About   Paper Submission   Registration   Events   Location Information   Cont

IJIE 2016

October 10-12, 2016, Seoul, Korea

"Smart Systems in Industrial Engineering"

Registration Open: September 5, 2016

✎ **Registration**

News

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Download Full Papers UPDATED	[2016-10-09]
Oral Presentation Schedule UPDATED	[2016-10-07]
Program Schedule UPDATED	[2016-10-07]
Final Call for Submission: May 30, 2016	[2016-05-17]
Abstract Submission Deadline extended to May 15, 2016	[2016-05-01]

COMMITTEE

Honorary Chair
Young Hoon Lee, Yonsei University

Conference Chair
Bongju Jeong, Yonsei University

Program Chair
Dongmin Shin, Hanyang University

IJIE 2016
SEOUL

ORGANIZER KIIE

INDUSTRY TOUR SAMSUNG ELECTRONICS   LG Display

📝 Call for Papers   🎤 Keynote Speakers   📓 Program   🍷 Conference Venue   🛏 Accommodation

IJIE2016 Program Schedule

🔲 October 9: Welcome Reception

Time	Program	Place
19:00 ~ 21:00	Welcome Reception	Mozart Hall (31F)

🔲 October 10: Keynote Speech, Regular Sessions, and Social Event

Time	Program	Place
08:00 ~	Registration	Lobby (19F)
08:30 ~ 10:00	A1. Manufacturing Systems (1)	Coral Hall (18F)
	A2. Operations Management (1)	Dong-hae Hall (18F)
	A3. Data Mining Applications (1)	Ivy Hall (19F)
	A4. Prediction & Forecasting	VIP Hall (19F)
	A5. Special Session (1) - Disassembly, Remanufacturing, and Closed-loop Supply Chain Issues	Brahms Hall (19F)
10:00 ~ 10:30	Coffee Break	Lobby
10:30 ~ 11:30	Keynote (1) - Smart Manufacturing toward Highly-customized Products Prof. Richard A. Wysk, North Carolina Stste University, USA	Brahms Hall (19F)
11:30 ~ 13:00	Lunch	Restaurant (1F − Buffet, 18F − Korean Food)
13:00 ~ 14:45	B1. Manufacturing Systems (2)	Coral Hall (18F)
	B2. Operations Management (2)	Dong-hae Hall (18F)
	B3. Data Mining Applications (2)	Ivy Hall (19F)
	B4. Portfolio Management	VIP Hall (19F)
	B5. Special Session (2) - Design Optimization in Additive Manufacturing	Brahms Hall (19F)
14:45 ~ 15:15	Coffee Break	Lobby
15:15 ~ 17:00	C1. Manufacturing Systems (3)	Coral Hall (18F)
	C2. Operations Management (3)	Dong-hae Hall (18F)
	C3. Data Mining Applications (3)	Ivy Hall (19F)
	C4. Human-Computer Interactions	VIP Hall (19F)
	C5. Special Session (3) - Production Engineering and Advanced Applications of Additive Manufacturing	Brahms Hall (19F)
17:00 ~ 20:00	Break	Lobby
20:00 ~ 21:30	Social Event − Musical Performance	Myeongdong NANTA Theatre

Presentation Schedule

October 10: Keynotes, Regular Sessions, and Social Event

10-Oct	A Sessions		08:30 ~ 10:00
A1: Manufacturing Systems (1)	Jae-Yoon Jung (Kyung Hee University)		Coral Hall (18F)

A1.1	Steel Manufactory Simulation Using Bayesian Learning and Updating Method with Process Mining Sanghyuck Park, Sunghyun Sim, Hyerim Bae, and Riska Asriana Sutrisnowati
A1.2	Process Planning in Commissioning and its Validation in Special Machinery using Bayesian Networks Sebastian Pöschl, Frank Wirth, and Thomas Bauernhansl
A1.3	The Effect of Repair and Failure Distributions on the Instantaneous Availability of Repairable Systems Farhood Rismanchian and Young Hoon Lee
A1.4	Fault Detection of Manufacturing Process Based on Dynamic Time Warping and Exponential Penalty (DTWEP) In-seok Lee, Seung Hwan Park, and Jun-Geol Baek

A2: Operations Management (1)	Dongmin Shin (Hanyang University)		Dona-hae Hall (18F)

A2.1	A Performance Comparison Study of Structured Regularization Methods of Spectroscopic Signals for Virtual Methodology Modeling Chanhee Park and Seoung Bum Kim
A2.2	Modeling and Cost Analysis of Paging Schemes by a Markov Chain Model in Wireless Network Jihee Jung, Jaejoon Suh, and Janghyun Back
A2.3	Developing Meta-heuristic Methods for Sequencing Problems by Using Candidate Order Based Constructive Heuristics Jun Woo Kim
A2.4	A Market Competition Model for Waste Recycling Systems Tsan Sheng Adam Ng, Jie Xiong, and Zhou He

A3: Data Mining Applications (1)	Arif Suryadi (Maranatha Christian University)		Ivy Hall (19F)

A3.1	Personal Data Privacy Throughout Big Data Applications in Industrial Engineering Francis Rousseaux and Stéphane Rivaud
A3.2	Customer Complaints Analysis for New Product Development using Textual Datamining and the Outcome Driven Innovation Method: a Case of the Korean Airconditioners Junegak Joung, Kiwook Jung, Sanghyun Ko, and Kwangsoo Kim
A3.3	Content-based Filtering for Recommendation Systems Using Multi-attribute Network Jieun Son and Seoung Bum Kim
A3.4	Recommending Suitable Alternative Performers Using Process Mining Technique: Towards Smart Organizations Jooseok Lee, Seunghoon Lee, Jinwoo Kim, and Injun Choi
A3.5	An Unstructured Business Process Execution Analysis Methodology that Incorporates the Effects of Organizational Structure Seunghoon Lee, Jinyoun Lee, and Injun Choi

A4: Prediction & Forecasting	Jae Joon Ahn (Yonsei University)		VIP Hall (19F)

A4.1	A Novel Hybrid Algorithm for Earnings Persistence Forecasting Hosang Jung and Jae Joon Ahn
A4.2	Forecasting the Growth of Reverse Mortgage Market in Korea Using a Bass Diffusion Analysis Jin-Ah Yang, Hyung-suk Choi, and Daiki Min
A4.3	Forecasting Wheat Consumption of Pakistan Considering Social and Economic Factors Nokhaiz Tariq Khan, Sara Shahnawaz, Gisun Jung, Yun Bae Kim, and Jinsoo Park
A4.4	A New Simulation Framework for Intermittent Demand Forecasting Using Classification Models Gisun Jung, Nokhaiz Tariq Khan, Jinsoo Park, and Yun Bae Kim

A5: Special Session (1) Disassembly, Remanufacturing and Closed-loop Supply Chain Issues	Dr. Tetuso Yamada (The University of Electro-Communications) and Dr. Surendra M. Gupta (Northeastern University)	Brahms Hall (19F)
A5.1	Evaluation of Design Alternatives of an Air Conditioner in an Advanced-Repair-to-Order-Disassembly-to-Order System under Stochastic Yield Aditi D. Joshi and Surendra M. Gupta	
A5.2	One-Dimensional Combination Warranty Policies Analysis for Remanufactured Product in Reverse Supply Chain Ammar Y. Alqahtani and Surendra M. Gupta	
A5.3	Modeling of A Closed Loop Supply Chain with Stochastic Product Returns Ayako Okuda, Aya Ishigaki, Surendra M. Gupta, and Tetsuo Yamada	
A5.4	Environmental and Economic Disassembly Parts Selection Design for Recycling, CO2 Saving Rates and Cost by Goal Programming Yuki Kinoshita, Tetsuo Yamada, Surendra M. Gupta, Aya Ishigaki, and Masato Inoue	

01-Oct	Keynote	10:30 ~ 11:30
Keynote (1)	Dongmin Shin (Hanyang University)	Brahms Hall (19F)
K1	Smart Manufacturing toward highly-customized Products Prof. Richard A. Wysk, North Carolina State University, USA	

10-Oct	B Sessions	13:00 ~ 14:45
B1: Manufacturing Systems (2)	Mohd Norzaimi Che Ani (Universiti Kuala Lumpur)	Coral Hall (18F)
B1.1	Common Due-date Assignment and Scheduling on a Single Machine with Sequence-dependent Setups and Discretely Controllable Processing Times Akmal Ulugov, Jeong-Hoon Shin, and Dong-Ho Lee	
B1.2	Hybrid Algorithms for Order Acceptance and Scheduling Gen-Han Wu, Hung-Wei Chen, and Wang-Xian Li	
B1.3	Modeling Part Replenishment System for Factory-in-factory Concept Mohd Norzaimi Che Ani, Mohd Khomeini Solihin Shafei, Shahrul Kamarudin, and Ishak Abdul Azid	
B1.4	A Sustainable Manufacturing System with Minimum Quantity Lubrication and Carbon Footprint Muhammad Omair and Biswajit Sarkar	
B2: Operations Management (2)	Lijing Zhu (China University of Petroleum)	Dona-hae Hall (18F)
B2.1	Determination of Interval Order Policy at Distributor and Retailers using Innovative Heuristic Method to Minimize Inventory Total Cost (Application Case at Distributor X in Indonesia) Rainisa Maini Heryanto, Santoso, and Elizabeth Ivana Kristianto	
B2.2	Designing an Optimal Inventory Replenishment Strategy in a Combined MTS-MTO Supply Chain Eungab Kim and Daiki Min	
B2.3	Applying Ant Colony Algorithm to Inventory and Open Vehicle Routing Problem for Multiple Depots and Multiple Retailers' Distribution System Anchalee Supithak	
B2.4	Analysis of a Traceability System for Perishable Food Supply Chains Lijing Zhu and Chulung Lee	
B2.5	Fuzzy Production Quantity Model with Backorders Harun Öztürk and Gyu M. Lee	
B3: Data Mining Applications (2)	Kyung Min Kim (Korea Railroad Research Institute)	Ivy Hall (19F)
B3.1	Utilizing Text Mining Technique to Support Design Automation on a Cloud-based System Kong-Zhao Lin, Yi-Wen Chen, Shin-Han Lin, Chih-Shuan Lin, and Ming-Chuan Chiu	
B3.2	Applying Data Mining Methods to Institutional Research: A Study of Alumni Satisfaction Survey Long-Sheng Chen, Wan-Ting Chien, and Jing-Rong Chang	
B3.3	Develop an Indicator of Health Status Based on Physical Exam Data Using Random Forest and Regression Analysis Yi-Wen Chen and Ming-Chuan Chiu	
B3.4	Choosing Store Type Using Cluster Analysis and Multiattribute Attitude Model for a Consumer Product Store in Bandung Arif Suryadi and Alfa Edison	

B4: Portfolio Management		◆	Hosang Jung (Inha University)	VIP Hall (19F)

B4.1	Euclidian Distance Approach to Evaluate the Performance of Markowitz's Portfolio Selection Model Hunbae Jeon, Hongseon Kim, and Seongmoon Kim
B4.2	Developing an Estimation of Expected Returns for a Portfolio Selection Model by Utilizing Markov Chain Kyungchan Park and Seongmoon Kim
B4.3	Developing an Enhanced Portfolio Trading System Using K-means and Genetic Algorithms Wonbin Ahn, Donghyun Cheong, Youngmin Kim, and Kyong Joo Oh
B4.4	Risk Management and Management Risks in Industrial Projects: Case Studies Tassia Farssura Silva and Silvio Melhado

B5: Special Session (2) Design Optimization in Additive Manufacturing	Namhun Kim (Ulsan National Institute of Science and Technology)	Brahms Hall (19F)

B5.1	Phenomenological Deformation Patterns of 3D Printed Products in a Selective Laser Sintering Process Sangho Ha, Kasin Ransikarbum, and Namhun Kim
B5.2	Improving the Adhesive Strength of Carbon Material-reinforced Composite for Fused Deposition Modeling (FDM) Eunju Park, Heechang Kim, Seungchul Lee, and Namhun Kim
B5.3	Lightweight Design of a Reference Jig Using Topology Optimization and Additive Manufacturing Namhun Kim, Jinsu Kim, Sangho Ha, and In Gwun Jang
B5.4	A Framework for Part Orientation Selection in Additive Manufacturing Using Analytic Hierarchy Process (AHP) Kasin Ransikarbum, Sangho Ha, Eunjoo Park, Jungmok Ma, and Namhun Kim

10-Oct	C Sessions	15:15 ~ 17:00

C1: Manufacturing Systems (3)	Gen-Han Wu (Yuan Ze University)	Coral Hall (18F)

C1.1	Process Improvement for Checking Jigs and CNC Programs Jirapat Wanitwattanakocol, Tana Nitiwitaya, and Pattaraporn Khuwuthyakorn
C1.2	A Fundamental Robot Work System Equipped with the Self-Improvement Mechanism Shuhei Inada, Takahira Yamaguchi, Masashi Fuchizawa, and Kyosuke Arai
C1.3	Aerosol Jet Printed Strain Gauge Hong Wei Tan, Anh Tuan Tran, and Chee Kai Chua
C1.4	Process Improvement, Storage, and Layout at an Injection Molding Plastics Manufacturer Lawrence J. H. Schulze, Anntette Wong, Christopher Avalos, and Hung Bui
C1.5	Development of Six Sigma Methodology to Improve Grinding Processes in the Production of Engine Gearbox Shaft Behrooz Noori and Mana Latifi

C2: Operations Management (3)	Shu-Chuan Chang (National Taipei University of Technology)	Dona-hae Hall (18F)

C2.1	Performance Evaluation of the Aisle Layout Design in the Distribution Center Taiki Kawamoto and Shuhei Inada
C2.2	A Differential Evolution Algorithm for The Single Row Layout Problem Feristah Ozcelik
C2.3	Product Packing System Optimization in a Supply Chain Considering Sustainability Shin-Han Lin, Wu-Hsun Chung, and Ming-Chuan Chiu
C2.4	Revenue-Sharing Contracts for Two Competing Retailers Hark-Chin Hwang
C2.5	Ideation Process for Digital Convergence with TRIZ and Value Sinae Kang and Ho Yeon Chung

C3: Data Mining Applications (3)	Kwanho Kim (Incheon National University)	Ivy Hall (19F)

C3.1	Discovering Key Features of Influencing Performances of Online Reviews in Social Media Long-ShengChen, Shu-Cih Tseng, and Mu-Chen Chen
C3.2	Tree-based Ensemble Classifier Using Kernel Fisher Discriminant Analysis Donghwan Kim, Seung Hwan Park, and Jun-Geol Baek
C3.3	Bus Station Advertising via Clustering and Optimization Kyung Min Kim, Taegyoon Kim, Bum-Seob Park
C3.4	A Minimum-variance Monitoring Statistic and Control Chart Younghoon Kim and Seoung Bum Kim

| C3.5 | An Inductive Algorithm to Combine Data and Expert Knowledge for Fault Interpretations in Multivariate Monitoring
Sang Min Lee and Seoung Bum Kim |

C4: Human-Computer Interactions	Ming-Chuan Chiu (National Tsing Hua University)	VIP Hall (19F)
C4.1	Enhancing productivity 4.0 concept in Industrial Design Project Jiawei Jhung and Dengchuan Cai	
C4.2	Design a Personalized Brain Computer Interface by User-centered Design Method Wan-Jun Lin, Chi-Shiuan Tsai, Peng Wu, Xiao-Han Zhu, and Ming-Chuan Chiu	
C4.3	Constructing a Healthy Information System with Wearable Device: User-Centric Viewpoint Hung-Pin Hsu[*] and Shi-Yuan Chen	
C4.4	Investigation on The Shape Characteristics of Curved-edge Display for Mobile Devices Sanghyun Kwon, Yushin Lee, Donggun Park, Myung Hwan Yun, and Byungki Jin	

C5: Special Session (3) Production Engineering and Advanced Applications of Additive Manufacturing	Namhun Kim (Ulsan National Institute of Science and Technology)	Brahms Hall (19F)
C5.1	Surface modification of an additive manufacturing part via the large pulsed electron beam (LPEB) Eunju Park, Jisoo Kim, Hyung Wook Park, and Namhun Kim	
C5.2	Hygroscopic swelling behavior of Nylon 12 parts produced via selective laser sintering process Sangho Ha, Eunju Park, Daeil Kwon, and Namhun Kim	
C5.3	A Process Planning Perspective Using Multi-criteria Decision-making for The Build Chamber Utilization in Additive Manufacturing Kasin Ransikarbum, Jungmok M, and Namhun Kim	
C5.4	Mechanical Properties on Polymers for 3D Printing Fabrication of Wearable Applications Juyoun Kwon and Namhun Kim	

| 10-Oct | Social Event | 20:00 ~ 21:30 |

Oct 11: Keynotes, Regular Sessions, and Grand Banquet

11-Oct	D Sessions	08:30 ~ 10:00

D1: Manufacturing Systems (4)	Jirapat Wanitwattanakosol (Chiang Mai University)	Coral Hall (18F)
D1.1	Digital Twin Concept in Manufacturing Industries- A literature Review and Avenues for Future Research Manuel Holler, Falk Uebernickel, and Walter Brenner	
D1.2	Manufacturer Selection in Smart Supply Chain Platform Joonrak Kim, Dongmin Son, and Bongju Jeong	
D1.3	Developing IOT Data Anomalies Response Model Toward Smart Factory Performance Measurement Gyusun Hwang, Jinwoo Park, and Tai-Woo Chang	
D1.4	Location of Congested Immobile Multi-server Facilities: Modeling and Solution Heuristics Mehdi Seifbarghy, Aida Mansouri, and Davar Pishva	

D2: Healthcare Systems	Byung Do Chung (Yonsei University)	Dona-hae Hall (18F)
D2.1	A Model for Allocating Medical Service Capacity in A Multi-Hospital Network Considering Patient Satisfaction Level and Uncertainty Ye Eun Kim and Young Hoon Lee	
D2.2	Strategic Blood Supply Chain Design for Emergency Response Sung Il Kim, Jinho Mun, Jun Kim, Hyun-Jung Kim, and Byung Do Chung	
D2.3	A Hybrid Optimization Approach to Berth Allocation Problems Jung-Fa Tsai, Shu-Chuan Chang, and Ming-Hua Lin	
D2.4	Assess Patient Expectation and Perception of Service Quality and Loyalty in Dental Services Yuan-Chia Chang, Buta Hayung, and Ching-Hsiang Lai	

D3: Human Factors (1)	Dengchuan Cai (National Yunlin University of Science and Technology)	Ivy Hall (19F)
D3.1	Design and Development of An ergonomic Lactating Chair Mellisa P. Delos Reyes, Mari Lois M. Almonte, ArraCarmina P. Prenda, Philip P. Ermita	

D3.2	Design and development of gripping set for bike carrier Wanyu Cheng and Dengchuan Cai		
D3.3	Development and Design of Ball Connector of Bike Carrier Chungpei Wu and Dengchuan Cai		
D3.4	The Effect of Different Hand Positions on Capability of Hand-grip Strength Rahul Jain, M.L. Meena, G. S. Dangayach, and A. K. Bhardwaj		
D4: Business & Management (1)		Habin Lee (Brunel University London)	VIP Hall (19F)
D4.1	Industrial Application of Configurators: From Motivations to Realized Benefits Katrin Kristjansdottir, Sara Shafiee, and Lars Hvam		
D4.2	The Business Model Canvas and Ecosystem of Streaming Music Industry in Taiwan - A Case Study of K Company Wei-Chen Wilbur Chang, and Jei-Zheng Wu		
D4.3	Smart Systems: Their Conveniences and Associated Risks Davar Pishva and Mehdi Seifbarghy		
D4.4	A Study of Key Factors for the Professional Volleyball Development in Taiwan Lin-Huan Hu, Chih-Fu Cheng, and Jei-Zheng Wu		
D5: Special Session (4) Service System Operations Management (SSOM)		Yong Won Seo (Chung-Ang University)	Brahms Hall (19F)
D5.1	Individual vs Group: Advice Taking in Judgmental Forecasting Adjustments Hyo Young Kim, Yun Shin Lee, and Duk Bin Jun		
D5.2	Managing the Healthcare Claim Review Process at a Workers' Compensation Provider Woonghee Tim Huh, Chloe Kim, and Kun Soo Park		
D5.3	Parallel Importing Under The Encroachment of Generic Goods Sung Hee Lee and Yong Won Seo		
D5.4	A Heuristic Algorithm for Tour-Guide Scheduling Problem: Based on A Tour Company Case Jin Bae, Byung-Cheon Choi, and Yong Won Seo		
11-Oct	**Keynote**		**10:30 ~ 11:30**
Keynote (2)		Daiki Min (Ewha Womans University)	Brahms Hall (19F)
K2	Sustainability and Reverse Supply Chains: An Overview Prof. Surendra M. Gupta, Northeastern University, USA		
11-Oct	**E Sessions**		**13:00 ~ 14:45**
E1:Service Management		Ming-Chuan Chiu (National Tsing-Hua University)	Coral Hall (18F)
E1.1	Design of Personalized Product Service System Utilizing Multi-Agent System Chi-Shiuan Tsai and Ming-Chuan Chiu		
E1.2	Develop A Cloud-based Service System: An Empirical Study of Restaurant Ordering Service Kong-Zhao Lin, Chih-Yuan Chu, and Ming-Chuan Chiu		
E1.3	A Data-Driven Methodology to Design New Service Concepts for Vehicle Operations Management Min-Jun Kim, Chie-Hyeon Lim, and Kwang-Jae Kim		
E1.4	Platform Planning Framework For Open Source Hardware Development with Case Study of Project Ara Jiyun Kim and Yoo-Suk Hong		
E1.5	Industrial Experience from Using The Cpm-Procedure for Developing, Implementing and Maintaining Product Sara Shafiee, Katrin Kristjansdottir, and Lars Hvam		
E2: Distribution & Transportation Systems		Philip P. Ermita (University of Perpetual Help Calamba Campus)	Dona-hae Hall (18F)
E2.1	Street Washing Truck Routing With Intermediate Refill Facilities Han-Shiuan Tsai and Ching-Jung Ting		
E2.2	A Hybrid Algorithm based on VNS and SA for the Dial-a-ride Problem with Time Windows Gen-Han Wu, Ning Chin, and Bai-Lyn Fang		
E2.3	A CVRPTWQT Problem: Solution by Generic Algorithm Yu-Hsiang Hsiao and Mu-Chen Chen		
E2.4	Fuzzy Bi-Objective Distribution Planning Problem under the Carbon Emission Consideration Yoonjea Jeong, Ilkyeong Moon, and Subrata Saha		

E2.5	Optimal Delivery Route Using Lingo Solver Katrina Denise B. Ortiz, Abbey Gail L. Suelto, and Philip P. Ermita		
E3: Human Factors (2)		Ilsun Rhiu (Seoul National University)	Ivy Hall (19F)
E3.1	Development and Design of Tire Holder of Bike Carrier Tingkai Chang and Dengchuan Cai		
E3.2	Packing Design of Portable Drip-Coffee Bag Tai-Yu Chen and Dengchuan Cai		
E3.3	The Study on Balance for Students with Intellectual Disability in Elementary School Chih-Sheng Chang, Kai-Shuan Shen, and Yi-Ru Wang		
E3.4	Ergonomics Checkpoints for Educational Environments Lawrence Schulze		
E4: Business & Management (2)		Jei-Zheng Wu (Soochow University)	VIP Hall (19F)
E4.1	Procurement Decisions in Project Management Processes - Result of An Industrial Questionnaire Survey Pawel Blaszczyk and Tomasz Błaszczyk		
E4.2	A New Interactive Approach to Negotiations with Projects Subcontractors Tomasz Błaszczyk, Pawel Blaszczyk, and Maciej Nowak		
E4.3	Combining Multidimensional Scaling with Conjoint Analysis to Accomplish Market Planning and Product Evaluation for 3D Printers Chihhsuan Wang		
E4.4	A Cooperative Game-Theoretic Network Design for Collaborative Operation of Service Centers and Consolidation Terminals in Delivery Services Ki Ho Chung, Seung Yoon Ko, Chul Ung Lee, and Chang Seong Ko		
E5: Special Session (5) Modeling, Simulation, and Optimization for 3D Printing (MOS3DP)		Jung Woo Baek (Chosun University)	Brahms Hall (19F)
E5.1	Geometric Influence in Selective Laser Melted Ti6Al4V Allo Zhong Yang Chua, Il Hyuk Ahn, and Seung Ki Moon		
E5.2	A Customized 3D Printed Sensor Development Framework for Component Condition Monitoring Seung Ki Moon, Yu En Tan, Hyunwoong Ko, Zhong Yang Chua, Teck Hui Ngo , Jihong Hwang, and Jung Woo Ba		
E5.3	Effect of 3D Printing Technology in a Production-Manufacturing System : Queueing Theoretic Approach Jung Woo Baek, Jihong Hwang, and Seung Ki Moon		
E5.4	Redesign and Multi-Material 3D Printing of Dynamic Mechanical Parts – RC Car Suspension and Bumper Hyoung-Joon Yoon, Goo-Hoon Jeong, Seok-Hwan Chung, and Jihong Hwang		
11-Oct	**F Sessions**		**15:15 ~ 17:00**
F1: Education Systems		Daiki Min (Ewha Womans University)	Coral Hall (18F)
F1.1	Improving A Smart Student Exchange Program Service Christina		
F1.2	Course Planning for Integrating The Concept of Ecological Sustainability into Industrial Design Project Sheng-Chun Huang and Dengchuan Cai		
F1.3	The Supported Factors and Its Barriers to Blended Courses Pradit Songsangyos and Pumitara Ruangthong		
F1.4	One Stop Shop Enrollment System: A Model Proposal to A University Alyza Aim Gaspar, Camille Kate Umandap, Kervie Corook, and Philip Ermita		
F1.5	Class Implementation of System Operation E-learning for Compiere ERP Fengjing Xu, Tetsuo Yamada, and Munenori Kakehi		
F2: Scheduling		Ching-Jung Ting (Yuan Ze University)	Dona-hae Hall (18F)
F2.1	Issues of Reducing Vehicle Waiting Time for AMHS in Semiconductor Manufacturing James T. Lin and Chih-Wei Huang		
F2.2	Two-Stage Flexible Flow Shop Scheduling Problem with Multiple Assembly Machines and Family Setup Times for Makespan Minimization Soo-Young Kim and Hyun-Jung Kim		
F2.3	Heuristic Scheduling Algorithm for Cloud Manufacturing Considering Collaboration Potentials Gilseung Ahn, You-Jin Park, and Sun Hur		

F2.4	Scheduling Group Appointment at Container Terminals
	Veterina Nosadila Riaventin and Kap Hwan Kim
F2.5	A Preliminary Study on the Optimal Operation Schedule for Interconnected Microgrid with Residential Demand
	Kyungchan Park, Soojeong Choi, and Sunju Park

F3: Human Factors (3)	Dengchuan Cai *(National Yunlin University of Science and Technology)*	Ivy Hall (19F)

F3.1	Longitudinal Comparison of Street Crossing Times at Controlled and Uncontrolled Crossings Among Groups Interfacing and not Interfacing with Hand-Held Devices
	Lawrence Schulze
F3.2	An Acceptability Study of Automated Driving Systems
	Jihye Lee and Sangwon Lee
F3.3	Development of A Posture Identification System to Prevent Work-Related Musculoskeletal Disorders for Sedentary workers
	Haeseok Jeong, Woojin Park, Haehyun Lee, Minho Lee, Seungwon Baek, Taekbeom Yoo and Yoonjin Lee
F3.4	Effects of Target Size, Position and Movement Direction on The Drag Performance of A Gaze Control Device
	Minjee Kim, Ilsun Rhiu, Daehwan Jin, Youlbeen Kang, and Myung Hwan Yun

F4: Network Management	Byung Do Chung *(Yonsei University)*	VIP Hall (19F)

F4.1	Vulnerability Analysis of Evacuation Transportation Networks
	Jun Kim, Hyun-Jung Kim, and Byung Do Chung
F4.2	Resilience Analysis of 4G LTE Mobile Telecommunication Network
	Thuy Mo Nguyen Thi and Young Yun Won
F4.3	Relational vs Structural Embeddedness: The Role of Uncertainty in Information Services Supply Chain Networks
	Habin Lee and Jaeyoun Oh
F4.4	Detection and Tracking of Disaster Events from Social Media
	Jih-Liang Hsieh, Yue-Fu Tsai, Wei-Guang Teng, and Yu-Chung Tsao

F5: Special Session (6) Smart Factory Technology for Big Manufacturing Data (SF-BMD)	Jae-Yoon Jung *(Kyung Hee University)*	Brahms Hall (19F)

F5.1	Big Data Analytics Platform Based on A Specialized Library for Manufacturing
	Ju Yeon Lee, Chanmo Jun, Dongil Kim, Bo Hyun Kim, and Jae-Yoon Jung
F5.2	A SaaS Platform for Smart Factory Capable of Providing Customized Services Based on Manufacturer's Needs
	Joo-Sung Yoon, Il-Ha Park, Chanmo Jun, and Bo Hyun Kim
F5.3	Service Oriented Architecture-Oriented Information Middleware for Smart Factory Applications
	Byeong Woo Jeon, Seung Jae Yoon, SooCheol Yoon, and Suk-Hwan Suh
F5.4	Production Rules Extraction and Simplification from Ensemble Decision Trees
	Josue Obregon, Jae-Yoon Jung, and Jae-Yoon Jung

11-Oct	**Keynote**	**17:00 ~ 18:00**
Keynote (3)	Yong Won Seo *(Chung-Ang University)*	Schubert Hall (31F)
K3	Korean SME Policy Innovation for Creative Economy *Dr. Young-Sup Joo, Small and Medium Business Administration, Republic of Korea*	
11-Oct	**Grand Banquet**	**18:00 ~ 20:00**

12-Oct: Industrial Tour

LGD: Depart scheduled at 08:30, SEC: Depart scheduled at 12:30
* Visitors are requested to come at the front of the hotel as per the schedule

🧊 October 11: Keynotes, Regular Sessions, and Grand Banquet

Time	Program	Place
08:00 ~	Registration	Lobby (19F)
08:30 ~ 10:00	D1. Manufacturing Systems (4)	Coral Hall (18F)
	D2. Healthcare Systems	Dong-hae Hall (18F)
	D3. Human Factors (1)	Ivy Hall (19F)
	D4. Business & Management (1)	VIP Hall (19F)
	D5. Special Session (4) - Service System Operations Management(SSOM)	Brahms Hall (19F)
10:00 ~ 10:30	Coffee Break	Lobby
10:30 ~ 11:30	Keynote (2) - Sustainability and Reverse Supply Chains: An Overview Prof. Surendra M. Gupta, Northeastern University, USA	Brahms Hall (19F)
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13:00 ~ 14:45	E1. Service Management	Coral Hall (18F)
	E2. Distribution & Transportation Systems	Dong-hae Hall (18F)
	E3. Human Factors (2)	Ivy Hall (19F)
	E4. Business & Management (2)	VIP Hall (19F)
	E5. Special Session (5) - Modeling, Simulation, and Optimization for 3D Printing(MOS3DP)	Brahms Hall (19F)
14:45 ~ 15:15	Coffee Break	Lobby
15:15 ~ 17:00	F1. Education Systems	Coral Hall (18F)
	F2. Scheduling	Dong-hae Hall (18F)
	F3. Human Factors (3)	Ivy Hall (19F)
	F4. Network Management	VIP Hall (19F)
	F5. Special Session (6) - Smart Factory Technology for Big Manufacturing Data(SF-BMD)	Brahms Hall (19F)
17:00 ~ 18:00	Keynote (3) - Korean SME Policy Innovation for Creative Economy Dr. Young-Sup Joo, Minister of Small and Medium Business Administration, Republic of Korea	Schubert Hall (31F)
18:00 ~ 20:00	Grand Banquet	Schubert Hall (31F)

🧊 October 12: Industrial Tour

Tour of LG Display	8:30 ~ 10:00	Leaving the Hotel President for LG Display
	10:00 ~ 11:30	Visiting LG Display (Paju)
	11:30 ~ 13:00	Leaving for the Hotel President
Tour of Samsung Electronics	12:30 ~ 14:00	Leaving the Hotel President for Samsung Electronics
	14:00 ~ 16:00	Visiting Samsung Electronics (Giheung-gu, Yongin)
	16:00 ~ 17:30	Leaving for the Hotel President

* Visitors are requested to come at the front of the hotel as per the schedule.

CHOOSING STORE TYPE USING CLUSTER ANALYSIS AND MULTIATTRIBUTE ATTITUDE MODEL FOR A CONSUMER PRODUCT STORE IN BANDUNG

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The research conducted at a store which sells consumer product in Bandung, Indonesia. The purpose of the study was to find a store type which preferred by consumers using Multiattribute Attitude Model. The store type in study were supermarket, mini market, and convenience store.

Questionnaires were distributed at the location of the store to its customers. The research variables were developed from Activity Interest Opinion (AIO) and Marketing Mix concepts. Cluster Analysis was used to find the characteristics of consumer and Multiattribute Attitude Model was used to find the store type which consumers preferred. The findings were that the consumers were categorized into 3 groups. The community and sports group (39%), community and shopping group (19%) and general group (42%) and the type of store which they preferred was the supermarket.

Keywords: Supermarket, Mini Market, Convenience Store, AIO, Marketing Mix, Multiattribute Attitude Model

1. INTRODUCTION

Consumer product store has been evolved from traditional store to supermarkets and now into convenience stores. There are different characteristics of consumer product store. In Indonesia we can find three major types of consumer product stores. They are namely supermarkets, mini markets and convenience stores.

Supermarkets are consumer product stores which offer a broad variety of product and usually need a large space to display their product. These stores had been emphasized they strategy on offering all you need products with relatively low and competitive price.

Mini markets focus their selling on certain segment of customers. They do not have broad varieties of product and usually need small place to display their product. They do not have to invest on product variances and large places. They strategy was to open as many mini market as possible so that they could be easily found by the customers. Mini markets are easy to find everywhere around the city.

Convenience stores are consumer product stores which combined mini stores and cafeteria. They sell only product which needed for certain group of people and also provide a place to have a quick meal or snack. The stores can be divided into two areas: product display area and cafeteria area.

This research was conducted in 2013 in Bandung, Indonesia, on a specific consumer product store at Jl Suria Sumantri, Bandung. The store, namely Store "X", was opened since June 2012. Store "X" was located between university and high school. The area in which the store located has 4 modern store (2 convenience stores and 2 mini market) and 1 traditional store. When it was opened the store chose mini market type as the type of store they want to operate. Therefore it only provides consumer goods for students and worker around it.

The store sales was below the expectation. Many customers complaint that they could not find the product which they need. The store manager was wondering whether the store type choice was accurate. Therefore a market research was needed to find which type of store which can complement with customer needs on the area.

2. METHODOLOGY

The multiattribute model [2] can be used to predict how customer evaluate alternatives of retailers. It is based on the notion that customers see a retailer as a collection of attributes or characteristics. The model is designed on the basis of how a retailer performance on relevant attributes perceived by consumer and the importance of those attributes to the customer.

The purpose of the study was to find a store characteristics, groups of customers, importance weights and performance beliefs for each consumer groups and store types as seen in table 1.

Table 1.
Table 2. Importance Weights and Performance Beliefs for Multiattribute Attitude Matrix

Importance Weights			Performance beliefs		
Store Characteristics	Customer group 1	Customer group 2	Supermarkets	Mini Markets	Convenience Stores
. . .					

Store characteristics were developed from marketing mix [1] which was summarized in Table 2.

Table 2. Store characteristics

Marketing Mix	Store Characteristics	*Supermarket*	*Minimarket*	*Convenience Store*
Product	Product variations	All product with various brands	Product limited to daily consumer product with few brands to choose with	only sell limited essential daily product with a few brands to choose
	Product size variations	All size available	only sell medium and small size	only sell economic size (usually medium)
	Product grouping information	information about product grouping are noticeable with big banner	information about product grouping are limited with small banner	no information about product grouping
	Cafeteria	no cafeteria	no cafeteria but sell instant food	with cafeteria and various ready to eat food
	Fresh fruit and vegetables	sell fresh fruit and vegetables	only sell small variations of fruit	no fresh fruit and vegetables
Price	Relative price	Price are competitive, relatively low	Price are on the average level	price are relatively high compare to other store type
Place	Cleanliness	store are cleaned regularly	store are cleaned once or twice a day	store are cleaned when necessary
	Store's air conditioning	relatively high temperature compare to other store type	not to cool	convenience with cool air conditioning
	Easiness to find	Not very easy to find in the city	very easy to find (everywhere)	easy to find in certain area of the city
	place for hangout	not available	available on the front store but very limited	available both on outdoor or indoor
	Alley's width	Spacious	only fit for one or two person	quite spacious
Promotion	media promotion	brochures and posters	posters	electronic media
	promo event	frequently offered	bundling product only	no promo
Process	operating hours	07.00 - 22.00	07.00 - 24.00 some are 24 hours	usually 24 hours
	Easiness in transaction	accept various debit or credit card	accept only limited debit or credit card	cash or electronic money
People	number of worker in store	more than 5	2 or 3	only 2
	workers availability	workers always available	few workers are available	1 or no worker available

Physical Evidence	number of cashier	more than 5	1-3	1-2
	trolley and shopping basket	A lot of selection for trolleys and shopping baskets	shopping baskets only	no trolley or shopping baskets
	interior and exterior	common interior and exterior design	common interior and exterior design	interior and exterior design are dynamic and inviting
	box for charity	no dedicated box for charity	box is provided for charity	box is provided for charity
	box for customer complains	no special box for complains	some stores provide box for complains	dedicated box for complains
	price tag accuracy	some price tag are misplaced	accurate	accurate
	Wi-Fi facility	no Wi-Fi facility	no Wi-Fi facility	free Wi-Fi

A descriptive study [3] was undertaken to find out what are the importance weights and performance belief of the store attributes. Questionnaires were distributed to 150 consumers with 4 Likert's scale of importance and performance. Means of data were calculated and used as the importance weights and performance belief.

Customers grouping were developed using AIO model [2]. The variables developed can be seen in Table 3. Questionnaires were distributed to 150 customers with 4 Likert's scale. Cluster analysis [4] was used to groups consumer into three groups.

Table 3. AIO variables

AIO	Operational variables
Activity	hobby
	social activities
	Join in a club activities
	hangout with friends in a community activities
	shopping activities
	sports activities
Interests	interest on family matters
	interest on working
	interest on social matter
	interest on recreational
	interest on looks (fashion)
	interest on information (read/watch news)
Opinion	self determination
	always look for quality in buying a product
	always look for long term use in buying a product

3. ANALYSIS

After data were gathered a reliability test was conducted for importance scale, performance scale and AIO attitude scale. The results showed that all items were reliable with reliability scores above 0.7. as shown in Table 4.

Table 4. Reliability

Variables	Reliability
Importance weight	0.884
Performance belief (supermarkets)	0.898
Performance belief (mini markets)	0.892
Performance belief (convenience store)	0.929
AIO	0.729

Cluster analysis, using K-Mean Cluster analysis, groups consumer into three groups with distinction as showed in Table 5.

Table 5. Distinction Between Groups

Group	AIO	% male	% female	Number of respondents
1	Shopping activities	28.6	71.4	28
2	Sport activities and always look for long term use in buying a product	62.1	37.9	58
3	No distinction (all AIO)	40.6	59.4	64

The importance weights were grouped based on grouping by cluster analysis. The weights were gotten by calculating the average answers from respondents in each group. The Importance Weights are summarized in Table 6.

Table 6. Importance Weights by Customers Group

Store Characteristics	Importance Weights		
	Group 1	Group 2	Group 3
Product variations	3.25	3.40	3.50
Product size variations	3.25	3.22	3.38
Product grouping information	3.25	3.17	3.48
Cafeteria	2.86	2.95	3.13
Fresh fruit and vegetables	3.36	3.59	3.78
Relative price	3.43	3.41	3.59
Cleanliness	3.46	3.53	3.75
Store's air conditioning	3.29	3.50	3.53
Easiness to find	3.32	3.45	3.59
place for hangout	2.79	2.95	3.14
Alley's width	2.96	3.14	3.16
media promotion	3.00	2.88	3.11
promo event	3.25	3.34	3.59
operating hours	3.14	3.36	3.69
Easiness in transaction	3.25	3.1	3.45
number of worker in store	2.89	3.05	3.27
workers availability	3.11	3.33	3.61
number of cashier	3.14	3.24	3.45

trolley and shopping basket	3.36	3.31	3.5
Exterior	3.04	3.14	3.34
Interior	3.00	3.16	3.33
box for charity	2.64	2.53	2.94
box for customer complains	3.00	3.24	3.13
price tag accuracy	3.39	3.40	3.75
Wi-Fi facility	2.64	2.78	3.02

The performance belief scores were gotten by averaging customers responds for each store characteristic and is summarized in Table 7.

Table 7. Performance beliefs

Store Characteristics	Performance beliefs		
	Supermarket	Minimarket	Convenience Store
Product variations	3.53	2.66	2.42
Product size variations	3.49	2.66	2.25
Product grouping information	3.33	2.73	2.53
Cafeteria	3.02	2.58	2.96
Fresh fruit and vegetables	3.43	2.61	2.28
Relative price	3.31	2.72	2.25
Cleanliness	3.17	2.91	3.00
Store's air conditioning	3.11	2.95	3.09
Easiness to find	3.00	3.08	2.87
place for hangout	2.72	2.60	3.08
Alley's width	3.27	2.70	2.77
media promotion	3.18	2.75	2.37
promo event	3.25	2.82	2.37
operating hours	3.14	3.03	2.99
Easiness in transaction	3.32	2.85	2.81
number of worker in store	3.33	2.74	2.39
workers availability	3.00	2.78	2.67
number of cashier	3.45	2.52	2.29
trolley and shopping basket	3.45	2.72	2.48
Exterior	2.97	2.76	3.03
Interior	2.90	2.72	2.96
box for charity	2.76	2.65	2.31
box for customer complains	2.96	2.64	2.29
price tag accuracy	3.31	2.78	2.80
Wi-Fi facility	2.28	2.27	2.96

The multiattribute attitude model simulates how customer evaluates store by calculating the sum of performance beliefs multiplied by the importance weights [2]. The overall evaluation is summarized in Table 8.

Table 8
Evaluation of Store Types

Group	Store type		
	Supermarket	Minimarket	Convenience Store
1	247	214	207
2	253	219	212
3	269	233	226

4. CONCLUSION

The result of this study shows that the type of store most appropriate for store "X' is supermarket. Therefore the minimarket choice made by the owner doesn't prove to be fit for the customer.

In this paper we developed store characteristics attributes using marketing mix concepts. The data gathered showed that customers perceived the benefits difference would be in variations product they can purchased, pricing, promotions, number of workers and cashiers, and the availability of trolley and shopping baskets.

The result from cluster analysis showed that the shopping activities mostly are females (71.4%) and the sports activities mostly are males (62.1%).

The multiattribute attitude model result showed similar results for all of the groups and close total score for each store type we had analyze. This could be resulted from the failure of the marketing mix concept used for store characteristics in extracting the most benefit difference from the customers' evaluation when choosing a consumer product store. Different concept was recommended to be used and compared to for further study.

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