPERIENCES FROM PARTNERING AND DESIGN-BUILD CONSTRUCTION PROJECTS IN NORWAY	937
<i>Eirik Kraakenes, Allen Tadayon , Agnar Johansen</i>	
LEAN CONSTRUCTION PRACTICE: CULTURE, STANDARDIZATION AND INFORMATIZATION — A CASE FROM CHINA	949
<i>Lixuan Jiang, Hua Zhong, Jianghong Chen, Zhenmin Su, Jinhua Zhang , Xiao Wang</i>	
MEASURING PROJECT’S TEAM CULTURE IN PROJECTS USING THE LAST PLANNER? SYSTEM	963
<i>Gunnar J. Lühr, Marian G. C. Bosch-Rekvelde</i>	
QUALITATIVE ANALYSIS FOR THE DIAGNOSIS OF THE LEAN CONSTRUCTION IMPLEMENTATION	975
<i>Tatiana G. Do Amaral, Leticia G. Oka, Carlos A. B. De Camargo Filho , José P. Barros Neto</i>	
FROM CONCEPT DEVELOPMENT TO IMPLEMENTATION: CHOOSING BY ADVANTAGES ACROSS AN ORGANIZATION	987
<i>Annett Schöttle, Luisa Maria Gigler , Brent Mingle</i>	
ASSESSING THE LEVEL OF IMPLEMENTATION OF LEAN CONSTRUCTION: AN AUDIT PROTOCOL	999
<i>Marianna Lira Comelli, Yan Mota Veras De Carvalho, Renan Caminha Marinho, Luis Felipe Cândido , José De Paula Barros Neto</i>	
LESSONS FOR CONSTRUCTION: DELIVERING MEGA PROJECT ON TIME THROUGH CULTURE AND HOSHIN KANRI	1011
<i>Søren Leth , Jon Lerche , Hasse H. Neve , Søren Wandahl</i>	
QUALITATIVE ANALYSIS OF LEAN TOOLS IN THE CONSTRUCTION SECTOR IN COLOMBIA	1023
<i>Fran M. Castiblanco, Ivonne A. Castiblanco , Joan P. Cruz</i>	

AN ACTIVE CARING APPROACH THROUGH PSYCHOLOGICAL SAFETY IN CONSTRUCTION PROJECTS	1037
<i>Subyn Gomez, Bryan Bishop, Glenn Ballard, Mario Saenz , Iris Tommelein</i>	
MENTAL HEALTH IN THE CONSTRUCTION INDUSTRY: A RAPID REVIEW	1049
<i>David Oswald, Jessica Borg , Fred Sherratt</i>	
USING STANDARDIZED WORK TO PREVENT CONSTRUCTION ACCIDENTS	1059
<i>Lesiba Mollo, Fidelis Emuze , John Smallwood</i>	
ANALYSIS OF VISUAL MANAGEMENT PRACTICES FOR CONSTRUCTION SAFETY	1069
<i>Eva S. Abdelkhalek, Mohamad D. Elsibai, Ghida K. Ghosson , Farook R. Hamzeh</i>	
LEAN CONSTRUCTION AND MATURITY MODELS: APPLYING FIVE METHODS.....	1081
<i>Priscila Mirapalmete Rodegheri , Sheyla Mara Baptista Serra</i>	
A SURVEY OF SIMULATION MODELLING TECHNIQUES IN LEAN CONSTRUCTION RESEARCH.....	1093
<i>Wenchi Shou, Peng Wu , Jun Wang</i>	
APPLICATION OF VIRTUAL AND AUGMENTED REALITY TECHNIQUES DURING DESIGN AND CONSTRUCTION PROCESS OF BUILDING PROJECTS	1105
<i>Pablo Orihuela, Maria Noel, Santiago Pacheco, Jorge Orihuela, Carlos Yaya5 , Rafael Aguilar</i>	
LEAN AND BIM IMPLEMENTATION IN COLOMBIA; INTERACTIONS AND LESSONS LEARNED.....	1117
<i>Juan Martín Gómez-Sánchez, José Luis Ponz-Tienda , Juan Pablo Romero-Cortés</i>	
METRICS IN VDC PROJECTS	1129
<i>Matilde Reinholdt Belsvik, Ola Lædre , Eilif Hjelseth</i>	
INTEGRATING INDOOR POSITIONING SYSTEMS AND BIM TO IMPROVE SITUATIONAL AWARENESS	1141
<i>Ana Reinbold, Olli Seppänen, Antti Peltokorpi, Vishal Singh , Erez Dror</i>	
QUESTIONABLE PRACTICE IN THE PROCESSING OF BUILDING PERMITS IN NORWAY	1151
<i>Jonas Wold, Ola Lædre , Jardar Lohne</i>	
EXPLORATORY STUDY OF ‘COSTING COLLABORATIVELY’ IN THE UK CONSTRUCTION INDUSTRY	1163
<i>Sa’id Ahmed, Christine Pasquire , Emmanuel Manu</i>	
MANAGER PERCEPTION AND DECISION FOR MAKING-DO IN CHINA V.S. IN THE U.S.	1175
<i>Ashad Javanmardi1, Yuxiang Zhang, Yanchun Liu, Shujuan Yang, Xiuxia Yu, Min Liu , Simon M. Hsiang</i>	
INTEGRATING LEAN CONSTRUCTION AND SUSTAINABILITY VIA A SYSTEM DYNAMICS FRAMEWORK.....	1187
<i>Ann Francis , Albert Thomas</i>	
RECONCEPTUALISING CREM ALIGNMENT TO ACCOUNT FOR WASTE.....	1197
<i>Tuuli Jylhä</i>	
NOT SEEING THE WOOD FOR THE TREES – A GEMBA WALK THROUGH A TIMBER FRAMED HOUSING DEVELOPMENT	1209
<i>John Hanahoe, Martin Taggart , Conor Willis</i>	
COMPARISON OF COLLABORATION AND TRADE PARTNER COMMITMENT IN TAKT IMPLEMENTATION CASES.....	1219
<i>Pekka Kujansuu, Joonas Lehtovaara, Max Grönvall, Olli Seppänen , Antti Peltokorpi</i>	
EVALUATING MULTISKILLING IN RESIDENTIAL CONSTRUCTION PROJECTS USING REGIONAL INDUSTRY SIMULATION	1229
<i>Samuel Korb, Avi Telyas, Rafael Sacks , Arens Duka</i>	
RESULTS OF INDICATORS FROM THE LINGUISTIC ACTION PERSPECTIVE IN THE LAST PLANNER® SYSTEM.....	1241
<i>Luis A. Salazar, Fabián Retamal, Glenn Ballard, Paz Arroyo , Luis F. Alarcón</i>	
TEAM-LEADER WALK AS INTERDISCIPLINARY COMMUNICATION TOOL AT THE BUILDING SITE	1251
<i>Håkon Fyhn , Lars Andersen</i>	
SUPPLY CHAIN RHYTHM: MULTIDISCIPLINARY TEAMS THROUGH COLLABORATIVE WORK STRUCTURING	1261
<i>Rafaella D. Broft , Stephen Pryke</i>	
FLOW IN TAKT PROJECTS – A PRACTICAL ANALYSIS OF FLOW AND RESOURCE EFFICIENCY	1271
<i>Marco Binninger, Janosch Dlouhy , Shervin Haghsheno</i>	
WHY WOULD LOCATION-BASED SCHEDULING BE APPLICABLE FOR OFFSHORE WIND TURBINE CONSTRUCTION?	1283
<i>Jon Lerche, Olli Seppänen, Kristian Birch Pedersen, Hasse Neve, Søren Wandahl , Allan Gross</i>	

WHY WOULD LOCATION-BASED SCHEDULING BE APPLICABLE FOR OFFSHORE OIL AND GAS CONSTRUCTION?	1295
<i>Jon Lerche, Hasse Neve, Kristian Birch Pedersen, Søren Wandahl, Allan Gross</i>	
HOW LONG DOES IT TAKE TO BUILD AN APARTMENT?	1309
<i>Sigmund Aslesen, Sigmund Reff, Espen Stordal</i>	
A PREDICTIVE METHOD FOR BENEFITS REALISATION THROUGH MODELLING UNCERTAINTY IN FRONT END DESIGN	1321
<i>Joas Serugga, Mike Kagioglou, Patricia Tzortzopoulos</i>	
AHP AND CBA APPLICATION TO LAYOUT DESIGN: A CASE OF CLASSROOM LAYOUT ASSESSMENT	1333
<i>Vijayalaxmi Sahadevan, Koshy Varghese</i>	
DESIGNING MUNICIPAL WASTE MANAGEMENT PROGRAMS USING CHOOSING BY ADVANTAGES AND DESIGN STRUCTURE MATRIX	1345
<i>Catalina Perez, Paz Arroyo</i>	
A PROPOSED LEAN DECISION-MAKING PROCESS FOR BUILDING ENERGY RETROFITS	1357
<i>Xiaosu Ding, Kristen Parish</i>	
CONNECTIONS BETWEEN MASS CUSTOMISATION PRACTICES IN HOUSING AND LEAN PRODUCTION	1369
<i>Cynthia S. Hentschke, Luciana G. Amorim, Carlos T. Formoso, Patricia Tzortzopoulos, Marcia E. S. Echeveste</i>	
THEORY OF QUALITY MANAGEMENT: ITS ORIGINS AND HISTORY	1381
<i>Lauri Koskela, Algan Tezel, Viranj Patel</i>	
DEVELOPING A CONCEPTUAL MODEL FOR VALUE DELIVERY IN VALUE SHOP CONFIGURED CONSTRUCTION PROJECTS	1391
<i>Frode Drevl, Ole Jonny Klakegg</i>	
PRINCIPLES OF MISTAKEPROOFING AND INVENTIVE PROBLEM SOLVING (TRIZ)	1401
<i>Iris D. Tommelein</i>	
PREDICTION OF ENVIRONMENTAL PERFORMANCE INDICATORS FOR CONSTRUCTION SITES BASED ON ARTIFICIAL NEURAL NETWORKS	1413
<i>Luara L. A. Fernandes, Mércurie J. Rocha, Dayana B. Costa</i>	
DAILY MANAGEMENT APPLICATION IN A DAM CONSTRUCTION PROJECT	1425
<i>Renato N. Mariz, Eduardo L. Galvao, Flavio A. Picchi, Reymard S. S. Melo, Marcela C. B. Barcelos</i>	
INTEGRATION OF HISTORIC BUILDING INFORMATION MODELING AND VALUATION APPROACHES FOR MANAGING CULTURAL HERITAGE SITES	1433
<i>María Guadalupe Mandujano Rodríguez</i>	
CONSTRUCTION PROGRESS MONITORING USING UNMANNED AERIAL SYSTEM AND 4D BIM	1445
<i>Juliana Sampaio Álvares, Dayana Bastos Costa</i>	
FACTORS INFLUENCING THE USE OF LAST PLANNER SYSTEM METHODS: AN EMPIRICAL STUDY IN PERU	1457
<i>Danny Murguía</i>	
LEAN CONSTRUCTION TECHNIQUES AND INDIVIDUAL PERFORMANCE	1469
<i>Shuquan Li, Meng Fan, Xiuyu Wu</i>	
TARGET VALUE DESIGN IN REAL ESTATE MARKET: A CONCEPTUAL MAP MODEL	1479
<i>Carolina Asensio Oliva, Ariovaldo Denis Granja</i>	
Author Index	