Program Book of
2024 International Conference on Applied Service Management

"Service Innovation and Digital Transformation in the ESG Era"

May 31 ~ June 3, 2024

International University of Ulaanbaatar, Ulaanbaatar, Mongolia

Co-Host :	Aviation Management Society of Korea Korea Aviation Strategy Institute Institute of Business Research, KAU Hospitality Analytics and Innovation Lab at University of Houston
Sponsors :	Simple, International University of Ulaanbaatar

Messages from Conference Chairs

Dear Colleagues,

Welcome to the 2024 International Conference on Applied Service Management co-hosted by Aviation Management Society of Korea, Korea Aviation Strategy Institute, Institute of Business Research at Korea Aerospace University, and Hospitality Analytics and Innovation Lab at University of Houston. We are very honored to host this wonderful event on the amazing and beautiful destination, Ulaanbaatar, Mongolia, sponsored by SIMPLE and International University of Ulaanbaatar.

On behalf of the Conference Committee, we are very pleased to welcome you to the 2024 International Conference on Applied Service Management to connect international stakeholders from academia and industry and bring together innovative research on various service issues. In particular, this year we aim to create and share critical issues and knowledge on service innovation, digital transformation, sustainability, Environmental, Social, and Governance (ESG), and more. We also hope provide you with research collaboration and networking opportunities between researchers and practitioners.

We are very happy and honored to invite Dr. Ki-Joon Back, Associate Dean for Research and Graduate Studies and Moores Chair Professor at Conrad N. Hilton College of Global Hospitality Leadership, University of Houston, as the conference Keynote Speaker. Dr. Back is one of the most productive and world-renowned researchers (World Top 2% Most Cited Scientist for Entire Career by Stanford University; the World Top 1% of scientists in the Business and Management Section by Research.com) and global leaders in all the areas of ESG, hospitality and tourism, and management issues. Another wonderful keynote speech will be delivered by Mr. Batjargal Purevdorj, CEO of Simple LLC in Mongolia. Mr. Purevdori is one of the most innovative and emerging entrepreneurs and introduces mobile banking systems and fintech in Mongolia. His practical business practices and valuable insights will be greatly helpful for conference participants to learn digital transformation and business strategies in the Mongolian market.

In the Plenary Session, Dr. Minwoo Lee, Director of Hospitality Analytics and Innovation Lab and Associate Professor at Conrad N. Hilton College of Global Hospitality Leadership, University of Houston, will share his knowledge and recent research trends on digital transformation and business analytics in the service context. Dr. Lee is one of the pioneers in integrating Business Analytics and Service Innovation in the Digital Transformation era and developing new research areas and curriculums in hospitality and tourism data analytics.

We want to take this opportunity to thank our sponsors, Simple and International University of Ulaanbaatar, for making this conference possible. We also thank Professor Moon Gil Yoon, for his continued support and endless dedications for this conference. We would like to extend our gratitude to the organizing committee members. Finally, we offer our special thanks to researchers and students who will present their wonderful work at the conference. We hope you will enjoy this opportunity to network and prepare your future.

We hope that the conference will be informative, enjoyable and fulfilling experience to all who attend. We look forward to meeting you at the 2024 International Conference on Applied Service Management in Mongolia.

Conference Co-Chairs

Habin Lee
Divisional Lead and Professor
Brunel Business School, Brunel University London

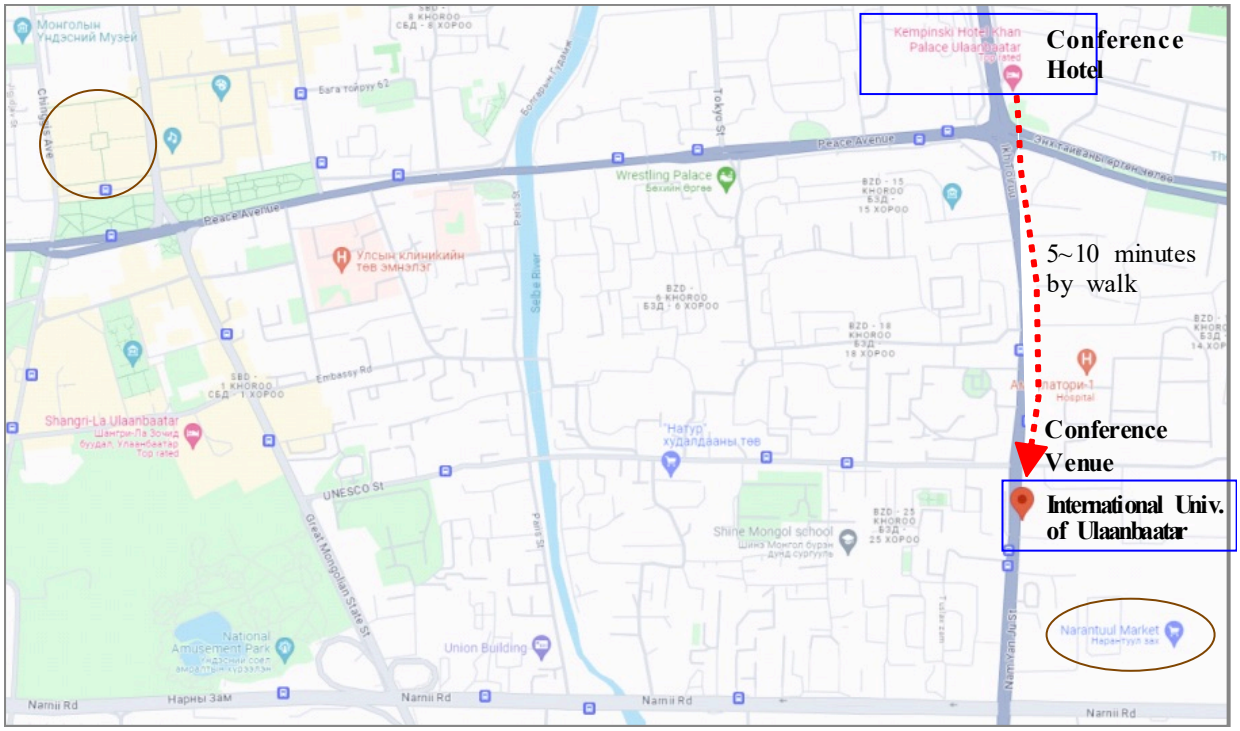
Minwoo Lee
Director of Hospitality Analytics and Innovation Lab and Associate Professor
Conrad N. Hilton College of Global Hospitality Leadership, University of Houston

Technical Program

May 31 (Fri)		
17:00~19:00	**Registration**	
18:00~20:00	**Welcome Reception**	
June 1 (Sat)		
09:00~09:20	**Opening Ceremony**	
09:20~10:30	**Keynote Speeches (T-1)**	
	" ESG Strategies: Global Hospitality Leadership " Ki-Joon Back (Prof. U. of Houston, US) **" Digital Transormation in Mongolian Financial Market "** Batjargal Purevdorj (CEO, Simple LLC, Mongolia)	
10:30~10:40	**Tea Break**	
10:40~12:00	**Session A-1** **Dong Myong Lee (Korea Aerospace Univ. KR)**	**Session A-2** **Shintaro Mohri (Kobe Gakuin Univ., JP)**
	"Self-organising Open Online Communities: A Dialectic Process Model" Habin Lee (Brunel University London, UK)	"A Study of Group Passenger Seating Management Strategies at a Major Airline" Hwi-Young Lee (Inha Techical Colleage, KR)
	"How airline shapes data driven transformation" Jae Wook Lim (Korea Aviation Strategy Institute, KR)	"A Study on Air Traveler's Price Sensitivity Level to Airline Ancillary Service" Otgonbayar Orosoo (Juulchin LLC, MN)
	"A Study of Confusion in Investment Behavior of Mongolian People" Banzragch Mijid (Mongolian Uni. of Science and Technology, MN), Bolormaa Ayurzana (Mongolian Uni. of Science and Technology, MN), Uyanga Davaasuren (Mongolian Uni. of Science and Technology, MN)	"A Study on the Impact of Emissions Trading System on Environmental Performance of Companies - Focusing on the Quantitative Analysis of Emissions Trading System in Korea" Inkyung Song (Ecovision21, KR)
	"Analyzing Important Weights of Major Factors Influencing the Utilization of Urban Air Mobility (UAM)" Jun Young Lee (Korea Aerospace Industries, KR), Yeon Soo Park (Uni. of Birmingham, UK)	"A study on customers' perceived value for selecting an airport in multi-airport region" Gun Woo Lee (Korea Aerospace Uni., KR), Yeabin Cho (Korea Aerospace Uni., KR), Sangphil Won (Korea Aerospace Uni., KR)
12:00~13:00	**Luncheon**	

June 1 (Sat)		
13:00~14:30	**Session B-1** **Sangsu Han (Osaka International University, JP)**	**Session B-2** **Habin Lee (Brunel Univ., UK)**
	"Revisiting passengers' perceptions of airline service quality: A theory-driven machine learning approach using big data" Juhwan Lim (Kansas State Uni., US), Minwoo Lee (Uni. of Houston, US), Jichul Jang (Kansas State Uni. US)	"A comperative study of tertiary education financing in different countries" Sh Mungunsukh (Uni. of the Humanities, MN), P. Lkhagvasuren (Uni. of the Humanities, MN), A. Enkhsuren (Uni. of the Humanities, MN)
	"Understanding the Psychological Drivers and Cultural Variations of Flight Shame" Jabin Jang (University of Warwick, UK)	"Using an automated valuation model for residential property valuation" Adilbish Enkhsuren (Mongolian Uni. of Science and Technology, MN), Bavuudorj Enkhtuya (Mongolian Uni. of Science and Technology, MN), Tamjav Byartugs (Mongolian Uni. of Science and Technology, MN), Dashdorj Zolzaya (Mongolian Uni. of Science and Technology, MN)
	"Prediction of Mongolian stock market: a deep learning model", Selenge Khurelbaatar (International Uni. of Ulaanbaatar, MN), Gantur Togtokh (New Mongol Institute of Technology, MN)	"Improving the Performance of Airport Monthly Demand Forecasting Models by utilizing Available Seat Plan" Manok Jo (Korean Air, KR)
	"A Study on Risk Assessment in overses Airport Project" Jeongin Ha (Korea Airports Corp., KR)	"A Study of Course Importance Analysis in the Department of Airline Cabin Services" Moon-Ju Yoo (Inha Technical College, KR)
14:30~14:40	**Tea Break**	
14:40~15:30	**Plenary Session** **" Data-driven Service Innovation and Corporate Digital Responsibility in the Digital Transformation Era "** Minwoo Lee (Univ. of Houston)	
15:30~15:40	**Tea Break**	
15:40~17:00	**Session C-1** **Hwi Young Lee (Inha Tecnical College, KR)**	**Session C-2** **Selenge Khurelbaatar (International Uni. of Ulaanbaatar, MN)**
	"Transformational Leadership and Quiet Quitting among Airlines Frontline Employees" Dong Myong Lee (Korea Aerospace Uni., KR)	"Evolution of Ancillary Services and Challenging Issues on Revenue Management in Airlines" Moon Gil Yoon (Korea Aerospace Uni., KR)
	"An Overview of ESG Reporting in Mongolia: Practices and Challenges" Bayarmaa Dorjnaran (Uni. of Science and Technology, MN), Selenge Khurelbaatar (International Uni. of Ulaanbaatar, MN)	"A study to identify factors affecting in sustainable performance of human resource in the university" Khandmaa Ailtgui (International Uni. of Ulaanbaatar, MN), Myagmarsuren Terbish (International Uni. of Ulaanbaatar, MN)
	"The impact of internal and external factors on housing choices of middle aged families in Mongolia" U. Enkhtuyagerel (Internatinal Uni. of Ulaanbaatar, MN)	"A Study on UAM(Urban Air Mobility) service area Selection Criteria" Min-Chul Jung (Korea Airport Corp., KR) Keum-Sik Yu (Korea Airport Corp., KR) Moon Gil Yoon (Korea Aerospace Uni., KR)
	"A proposal for a business simulation game on Google Workspace" Sangsu Han (Osaka International University, JP)	"Economic impact of tourism industry in Mongolia" B. Munguntuul (International Uni. of Ulaanbaatar, MN), A. Munkh-Erdene (International Uni. of Ulaanbaatar, MN)
17:00~17:30	**Tea Break**	
17:30~19:00	**Traditional Performance of Mongolia**	
18:00~22:00	**Banquet**	

June 2 (Sun) Sponsored Session Program	
09:00-11:30	**AMSOK Sponsored Session S-1** **Sang Pil Won (KAU, Korea)** **"Future Overlook of Service Industry in Intelligent AI Era"** Dohee Han (KASI, Korea), Shogo Shiode (Kobe Gakuin Univ., Japan), Moon Ju Yoo (Inha Technical College, Korea), Batjargal Purevdorj (Simple LLC, Mongolia), Yeonsang Jang (TourSoft, Korea), Habin Lee (Brunel University, UK)
11:30~13:00	**Luncheon**
13:00-18:00	**KASI Sponsored Session** **Industry Field Trip – Govi Company**
June 3 (Mon) Committee Meeting	
09:00-11:00	**Steering Committee Meeting**
11:00-12:00	**Closing Ceremony**



June 1 (Sat)	
09:00~09:20	**Opening Ceremony**
09:20~10:30	**Keynote Speeches** **“ ESG Strategies: Global Hospitality Leadership ”** Ki-Joon Back (Prof. U. of Houston, US) **“Digital Transormation in Mongolian Financial Market”** Batjargal Purevdorj (CEO, Simple LLC, Mongolia)

Ki-Joon Back, Ph.D. Founder of CGS

Associate Dean for Research and Graduate Studies & Moores Chair Professor, Hilton College of Global Hospitality Leadership, University of Houston

 Leader of hospitality education in both teaching and research: Multiple research award winners and developed numerous students: World Top 2% Most Cited Scientists for Entire Career by Stanford University; the World Top 1% of scientists in the Business and Management Section by Research.com; elected National Honor Society, Phi Kappa Phi, faculty member;

- Published over 170 manuscripts, book chapters, and proceedings in the area of hospitality and tourism research (consumer behaviors, gambling-related research);
- Received over 27 research awards at the international level of conferences and journals, including the highest research achievement award in the hospitality and tourism discipline, the ICHRIE Lifetime Research Achievement Award and the Founder's Award for the Lifetime Hospitality Graduate Education;
- Founded the Consortium of Global Sustainability, including 61 global academic members in 17 countries (the-consortium.net); and
- Serve as a managing editor, associate editor, guest editor, and editorial board member of top- tier hospitality and tourism journals

"Service Innovation and Digital Transformation in the ESG Era"

Abstracts

Session A-1

Self-organising Open Online Communities: A Dialectic Process Model

Habin Lee (Brunel University London, UK)

Abstract: This paper develops a dialectic process model to explain how group norms evolve in self-organizing open online communities. Archive data collected from a celebrity fandom community is used for a netnography study that is complemented by an interview with the community manager. The analysis of the data reveals that norm clarity and alignment with the community identity are sources of contradictions. I find that group norms evolve based on how contradictions are resolved through the creation of synergy (contradictions upgrade group norms) or overcoming (contradictions result in dominant force's preferences). The findings have theoretical implication on the query of stability versus changeability tension in OCs literature by revealing how OC members selectively use paradox and dialectic perspectives in managing contradictions.

How airline shapes data driven transformation

Jae Wook Lim (Korea Aviation Strategy Institute, KR)

Abstract: Up in the air, a modern plane generates huge data every flight. This data can be used to create valuable business outcomes, from improved operational efficiency to higher customer satisfaction. In order to become a truly data-driven company, the industry incumbent faced not a mechanical problem but a human one. Organizational resistance to change stood in the way of transformational efforts. Accordingly airline need to create a kind of data leadership program, and along the way, its team learned valuable insights about the roles that people could play in data-driven change.

A Study of Confusion in Investment Behavior of Mongolian People

Banzragch Mijid (Mongolian Uni. of Science and Technology, MN), **Bolormaa Ayurzana** (Mongolian Uni. of Science and Technology, MN), **Uyanga Davaasuren** (Mongolian Uni. of Science and Technology, MN)

Abstract: Unlike traditional finance, the study of behavioral finance focuses on the cognitive and emotional characteristics that influence investors' decision-making processes, leading to irrational decisions. One approach to identifying investor illusions is Michael M. Pompion's method, which was employed to study the investment behavior of Mongolian people and how these illusions affect their decision-making. The study involved selecting twenty different types of illusions, and data was collected using a questionnaire that was then evaluated with a scoring system. The researchers used both a behavioral type identification test and a key behavioral illusion identification test to identify the main illusions causing investor bias. The study concluded that avoidance of loss, avoidance of regret, overconfidence, optimism, and illusory management are the primary causes of these illusions.

Analyzing Important Weights of Major Factors Influencing the Utilization of Urban Air Mobility (UAM)

Jun Young Lee (Korea Aerospace Industries, KR), **Yeon Soo Park** (Uni. of Birmingham, UK)

Abstract: The increasing interest in Urban Air Mobility (UAM) as a potential solution to urban transportation challenges necessitates a deeper understanding of consumer behavior towards this emerging mode of transport. This research aims to analyze the factors influencing consumer behavior when considering UAM compared to traditional modes of transportation. After an extensive literature review, nine significant behavioral factors were identified, which include cost, travel time, accessibility, schedule & availablity, responsiveness, safety, aircraft reliablity, flight comfortness and environmental impact. This study will utilize a survey method to collect data from potential consumers, focusing on these identified factors to evaluate their influence on the decision-making process regarding UAM adoption. This research seeks to contribute valuable insights into the development strategies of UAM services by understanding the motivational dynamics that drive consumer acceptance and preference.

Session A-2

A Study of Group Passenger Seating Management Strategies at a Major Airline

Hwi-Young Lee (Inha Techical Colleage, KR)

Abstract: The concept of revenue management have been used widely in the hotel and air transportation industries, and considered as a good system for managing a perishable asset. Recently, its application area is being increasingly expanded to service industries such as the travel, the railway, and the sport industries. The group demand is not only controlled by airline's constant efforts, but is controlled by airline-travel agency's relationship. Therefore the group seats allocation model have to be applicable each model in according to the air travel markets environment (airlines-travel agency's environment etc). In this paper, we concentrated on RM problem for the package group demand and developed a seat allocation model for revenue optimization. And we develop a seat allocation model for package group demand in domestic with airlines-travel agency's environment. Especially, to manage the demand uncertainty effectively, a linear approximation technique is applied in the modeling process. Thereby, we can formulate our problem as a mixed Integer Programming model which is ease to solve by various mathematical programming tools.

A Study on Air Traveler's Price Sensitivity Level to Airline Ancillary Services

Otgonbayar Orosoo (Juulchin LLC, MN)

Abstract:

A Study on the Impact of Emissions Trading System on Environmental Performance of Companies - Focusing on the Quantitative Analysis of Emissions Trading System in Korea

Inkyung Song (Ecovision21, KR)

Abstract: International efforts to reduce greenhouse gases have led to the introduction of emission trading systems worldwide. The Republic of Korea also made efforts to reduce greenhouse gases through the introduction of the emission trading system in 2015. However, academic research on whether the emission trading system contributed to effective greenhouse gas reduction in the power generation and industrial sectors is insufficient. We studied how the government's policies, such as the emission trading system and the target management system, affect the environmental performance of companies. Several meaningful results were derived through quantitative analysis based on government policy and public data. However, future research is needed due to the following limitations. First, there is a lack of specific research on how companies' efforts to adapt to the government's environmental policy improve environmental performance. Second, long-term follow-up studies are needed in the future due to the short history of introducing the target management system and the emission trading system.

A study on customers' perceived value for selecting an airport in multi-airport region

Gun Woo Lee (Korea Aerospace Uni., KR), **Yeabin Cho** (Korea Aerospace Uni., KR), **Sangphil Won** (Korea Aerospace Uni., KR)

Abstract: When using air travel in a multi-airport region, we can select both an airport and an airline to use. In this case, the airline and the airport are selected by taking into account the schedule, route, number of flights, fare, and convenience of ground access to the airport. In general, airlines tend to sell their tickets at different prices depending on the airport, even for the same route operated in multi-airport region. In this study, we focus on analyzing customers' perceived value of the airport they use in a multi-airport region. Using the conjoint analysis method, we will set up a model to analyze customers' perceived value of the airport used and conduct empirical analysis via a survey.

Session B-1

Revisiting passengers' perceptions of airline service quality: A theory-driven machine learning approach using big data

Juhwan Lim (Kansas State Uni., US), **Minwoo Lee** (Uni. of Houston, US), **Jichul Jang** (Kansas State Uni. US)

Abstract: Understanding the discrepancy between what airline passengers expect and what they are offered is vital to increase service quality and customer satisfaction. The current study aims to expand the current knowledge regarding airline service quality dimensions using the passengers' actual service experiences. Specifically, this study investigates airline service quality factors perceived by passengers, analyzing online passenger reviews and their effects on customer satisfaction. Using 1,389,689 online passenger reviews from TripAdvisor.com, the structural topic modeling algorithm identified 29 airline service quality factors. Drawing upon AIRQUAL and SERVQUAL as theoretical frameworks, five unique dimensions (i.e., flight attendance service, flight schedule, in-flight entertainment, in-flight meal, and baggage) are suggested. Moreover, our regression analysis emphasizes the significance of flight attendant services and hidden critical factors, such as attention to child passengers and special requests, in enhancing customer satisfaction. Based on word distribution, detailed practical implications are discussed.

Understanding the Psychological Drivers and Cultural Variations of Flight Shame

Jabin Jang (University of Warwick, UK)

Abstract: In the face of growing environmental concerns, the phenomenon of 'flight shame' has emerged, influencing passengers' choices in air travel. This study sought to answer the question: How do psychological drivers contribute to flight shame, and how does it vary across different regional contexts? A combination of qualitative and quantitative methodologies was employed to examine the psychological motivations behind flight shame and its manifestations across varying contexts. Key findings revealed that environmental consciousness is on the rise; however, it does not consistently deter individuals from flying. Immediate environmental consequences exerted more influence on flight decisions than mere awareness. Furthermore, pronounced cross-cultural differences in understanding flight shame were observed, suggesting the need for culturally sensitive research designs in subsequent studies. In conclusion, while 'flight shame' is gaining traction as an influential factor, other tangible repercussions and cultural distinctions play a critical role in shaping travel behaviours.

Prediction of Mongolian stock market: a deep learning model

Selenge Khurelbaatar (International Uni. of Ulaanbaatar, MN), **Gantur Togtokh** (New Mongol Institute of Technology, MN)

Abstract: The number of investors in the Mongolian stock market has increased in recent years because of decreasing saving rates and the development of the stock exchange in Mongolia. However, predicting the stock market is still challenging. Recently, deep learning-based models have been used to help investors to predict stock market movement. This research predicted the direction of movement of 10 Mongolian companies which parameters such as market capitalization, average daily turnover, and number of trading days are high. This prediction is based on the LSTM model and uses historical closing prices. Through experiments, we show the model's prediction accuracy on each of the 10 companies.

A Study on Risk Assessment in overses Airport Project

Jeongin Ha (Korea Airports Corp., KR)

Abstract: The overseas airport business is forecasted to maintain an annual growth rate of 4-5%, with a shift in procurement methods from traditional contracting to investment-led development. Consequently, recent demands from governments and construction firms emphasize the necessity of expanding into overseas airport business markets, given the limitations of domestic development projects. Investment-led overseas airport business projects pose higher profitability and risk compared to standard contracting projects, potentially exerting significant impacts on national economies and enterprises in case of project failure. Key challenges include securing approval from host governments, funding constraints from project owners, and complex risks associated with substantial capital investment, project execution, and ongoing maintenance. In light of these

observations, this study aims to highlight the necessity for risk analysis tailored to the characteristics of investment-led overseas airport business projects. Reviewing existing risk assessment methods related to overseas airport business projects, various approaches are proposed for country-specific, project-specific, and project-level risk evaluations. Critically, existing methods often lack objectivity due to subjective and qualitative information, underscoring the need for objective risk quantification to enhance practical applicability. This research proposes a methodology for risk assessment tailored to investment-led overseas airport business projects. By systematically deriving and evaluating key risks aligned with project characteristics, the study aims to assess risk levels and propose corresponding risk characteristics and mitigation strategies. This research contributes to advancing risk management practices tailored to investment-led overseas airport business projects, enhancing understanding of risk factors, and promoting effective risk mitigation strategies for practical industry application.

Session B-2

A comperative study of higher education financing in different countries

Sh Mungunsukh (Uni. of the Humanities, MN), **P. Lkhagvasuren** (Uni. of the Humanities, MN), **A. Enkhsuren** (Uni. of the Humanities, MN)

Abstract: Good education is the main pillar of a country's development. In this research, we have chosen Mongolia and some countries in the world to study how these countries value and finance tertiary education. For this purpose, some statistical analysis is performed on the quantitative data on the percent of tertiary education expenditure in the government expenditure of countries of different income levels, and some conclusions and recommendations are made based on the results.

Using an automated valuation model for residential property valuation

Adilbish Enkhsuren (Mongolian Uni. of Science and Technology, MN), **Bavuudorj Enkhtuya** (Mongolian Uni. of Science and Technology, MN), **Tamjav Byartugs** (Mongolian Uni. of Science and Technology, MN), **Dashdorj Zolzaya** (Mongolian Uni. of Science and Technology, MN)

Abstract: The real estate sector is one of the important pillars of the country's economic development. Asset valuation is determined by systematically collecting, researching, calculating, and summarizing the necessary data for determining the value of assets for various purposes based on the laws, regulations, and standards that apply to it. Within the scope of this activity, detailed information about the assets being evaluated and comparable assets, historical market price increases and decreases, macro, microeconomics, legal acts, etc., are important to accurately determine the value of the assets. Within the framework of the need to create an asset valuation database, we determined asset classification, valuation methods, and factors affecting valuation, and studied residential real estate valuation using an automatic valuation model.

Improving the Performance of Airport Monthly Demand Forecasting Models by utilizing Available Seat Plan

Manok Jo (Korean Air, KR)

Abstract: This paper presents an approach to improve the accuracy of airport passenger demand forecasting models by integrating airlines' available seat data into the traditional ARIMA model. The traditional ARIMA forecasting methods primarily rely on historical series data itself, and often overlook the importance of exogenous variables such as airlines' available seats or supply capacity in forecasting. By incorporating airlines' available seat data into our model, we provide more robust and reliable forecasts. This study validates the superiority of our model by comparing its forecasting performance with a widely used model (SARIMA) using actual datasets of international boarding and available seats of Incheon Airport from 2011 to 2019. The results demonstrate that our model improves the explanatory power from 0.76 to 0.91 in terms of the coefficient of determination and reduces the AIC and BIC, indicating enhanced goodness of fit compared to traditional ARIMA models. This research is expected to contribute to the optimization of airport operations through more accurate demand forecasting.

A Study of Course Importance Analysis in the Department of Airline Cabin Services

Moon-Ju Yoo (Inha Technical College, KR)

Abstract: Airline cabin crew training departments at four-year and two-year colleges and universities across the country are operating the curriculum accordingly by setting the curriculum that corresponds to the airline training to the educational environment and equipping the faculty, facilities, and equipment. For the feasibility study of the selected subjects and curriculum, data were collected from third-year students in the Department of Airline Cabin Service using the 1:1 Delphi Method to collect data that can be used for Dynamics Analysis to identify the mutual influence between each subject, unlike the data used for IPA or Hirschkowitz Analysis, which are one-way static analyses. As a result of the analysis, we were able to categorize the analysis factors by subject group into three groups, and eight subjects were identified. In other words, competency development courses, cabin practice courses, and basic common courses were formed as the upper elements, and the lower elements included fusion and convergence courses and aviation and tourism courses in the competency development courses, cabin theory, cabin practice, safety and security courses in the cabin practice courses, and foreign language, manners practice, and employment practice in the basic common courses.

Session C-1

Transformational Leadership and Quiet Quitting among Airlines Frontline Employees

Dong Myong Lee (Korea Aerospace Uni., KR)

Abstract: In this study, we attempted to empirically analyze the impact of leadership on the 'quiet quitting' among airline ground staff. As millennials and Generation Z enter the workplace, 'quiet quitting' is emerging as a major issue. In this study, we will focus on the leadership that directs and supervises them and takes measures to respond to 'quiet quitting'. 'Quiet quitting' does not yet have a common definition in academic fields. Summarizing the discussions to date, it can be defined as a employee's lack of enthusiasm for his or her job and an attitude of only performing the minimum prescribed tasks. The first purpose of this study is to empirically analyze whether quiet quitting can be defined by two existing concepts: job engagement and organizational citizenship behavior. Furthermore, we would like to examine leadership as independent variables on quiet quitting. Three important variables affecting quiet quitting are the value of employees, the meaningfulness of the job, and leadership. Among them, this study aims to analyze how transactional and transformational leadership, two representative types of leadership, affect quiet quitting.

An Overview of ESG Reporting in Mongolia: Practices and Challenges

Bayarmaa Dorjnaran (Uni. of Science and Technology, MN), **Selenge Khurelbaatar** (International Uni. of Ulaanbaatar, MN)

Abstract: In recent years, Environmental, Social, and Governance (ESG) reporting has gained significant traction globally as a means for companies worldwide to communicate their sustainability performance to stakeholders. ESG reporting refers to the practice of companies disclosing information about their Environmental, Social, and Governance (ESG) performance to stakeholders, including investors, regulators, employees, customers, and the general public. It enables informed decision-making by investors, who increasingly consider sustainability factors in their investment strategies. Ultimately, ESG reporting not only mitigates risks and enhances competitiveness but also drives positive societal and environmental impact, aligning businesses with sustainable development goals. As Mongolia's economy grows, the importance of sustainable business practices becomes more evident. Mongolian Financial Regulatory Commission, Mongolian Stock Exchange and other development partners released "The ESG and Sustainability Reporting Guidance for Mongolian Companies" in August, 2022. This paper provides a brief overview of ESG reporting in Mongolia, focusing on the practices adopted by companies and the challenges they encounter.

The impact of internal and external factors on housing choices of middle aged families in Mongolia

U. Enkhtuyagerel (Internatinal Uni. of Ulaanbaatar, MN)

Abstract: Business organizations fundamentally exist to provide the market with goods and services that satisfy consumer needs and requirements. It is widely held by researchers that a multitude of internal and external factors exert a significant influence over consumer purchasing choices. Housing purchases are categorized by

income level, with homes classified into size ranges: those with less than 44 square meters, those spanning from 45 to 87 square meters, and those larger than 88 square meters. As a researcher, I have identified the following factors that critically influence the housing purchase decisions of middle-aged families within the spectrum of internal and external influences. Middle-aged families residing in apartments smaller than 44 square meters have indicated a preference for larger living rooms and bedrooms in their next housing choice. External factors such as design solutions, swimming pools, road spaciousness, and street layout are also considered when selecting a home. For apartments measuring 45 to 87 square meters, priorities include larger living rooms and bedrooms, as well as concerns about noise and soil pollution, wide sidewalks and roads, and proximity to bus stops. For apartments larger than 88 square meters, selection criteria focus on features such as balconies, swimming pools, air quality, street lighting, wide roads, and the proximity to hospitals, health centers, and bus stations.

A proposal for a business simulation game on Google Workspace

Sangsu Han (Osaka International University, JP)

Abstract: In recent years, along with the impact of the Corona Disaster and the evolution of cloud computing (hereinafter referred to as "cloud"), the development of cloud-based distance education support tools has been gaining in activity. The Cloud computing refers to a method in which software and data that were previously managed and used on a computer at hand are used as needed in the form of services via the Internet or other networks. It is becoming increasingly popular, especially for portable devices such as tablets and smartphones, because of the advantages of cost reduction through resource sharing and anytime, anywhere access. Representative examples include Google Workspace which are provided by Google as SaaS (Software as a Service) and the Zoom. The SaaS refers to a form of usage in which software is provided through a communication network, etc., and users call up and use what they need, when they need it. The SaaS refers to a form of usage in which software is provided through a communication network, etc., and users call up what they need when they need it. In this study, the Zoom is used as a remote communication tool, allowing users to participate in web-based management meetings related to business game anytime, anywhere, and from any terminal. In this study, Google Classroom will be used to summarize the progress of the business game, communicate information, and check the progress of the game; Google Form will be used to reconfirm the content of the messages and collect questionnaires; Google Sheets will be used to collect group work materials during the meeting time; and the Zoom will be used as the remote communication tool. The participants will use Google Sheets to create group work documents during the meeting time and share documents in real time within the team using shared documents. Finally, using Zoom, a business game will be played in real-time by all participants. The key point is to use Zoom's breakout function to assign each group to work in pairs. The goal is to facilitate smooth discussion among the groups by gathering online at the same time. The purpose of this study is to propose a business game that allows non-management students to learn basic management concepts in a game-like environment, and to explore the feasibility of implementing the game on a cloud-based platform.

Session C-2

Evolution of Ancillary Services and Challenging Issues on Revenue Management in Airlines

Moon Gil Yoon (Korea Aerospace Uni., KR)

Abstract: Traditionally, airlines have sought to increase their revenue through capacity control and pricing strategies on their products. However, the introduction and development of various ancillary products, recognized as significant revenue sources, have brought about changes in the existing airline business model. Specifically, the introduction of various commitment option products through business process redesign, as well as ancillary products resulting from unbundling full-service offerings, has altered airlines' sales activities. Consequently, traditional RM roles and operations are no longer as effective, prompting the need for a new approach. Thus, we will discuss several issues and the future of airlines' RM to address the changing products and business models in the airline market.

A study to identify factors affecting in sustainable performance of human resource in the university

Khandmaa Ailtgui (International Uni. of Ulaanbaatar, MN), **Myagmarsuren Terbish** (International Uni. of Ulaanbaatar, MN)

Abstract: By hiring a skilled worker for a suitable job and providing that worker with suitable conditions and managerial

support, future work attitudes and stable working conditions will be improved and the organization's activities will have a positive impact on the economy. Higher education teachers are not only producers, but also human capital with high knowledge and skills, thus they need a leader with a comprehensive set of skills to manage them. The concept of management for the new century is as follows: Human resource is the accumulation of inexhaustible scientific and intellectual wealth; The strategic concept of people-centered management; The most valuable good in the XXI century is knowledge. One important point about management in the new century is

- According to researchers, the main factor of competition is qualified and skilled workers. In the formation and selection of personnel, the prevailing tendency is to find people with a good attitude, systematically develop them in the workplace and employ them for a long period of time.
- By hiring a qualified worker for a suitable job and providing that worker with suitable conditions and management support, their future work attitudes and stable working conditions will improve and the organization's performance will have a positive impact on the economy.

Factors affecting sustainable operation of employee: Personality-related factors, Work and profession-related factors, Factors related to organization, Factors related to local and social resources. Analysis of the above factors is important for shaping, development and sustainable operation of the human resources of an organization.

A Study on UAM(Urban Air Mobility) service area Selection Criteria

Min-Chul Jung (Korea Airport Corp., KR) **Keum-Sik Yu** (Korea Airport Corp., KR) **Moon Gil Yoon** (Korea Aerospace Uni., KR)

Abstract: The idea of using the sky, a three-dimensional space, has been continuously raised as an alternative to the congestion of ground transportation networks due to global urbanization. Recently, Electric Vertical Take-off Landing (eVTOL) aircraft using advanced technologies such as electric distributed power technology, artificial intelligence control (S/W), batteries, strong communication and carbon materials are being developed, increasing the possibility of realizing Urban Air Mobility. However, it is considered a difficult problem to build a UAM Vertiport in the city due to problems such as high density, intensively developed limited urban space, high real estate prices, laws, regulations, and the cost of large-scale renovations of buildings. It is widely accepted that UAM demand is the first factor to be considered. The selection of the location of the UAM take-off and landing site needs to be analyzed in a two-stage division procedure The first step is to select the UAM service area (UAM transportation zone), which is the catchment area of the UAM vertiport. As a second step, final site selection procedure was proposed to evaluate and select several candidate sites that can be constructed within the selected service area. In order to select the UAM service area, Along with the traffic volume (22%) of the existing two-dimensional transportation, Land cost (21%), public transportation access (21%), obstacles (27%) such as high-rise buildings, and noise impact (10%) were derived as criteria.

Economic impact of tourism industry in Mongolia

B. Munguntuul (International Uni. of Ulaanbaatar, MN), **A. Munkh-Erdene** (International Uni. of Ulaanbaatar, MN)

Abstract: The tourism sector is one of the sectors most closely related to sustainable development through the development of environmentally friendly green production, which is the general trend of modern global development. Compared to other industries, tourism is one of the "smoke-free" industries that cause relatively little damage to the environment. Mongolia's policy documents state that tourism will be intensively developed and become one of the leading sectors of the economy, but the way to implement it is not clear, there is no result-based control mechanism, there is little budgeted investment in the sector, and there is a lack of research on economic impact and efficiency. there are still many issues to be resolved. Foreign tourists conclude that Mongolia's tourism resources are unique, and considering the destination development model of tourism products and services, it is in the discovery stage of product and development, and it is also defined as a destination of special interest with a limited market and a small number of users. In this research work, the direct and indirect economic effects and benefits of the tourism industry in our country, which has a special interest market, have been calculated, including the income from tourism, job creation, infrastructure investment, and the impact on other sectors.

2024 International Conference on Applied Service Management, May 31 ~ June 3, 2019
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“Service Innovation and Digital Transformation in the ESG Era”

Presentations

A Study of Group Passenger Seating Management Strategies at a Major Airline

Hwi-Young Lee
(Inha Technical College, Korea)

2024. 05. 31~ 06. 03.

International University of Ulaanbaatar, Ulaanbaatar, Mongolia

Agenda

1. Prologue
2. The theoretical background of Group RM Model
3. Seat Allocation Model for Package Group Demand
4. Computational Experiments
5. Conclusions

I. Prologue

○ The concept of revenue management is being expanded to service industries (Hotel, Railway etc)

- considered as a good system for managing a perishable assets

○ Analysis the properties of package group demand in the process of reservation request, cancellation and acceptance

- Develop a seat allocation model for package group demand in a single flight leg with some assumptions being considered in the previous researches

○ We can formulate our problem as a mixed Integer Program - ming model which is ease to solve by various mathematical programming tools

II. The theoretical background of RM Model

Sort			Revenue Management Factors			
			Demand Shift	Cancellation	Refund	No-show
Static Decision Making Model	Indepe-ndent Model	Littlewood	none	none	none	none
		Richter	none	none	none	partial deliberation
		EMSR	none	none	none	partial deliberation
		EMSRb	none	none	none	partial deliberation
	Subor-dinate Model	Pfeifer	down-grade	none	none	none
		Brumelle & anothers	down-grade	none	none	none
		Bodily & Weatherford	Up-grade	none	none	none
		Yoon & Lee	Up/down grade	none	none	none
Dynamic Model	Subramanian etc.		none	deliberation	deliberation	deliberaion
	Probable Dynamic Model		down-grade	deliberation	deliberation	deliberation
Over Booking Model	Alstrup		none	none	none	
	Brumelle & anothers		none	none	none	deliberation

III. Seat Allocation Model for Package Group Demand

1. Policy for each travel agent

- **Set the threshold number of seats for each travel agent**
- **If the requested demand is less than the threshold, the remaining seat may be transferred for individual customers.**
- **If the requested demand is grater than the threshold, the excess demand can be covered by very expensive penalties.**
- **[Total number of seats(Q) – allocated seats for agents] can be sold for individual customers with high values.**

III. Seat Allocation Model for Package Group Demand

2. Define Variables

$\mathbf{D_{il}}$: group demand from travel agent *l* at fare class *i* (random variable, the maximum demand $\mathbf{D_{il}}$),
$\mathbf{M_i}$: the minimum of group demand for group fare class *i*,
$\mathbf{R_0}$: the expected revenue of each seat transformed to the IND demands from GRP demands,
$\mathbf{R_{il}}$: the expected revenue per seat for travel agent *l* at fare class *i*,
$\mathbf{g_{il}}$: the penalty for each excess demand for travel agent *l* at fare class *i*,
$\mathbf{x_{il}}$: the threshold for travel agent *l* at fare class *i* (decision variable),
$\mathbf{y_{il}}$: 0,1 integer variable which equals 1 if a demand for travel agent *l* at fare class *i* is greater than or equal to and 0 if not,
$\mathbf{w_{il}}$: seat transition rate from group demands to individual demand,
$\mathbf{P(D_{il}=d)}$: the probability that the demand is equal to for travel agent *l* at fare class *i*,
$\mathbf{F(D_{il})}$: the cumulative probability function,
$\mathbf{L, I_l,}$: set of travel agents and set of fare classes for agent *l* respectively.

III. Seat Allocation Model for Package Group Demand

3. Consider a demand request

$x_{il}=0$: the expected revenue can be obtained when the demand is not less than $C_{il}=E[-g_{il} D_{il}]$, $D_{il}<M_i$

$x_{il}\geq M_i$, $D_{il}<M_i$: the request group demand can not accepted because it is less than the minimum requirement. Since some of them(w_{il}) can be used for the individual one, the expected revenue is calculated as

$z_0(x_{il})=E[R_0 w_{il} x_{il}]$, $D_{il}<M_i$

$x_{il}\geq M_i$, $Dil\geq M_i$: the expected revenue can be calculated separately and by the relationship between the demand and the threshold.

$z_1(x_{il})=E[r_{il} D_{il}]$, $D_{il}\leq M_i$, $z_2(x_{il})=E[r_{il} x_{il} - g_{il}(D_{il} - x_{il})]$, $D_{il}>x_{il}$

The total expected revenue can be defined as follow:

$$Z=\sum\sum[C_{il}(1 - y_{il}) + z_0(x_{il}) + z_1(x_{il}) + z_2(x_{il}) + R_0(Q- \sum\sum x_{il})$$

III. Seat Allocation Model for Package Group Demand

4. Optimal Deciding Model (stochastic L-P model)

$$[P_0] \quad Max \quad Z=\sum\sum[C_{il}(1 - y_{il}) + z0(x_{il}) + z_1(x_{il}) + z_2(x_{il}) + R_0(Q- \sum\sum x_{il}) \qquad (1)$$

$$s.t. \quad M_i y_{il} \leq x_{il} \leq D_{il} y_{il}, \qquad i\in I_i, \ l\in L, \qquad (2)$$

$$\sum\sum x_{il} \leq Q, \qquad (3)$$

$$Y_{il} \in \{0,1\}, \ x_{il} \geq 0, \ i\in I_i, \ l\in L, \qquad (4)$$

IV. Computational Experiments

1. Probability distributions for travel agents

Agents	Season	Probabilities (%)									
		[10,12]	[12,14]	[14,16]	[16,18]	[18,20]	[20,22]	[22,24]	[24,26]	[26,28]	[28,30]
1	Peak	14	5	17	12	12	16	14	3	1	7
	Non-Peak	30	25	30	5	5	3	2	0	0	0
2	Peak	20	1	5	8	5	19	16	1	7	18
	Non-Peak	25	25	20	10	5	5	5	5	0	0
3	Peak	12	22	14	32	0	13	2	0	4	1
	Non-Peak	15	20	25	10	10	5	0	5	5	5
4	Peak	19	10	3	9	9	12	20	1	9	8
	Non-Peak	30	20	25	5	5	5	5	5	0	0
5	Peak	16	17	18	16	3	0	1	5	12	12
	Non-Peak	25	20	20	10	0	0	5	5	10	5
6	Peak	14	3	8	3	15	2	22	13	2	18
	Non-Peak	15	15	15	15	15	10	5	5	5	0

[a, b] means the interval between a and b

2. Seat Allocation Results for Package Group Demands

Agents	Average Demand		(g_{il}, w_{il})					
			(40,40)	(40,20)	(40,10)	(20,40)	(20,20)	(20,10)
1	Peak	17.5	0	0	0	0	0	0
	Non-Peak	12.9	0	0	0	0	0	0
2	Peak	19.3	20	20	20	20	20	20
	Non-Peak	14.1	0	0	0	0	0	0
3	Peak	15.2	0	0	0	0	0	0
	Non-Peak	15.7	0	0	0	0	0	0
4	Peak	18.2	18	18	20	20	16	16
	Non-Peak	13.9	0	0	0	0	0	0
5	Peak	17.3	0	0	0	0	0	0
	Non-Peak	15.6	0	0	0	0	0	0
6	Peak	20.1	22	22	20	20	20	20
	Non-Peak	16.1	16	16	16	16	0	0
Total	Peak	107.6	60	60	60	60	56	56
	Non-Peak	88.3	16	16	16	16	0	0

IV. Conclusion

○ **The group demands can be classified into multi-pattern in air travel markets.**

○ **We concentrated on RM problem for the package group demand and developed a seat allocation model for revenue optimization.**

○ **To manage the demand uncertainty effectively, a linear approximation technique is applied in the modeling process.**

○ **We can formulate our problem as a mixed I-P model which is ease to solve by various mathematical programming tools.**

Thank You for your listening !!!

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[ICASM2024]

A Study on the Impact of Emissions Trading Scheme on Environmental Performance of Companies – Focusing on the Quantitative Analysis of Emissions Trading Scheme in Korea

In Kyong Song, Korea Aerospace University
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1. Introduction

Research background and objectives

- Since the launch of the Ministry of Environment in 1995, Korea has achieved remarkable environmental achievements such as garbage disposal scheme through regulatory-oriented environmental policies.
- In addition, the government is making efforts to reduce greenhouse gas emissions at the national level by introducing and implementing policies to reduce greenhouse gas emissions, such as the Emissions Trading Scheme (ETS), Target Management Scheme(TMS), Renewable Energy Portfolio Standard (RPS), and the mandatory diagnosis scheme for energy-consuming companies.
- In particular, the Korean government introduced the Emissions Trading Scheme(ETS) in 2015 and is making various efforts to reduce greenhouse gases, such as strengthening the Nationally Deteriorated Contribution (NDC), and the Strategy of 2050 carbon neutrality, but some are skeptical about the actual reduction results.
- If the emission trading scheme works effectively, companies will be able to create a Creating Shared Value(CSV) by recognizing greenhouse gas reduction activities as a positive (cost reduction/brand value/product value) rather than a negative (regulatory/mandatory cost) aspect.
- Therefore, companies lack research on whether various reduction efforts and activities (Environmental Innovations) affect their environmental and financial performance, such as facility replacement, process improvement, emission rights purchase, and reduction projects for greenhouse gas reduction.
- Our research goal is to make policy suggestions for the effective development of the emission trading scheme through quantitative analysis of the impact of the emission trading scheme on the environmental performance of companies.

1. Introduction

Research question

- We conducted various analyses to understand the impact of the GHG Emission Trading Scheme on the environmental performance of companies.
- There are two major government policies related to greenhouse gas of the Korean government: the Greenhouse Gas·Energy Target Management Scheme and the GHG Emissions Trading Scheme.
- The criteria for selecting the Greenhouse Gas·Energy Target Management Scheme are companies with an average annual GHG emission of 50,000 tons over the past three years or businesses with an average GHG emission of 15,000 tons. (Source: Greenhouse Gas Inventory & Research Center of Korea).

	~ 2011.12.31		2012.01.01 ~		2014.01.01 ~ the present	
	company	factory	company	factory	company	factory
greenhouse gas emissions(tCO2-eq)	125,000	25,000	87,500	20,000	50,000	15,000
energy consumption(TJ)	500	100	350	90	200	80

- In addition, the Greenhouse Gas Emissions Trading Scheme is a company with an annual average of more than 125,000 tons of greenhouse gas emissions over the past three years or with at least one workplace with more than 25,000 tons. (Source: Greenhouse Gas Inventory & Research Center of Korea).

	1st Plan Period ('15~'17)	2nd Plan Period ('18~'20)	3rd Plan Period ('21~'25)
Main Objective	Accumulation of experience and settlement of GHS ETS	A significant reduction in greenhouse gases	Aggressive greenhouse gas reduction
Allocation	Allotment free of charge Utilize the experience of the goal management system	Commencement of paid allocation Free: 97% Paid: 3%	Expanding the paid allocation ratio Free: 90% Paid: 10%

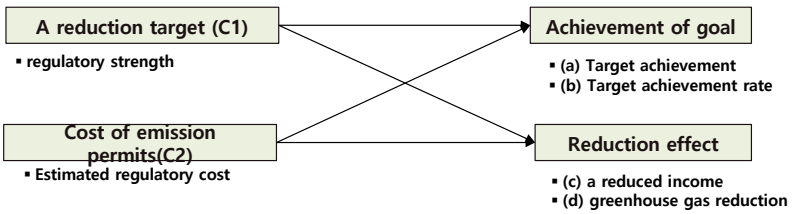
1. Introduction

1. Introduction | 2. Literature Review | 3. Research method | 4. Results | 5. Implications and Limitations

1 Research background and objectives
2 Research question

Research question

- The Korean government's greenhouse gas government policy induces companies to reduce greenhouse gas emissions through market mechanisms through reduction targets and emission trading.
- In accordance with the government's policy goals, companies are promoting various environmental innovations (equipment replacement, process improvement, infrastructure construction, human resource investment, etc.).
- The type and intensity of corporate environmental innovation activities may vary depending on factors such as industry, emission permit price, and target policy type as well as government policy.
- We would like to investigate the relationship between these various factors and make policy suggestions for the effective development of the emission trading scheme through quantitative analysis of the impact of the emission trading scheme on the environmental performance of companies.



2. Literature Review

Environmental Regulation and Environmental Innovation

- Analysis of the fundamental drivers of environmental innovation is mainly based on the discovery of three research areas: innovation, management science, and environmental economics.
- According to traditional innovation research (cf. Carter and Williams, 1959; Kleinknecht and Verspagen, 1990; Schmookler, 1966; Walsh, 1984), innovation is driven primarily by three factors: (1) the development of science and R&D (supply-side or technology-based innovation), (2) market conditions (demand-driven innovation), and (3) new public policies (regulation-based innovation).
- Because technological innovation and organizational innovation are likely to develop into along complementary lines(Antonioli et al., 2013), the role of environmental organizational innovation, such as environmental management systems (EMS) and audit schemes, receives great attention among the drivers of environmental innovation (Arimura et al., 2008; Frondel et al., 2004; Wagner, 2007, 2008; Johnstone and Labone, 2009)
- Thus, unless induced (or enforced) by appropriate environmental regulations, companies typically have little/no incentive to carry out environmental innovation.
- This means that the return on investment in environmental innovation is very uncertain. In a meta-analysis of numerous studies on this issue (Horváthova, 2010), about half of the studies concluded that "going green's economic returns are positive, while half of the studies are either absent or even negative."
- Therefore, public regulation plays a particularly important role in the environmental context compared to private incentives, making environmental innovation more regulatory-driven than standard innovations.
- The second area of research on the drivers of environmental innovation is the management science literature on corporate social responsibility (CSR).

2. Literature Review

1. Introduction | 2. Literature Review | 3. Research method | 4. Results | 5. Implications and Limitations

1 Environmental Regulation and Environmental Innovation
2 EU ETS and Environmental Innovation
3 Environmental Innovation Activities
4 Environmental Performance and Financial Performance

Environmental Regulation and Environmental Innovation

- Several studies have pointed out that many companies adopt CSR policies to minimize investment in environmental innovation and improve their "green" image (e.g. Suchman, 1995; Bansal and Hunter, 2003).
- Third, regarding environmental economics research, there has been a heated debate about the economic effects of environmental regulations since the early 1990s. In particular, according to Potter's controversial hypothesis, many studies study whether stricter environmental regulations promote environmental innovation (see Jaffe et al., 2002; Vollebergh, 2007; Popp et al., 2009 for some surveys of the imperial literature on this issue).
- While less innovative firms may be induced to introduce environmental innovation to comply with regulated environmental standards, more innovative firms tend to perform environmental innovation primarily for entry into new markets.
- Johnstone et al. (2011) found that the perceived stringency of environmental regulation has a positive impact on environmental innovation using patent data for 77 countries between 2001 and 2007.
- Klaassen et al. (2005) argue that differences in environmental regulatory stringency between countries promote different environmental capabilities, while Popp (2006) emphasizes that environmental innovation decisions are driven by domestic regulations rather than foreign/international regulations.
- Leiter et al. (2011) concluded in a study focusing on nine manufacturing industries in 21 European countries during 1998-2007 that environmental regulations have a positive effect on investment but are diminishing investment effects.

2. Literature Review

Environmental Regulation and Environmental Innovation

- Veugelers(2012) investigates the impact of government intervention on corporate decision-making to create and adopt clean innovation using CIS environmental innovation data. Combining regulations and taxes with subsidies, it argues that well-designed policy interventions have a stronger impact on environmental innovation, especially on CO2 reduction.
- Using German CIS data, Jennings and Rexhauser (2011) analyzes the long-term effects of environmental regulations on innovation. Despite being somewhat limited in the current situation, the time span between the introduction of ETS and the observed innovation effects can have a clear time lag between "policy dose" and "innovation response," which is commonly used in studies evaluating firms' responses to new policy implementations (cf. Jaffe and Palmer, 1997; Brunnermeier and Cohen, 2003).
- To sum up, most studies have found that environmental regulation triggers environmental innovation, but empirical evidence is affected by the level of aggregation and is still partially controversial.

2. Literature Review

EU ETS and Environmental Innovation

- Since its introduction in 2005, EU ETS has experienced various implementation problems such as initial overallocation (Gilbert et al., 2004; Sijm, 2005), hacker attacks, VAT fraud (Frunza et al., 2010), and high carbon price volatility.
- Kemp (2010), Kemp, and Pontoglio (2011) noted that there has been little large-scale empirical investigation into the innovation effects of EU ETS, including the trial phase (2005-2007).
- Pontoglio (2010) emphasized the innovation deficiencies of the Italian paper and cardboard sectors, Tomas et al. (2010) analyzed the Portuguese chemical sector, and Rogge et al. (2011) studied the energy sectors in Germany.
- In another important survey on the innovation effects of ETS in the EU power sector, Schmidt et al. (2012) concluded that EU ETS has a limited impact on innovation activities (adoption and R&D) for power generation technologies.
- Anderson et al. (2011), which focuses on a small number of Irish companies, found that EU ETS is somewhat effective in stimulating technological changes.
- Similar results are found in the study of Martin et al. (2011), the propensity to innovate varies greatly from country to country, even after controlling the existing differences in industrial structure.
- By using a new dataset of 743 ETS companies in several countries, researchers find that EU ETS's regulated firms have more innovation than unregulated firms in terms of low-carbon technologies.

2. Literature Review

Environmental Innovation Activities

- Existing research on environmental innovation is mainly on environmental management systems, environmental product innovation, environmental process innovation, and environmental technology innovation.
- VEP is defined as a program, code, consensus, and commitment " that encourages " to voluntarily reduce their environmental impact beyond the requirements of the environmental regulatory system (e.g., Darnall and Sides, 2008).
- Public VEPs (public VEPs) can be categorized as negotiated agreements between companies and governments, and unilateral agreements by companies (e.g., Khanna, 2001; Albertini and Segerson, 2002; Koehler, 2007; Henriques and Sadorsky, 2008).
- The most important business-led initiative is ISO 14000 (e.g., Potoski and Prakash, 2005a).
- Launched in 1996, ISO 14001 is the world's most widely adopted VEP, and by the end of December 2006, approximately 130,000 facilities had received ISO 14001 certification.
- Germany ranks seventh with 5,800 certifications, behind Japan (21,779), China (18,979), Spain (11,205), Italy (9,825), the United States (8,081) and Korea (5,893).
- EMAS was introduced by the European Commission in 1993 in the context of the Fifth Environmental Action Programme "On Sustainability" (e.g., Wätzold and Bültmann, 2001).
- EMAS certification was received by more than 6,000 European operations (4,000+ organizations) as of the end of September 2008, with Germany having the largest number of facilities certified by 1,847.
- Technological environmental innovation, i.e., product and process innovations, consists of new products and processes to avoid or reduce the environmental burden (e.g., Ziegler and Rennes, 2004). No environmental patents are used as an alternative to technological environmental innovation (such as Brunnermeier and Cohen, 2003; Nameroff et al., 2004 or – to some extents – Wagner, 2007).

2. Literature Review

1. Introduction | 2. Literature Review | 3. Research method | 4. Results | 5. Implications and Limitations

1 Environmental Regulation and Environmental Innovation
2 EU ETS and Environmental Innovation
3 Environmental Innovation Activities
4 Environmental Performance and Financial Performance

Environmental Innovation Activities

- According to Oslo-Manual of OECD and Eurostat (1997), in contrast to technological innovation, organizational innovations mean the implementation of new management technologies such as TQM, the introduction of significantly changed organizational structures, and the realization of new or substantially changed corporate strategic directions. In this respect, ISO 14001 or EMAS can be considered organizational innovation.
- Wagner (2007, 2008) uses (written) survey data consisting of "green design of a new products" and "implementation of cleaner technology."
- Horbach (2008) analyzes the panel of the Institute for Employment (IAB) and the Mannheim Innovation Panel (MIP) of the European Centre for Economic Research (ZEW).
- Previous microeconomic studies analyze the impact of EMS certification (and single EMP) on technological environmental innovation (e.g., Ziegler and Renings, 2004; Rehfeld et al., 2007; Wagner, 2007, 2008; Frondel et al., 2007, 2008; Horbach, 2008).
- Conceptually, the hypothesis that EMS can promote environmental product and process innovation (and thus limit the environmental burden) can be based on the resource-based view (e.g., Wernerfeld, 1984; Barney, 1991).
- Within this framework, Wagner (2007) argued that EMS enables the development of strategic resources that can generally have a positive impact on technological innovation capabilities.
- Andreas Ziegler and Jazmin Seijas Nogareda hypothesized that the adoption of VEPs, such as EMS certification, could be reversely affected by environmental product or process innovation.
- Because patent or R&D activities take place early in the innovation process and are not necessarily realized by innovation, the output of the innovation process—product and process innovation—is a better indicator.

2. Literature Review

Environmental Performance and Financial Performance

- Finding the relationship between environmental, social and governance (ESG) standards and corporate financial performance (CFP) can be traced back to the early 1970s.
- Scholars and investors have since published more than 2000 empirical studies and several review studies on this relationship.
- Gunnar Friede, Timo Busch & Alexander Bassen combine more than 3,700 findings from more than 2,200 individual primary studies with a second-level study of 60 review studies of ESG-CFP relationships (note-count studies and meta-analysis).
- About 90% of studies found a non-negative ESG-CFP relationship, and more importantly, most studies reported positive findings.
- It also highlights that ESG's positive impact on CFP appears stable over time

3. Research method

Data Collection

- Source: National accredited public data and policies, such as the Greenhouse Gas Inventory & Research Center of Korea, Nationally Deteriorated Contribution (NDC), etc
- Data: 7,042 data from companies subject to emission trading scheme and target management scheme between 2011 and 2022
- Excluding data from six companies with annual greenhouse gas emissions of more than $10{,}000{,}000_{tCO2\text{-}eq}$ (POSCO, Hyundai Steel, Samsung Electronics, Ssangyong Cement Industries, Ssangyong E&E, and S-oil)

Qualitative Data Analysis

- Quantitative analysis such as regression, multiple regression, and probit regression
- Analysis Tools: R, Python
- Independent variables: A reduction target(C1), Cost of emission permits (C2)
- Dependent variables: Target achievement(a), Target achievement rate(b), A reduced income(c), Greenhouse gas reduction(d)
- Variable definition
  - A reduction target (regulatory strength): Yearly/Industry reduction coefficient
  - Cost of emission permits (Estimated regulatory cost): (Actual emission-emission allowance)*KAU_{t-1} +paid allocation)*KAU_{t-1}
  - Target achievement: 0, 1
  - Target achievement rate : Actual emission/emission allowance
  - A reduced income: (Greenhouse gas reduction)*KAU_{t+1}
  - Greenhouse gas reduction (emission allowance-actual emission)

4. Results

1 Results

Results

- As a result of quantitative analysis such as regression analysis, multiple regression analysis, and probit regression analysis, the cost of emission permits has a significant effect on the achievement or reduction effect of a company's greenhouse gas goals rather than reduction goals.
- In addition, the National Greenhouse Gas Reduction Policy(ETS, TMS) has not been analyzed to have a statistically significant effect on the Target achievement, but it has been found to have a significant effect on the effect of reducing greenhouse gases(A reduced income(c), Greenhouse gas reduction(d))

Regression equation	Adjust R-squared	P-value
$c= -6.433e^{09} * C1+1.928e0^{8}$	0.173	$2e^{-16}$
d=-241,588 * C1+6525	0.1685	$2e^{-16}$
$c=-9.939e^{-03} * C2+5.885e0^{5}$	0.8876	$2.2e^{-16}$
$d=-3.877e^{-07} * C2+1.704e0^{1}$	0.9322	$2.2e^{-16}$
$b= -8.206e^{0} * C1-2.548e^{-12} *C2+1.506e^{-01}$	0.4986	C1: $2e^{-16}$
$c=-2.773e^{08} * C1-9.852e^{-01} * C2 +3.762e^{+07}$	0.8879	C1: $1.71e^{-07}$ C2: $2e^{-16}$
$d=-3.782e^{04} * C1-3.758e^{-05} * C2-1.436e^{03}$	0.6215	C1 : $2e^{-16}$ C2 : $2e^{-16}$

5. Implications and Limitations

1 Implications

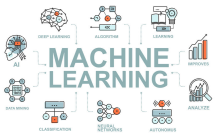
2 Limitations

Implications

- International efforts to reduce greenhouse gases have led to the introduction of emission trading scheme worldwide. The Republic of Korea also made efforts to reduce greenhouse gases through the introduction of the emission trading scheme in 2015.
- However, academic research on whether the emission trading scheme contributed to effective greenhouse gas reduction in the power generation and industrial sectors is insufficient.
- We studied how the government's policies, such as the emission trading scheme and the target management scheme, affect the environmental performance of companies.
- Several meaningful results were derived through quantitative analysis based on government policy and public data.

Limitations

- However, future research is needed due to the following limitations.
- First, there is a lack of specific research on how companies' efforts to adapt to the government's environmental policy improve environmental performance.
- Second, long-term follow-up studies are needed in the future due to the short history of introducing the target management scheme and the emission trading scheme.



Revisiting passengers' perceptions of airline service quality: A theory-driven machine learning approach using big data

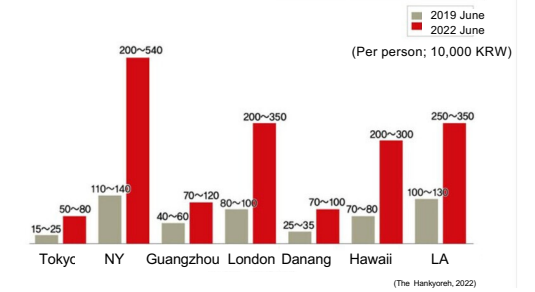
Presenter: Minwoo Lee, Ph.D. — University of Houston
Co authors: Juhwan Lim and Jichul Jang, Ph.D. — Kansas State University

I . Introduction

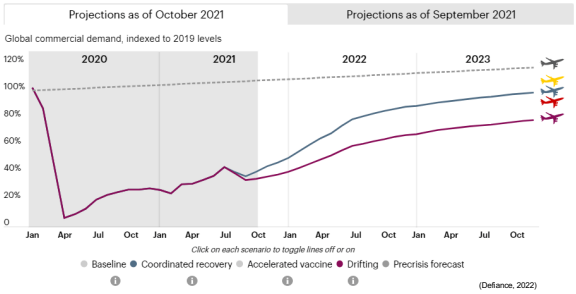
I . Introduction

Explosion of flight prices

Ticket price from Incheon



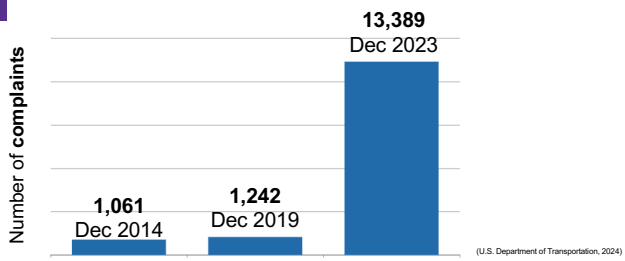
Recovery for global air travel demand



- Flight ticket price **doubled / tripled**
- **Emerging demand** leads to the explosion of flight ticket price

I . Introduction

How about service?



Courtesy		Screening of Personal Property		Screening of Passengers		Wait Times (Checkpoint)	
Number of Complaints	Complaints per 100,000 Passengers	Number of Complaints	Complaints per 100,000 Passengers	Number of Complaints	Complaints per 100,000 Passengers	Number of Complaints	Complaints per 100,000 Passengers
1,321	1.9	658	1.0	10,638	15.1	130	0.2

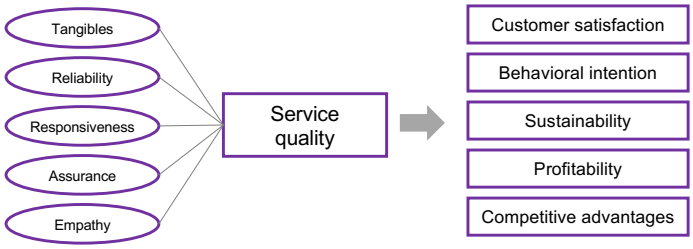
Civil Rights		Other TSA-related		Non-TSA related, Airline		Non-TSA related, All Others	
Number of Complaints	Complaints per 100,000 Passengers	Number of Complaints	Complaints per 100,000 Passengers	Number of Complaints	Complaints per 100,000 Passengers	Number of Complaints	Complaints per 100,000 Passengers
275	0.4	164	0.3	44	0.1	159	0.3

- Some poor services fall short of **expectations**
- May not be ready to perform excellent

The problem is service quality!

- **Service quality**
  - Customers' global judgments about the superiority of service (Parasuraman et al., 1988)
  - Involves perceived quality by customers due to the characteristics of service: (Grönroos, 2001; Zeithaml et al., 1985)
    Intangibility, inseparability, and perishability

- **Importance of service quality**

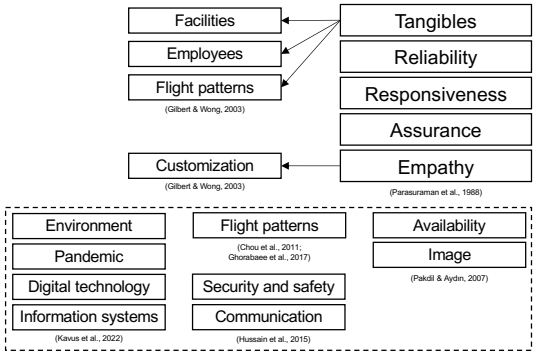


(Farooq et al., 2018; Koklic et al., 2017; Liou et al., 2011; Park et al., 2020; Shah et al., 2020; Suki, 2014; Tahanisaz, 2020)

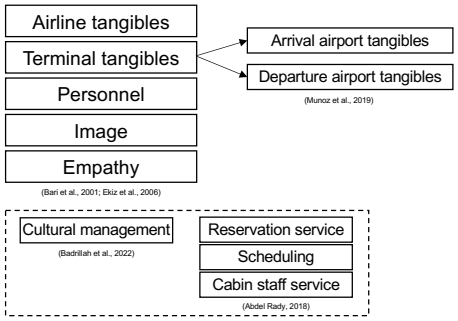
SERVQUAL

- **SERVQUAL**
  - An effective instrument for measuring service quality
  - Dimensions should be **revised** for specific industry (Ladhari, 2009)

Extension of **SERVQUAL**



Extension of **AIRQUAL**



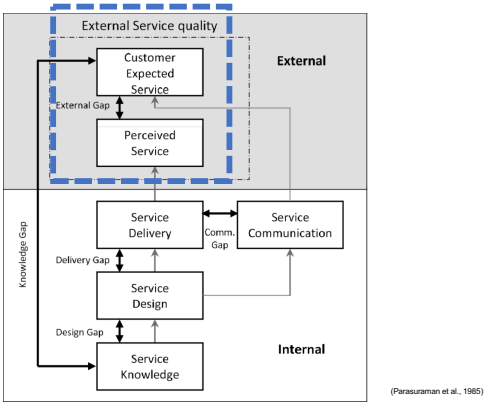
Airline industry

- **Complex nature** of the airline businesses
  - **A wide range** of services

- **Spatial changes** with **diverse** passengers

- Rather than **measuring** service quality,
  - SERVQUAL/AIRQUAL dimensions sufficient to capture the complexity?
  - Enough to understand customers' various perceptions of service quality?

Service quality gap model



(Parasuraman et al., 1985)

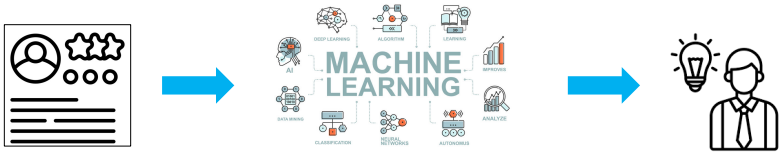
- **Holding a customer viewpoint**
  - Evaluation based on what they expect and perceive (Zeithaml et al., 1993)
  - Diversifying and evolving customers' service expectations
  - Need to scrutinize customers' own voices (Moro et al., 2020; Sezgen et al., 2019)

I . Introduction

Research opportunity

- **Incorporate research streams of airline service quality**
  - By comprehensively revisiting and confirming what previous studies documented
  - By uncovering what dimensions "customers" perceive

- **Analyze online customer reviews with business analytics**
  - Understand service quality dimensions from a customer perspective
    "Beyond pre-determined survey framework" (Korfiatis et al., 2019; Martin-Domingo et al., 2019)



I . Introduction

Research objectives

Previous studies

- Using **SERVQUAL** model
  - Measure service quality
  - Extension of dimensions

Research Gap

Present study

- Provide a **contextualized** understanding
  - Extract customers perceptions
  - Effect on customer satisfaction
  - Machine learning techniques

1. What specific airline service quality factors do passengers perceive?
2. Compared with the previous studies using the SERVQUAL and AIRQUAL models, what airline service quality dimensions specific to the airline context could be additionally identified?
3. Do the extracted airline service quality factors lead to customer satisfaction?

Ⅱ. Literature review

SERVQUAL

• SERVQUAL scale development

Customers and service providers

Reliability
Responsiveness
Competence
Access
Courtesy

Communication
Credibility
Security
Understanding
Tangibles

Scale purification

Tangibles
Reliability
Responsiveness
Assurance
Empathy

Dimensions	Definition
Tangibles	Physical facilities, equipment, and appearance of personnel
Reliability	Ability to perform the promised service dependably and accurately
Responsiveness	Willingness to help customers and provide prompt service
Assurance	Knowledge and courtesy of employees and their ability to inspire trust and confidence
Empathy	Caring, individualized attention the firm provides its customers

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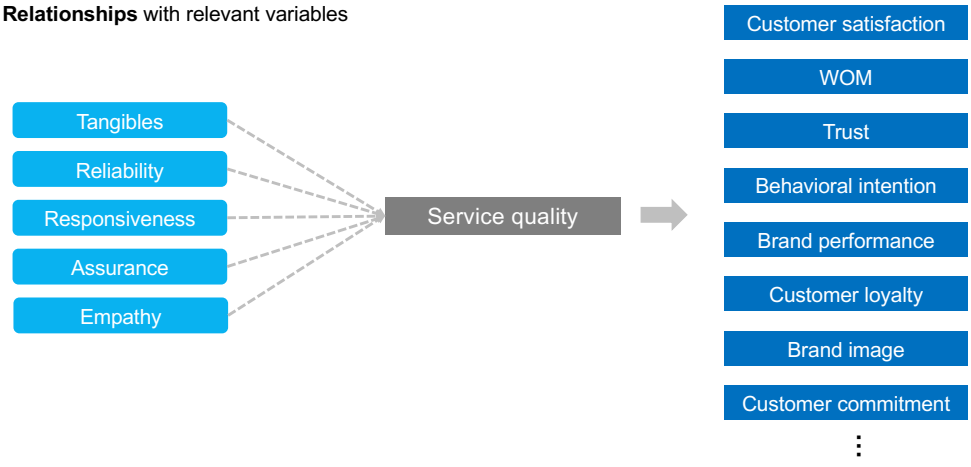
Ⅱ. Literature review

Application of SERVQUAL

• **Relationships** with relevant variables

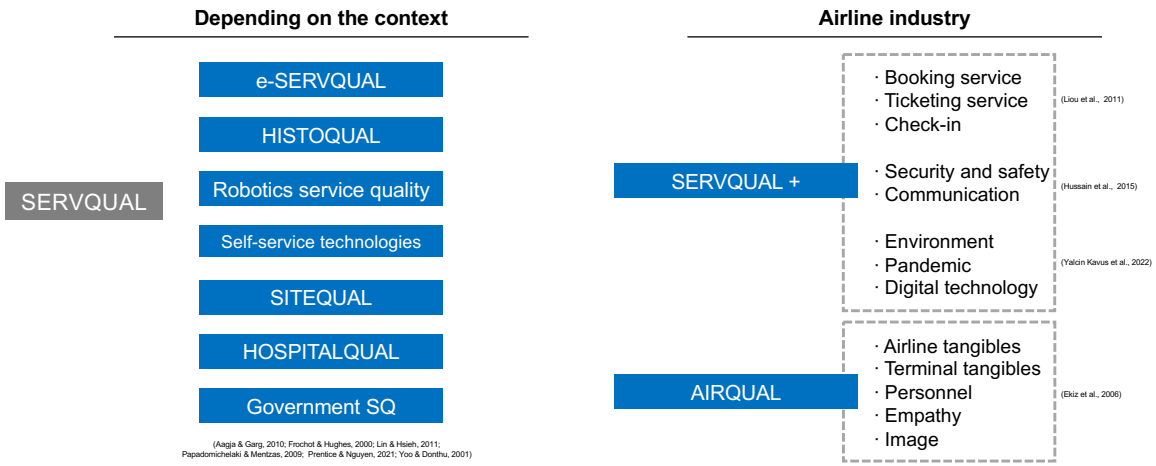


(Anderson et al., 1994; Chen, 2008; Cronin & Taylor, 1992; Fornell, 1992; Gilbert & Wong, 2003; Oh, 1999; Oliver, 1980; Park et al., 2005; Tam, 1999; Yayla-Kullu & Tansitpong, 2013; Zeithmal et al., 1996)

Ⅱ. Literature review

Application of SERVQUAL

• Developing specific **dimensions**



(Aagja & Garg, 2010; Frochot & Hughes, 2000; Lin & Hsieh, 2011; Papadomichelaki & Mentzas, 2009; Prentice & Nguyen, 2021; Yoo & Donthu, 2001)

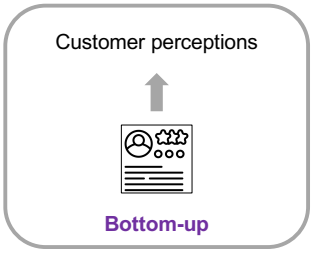
Ⅱ. Literature review

Current research

- To extend the research stream …

- **Actual** perceptions

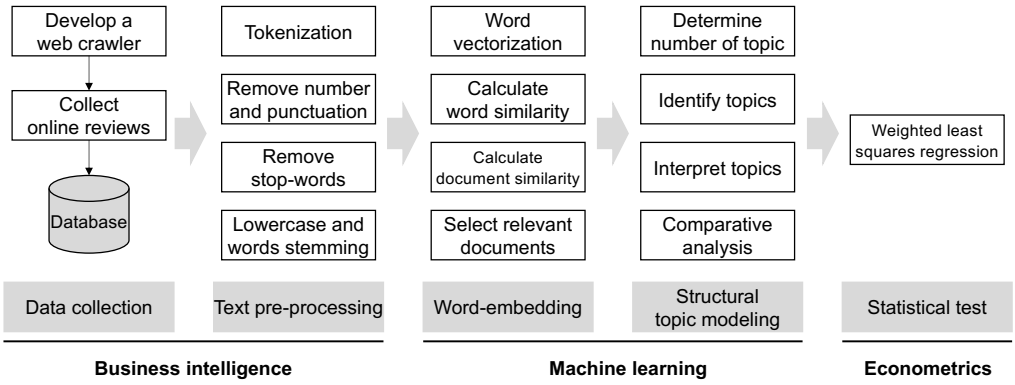
Online customer **reviews**



Ⅲ. Method

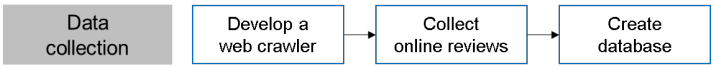
Ⅲ. Method

Methodological framework

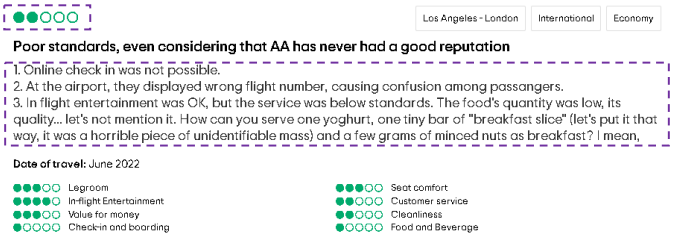


Ⅲ. Method

Data collection



- Develop a web crawler using python software (TripAdvisor.com)
- Gathered **1,391,608 online reviews** in 2018, covering 592 airlines operating in 161 countries
- Review **textual data** and **overall rating**



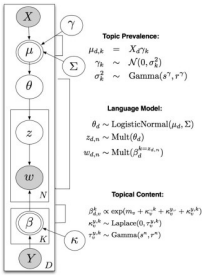
Ⅲ. Method

Structural topic modeling

Structural topic modeling → Determine topic number → Identify topics → Interpret topics → Comparative analysis

- To extract **customers perceived dimensions** of service quality
- **Summarize** documents based on word co-occurrence

	Word 1	Word 2	…	Word 1,234
Review 1	1	1		1
Review 2	0	1		0
…				



(Roberts, et al., 2014)

	Topic 1	Topic 2	…	Topic 7	Sum
Review 1	0.23	0.23		0.15	1
Review 2	0	0.43		0	1
…					

Ⅳ. Results

IV. Results

Word-embedding

- To **keep service quality-focused** online reviews
  - Using top 50 word semantically close to "**quality**"

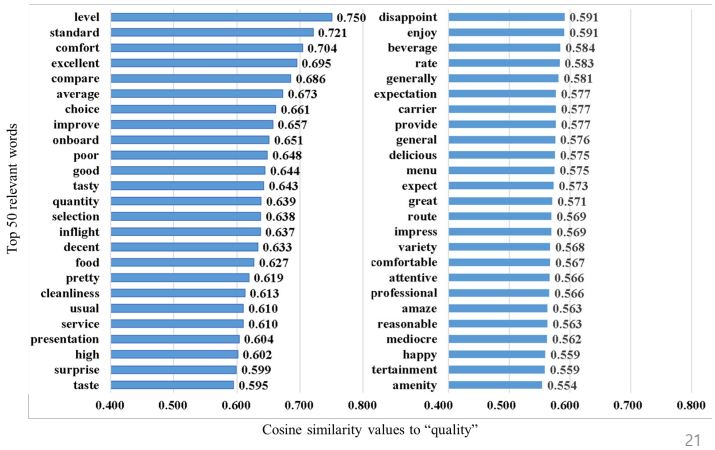
Entire reviews

- Document: 1,389,689

↓

- Document: 494,775
- Words: 99,176

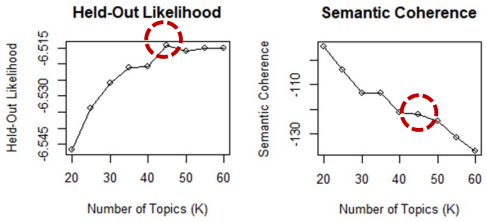
Service quality focused reviews



IV. Results

Structural topic modeling

- Determining the **number of topics** (Roberts et al., 2016; Vanhala et al., 2020)



- **Label** and **exclude** topics
  - Based on the word meanings distributed over topics (Griffiths & Steyvers, 2004)

15	Bathroom cleanliness	sit, break, bathroom, terribl, dirti, restroom, urin, smell

  - Comparing the definition of SERVQUAL dimensions
  - 19 topics discarded: country name, city name, airline name, and noise topic

IV. Results

Topic	Topic label	Representative words	Topic prevalence
1	Baggage 1) Handling service	luggag, baggag, allow, prioriti,free, kilo, weight, excess	0.026
2	Baggage 2) Carry-on	put, overhead, bag, item, bin carryon, size	0.012
3	Flight attendant service 1) Friendliness	attend, comfort, service, friend, nice, wonder, job	0.056
4	Flight attendant service 2) Handling incidents	staff, apologis, captain, shout, drunken, attack, cope	0.021
6	Flight attendant service 3) Efficiency	staff, help, time, easi, effici, profession, quick, help	0.047
7	Mobile phone usage	wifi, app, phone, devic, ipad, charg, download, power, mobil, port, usb	0.008
9	In-flight entertainment 1) Movie	movi, select, watch, show, trendi, movietv	0.014
10	Aircraft interior and exterior	aircraft, plaine, light, airbus, dreamlin, old, small, cabin, modern, temperature	0.018
11	Ticket refund	custom, call, email, ask, receiv, respons, refund, ticket, back, receipt, letter	0.026
12	Special request	assist, special, need, request, chair, meet, wheelchair, birthday, handicap	0.020
13	Layover (stopover)	hour, connect, direct, stop, layover, short, long	0.019
14	Flight attendant service 4) Excellent service	service, crow, excel, attent, outstand, superb, comfort, faultless, charm, spotless	0.037
15	Bathroom cleanliness	sit, break, bathroom, terribl, dirti, restroom, urin, smell	0.016
16	Check-in service	airport, check, secur, queue, pass, desk, drop, long, checkin	0.023
17	In-flight meal 1) Purchased meal	food, buy, eat, order, sandwich, drink, free, sell, stock	0.016
18	In-flight entertainment 2) Option variety	entertain, inflight, system, screen, film, option, music, limit, game, variety, subtitl	0.022
21	Seat legroom	seat, row, extra, front, legroom, uncomfort, cramp, space	0.039
23	Booking service	book, chang, pay, onlin, websit, reserve, advance, card, purchas	0.022
24	In-flight meal 2) Menu variety	meal, menu, choic, vegetarian, option, main, order, glutenfre	0.015
27	Attention to child passengers	child, kid, give, want, cri, scream, babi, toddler, sick, antianxieti	0.025
29	Upper class cabin 1) Business class	class, busi, loung, flat, upper, privacy, biz	0.026
30	In-flight meal 3) Beverage	water, coffee, bottl, glass, tea, cup, juic, ice, hot, plastic	0.010
31	Amenity	blanket, pack, pillow, headphone, eye, amen, sleep, ear, kit, mask, toothbrush	0.010
32	Upper class cabin 2) Premium economy	premium, economi, comfort, space, wide, spacious, worth, suffice	0.031
33	Frequent flight program	upgrad, point, frequent, member, mile, star, club, program, status, gold, access	0.012
36	Flight schedule 1) Punctuality	time, arriv, leav, earli, minut, late, land, departure, schedule, min, hour	0.037
37	Flight schedule 2) Cancellation	delay, hour, day, cancel, hotel, miss, inform, night, weather, voucher, rebook	0.032
42	Boarding service	gate, board, wait, line, final, announc, minut, hour, stand	0.020
44	In-flight meal - 4) Liquor	drink, snack, wine, beer, alcohol, liquor, nonalcohol	0.026

IV. Results

Captured **comprehensive** airline service quality covering the **overall process** of air transportation

Stage	Before the flight	At the airport	During the flight	After the flight
Topics	Booking service	Check-in service Baggage handling Boarding service Flight punctuality	Set legroom Flight attendant service In-flight meal In-flight entertainment Amenity	Frequent flight program




IV. Results

Structural topic modeling

• Comparison with **SERVQUAL dimensions** and **previous studies**

Assurance (1)
Flight attendant service - 2) Handling incidents

Empathy (4)
Special request
In-flight entertainment - 2) Option variety
In-flight meal - 2) Menu variety
Attention to child passengers

Tangibles (7)
In-flight entertainment - 1) Movie
Aircraft interior and exterior
Bathroom cleanliness
Seat legroom
In-flight meal - 3) Beverage
Amenity
In-flight meal - 4) Liquor

Rarely appeared in literature

Reliability (14)
Baggage handling service
Flight attendant service - 1) Friendliness
Mobile phone usage
Ticket refund
Layover (stopover)
Flight attendant service - 4) Excellent service
In-flight meal - 1) Purchased meal
Booking service
Upper class cabin - 1) Business class
Upper class cabin - 2) Premium economy
Frequent flight program
Flight punctuality
Flight delay and cancellation
Carry-on baggage

Responsiveness (3)
Flight attendant service - 3) Efficiency
Check-in service
Boarding service

IV. Results

Structural topic modeling

• Re-organize service quality dimensions
- Reflect the **diversified perceptions** about the airline services

Aircraft interior and exterior
Amenity
Attention to child passengers
Baggage handling service
Bathroom cleanliness
Boarding service
Booking service
Carry-on baggage
Check-in service
Flight attendant service - 1) Friendliness
Flight attendant service - 2) Handling incidents
Flight attendant service - 3) Efficiency
Flight attendant service - 4) Excellent service
Flight delay and cancellation
Flight punctuality
Frequent flight program
In-flight entertainment - 1) Movie
In-flight entertainment - 2) Option variety
In-flight meal - 1) Purchased meal
In-flight meal - 2) Menu variety
In-flight meal - 3) Beverage
In-flight meal - 4) Liquor
Layover (stopover)
Mobile phone usage
Seat legroom
Special request
Ticket refund
Upper class cabin - 1) Business class
Upper class cabin - 2) Premium economy

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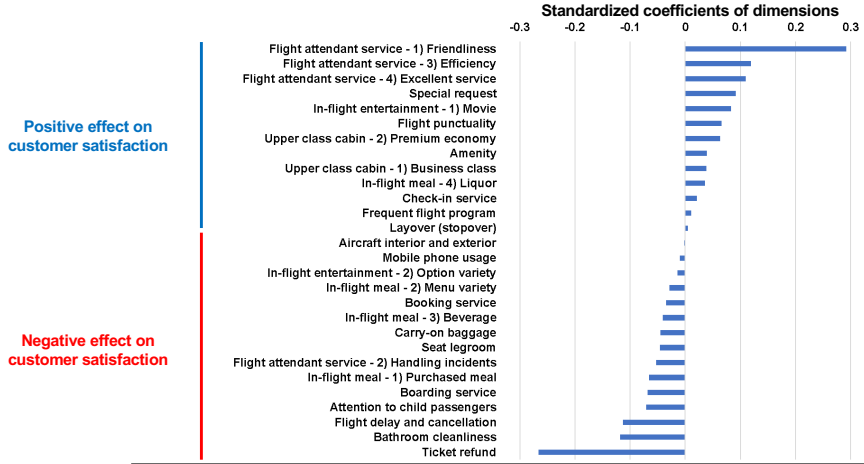
IV. Results

Regression analysis

- The effects of service quality dimensions on **customer satisfaction**
  - Weighted least squares (WLS) regression - Violate homoscedasticity assumption



IV. Results

Regression analysis

- To illustrate…

Positive effect of
Flight attendant service - Friendliness

Great flight experience ever! ★★★★★

It was awesome experience! Flight attendants was so friendly and nice! […] They did wonderful job and I feel like they are my friends!

Feb 21, 2017 From ICN to MHK

Negative effect of
Ticket refund

Never use this airline ★★★★★

When I tried to refund my ticket, they never responded my call. […] I needed to wait their responses forever. Never use again!

Aug 10, 2016 From ICN to MCI

V. Discussion

Theoretical implications

1. Captures a **comprehensive understanding** of service quality perceived **by customers**
   - Fundamental: “flight attendant,” “booking,” “check-in,” “boarding,” and “seat” (Gupta, 2018; Jiang & Zhang, 2016; Liou et al., 2011; Pakdil & Aydin, 2007; Park et al., 2004)
   - Occasionally happening: “special assistance service for the handicapped or child” and “flight delays and cancellations” (Gupta, 2018; Jiang & Zhang, 2016)

2. Uncover factors **rarely appeared in literature**
   - "Bathroom cleanliness," "mobile phone usage," and "carry-on baggage"



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V. Discussion

Theoretical implications

3. Suggests possible **unique** airline service quality dimensions
   - Dimensions of SERVQUAL should be modified for a specific industry (Ladhari, 2009)
   - Identified **diversified perceptions**: "flight attendant service," "in-flight meal," and "in-flight entertainment"
   - Hardly explained by the one SERVQUAL dimension's definition

4. Regression analysis confirms
   - The importance of flight attendant service on customer satisfaction
   - Friendliness, efficiency, and excellent service of flight attendants are positioned on the top 3

(Farooq et al., 2018; Koklic et al., 2017)

V. Discussion

Practical implications

• An opportunity to design **customer-centric** service plans
   - Directly show what types of service dimensions passengers perceive
   - Develop a service **checklist** throughout the service process

• **Improvement points** for enhancing **customer satisfaction**
   - Bathroom cleanliness, ticket refund, flight delay and cancellation, beverages, carry-on baggage, boarding service, flight attendant's ability to handle incidents, and booking service

V. Discussion

Limitations

	Current research	Future research
1. Possible **unique** airline service quality dimensions		
	• Flight attendance service, in-flight entertainment, and in-flight meal • Exploratory approach	• Validate as distinct service quality dimensions • Check the validity and reliability to extend the SERVQUAL
2. Regarding **text pre-processing**		
	• Removed words related to city, country, airport, and airline names • Produce more rigorous topic modeling results	• Compare dimensions depending on various factors • Airline business model, nationality, and routes
3. Regarding **context**		
	• Focus on the overall service quality • Generalizable results	• Pay attention to specific situation, such as Pandemic • Comparison before and after the pandemic • Guidelines for recovering from the pandemic

Thank you!

Appendix

Text pre-processing

Text pre-processing → Tokenization → Remove number and punctuation → Remove stop-words → Lowercase and stemming words

I visited to Busan 2 times.

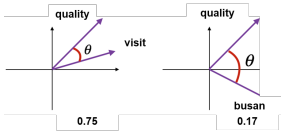
Tokenization	Remove number and punctuation	Remove stop-words	Lowercase and stemming words
I / visited / to / Busan / 2 / times / .	I visited Busan times	visited Busan times	visit busan time

Appendix

Word-embedding

Word-embedding → Word vectorization → Calculate word similarity → Calculate document similarity → Screen relevant document

- To **keep service quality-focused** online reviews (key-word: quality)
- Skip-gram approach of Word2vec algorithms (Mikolov et al., 2013)



	Visit	busan	…	quality
Review 1	1	1		0
Review 2	1	0		1
…			…	

1. Word vectorization

	Visit	busan	…
Review 1	0.75	0.17	
Review 2	0.75	0	
…			…

2. Calculate word similarity

	Visit	busan	…	Document similarity
Review 1	0.75	0.17		2.56
Review 2	0.75	0		0.95
…			…	

3 & 4. Calculate document similarity and screen

Criteria: 1.0 (Kwon et al., 2020)

Selected

Removed

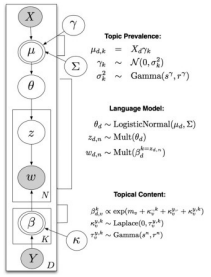
Appendix

Structural topic modeling

Structural topic modeling → Determine topic number → Identify topics → Interpret topics → Comparative analysis

- To extract **customers perceived dimensions** of service quality
- Basically, **summarize** documents based on word co-occurrence

	Word 1	Word 2	…	Word 1,234
Review 1	1	1		1
Review 2	0	1		0
…				



(Roberts, et al., 2014)

	Topic 1	Topic 2	…	Topic 7
Word 1	0.23	0.23		0.15
Word 2	0	0.43		0
…				
Sum	1	1		1

	Topic 1	Topic 2	…	Topic 7	Sum
Review 1	0.23	0.23		0.15	1
Review 2	0	0.43		0	1
…					

Appendix

Statistical test

Statistical test → Regression analysis

- To examine the effects of dimensions on **customer satisfaction**

	IV					DV
	Topic 1	Topic 2	…	Topic 7	Sum	Star-rating
Review 1	0.23	0.23		0.15	1	5
Review 2	0	0.43		0	1	3
…						

Proxy of customer satisfaction

(Gunasekar et al., 2021; Kwon et al., 2020)

References

Aagja, J. P., & Garg, R. (2010). Measuring perceived service quality for public hospitals (PubHosQual) in the Indian context. International Journal of Pharmaceutical and Healthcare Marketing.

Abdullah, A., & Khan, A. Q. (2012). Liquidity risk management: A comparative study between domestic and foreign banks in Pakistan. Journal of Managerial Science, 6(1), 62-72.

Blei, D. M. (2012). Probabilistic topic models. Communications of the ACM, 55(4), 77-84.

Brady, M. K., & Cronin Jr, J. J. (2001). Some new thoughts on conceptualizing perceived service quality: a hierarchical approach. Journal of Marketing, 65(3), 34-49.

Carvalho, R. C. D., & Medeiros, D. D. D. (2021). Assessing quality of air transport service: a comparative analysis of two evaluation models. Current Issues in Tourism, 24(8), 1123-1138.

Chang, J., Boyd-Graber, J., Gerrish, S., Wang, C., & Blei, D. M. (2009). Reading tea leaves: How humans interpret topic models. In Advances in neural information processing systems NIPS.

Chen, F. Y., & Chang, Y. H. (2005). Examining airline service quality from a process perspective. Journal of Air Transport Management, 11(2), 79-87.

Chen, L., Li, Y. Q., & Liu, C. H. (2019). How airline service quality determines the quantity of repurchase intention-Mediate and moderate effects of brand quality and perceived value. Journal of Air Transport Management, 75, 185-197.

DiMaggio, P., Nag, M., & Blei, D. (2013). Exploiting affinities between topic modeling and the sociological perspective on culture: Application to newspaper coverage of US government arts funding. Poetics, 41(6), 570-606.

Ding, K., Choo, W. C., Ng, K. Y., & Ng, S. I. (2020). Employing structural topic modelling to explore perceived service quality attributes in Airbnb accommodation. International Journal of Hospitality Management, Advance online publication.

Ekiz, H.E., Hussain, K., & Bavik, A. (2006). Perceptions of service quality in north Cyprus National Airline, Tourism and Hospitality Industry 2006 – New Trends in Tourism and Hospitality Management, Proceedings of 18th Biennial International Conference, Faculty of Tourism and Hospitality Management.

Fan, F., Zhao, W. X., Wen, J. R., Xu, G., & Chang, E. Y. (2017). Mining collective knowledge: inferring functional labels from online review for business. Knowledge and Information Systems, 53(3), 723-747.

Farooq, M. S., Salam, M., Fayolle, A., Jaafar, N., & Ayupp, K. (2018). Impact of service quality on customer satisfaction in Malaysia airlines: A PLS-SEM approach. Journal of Air Transport Management, 67, 169-180.

Fick, G. R., & Brent Ritchie, J. R. (1991). Measuring service quality in the travel and tourism industry. Journal of Travel Research, 30(2), 2–9.

Frochot, I., & Hughes, H. (2000). HISTOQUAL: The development of a historic houses assessment scale. Tourism management, 21(2), 157-167.

Griffiths, T. L., & Steyvers, M. (2004). Finding scientific topics. Proceedings of the National Academy of Sciences, 101(suppl 1), 5228-5235.

Grönroos, C. (2001). The perceived service quality concept–a mistake?. Managing Service Quality: An International Journal, 11(3), 150-152.

Gunasekar, S., Kumar, D. S., Purani, K., Sudhakar, S., Dixit, S. K., & Menon, D. (2021). Understanding service quality attributes that drive user ratings: A text mining approach. Journal of Vacation Marketing, 27(4), 400-419.

Guo, Y., Barnes, S. J., & Jia, Q. (2017). Mining meaning from online ratings and reviews: Tourist satisfaction analysis using latent dirichlet allocation. Tourism management, 59, 467-483.

Gupta, H. (2018). Evaluating service quality of airline industry using hybrid best worst method and VIKOR. Journal of Air Transport Management, 68, 35-47.

Han, H., Lee, K. S., Chua, B. L., Lee, S., & Kim, W. (2019). Role of airline food quality, price reasonableness, image, satisfaction, and attachment in building re-flying intention. International Journal of Hospitality Management, 80, 91-100.

Hayes, A. F., & Cai, L. (2007). Using heteroskedasticity-consistent standard error estimators in OLS regression: An introduction and software implementation. Behavior Research Methods, 39(4), 709-722.

Holbrook, M. B., & Corfman, K. P. (1985). Quality and value in the consumption experience: Phaedrus rides again. In J. Jacoby and J. C. Olson (Eds.), Perceived quality: How consumers view stores and merchandise (pp. 31–57). Lexington Books.

Hu, N., Zhang, T., Gao, B., & Bose, I. (2019). What do hotel customers complain about? Text analysis using structural topic model. Tourism Management, 72, 417-426.

Hussain, R., Al Nasser, A., & Hussain, Y. K. (2015). Service quality and customer satisfaction of a UAE-based airline: An empirical investigation. Journal of Air Transport Management, 42, 167-175.

Jarque, C. M., & Bera, A. K. (1987). A test for normality of observations and regression residuals. International Statistical Review, 55(2), 163-172.

Jiang, H., & Zhang, Y. (2016). An investigation of service quality, customer satisfaction and loyalty in China's airline market. Journal of Air Transport Management, 57, 80-88.

Koklic, M. K., Kukar-Kinney, M., & Vegelj, S. (2017). An investigation of customer satisfaction with low-cost and full-service airline companies. Journal of Business Research, 80, 188-196.

Korfiatis, N., Stamolampros, P., Kourouthanassis, P., & Sagiadinos, V. (2019). Measuring service quality from unstructured data: A topic modeling application on airline passengers' online reviews. Expert Systems with Applications, 116, 472-486.

Kwon, W., Lee, M., & Back, K. J. (2020). Exploring the underlying factors of customer value in restaurants: A machine learning approach. International Journal of Hospitality Management, Advance online publication.

Ladhari, R. (2009). A review of twenty years of SERVQUAL research. International Journal of Quality and Service Sciences, 1(2)172-198.

Li, W., Yu, S., Pei, H., Zhao, C., & Tian, B. (2017). A hybrid approach based on fuzzy AHP and 2-tuple fuzzy linguistic method for evaluation in-flight service quality. Journal of Air Transport Management, 60, 49-64.

References

Lim, J., & Lee, H. C. (2020). Comparisons of service quality perceptions between full service carriers and low cost carriers in airline travel. Current Issues in Tourism, 23(10), 1261-1276.

Lim, S. S., & Tkaczynski, A. (2017). Origin and money matter: The airline service quality expectations of international students. Journal of Hospitality and Tourism Management, 31, 244-252.

Lin, J. S. C., & Hsieh, P. L. (2011). Assessing the self-service technology encounters: development and validation of SSTQUAL scale. Journal of retailing, 87(2), 194-206.

Liou, J. J., Tsai, C. Y., Lin, R. H., & Tzeng, G. H. (2011). A modified VIKOR multiple-criteria decision method for improving domestic airlines service quality. Journal of Air Transport Management, 17(2), 57-61.

Lucini, F. R., Tonetto, L. M., Fogliatto, F. S., & Anzanello, M. J. (2020). Text mining approach to explore dimensions of airline customer satisfaction using online customer reviews. Journal of Air Transport Management, Advance online publication.

Martín-Domingo, L., Martín, J. C., & Mandsberg, G. (2019). Social media as a resource for sentiment analysis of Airport Service Quality (ASQ). Journal of Air Transport Management, 78, 106-115.

Mikolov, T., Sutskever, I., Chen, K., Corrado, G. S., & Dean, J. (2013). Distributed representations of words and phrases and their compositionality. Advances in neural Information Processing Systems, 3111-3119.

Moro, S., Lopes, R. J., Esmerado, J., & Botelho, M. (2020). Service quality in airport hotel chains through the lens of online reviewers. Journal of Retailing and Consumer Services, Advance online publication.

Nadiri, H., Hussain, K., Ekiz, E. H., & Erdoğan, Ş. (2008). An investigation on the factors influencing passengers' loyalty in the North Cyprus national airline. The TQM Journal, 20(3), 265-280.

Pakdil, F., & Aydın, Ö. (2007). Expectations and perceptions in airline services: An analysis using weighted SERVQUAL scores. Journal of Air Transport Management, 13(4), 229-237.

Papadomichelaki, X., & Mentzas, G. (2009). A multiple-item scale for assessing e-government service quality. In International conference on electronic government (pp. 163-175). Springer, Berlin, Heidelberg.

Parasuraman, A., Zeithaml, V. A., & Berry, L. (1988). SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality. Journal of Retailing, 64(1), 12-40.

Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1985). A conceptual model of service quality and its implications for future research. Journal of Marketing, 49(4), 41-50.

Park, J. W., Robertson, R., & Wu, C. L. (2004). The effect of airline service quality on passengers' behavioural intentions: A Korean case study. Journal of Air Transport Management, 10(6), 435-439.

Park, S., Lee, J. S., & Nicolau, J. L. (2020). Understanding the dynamics of the quality of airline service attributes: Satisfiers and dissatisfiers. Tourism Management, Advance online publication.

Perçin, S. (2018). Evaluating airline service quality using a combined fuzzy decision-making approach. Journal of Air Transport Management, 68, 48-60.

Prentice, C., & Nguyen, M. (2021). Robotic service quality–Scale development and validation. Journal of Retailing and Consumer Services, 62, 102661.

Punel, A., Hassan, L. A. H., & Ermagun, A. (2019). Variations in airline passenger expectation of service quality across the globe. Tourism Management, 75, 491-508.

Rajaguru, R. (2016). Role of value for money and service quality on behavioural intention: A study of full service and low cost airlines. Journal of Air Transport Management, 53, 114-122.

Roberts, M. E., Stewart, B. M., & Airoldi, E. M. (2016). A model of text for experimentation in the social sciences. Journal of the American Statistical Association, 111(515), 988-1003.

Roberts, M. E., Stewart, B. M., Tingley, D., Lucas, C., Leder-Luis, J., Gadarian, S. K., ... & Rand, D. G. (2014). Structural topic models for open-ended survey responses. American journal of political science, 58(4), 1064-1082.

Saeida Ardakani, S., Nejatian, M., Farhangnejad, M. A., & Nejati, M. (2015). A fuzzy approach to service quality diagnosis. Marketing Intelligence & Planning, 33(1), 103-119.

Sezgen, E., Mason, K. J., & Mayer, R. (2019). Voice of airline passenger: A text mining approach to understand customer satisfaction. Journal of Air Transport Management, 77, 65-74.

Shah, F. T., Syed, Z., Imam, A., & Raza, A. (2020). The impact of airline service quality on passengers' behavioral intentions using passenger satisfaction as a mediator. Journal of Air Transport Management, Advance online publication.

Suki, N. M. (2014). Passenger satisfaction with airline service quality in Malaysia: A structural equation modeling approach. Research in transportation business & management, 10, 26-32.

Tahanisaz, S. (2020). Evaluation of passenger satisfaction with service quality: A consecutive method applied to the airline industry. Journal of Air Transport Management, Advance online publication.

Tahanisaz, S., & shokuhyar, S. (2020). Evaluation of passenger satisfaction with service quality: A consecutive method applied to the airline industry. Journal of Air Transport Management, Advance online publication.

Vanhala, M., Lu, C., Peltonen, J., Sundqvist, S., Nummenmaa, J., & Järvelin, K. (2020). The usage of large data sets in online consumer behaviour: A bibliometric and computational text-mining–driven analysis of previous research. Journal of Business Research, 106, 46-59.

Xu, X., Liu, W., & Gursoy, D. (2019). The impacts of service failure and recovery efforts on airline customers' emotions and satisfaction. Journal of Travel Research, 58(6), 1034-1051.

Yalcin Kavus, B., Gulum Tas, P., Ayyildiz, E., & Taskin, A. (2022). A three-level framework to evaluate airline service quality based on interval valued neutrosophic AHP considering the new dimensions. Journal of Air Transport Management, Advance online publication.

Yoo, B., & Donthu, N. (2001). Developing a scale to measure the perceived quality of an Internet shopping site (SITEQUAL). Quarterly journal of electronic commerce, 2(1), 31-45.

Zeithaml, V. A., Berry, L. L., & Parasuraman, A. (1993). The nature and determinants of customer expectations of service. Journal of The Academy of Marketing Science, 21(1), 1-12.

Zeithaml, V. A., Parasuraman, A., & Berry, L. L. (1985). Problems and strategies in services marketing. Journal of Marketing, 49(2), 33-46.

Zhao, Y., Xu, X., & Wang, M. (2019). Predicting overall customer satisfaction: Big data evidence from hotel online textual reviews. International Journal of Hospitality Management, 76, 111-121.

Prediction of Mongolian stock market: a deep learning model

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Contents

1.Introduction

- Need of Stock Price Prediction on MSE
  - Increasing the number of investors
  - decreasing saving rates
  - development of the stock exchanged
  - Mongolia banks' IPO
- Trend of Stock Price Prediction Methodology
  - Artificial intelligence
    - Machine Learning
      - Deep Learning

2.Deep Learning models

- Main types of deep Leaning models
  - Feed Forward Neural Networks - FNN
  - Convolutional Neural Network - CNN
  - Recurrent Neural Network – RNN

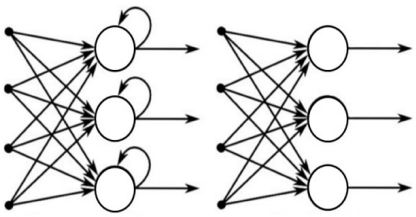


Figure 1. Comparison of recurrent neural network (RNN) and feed-forward neural network (FNN).

2.Deep Learning models

- Long short term memory model - LSTM
  - One of models of Recurrent Neural Network (RNN)
  - Fit for Time Series Data

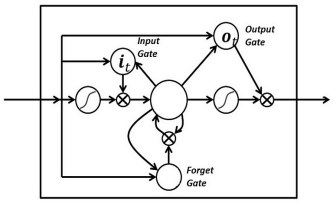
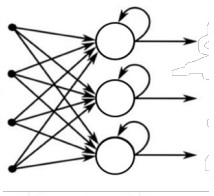


Figure 2. Sample LSTM unit Source : [6]

3.A prediction model

- Inputs and outputs of prediction model

Stock price of 60 days →  → 61th day price

Input LSTM model Output

- Structures of LSTM model

Layer 1: units = 50, activation = 'relu', Dropout(0.2)
Layer 2: units = 50, activation = 'relu', Dropout(0.2)
Layer 3: units = 50, activation = 'relu', Dropout(0.2)
Layer 4: units = 50, activation = 'relu', Dropout(0.2)

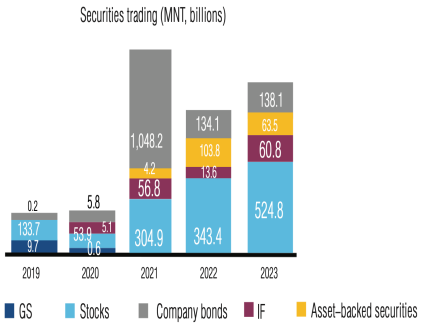
Mongolian Stock market

- Mongolian Stock Exchange and the initiation of state-owned privatization in order to develop the securities market by Resolution No. 22 of the Government of Mongolia dated January 18, 1991.
- in 1992, as part of the government's privatization policy, a total of 475 state-owned factories were converted into joint-stock companies, and 96.1 million shares with an investment of 8.2 billion MNT were sold to citizens through the Mongolian Stock Exchange.
- As a result, about 52 percent of the total population of Mongolia, or 1.2 million people became shareholders. This process changed the economic structure of Mongolia, created basic conditions for improving efficiency, creating market competition, supporting the development of the private sector in the economy, and organizing privatization on a large scale.
- According to the decision of the Government of Mongolia, the Mongolian Stock Exchange cooperates with the internationally renowned "London Stock Exchange" group at a strategic level and has reached a new level of development in terms of capital market regulation, technology, and infrastructure.

Mongolian Stock market

	2022	2023
Market Capitalization	MNT 6.89 Trillion	MNT 11.6 Trillion
TOP-20 index	37,565.55 unit	41,437.42 unit
Listed companies	183	173
Daily average trade	MNT 2.4 Billiom	MNT 33.3 Billiom

Mongolian Stock market



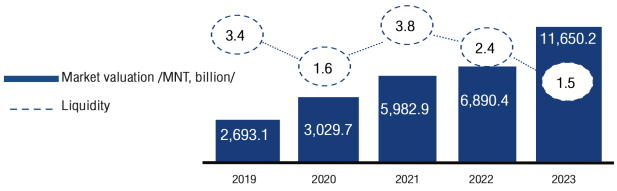
- The securities trading amounted to a total of MNT 787.2 billion, representing a 32.3 percent increase from the previous year and a 5.5-fold increase from the same period in 2019.

- Of all trades, 66.7% were shares, 7.7 % were investment fund units, 17.5 % were corporate bonds, and 8.1 % were asset-backed securities.

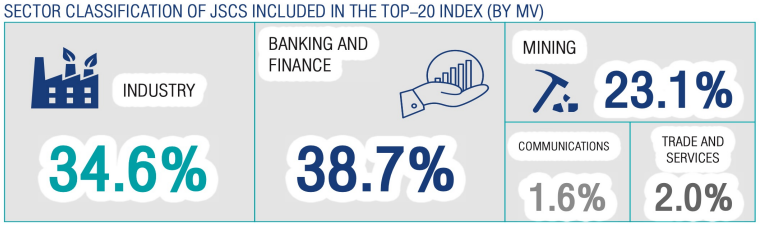
Mongolian Stock market

Market capitalization and liquidity

- The market capitalization increased by 1.7% to MNT11,650.2 billion compared to the previous year. Liquidity also improved, rising by 1.5%.



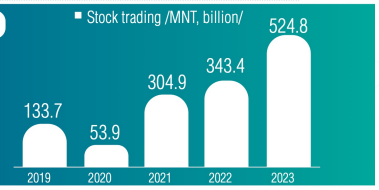
SECTOR CLASSIFICATION OF JSCS INCLUDED IN THE TOP-20 INDEX (BY MV)



Mongolian Stock market

STOCK TRADING

o Stock trading reached MNT524.8 billion, marking a 3.9–fold increase compared to the same period in 2019 and a 1.5–fold increase compared to the previous year.



NEW SHARES /IPO/

COMPANY	Date of registration	Withdrawal amount /MNT, billion/
"Gazar Shim" JSC	2023.01.25	10.5
"Khan Bank" JSC	2022.12.09	183.4
"Trade and Development Bank" JCS	2023.05.12	83.5
"Khas Bank" JCS	2023.05.12	35.7
"Monlogistics Holding" LLC	2023.06.13	11.0
"MOST Fintech" LLC	2023.10.25	5.8
"Innovation Investment" LLC	2023.11.08	8.3
Total		338.2

4.Data Collection

- Selection of companies
  - 10 Mongolian companies
    - market capitalization
    - average daily turnover
    - number of trading days
- Time period of dataset
  - 1000 days of closing price
    - Training set
      - 979 days of closing price
    - Test set
      - 21 days of closing price

№	Code	Company's name
1	APU	APU JSC
2	AARD	Ard financial group
3	GOV	Govi JSC
4	NEH	Darkhan Nehii
5	MMX	Makhimpex
6	MIK	Mongolian Mortgage Corporation
7	MNP	Mongolian post
8	SUU	SUU JSC
9	TTL	Tavantolgoi
10	TCK	Talkh-Chiker

Table 1. selected 10 companies.

5.Prediction results

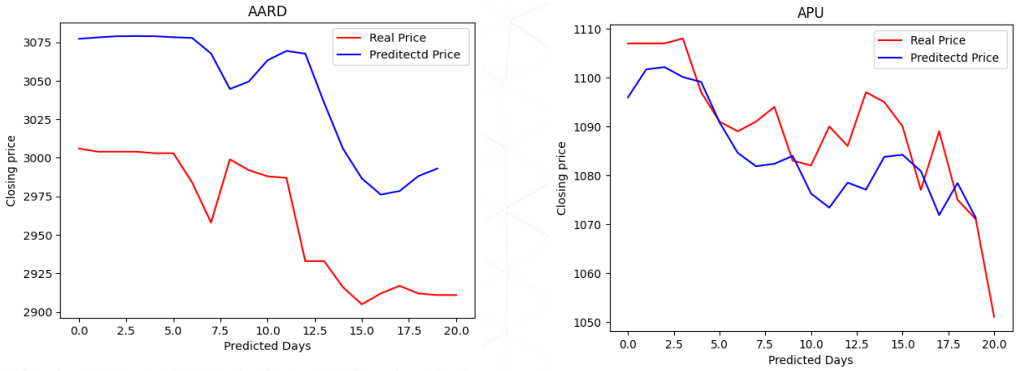


Figure 3. Compare predicted closing price and actual closing price of APU and AARD on testset

Training set is 980 days of closing price
Test set is 21 days of closing price
Number of training epochs: 100

5.Prediction results

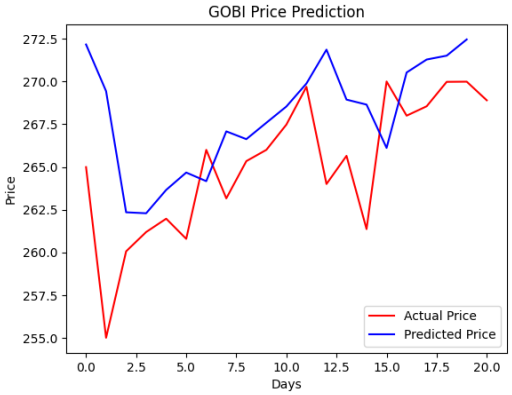


Figure 3. Compare predicted closing price and actual closing price of GOBI on testset

Training set is 980 days of closing price
Test set is 21 days of closing price
Number of training epochs: 100

5.Prediction results

№	Code	Company's name	Accuracy
1	APU	APU JSC	
2	AARD	Ard financial group	
3	GOV	Govi JSC	
4	NEH	Darkhan Nehii	
5	MMX	Makhimpex	
6	MIK	Mongolian Mortgage Corporation	
7	MNP	Mongolian post	
8	SUU	SUU JSC	
9	TTL	Tavantolgoi	
10	TCK	Talkh-Chiker	

Table 1. selected 10 companies.

Conclusions

The aim of research is to forecast price movement of listed 10 companies on the Mongolian stock market using Long Short Term Memory model. With the characteristics of the structure and parameters, the LSTM model is suitable for time series data such as stock price history. Therefore, the application of the LSTM to analyze and forecast stock prices is considered appropriate, the results of this study are also consistent with the above conclusions.

Thank you for your attention

A Study of Course Importance Analysis in the Department of Airline Cabin Services

2024. 06. 01(sat)

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Title

Ⅰ-1. Research Background and Methods

[1] Research Background

- Article 76 (1) and (3) of the Aviation Safety Act: A person operating an aircraft shall carry on board the crew necessary for the minimum safety of the operation and shall provide them with the necessary training to perform their duties.

- Unlike the role of cabin crew, Article 48 of the Aviation Safety Act specifies matters related to training institutions (designation of specialized training institutions, etc.), but it does not specify the minimum curriculum and subjects for training personnel.

- Recognizing that four-year and two-year colleges and universities across the country arbitrarily set the curriculum and operate the curriculum according to their faculty, facilities, and equipment.

Ⅰ-2. Research Background and Methods

[2] Research Methods

- **Data collection: In-depth survey method using 1:1 Delphi method for 3rd year students enrolled in the Department of Airline Cabin Services**
  - The collected data was collected in the form of data that can be used for dynamic analysis of the degree of mutual influence between each subject, unlike the data that is usually collected for one-way static analysis (statics analysis-IPA, Hirschkowitz, etc.)
- **Analysis model: Mixed use of DEMATEL-model and ANP-analysis model, which are widely used as analysis tools to determine business units for analysis through dynamic analysis of the degree of interconnected influence of each subject. Established the objectivity of academic theories, and based on the final results, established an objective system to organize training subjects for two-year and four-year airline cabin service personnel training**

II-1. Research Model

[1] Impact analysis by subject

- Structuring a Z matrix table : $Z=\begin{pmatrix} Z_{11} \cdots Z_{1j} \cdots Z_{1n} \\ \cdots \quad \cdots \quad \cdots \\ Z_{i1} \cdots Z_{ij} \cdots Z_{\in} \\ \cdots \quad \cdots \quad \cdots \\ Z_{n1} \cdots Z_{ni} \cdots Z_{nn} \end{pmatrix}$

- Configure a Y-matrix

$$Y=Z/g,\ g=\max\left(\max_{1\le i\le n}\sum_{j=1}^{n}|Z_{ij}|, \max_{1\le i\le n}\sum_{j=1}^{n}|Z_{ij}|\right),\ i,j\in 1,2,3,\ldots,n$$

- Organizing a T-matrix

$$T=Y+Y^2+Y^3+\ldots=\sum_{i=1}^{\infty}Y^i=Y(I+Y)^{-1}$$

- Derive a correlation table of influence for each factor based on a T-matrix

$$T=[t_{ij}]_{n\times n},\ i,j\in 1,2,3,\ldots,n, D=\left[\sum_{j=1}^{n}t_{ij}\right]_{n\times 1}=[t_i]_{n\times 1}, R=\left[\sum_{j=1}^{n}t_{ij}\right]_{n\times 1}=[t_j]_{n\times 1}$$

II-2. Research Model

[2] Analyze course importance

- Step 1 : Structuring direct importance for each subject group
- Step 2 : Structuring the weight matrix
- Step 3 : Structuring the Initial Waiting Matrix
- Step 4 : Structuring the Weighted Waiting Matrix
- Step 5 : Structuring the Marginal Weight Matrix

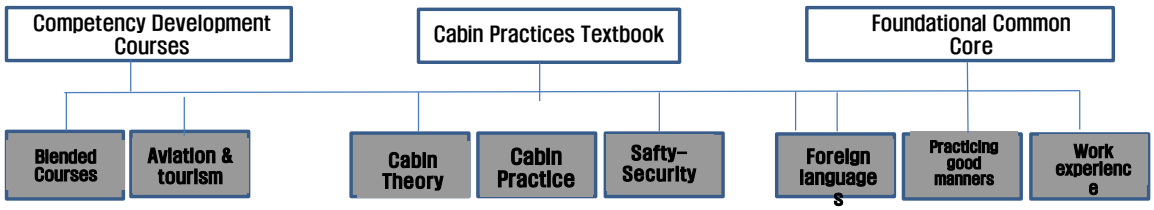
Ⅲ-1. Analysis Results

[1-1] Impact analysis

➢ Demographic analysis

구분		Frequency	Ratio
Gender	Male	5	16.7
	Female	25	83.3
Education	3rd year in Aviation Services	30	100

➢ Organize analytics elements by subject group



Ⅲ-1. Analysis Results

[1-2] Impact analysis

➢ Structuring a Z matrix table

Z		a1	a2	a3	a4	a5	a6	a7	a8	SUM
	a1	0.0000	3.9667	3.5000	2.8000	4.0667	4.0667	2.9000	4.0333	25.3
	a2	3.6667	0.0000	4.9000	4.6000	4.1333	4.8000	5.7000	4.6667	32.5
	a3	3.2000	4.5333	0.0000	6.3333	5.6333	4.7667	5.4000	5.4667	35.3
	a4	3.1333	4.3000	6.1667	0.0000	5.2667	5.4667	5.9333	5.9333	36.2
	a5	4.1667	4.0333	5.5667	5.3333	0.0000	4.6667	4.2333	5.3000	33.3
	a6	3.8667	5.0667	4.7667	5.8667	4.7333	0.0000	5.2667	5.7667	35.3
	a7	3.1667	5.3667	5.4000	5.7667	4.3667	4.9333	0.0000	5.6333	34.6
	a8	3.8667	4.6333	5.4333	5.9667	5.3667	5.7667	5.8667	0.0000	36.9
	SUM	25.1	31.9	35.7	36.7	33.6	34.5	35.3	36.8	

➢ Configure a Y-matrix

Y		a1	a2	a3	a4	a5	a6	a7	a8	
	a1	0.0000	0.1075	0.0949	0.0759	0.1102	0.1102	0.0786	0.1093	0.6865
	a2	0.0994	0.0000	0.1328	0.1247	0.1120	0.1301	0.1545	0.1265	0.8799
	a3	0.0867	0.1229	0.0000	0.1716	0.1527	0.1292	0.1463	0.1481	0.9575
	a4	0.0849	0.1165	0.1671	0.0000	0.1427	0.1481	0.1608	0.1608	0.9810
	a5	0.1129	0.1093	0.1509	0.1445	0.0000	0.1265	0.1147	0.1436	0.9024
	a6	0.1048	0.1373	0.1292	0.1590	0.1283	0.0000	0.1427	0.1563	0.9575
	a7	0.0858	0.1454	0.1463	0.1563	0.1183	0.1337	0.0000	0.1527	0.9386
	a8	0.1048	0.1256	0.1472	0.1617	0.1454	0.1563	0.1590	0.0000	1.0000
		0.6793	0.8645	0.9684	0.9937	0.9097	0.9341	0.9566	0.9973	

Ⅲ-1. Analysis Results

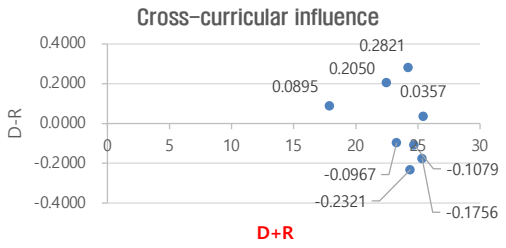
[1-3] Impact analysis

➢ Organizing a T-matrix

Y(I-Y)^1		a1	a2	a3	a4	a5	a6	a7	a8	D
	a1	0.7949	1.0901	1.1925	1.2091	1.1416	1.1660	1.1713	1.2301	8.9957
	a2	1.0914	1.2535	1.5130	1.5471	1.4159	1.4612	1.5201	1.5410	11.3432
	a3	1.1657	1.4676	1.5149	1.7051	1.5593	1.5745	1.6310	1.6788	12.2969
	a4	1.1893	1.4947	1.6930	1.5951	1.5847	1.6228	1.6770	1.7243	12.5809
	a5	1.1249	1.3789	1.5582	1.5942	1.3452	1.4884	1.5194	1.5859	11.5951
	a6	1.1758	1.4736	1.6222	1.6880	1.5340	1.4540	1.6219	1.6781	12.2477
	a7	1.1456	1.4616	1.6152	1.6657	1.5072	1.5522	1.4775	1.6545	12.0794
	a8	1.2186	1.5182	1.6959	1.7521	1.6037	1.6466	1.6933	1.6044	12.7328
	R	8.9061	11.1382	12.4048	12.7565	11.6918	11.9656	12.3115	12.6971	

➢ Derive an impact correlation table based on a T-matrix

	R	E	D+R	D-R
a1	8.995664	8.9061	17.90181	0.0895
a2	11.34322	11.1382	22.48142	0.2050
a3	12.29688	12.4048	24.70168	-0.1079
a4	12.58085	12.7565	25.33731	-0.1756
a5	11.5951	11.6918	23.28686	-0.0967
a6	12.24767	11.9656	24.21329	0.2821
a7	12.07939	12.3115	24.39087	-0.2321
a8	12.73279	12.6971	25.42991	0.0357



Ⅲ-2. Analysis Results

[2-1] Results of importance analysis

➢ Initially heavy matrix (W0, Initial Weighted-Matrix) Derive

	a1	a2	a3	a4	a5	a6	a7	a8	
초기중요도	4.233	5.067	5.500	6.000	6.333	6.333	5.833	6.333	45.633
표준화값	0.093	0.111	0.121	0.131	0.139	0.139	0.128	0.139	1.000

W0			a1	a2	a3	a4	a5	a6	a7	a8
		G	0.093	0.111	0.121	0.131	0.139	0.139	0.128	0.139
	a1	0.093	1.000	0.836	0.770	0.706	0.668	0.668	0.726	0.668
	a2	0.111	1.197	1.000	0.921	0.844	0.800	0.800	0.869	0.800
	a3	0.121	1.299	1.086	1.000	0.917	0.868	0.868	0.943	0.868
	a4	0.131	1.417	1.184	1.091	1.000	0.947	0.947	1.029	0.947
	a5	0.139	1.496	1.250	1.152	1.056	1.000	1.000	1.086	1.000
	a6	0.139	1.496	1.250	1.152	1.056	1.000	1.000	1.086	1.000
	a7	0.128	1.378	1.151	1.061	0.972	0.921	0.921	1.000	0.921
	a8	0.139	1.496	1.250	1.152	1.056	1.000	1.000	1.086	1.000

➢ Weighted Matrices (W^, Weighted-Matrix) Derive

W^		a1	a2	a3	a4	a5	a6	a7	a8
	a1	0.7949	0.9119	0.8972	0.8391	0.7519	0.7860	0.8314	0.8145
	a2	1.3046	1.2535	1.3520	1.2622	1.1032	1.1789	1.2695	1.2146
	a3	1.5493	1.6424	1.5149	1.5519	1.3531	1.4087	1.5229	1.4728
	a4	1.7137	1.8321	1.8601	1.5951	1.5103	1.5992	1.7133	1.6599
	a5	1.7079	1.7699	1.7956	1.6728	1.3452	1.5340	1.6364	1.6037
	a6	1.7444	1.8265	1.8130	1.7129	1.4884	1.4540	1.6852	1.6466
	a7	1.6141	1.7501	1.7299	1.6304	1.3995	1.4939	1.4775	1.5596
	a8	1.8404	1.9262	1.9332	1.8201	1.5859	1.6781	1.7963	1.6044

Ⅲ-2. Analysis Results

[2-2] Results of importance analysis

➢ Weighted Super-Matrix (S^, Weighted Super-Matrix) Derive

S0		G	a1	a2	a3	a4	a5	a6	a7	a8
	G		0	0	0	0	0	0	0	0
	a1	0.0928	0.7949	0.9119	0.8972	0.8391	0.7519	0.7860	0.8314	0.8145
	a2	0.1110	1.3046	1.2535	1.3520	1.2622	1.1032	1.1789	1.2695	1.2146
	a3	0.1205	1.5493	1.6424	1.5149	1.5519	1.3531	1.4087	1.5229	1.4728
	a4	0.1315	1.7137	1.8321	1.8601	1.5951	1.5103	1.5992	1.7133	1.6599
	a5	0.1388	1.7079	1.7699	1.7956	1.6728	1.3452	1.5340	1.6364	1.6037
	a6	0.1388	1.7444	1.8265	1.8130	1.7129	1.4884	1.4540	1.6852	1.6466
	a7	0.1278	1.6141	1.7501	1.7299	1.6304	1.3995	1.4939	1.4775	1.5596
	a8	0.1388	1.8404	1.9262	1.9332	1.8201	1.5859	1.6781	1.7963	1.6044
		1.0000	**12.2693**	**12.9126**	**12.8958**	**12.0845**	**10.5374**	**11.1327**	**11.9324**	**11.5761**

➢ Apply the importance of each subject group to the weight matrix (W^) The Initial Super-Matrix (S0) Theorem

S^		G	a1	a2	a3	a4	a5	a6	a7	a8
	G		0	0	0	0	0	0	0	0
	a1	0.0928	0.0648	0.0706	0.0696	0.0694	0.0714	0.0706	0.0697	0.0704
	a2	0.1110	0.1063	0.0971	0.1048	0.1044	0.1047	0.1059	0.1064	0.1049
	a3	0.1205	0.1263	0.1272	0.1175	0.1284	0.1284	0.1265	0.1276	0.1272
	a4	0.1315	0.1397	0.1419	0.1442	0.1320	0.1433	0.1436	0.1436	0.1434
	a5	0.1388	0.1392	0.1371	0.1392	0.1384	0.1277	0.1378	0.1371	0.1385
	a6	0.1388	0.1422	0.1414	0.1406	0.1417	0.1412	0.1306	0.1412	0.1422
	a7	0.1278	0.1316	0.1355	0.1341	0.1349	0.1328	0.1342	0.1238	0.1347
	a8	0.1388	0.1500	0.1492	0.1499	0.1506	0.1505	0.1507	0.1505	0.1386
		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

➢ Derive a standardized Weighted Super-Matrix (S^) based on Columns-sum

Ⅲ-2. Analysis Results

[2-3] Results of importance analysis

➢ Limiting Super-Matrix (S∞) Derive

S^		G	a1	a2	a3	a4	a5	a6	a7	a8
	G		0	0	0	0	0	0	0	0
	a1	0.0928	0.0648	0.0706	0.0696	0.0694	0.0714	0.0706	0.0697	0.0704
	a2	0.1110	0.1063	0.0971	0.1048	0.1044	0.1047	0.1059	0.1064	0.1049
	a3	0.1205	0.1263	0.1272	0.1175	0.1284	0.1284	0.1265	0.1276	0.1272
	a4	0.1315	0.1397	0.1419	0.1442	0.1320	0.1433	0.1436	0.1436	0.1434
	a5	0.1388	0.1392	0.1371	0.1392	0.1384	0.1277	0.1378	0.1371	0.1385
	a6	0.1388	0.1422	0.1414	0.1406	0.1417	0.1412	0.1306	0.1412	0.1422
	a7	0.1278	0.1316	0.1355	0.1341	0.1349	0.1328	0.1342	0.1238	0.1347
	a8	0.1388	0.1500	0.1492	0.1499	0.1506	0.1505	0.1507	0.1505	0.1386
		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

곱하기 $(S^{\wedge 2})$

S^		G	a1	a2	a3	a4	a5	a6	a7	a8
	G		0	0	0	0	0	0	0	0
	a1	0.0928	0.0648	0.0706	0.0696	0.0694	0.0714	0.0706	0.0697	0.0704
	a2	0.1110	0.1063	0.0971	0.1048	0.1044	0.1047	0.1059	0.1064	0.1049
	a3	0.1205	0.1263	0.1272	0.1175	0.1284	0.1284	0.1265	0.1276	0.1272
	a4	0.1315	0.1397	0.1419	0.1442	0.1320	0.1433	0.1436	0.1436	0.1434
	a5	0.1388	0.1392	0.1371	0.1392	0.1384	0.1277	0.1378	0.1371	0.1385
	a6	0.1388	0.1422	0.1414	0.1406	0.1417	0.1412	0.1306	0.1412	0.1422
	a7	0.1278	0.1316	0.1355	0.1341	0.1349	0.1328	0.1342	0.1238	0.1347
	a8	0.1388	0.1500	0.1492	0.1499	0.1506	0.1505	0.1507	0.1505	0.1386
		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

S^{∞}		G	a1	a2	a3	a4	a5	a6	a7	a8
	G		0	0	0	0	0	0	0	0
	a1	**0.0698**	0.0698	0.0698	0.0698	0.0698	0.0698	0.0698	0.0698	0.0698
	a2	**0.1044**	0.1044	0.1044	0.1044	0.1044	0.1044	0.1044	0.1044	0.1044
	a3	**0.1262**	0.1262	0.1262	0.1262	0.1262	0.1262	0.1262	0.1262	0.1262
	a4	**0.1415**	0.1415	0.1415	0.1415	0.1415	0.1415	0.1415	0.1415	0.1415
	a5	**0.1367**	0.1367	0.1367	0.1367	0.1367	0.1367	0.1367	0.1367	0.1367
	a6	**0.1400**	0.1400	0.1400	0.1400	0.1400	0.1400	0.1400	0.1400	0.1400
	a7	**0.1328**	0.1328	0.1328	0.1328	0.1328	0.1328	0.1328	0.1328	0.1328
	a8	**0.1485**	0.1485	0.1485	0.1485	0.1485	0.1485	0.1485	0.1485	0.1485

a8	0.148538	14.9	취업실무
a4	0.141521	14.2	객실실무실습
a6	0.139977	14.0	외국어
a5	0.136726	13.7	항공안전·보안
a7	0.132756	13.3	서비스매너
a3	0.126213	12.6	객실실무이론
a2	0.104422	10.4	항공 · 관광
a1	0.069847	7.0	융 · 복합

Ⅳ. Conclusion (Implications)

➢ Implications from an academic perspective

- Prepare a curriculum system for human resource training (feat. importance analysis)
- Conducting multi-dimensional matrix analysis by dynamic analysis outside the existing static analysis framework
- Derive specific and reasonable results than simple IPA analysis or analysis by Hirschkowitz, etc

➢ Practical implications

- Discover differences in students' important subjects Future Research Issues
- Establish a baseline system for the weighting of subjects by time for each group
- It is important for workforce training institutions to organize subjects according to the importance required by industrial sites..

Q & A

International Conference on Applied Service Management
Service Innovation and Digital Transformation in the ESG Era

A COMPARATIVE STUDY OF TERTIARY EDUCATION FINANCING IN DIFFERENT COUNTRIES

Mungunsukh.Sh

2024

Content

INTRODUCTION

> Tertiary education has become the aspiration of more and more young people around the globe while at the same time a fundamental requirement for employment in the sectors and industries that drive development in every country.

www.worldbank.org

Data for research

- National Statistics Office of Mongolia
- The Organization for Economic Co-operation and Development (OECD)
- UNESCO Statistical Organization

The financing of tertiary education

Percent of education expenditure in government spending

- Education expenditure in government spending (%)

Low income	Lower middle income	Upper middle income	High income
16.71362	18.53833	16.77038	16.81637

- Analysis of Variances

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Income Group	3	7.91	2.64	0.18	0.91
Residuals	14	207.49	14.82		

Percent of tertiary education expenditure in education expenditure

- Tertiary education expenditure in government spending (%)

Low income	Lower middle income	Upper middle income	High income
23.28077	20.69815	16.30984	39.25826

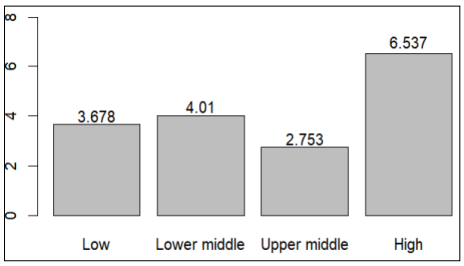
- Upper-middle-income countries spend relatively less on tertiary education than countries at others.
- High-income countries spend the greatest amount on tertiary education than countries at others.

Percent of tertiary education expenditure in government expenditure

- Tertiary education expenditure in government spending (%)

Low income	Lower middle income	Upper middle income	High income
3.677816	4.009889	2.752620	6.536884

- By bar chart



Comparison of Mongolia and other countries

Testing assumption 1 ...

t = -7.4321, df = 7, p-value = 0.0001454
alternative hypothesis: true difference in means is not equal to 0

95 percent confidence interval:
 -2.796584 -1.446570

sample estimates:
mean of the differences
-2.121577

Testing assumption 2 ...

t = -7.4321, df = 7, p-value = 7.27e-05
alternative hypothesis: true difference in means is less than 0

95 percent confidence interval:
-Inf -1.580749

sample estimates:
mean of the differences
-2.121577

CONCLUSION

- paying equal attention to education depending on their income level
- pay unequal attention to tertiary education depending on their income level
- increase government funding in order to have high qualified professionals with tertiary education

THANK YOU

International Conference on Applied Service Management
- Service Innovation and Digital Transformation in the ESG Era
-

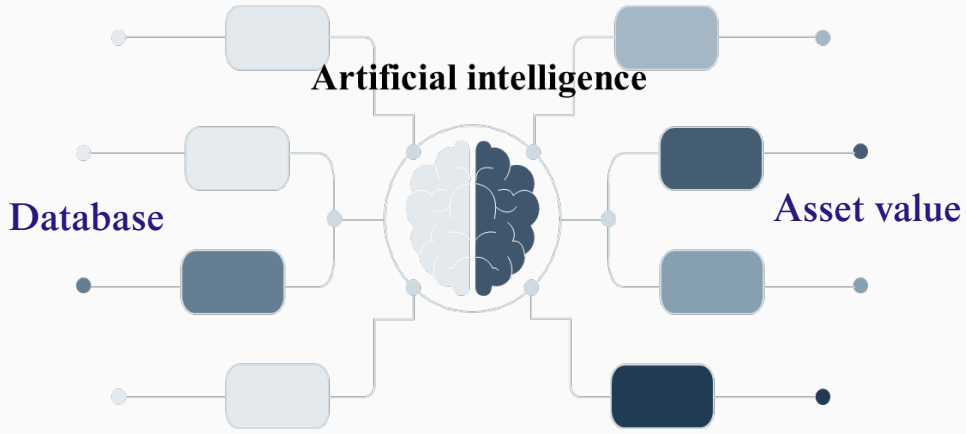
USING AN AUTOMATED VALUATION MODEL FOR RESIDENTIAL PROPERTY VALUATION

Enkhsuren.A

2024

Content

Introduction



Model theoretical approaches to automatic valuation

The theoretical methodology of the automatic valuation model is traditional for asset valuation:

- market approach,
- income approach,
- cost approach.

Model theoretical approaches to automatic valuation

Market approach, Sales Comparison Method

- Direct market method
  $$MV_s = SP_c + ADJ_c$$
- Additive model
  $$MV = B_0 + B_1 * X_1 + B_2 * X_2 \dots \dots \dots.$$
- Multiplicative model
  $$MV = B_0 * X_1^{B1} * X_2^{B2} * \cdots \dots \dots \dots.$$
- Hybrid model
  $$MV = \pi GQ * \left[\left(\pi BQ * \sum BA\right) + \left(\pi LQ * \sum LA\right) + \sum OA\right]$$

Source: Automated valuation standard

Market approach, Sales Comparison Method

- Retrospective AVMs
- Prospective AVMs
- Hedonic AVMs
- Repeat paired sales AVMs
- Tax assessed value AVMs
- Hybrid AVMs

Source: Automated valuation standard

Machine learning methodology

In real estate valuation, decision trees and random forest methods are widely used in real estate valuation using databases, automatic valuation methods, and machine learning to perform valuation work. Because real estate prices are constantly changing due to the influence of the market.

Decision tree

$$E\left(S\right)=\sum_{i=1}^{c}{{-p}_i\log_2{p_i}}$$

$$E\left(T, X\right)=\sum_{c\inX}{P(c)E(c)}$$

$$GainT,X=EntropyT-Entropy(T,X)$$

Random forest

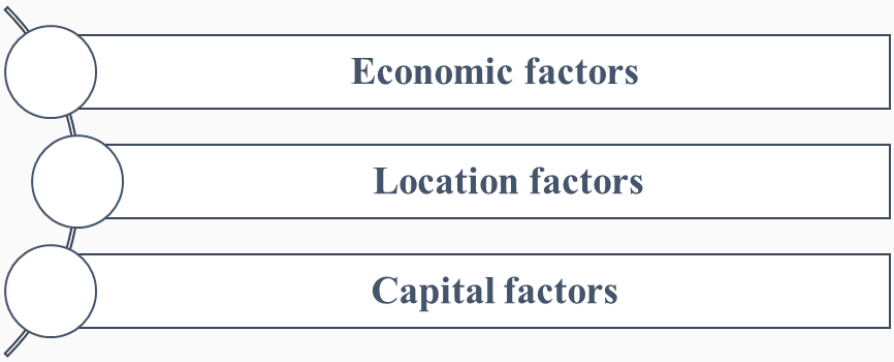
$$g_{RF}\left(x\right)=\frac{1}{B}\sum_{b=1}^{B}{g_{T_b^\ast}(x)}$$

B- the number of decision tree

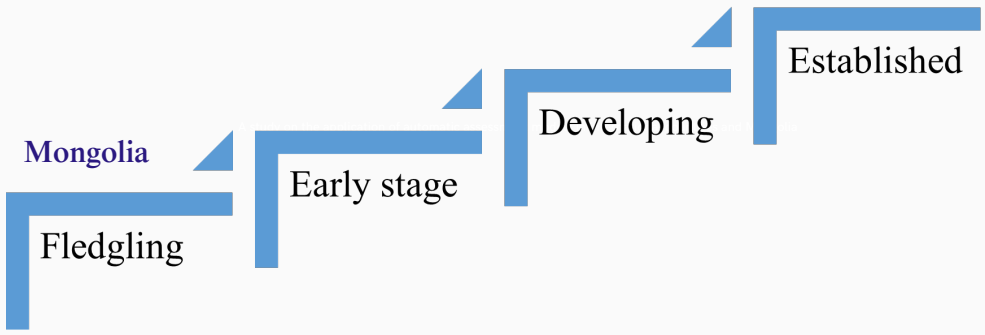
$g_{T_b^\ast}\left(x\right)$-trained decision tree

Source: D.Zolzaya, B.Tsetsegee (2021). Fundamentals of Artificial Intelligence

Factors affecting real estate prices



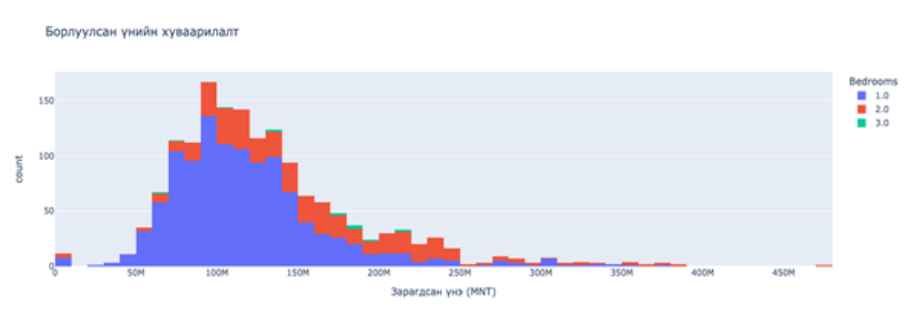
A study on the application of automatic assessment models in international countries and Mongolia



Residential real estate valuation using hybrid AVMs

Statistics						
		Total price	**Area size**	**Year**	**Area price**	**Rooms**
N	Valid	15198	15198	15198	15198	15198
	Missing	0	0	0	0	0
Mean		345978127.41	84.21	2015	3774959.16	2.81
Std. Deviation		321964299.54	44.97	8.9	1511636.68	.91
Minimum		26000000.00	18.00	1980.00	1000000	1.00
Maximum		4500000000.00	393.00	2024.00	13000000	5.00

Residential real estate valuation using hybrid AVMs



Sold price, /by number of bedroom/

Residential real estate valuation using hybrid AVMs

Sold price, /on the date of construction of the property/

Residential real estate valuation using hybrid AVMs

Date advertised and sold price

Residential real estate valuation using hybrid AVMs

№	Model	Scores
1	Catboost Regress	0.891916
2	Decision Tree Regress	0.745205
3	Linear Regress	0.761154
4	Random Forest Regress	0.895653
5	XGboost Regress	0.86051

As a result of the experiment

Conclusion

- The problem of valuation of residential real estate by automatic valuation model has been studied. As a result of the research, it is possible to automatically evaluate residential real estate in Mongolia.
- The automated valuation model performs valuation based on the database.
- It is concluded that the lack of a specialized asset valuation database in Mongolia will cause difficulties in real estate valuation using the automated valuation model.

References

- International Association of Assessing Officers, 2018
- Standard on Automated Valuation Models
- International Association of Assessing Officers, 2017
- Standard on Mass Appraisal of Real Property, 2017
- Published by Australian Property Institute, 2012
- “Australia and New Zealan Valuation and Property Standards”
- Bogdan Trawinski, Wroclaw Piwowarczyk, Zbigniew Telec, Wroclaw University of Science and Technology “Comparison of expert algorithms with machine learnin models for real estate appraisal”, 2017
- A. Geenen H. Nguyen R.T. Wiersma, “Automating Valuations for Real-Estate”, 2017
- Tuğba GÜNEŞ and Ümit YILDIZ, Turkey, “Mass Valuation Techniques Used in Land Regıstry and Cadastre Modernızatıon Project of Republıc of TURKEY”, 2015

- Nils Kok, Eija-Leena Koponen, and Carmen Adriana, Martínez-barbosa “Big Data in Real Estate? From Manual Appraisal to Automated Valuation” 2017
- Professor Mike Hefferan, University of the Sunshine Coast and Adjunct Professor Terry Boyd, Central Queensland University and University of the Sunshine Coast, “Property Taxation and Mass Appraisal Valuations in Australia – Adapting to a New Environment” 2010
- Brano GLUMAC, François Des Rosiers, “Real estate and land property automated valuation systems: A taxonomy and conceptual model” 2018
- Michael Bekech, Chair, “Computer Assisted Mass Appraisal Systems” 2002
- Tengxiang Su, “A BIM and Machine Learning Integration Framework for Automated Property Valuation”, 2022
- Hilgers, B.A.J, “Automated Valuation Models for Commercial Real Estate in the Netherlands”, 2018

- RICS, International valuation standards., 2020
- Manya M. Mooya., Real Estate Valuation Theory., 2016
- Appraisal Institute., The Appraisal of Real Estate 15th edition., 2020
- RICS., Automated valuation models (AVMs): Implications for the profession and their clients., https://www.rics.org/globalassets/rics-website/media/knowledge/research/insights/future-of-valuations-insights-paper-rics.pdf
- S. Dorjsuren., Valuation of Immovable properties., 2005
- Profession evaluation institution., Basics of Property Valuation., 2014
- G. Gantulga., Real Estate Relations 2011
- D.Zolzaya, B. Tsetsgee., Basic of Artificial Intelligence.,2021

Thank you

An Overview of ESG Reporting in Mongolia: Practices and Challenges

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Selenge Khurelbaatar (International University of Ulaanbaatar)

2024.06.01

Outline

1. Introduction
2. Background
3. Research Objectives and methods
4. Results
5. Conclusion

1. INTRODUCTION

What is ESG Reporting?

ESG Reporting, also known as Sustainability Reporting, refers to the practice of companies and organizations disclosing information about their Environmental, Social, and Governance (ESG) performance.

This aspect focuses on a company's impact on the environment. It includes metrics such as carbon emissions, energy consumption, water usage, waste management, pollution levels, and efforts towards environmental sustainability and conservation.

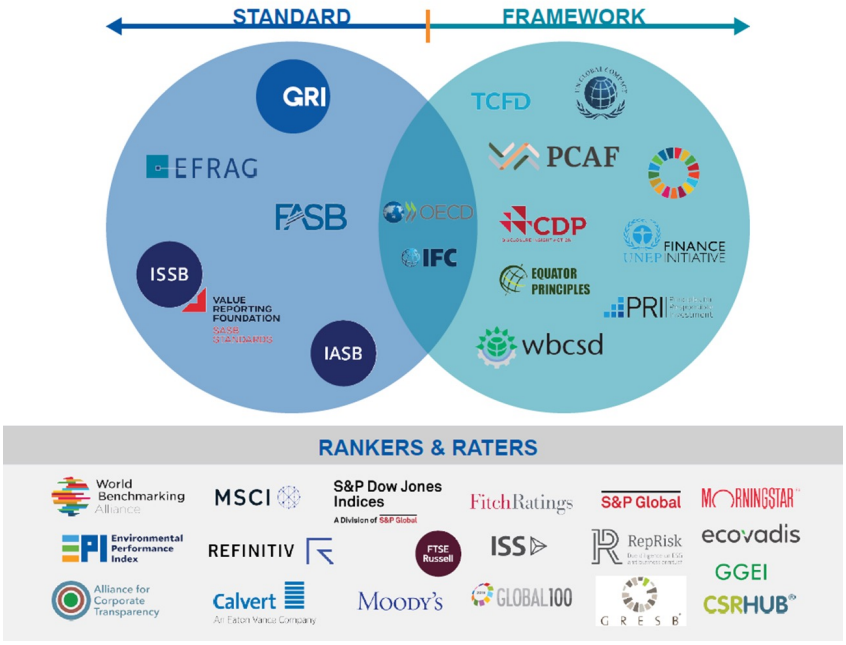
Social factors encompass how a company interacts with and affects society. This includes aspects such as labor practices, human rights, employee diversity and inclusion, community engagement, philanthropy, product safety, and supply chain management.

Governance pertains to the systems and processes that oversee the operations and decision-making within a company. This includes board composition, executive compensation, shareholder rights, ethical standards, risk management practices, regulatory compliance, and transparency.

Importance of ESG reporting

- ESG reporting fosters transparency
- It enhances accountability
- Helps manage risks effectively
- Builds investor confidence
- Creates competitive advantage
- Ensures regulatory compliance
- Drives long-term value
- Promotes sustainability
- Strengthens stakeholder trust
- Enhances brand reputation

Standards and Framework of ESG reporting



2. Background

- Many researchers emphasize the importance of disclosure, quality assurance and ESG reporting of the organization's own sustainable development reports (Irina Zenkina, 2023).
- Investors use ESG reporting to make effective asset allocation decisions (Koren Maas, Stefan Schaltegger, Nathalie Crutzen, 2016)
- But current ESG reporting still has significant challenges. However, current ESG reporting is still exposed to some major challenges. Such as data collection manual way, lack of transparency, listed companies are reluctant to share data with others, especially competitors (Wei Wu a, Yelin Fu a b, Zicheng Wang a, Xinlai Liu a, Yuxiang Niu a, Bing Li a, George Q. Huang a, 2022-10)

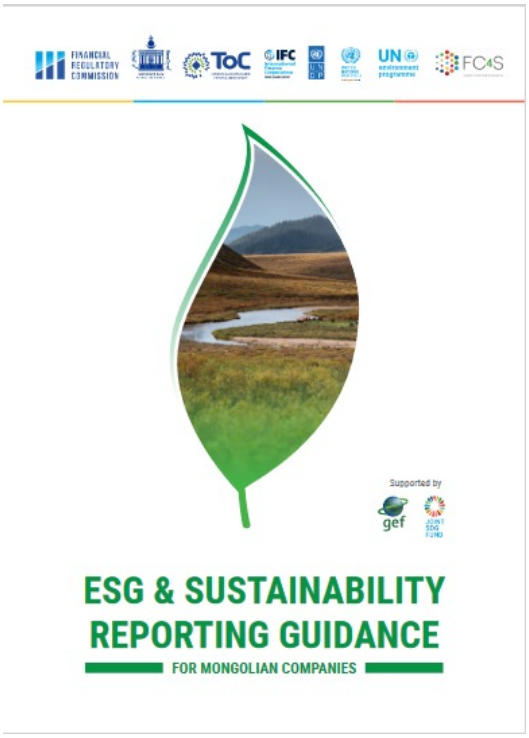
3. Research Objectives and methods

- This paper provides a brief overview of ESG reporting in Mongolia, focusing on the practices adopted by companies and the challenges they encounter.
- Within the framework of the study, methods of analysis and synthesis, detailing and generalization, comparison, abstraction, analogy approaches were applied.

4. Results

An Overview of Reporting in Mongolia

- FRC, MSE and other development partners released **"The ESG&Sustainability Reporting Guidance for Mongolian Companies"** in **August, 2022.** Introduction of the ESG disclosure and reporting requirements and guidance aims to bring Mongolian market practice in line with international standards and improve transparency and disclosure for the public, investors and other stakeholders.
- The guidance has identified **30 ESG indicators** that are considered essential or minimum to report in alignment with the recommendations of key global reporting frameworks. These indicators are identified in the following section as 'core' indicators. The indicators are also mapped against GRI, SDGs, SASB, TCFD, IFC, IFRS and other reporting standards. In addition to the 'core' or mandatory indicators, a set of optional indicators together with guidance on describing the management approach related to the reporting topic/issue is included.



An Overview of Reporting in Mongolia

As of May 2024, only 8 percent of all companies listed on the Mongolian Stock Exchange have publicly reported their ESG and Sustainability Reports for 2023. Of these companies, 78.5 percent prepared their reports according to the ESG & Sustainability Reporting Guidance. This indicates that the activity of ESG and sustainability reporting among joint-stock companies is weak. The disclosure of ESG core indicators was studied by companies that reported according to the "The ESG&Sustainability Reporting Guidance for Mongolian Companies".

MONGOLIAN
STOCK EXCHANGE

Sustainability Management System Indicators

	Indicator	Description	The percentage of companies disclosing that indicator
MS1.1	Senior management commitment	Sustainability commitment statement in place	90.9%
MS2.1	Sustainability policy and procedures	Sustainability policy with targets	100%
MS2.2		Set of sustainability procedures	18.2%
MS3.1	Governance structure	Dedicated committees responsible for sustainability	100%
MS3.2		Dedicated ESG/sustainability director(s) at the board level	100%
MS3.3		Dedicated ESG/sustainability manager(s) at the executive level	100.0%
MS3.4		Dedicated ESG/sustainability officer at the operational level	100%
MS3.5		Sustainability issues covered in board meetings	100%
MS4.1	Materiality assessment	Materiality process, assessment, and/or matrix	100%
MS5.1	Organizational capacity	Annual average hours of sustainability training per employee	81.8%
MS6.1	Monitoring	Sustainability included in the scope of audit committee and internal control functions	90.9%
MS7.1	Sustainabiliy reporting and verification	Disclosure of a sustainability report annually	100%
MS7.2		TCFD-aligned climate disclosure	90.9%
MS7.3		Sustainability data assured by an independent third-party	63.6%
MS8.1	Memberships	Participation in sustainability associations and advocacy organizations	90.9%

Environmental Indicators

Ref	Area	Indicator	The percentage of companies disclosing that indicator
E1.1	Energy	Total energy consumption	81.8%
E1.2		Electricity	90.9%
E1.3		Heat	90.9%
E1.4		Fuel	90.9%
E1.5		Non-Renewable energy	72.7%
E1.6		Renewable energy	72.7%
E2.1	GHG emissions	Emissions	81.8%
E2.2		Emissions reduction	54.5%
E2.3		Carbon offsetting	81.8%
E3.1	Climate change	Climate policy	100%
E3.2		Climate risk and opportunity assessment	100%
E3.3		Economic loss	72.7%
E3.4		Climate investment	63.6%
E3.5		Prevention/ adaptation to climate change	100%
E4.1	Water	Water used	90.9%
E4.2		Water saved	72.7%
E4.3		Water reuse	45.5%
E4.4		Water discharged	54.5%
E5.1	Waste	Waste discharged	54.5%
E5.2		Waste recycled	54.5%
E5.3		Hazardous waste	72.7%
E6.1	Biodiversity	Landscape planning, design greenery	72.7%
E6.2		Wild plants and animals	54.5%
E6.3		Activities negatively affecting biodiversity- sensitivity	45.5%

Social Indicators

Ref	Area	Indicator	The percentage of companies disclosing that indicator
S1.1	Human capital development	Employee turnover	81.8%
S1.2		Jobs created	81.8%
S1.3		Training	81.8%
S2.1	Occupational, health and safety	OHS policy	72.7%
S2.2		Incidents	81.8%
S2.3		OHS training	90.9%
S2.4		Health programs	72.7%
S3.1	Equal opportunity	Gender policy	81.8%
S3.2		Anti-sexual harassment policy	90.9%
S3.3		Non-discrimination policy	90.9%
S3.4		Gender balance	81.8%
S3.5		Board level gender balance	90.9%
S3.6		C- level gender balance	90.9%
S3.7		Junior level gender balance	81.8%
S3.8		Gender pay gap	81.8%
S4.1	Access & inclusion	Disability policy	90.9%
S4.2		Employees with disability	81.8%
S4.3		Access to facilities	90.9%
S4.4		Fines	27.3%
S5.1	Community engagement & disclosure	Stakeholder engagement	90.9%
S5.2		Policy and process for social	81.8%
S5.3		Grievance policy	90.9%
S5.4		Disclosure to communities	90.9%
S5.5		Worker/community complaints	81.8%
S5.6		Community investment	72.7%
S6.1	Supply chain management	Procurement policy	90.9%
S6.2		Local procurement	81.8%
S6.3		Sustainable procurement share	54.5%

Governance Indicators

Ref	Area	Indicator	The percentage of companies disclosing that indicator
G1.1	Corporate governance policy	Corporate governance policy	72.7%
G1.2		Board independence	90.9%
G1.3		Treatment/ rights of minority shareholders	90.9%
G2.1	Corruption and ethics	Anti-corruption policy	90.9%
G3.1	Compliance	Compliance policy	90.9%
G3.2		Compliance program/procedures	81.8%

Potential Challenges

Adopting "The ESG&Sustainability Reporting Guidance for Mongolian Companies" is a critical step for Mongolian companies aiming to improve their ESG reporting. But there are some common challenges:

Limited awareness and expertise regarding ESG issues and reporting among businesses, particularly small and medium-sized enterprises (SMEs), pose another significant challenge. Many companies may lack the necessary knowledge and skills to produce meaningful ESG reports.

Data Availability and Quality: Challenges in collecting, analyzing, and reporting ESG data, particularly for environmental and social metrics, may arise due to limited data availability, reliability, and consistency.

Resource constraints are a considerable barrier to robust ESG reporting. Implementing comprehensive reporting processes requires significant time, financial investment, and dedicated personnel. Smaller companies, in particular, may struggle to allocate the necessary resources, leading to lower-quality reports or a reluctance to engage in ESG reporting altogether.

Capacity and Training: A lack of internal capacity, expertise, and training in ESG reporting methodologies and frameworks may pose challenges for companies aiming to adopt comprehensive reporting practices.

Stakeholder Engagement*:* Limited stakeholder engagement and dialogue on ESG issues may hinder companies' understanding of stakeholders' expectations and priorities, impacting the relevance and effectiveness of ESG reporting.

Integration with Business Strategy: Disconnects between ESG reporting and core business strategies, goals, and performance metrics may undermine the credibility and impact of reporting efforts.

5. Conclusion

- ESG reporting in Mongolia is at a critical juncture, reflecting both significant progress and notable challenges. The adoption of the "ESG & Sustainability Reporting Guidance for Mongolian Companies" in 2022 marks a vital step toward aligning Mongolia's business practices with international standards. However, the overall engagement remains low, with only 8 percent of companies listed on the Mongolian Stock Exchange publicly reporting their ESG and Sustainability Reports for 2023.
- The high disclosure rates in governance indicators and certain environmental and social aspects show a commitment to transparency and ethical practices among these companies. Yet, areas such as of sustainability procedures, sustainability data assured by an independent third party, biodiversity impacts, water reuse, fines and sustainable procurement share demonstrate room for improvement. The relatively low disclosure rates in these areas suggest a need for enhanced data collection and reporting mechanisms.
- The challenges faced by Mongolian companies in ESG reporting are multifaceted. Limited awareness and expertise, particularly among small and medium-sized enterprises (SMEs), hinder the production of meaningful ESG reports. Resource constraints, data availability and quality, and the need for greater internal capacity and training also pose significant barriers. Additionally, the integration of ESG considerations into core business strategies remains a challenge for many companies. Despite these challenges, there are opportunities for improvement.
- In conclusion, while ESG reporting in Mongolia faces several challenges, there are numerous opportunities to enhance practices and improve the quality of disclosures. By addressing these challenges through the adoption of best practices and leveraging available opportunities, Mongolian companies can better meet stakeholder expectations, manage risks, and contribute to sustainable development.

REFERENCES

1. Global Reporting Initiative Standards
2. Lakshminarayan, A., Herrera Gomez, A., Hellblom, M., & Sreenivas, S. (2022). Importance of ESG Reporting. Easy To Trust.
3. Rouen, E., Sachdeva, K., & Yoon, A. (2022). The Evolution of ESG Reports and the Role of Voluntary Standards. Harvard Business School.
4. Serafeim, George, 2022, Purpose and Profit: How Business Can Lift Up the World (HarperCollins Leadership).
5. Hadiqa Ahmad, M. Y. (2024). Environmental-, social-, and governance-related factors for business investment and sustainability: a scientometric review of global trends. *Environment, Development and Sustainability*, 26:2965–2987.
6. Diane So-Hyun Park, T. L.-C. (2024). *Implementation of Environment, Social,and Governance (ESG): Case of Korean Global Firms.* preprints.org.
7. Irina Zenkina. (2023). Ensuring the transparency of ESG reporting based on the development of its standardization. *E3S Web of Conferences 371, 05077*.
8. Koren Maas, Stefan Schaltegger, Nathalie Crutzen. (2016). Integrating corporate sustainability assessment, management accounting, control, and reporting. *Journal of Cleaner Production Volume 136, Part A*, 237-248.
9. Wei Wu a, Yelin Fu a b, Zicheng Wang a, Xinlai Liu a, Yuxiang Niu a, Bing Li a, George Q. Huang a. (2022-10). Consortium blockchain-enabled smart ESG reporting platform with token-based incentives for corporate crowdsensing. *Computer& Industrial Engineering Volume 172, Part A*, 108456.
10. Financial Regulatory Commission (2022).ESG & Sustainability Reporting Guidance for Mongolian Companies.

THANK YOU FOR YOUR ATTENTION

THE IMPACT OF INTERNAL AND EXTERNAL FACTORS ON HOUSING CHOICES OF MIDDLE AGED FAMILIES IN MONGOLIAN

Internatinal University of Ulaanbaatar,
U. Enkhtuyagerel, master, senior teacher.

Interduction

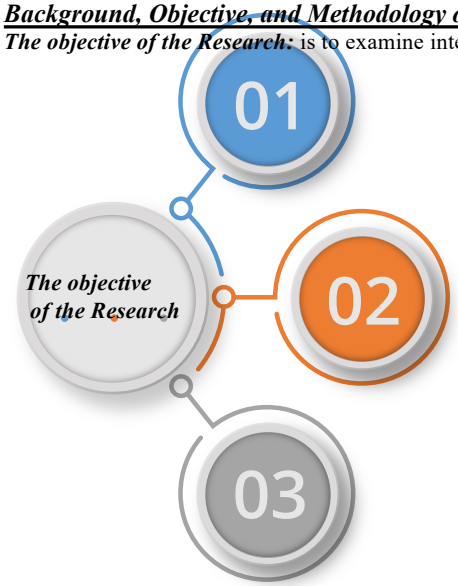
Housing market development contributes significantly to the financial market and economic development of the country. Supply, quality, and financing of housing are indicators that express the development of the country. The development of the housing sector has also been renewed and advanced by global development trends.

The Government of Mongolia developed a long-term development policy-Vision-2050 to fit the needs of consumers and improve the safe living conditions of the people. In this policy document, there is a stage of improving accessibility of comfortable housing fit to the needs and sets a goal of providing qualitative, comfortable, and affordable housing that meets the family's needs.

As the interest in living in settled areas increased, people migrated massively and settled in one place densely to build towns and settlements, thus the need for housing increased accordingly, people likely to choose housing based on its external and internal comfort.

Background, Objective, and Methodology of the Research:

The objective of the Research: is to examine internal and external factors that impact housing choice.



objective 01

To determine families' life cycles based on consumer behavior, purchasing decision theory, and methodology;

objective 02

Impact of internal factors on choosing housing;

objective 03

Study and describe the impact of external factors on choosing housing;

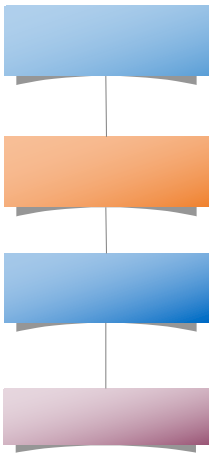
№	Scientist	Year	Studied factors
1	Wheaton	1990	Studied some major changes in housing demographics, the purchase of housing is explained about household purchasing power.
2	Cronin	1982	Studied the housing market about demographic factors.
3	Hood	1999	
4	Koklic	2001	
5	Rossi	1955	Changes in the demographic factors of the household are the major factors in the decision and choice of housing purchase, gender, age, marital status, profession, education of the head of a household, number of family members, household structure, household income, and expenditure, knowledge on the housing market, and residence area.
6	Galvez and Kleit	2011	
7	Rashid	2012	
8	Mateja Kos Koklic and Irena Vida	2009	In their article "Strategic Household Purchase Consumer House Buying Behavior" wrote: "In addition to the idiosyncratic characteristics of the customer, his/her personal situation and environmental factors, the role of feelings, experience, subconscious factors, needs, and goals should be taken into account to better understand this kind of decision making."
9	Sabagh	1969	He proves that housing demand can be predicted based on family life cycle, marital status, income, lifestyle, and socio-demographic factors.
10	Ritchey	1984	
11	Musterd	1989	
12	H A Morrow-Jones	1974-1983	He studied the perception of the housing life cycle and patterns of homeownership in the United States and concluded that young people first live in rental housing and then own the house.
13	Philip Kotler	2012	He concluded that a buyer's decisions are significantly influenced by their personal characteristics, which include age, life cycle stage, occupation, economic situation, lifestyle, personality, and self-concept.

State of study of the internal and external factors that impact the consumer's housing preferences

№	Scientist	Year	Studied factors
1	Dale-Johnson and Phillips	1984	Living room, kitchen, bedroom, bathroom, neighborhood layout
2	Greene and Ortu´zar	2002	Housing area, age, materials, and area
3	Bitter, Mulligan and Dall'erba	2007	Square meter area per person, room per person, house design, interior design, price, room layout, ventilation
4	Bhatti & Church, Greene & Ortuzar, Opoku & Abdul-Muhmin Pasha & Butt	2004 2002 2010 1996	The garden area and the type of public area (i.e., swimming pool, lounge) and garden
5	Arimah Cheshire & Sheppard Fierro et al Pasha & Butt	1997 1995 2009 1996	Environmental pollution, the concentration of hazards, air factors, pollution, open space, greenery, security, cultural features of the environment, street lighting, noise, pollution, rainwater drainage, sidewalks, roads, pavement width, orientation, street layout
6	Fierro et al Greene & Ortuzar Yusuf & Resosudarmo Zabel & Kiel	2009 2002 2009 2000	Facility: downtown, main street, school, kindergarten, health center, hospital, shopping mall, restaurant, sports facility, library, social center
7	D.Gan-Ochir	2012	Nearness to the district, bus station, transportation network, environmental safety, noise, comfort, nearness to the city center, large trade center, trade and service points, air pollution

Internal factors	External factors of housing		
	External design and spacing	Environmental factors	Locational factors
Housing area **Housing age** **Housing material** **Residential area** **Living room** **Kitchen** **Bedroom** **Bathroom** **Fence around** **Does it have a balcony?** **Style and general condition of the housing**	Appearance Type and quality of covering Outdoor garden The role of parks Roof Outer wall Outdoor floor Outdoor space A unique interior design solution for housing A pool and lounge	Environmental pollution Danger focus Air pollution Open space Greenery Security Cultural feature Street lighting Outside noise Pollution Rainwater drainage Pathway Wide sidewalk and exit Street layout	Таны гэр орон хамаатан садантайгаа ойрхон эсэх Close to school and kindergarten Close to hospital and health center Close to trade centers Close to supermarket With sports equipment, a sport hall, and basketball court Whether it is close to the theatre and entertainment places? Whether it is close to the bus station Whether it is close to other public services Whether it is close to the city center? Whether your home is close to your relatives

Outcomes:



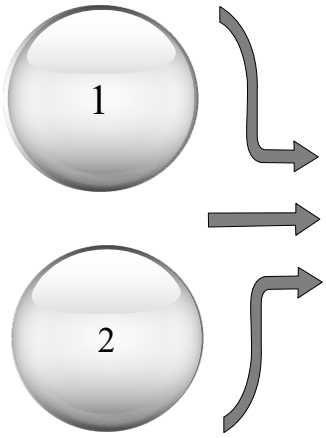
The issue of developing a housing finance system is one of the crucial goals of the country to provide the population with housing and to improve their living conditions.

According to an order of the Minister of Roads, Transportation, Construction, and Urban Development, the income classification of households was set depending on the housing area and the number of rooms.

In recent years, the number of buildings and residential areas has dramatically increased, and in 2021, 17,478 residential buildings were going into construction.

Previous studies:

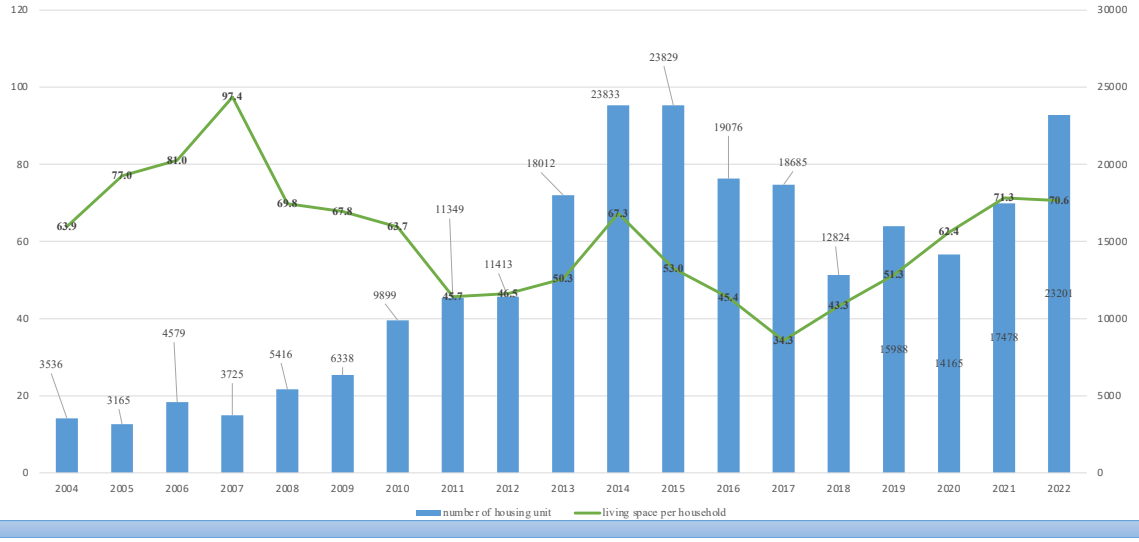
The previous studies were studied in two areas as follows:



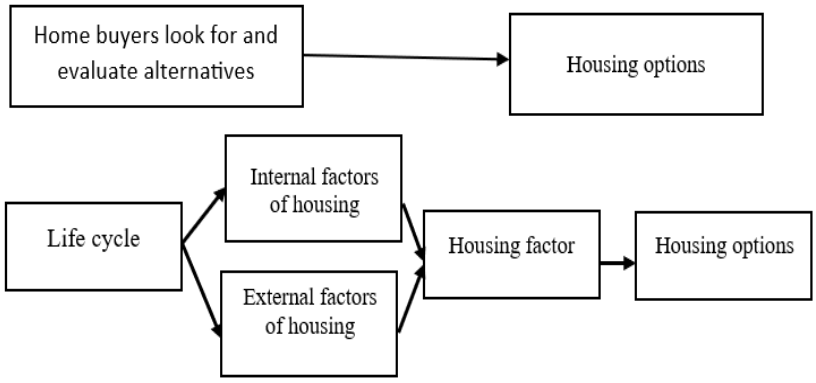
The impact of life cycles on consumers' housing preferences;

Research the external and internal factors in housing preferences;

Residential buildinng, number of housing unit, living space per houshold



Primary research was carried out according to the following model



A value of Keizer (KMO)=0.86 of the questionnaire that determines the external and internal factors of the user indicates that the sample is sufficient, and the value of Cronbach's alpha=0.89 indicates that the questionnaires are reliable. Internal factors influence 89% of consumer purchases.

To prove that the choice of the current apartment was made taking into consideration external and internal factors in the sample survey, the following hypothesis was made.

H_0; The choice was made based on these factors in the current housing.

H_1; The choice was not made based on these factors in the current housing.

Middle aged family internal and external factors of current housing /Single factor ANOVA analysis/

		SS	df	MS	F stat	P
	Internal factors					
1	Kitchen	0.598	2	.298	**2.959**	**0.053***
2	Living room	2.998	2	1.499	**6.130**	**0.002****
3	Bedroom	0.477	2	.239	**3.045**	**0.048***
4	Bathroom	1.419	2	.710	**2.854**	**0.059***
	Environmental factors					
1	Air pollution	1.845	2	.923	**4.000**	**0.019****
2	Outside noise	1.745	2	.873	**3.519**	**0.030****
3	Pollution	2.066	2	1.033	**4.920**	**0.08*****
	Locational factors					
1	Close to school and kindergarten	3.247	2	1.624	**8.180**	**0.000*****
2	Close working	1.216	2	.608	**2.448**	**0.088****
3	Close to hospital and health center	2.252	2	1.128	**5.373**	**0.005****
4	Close to trade centers	.723	2	.362	**2.589**	**0.076****

An analysis of internel and externel factors that middle aged families consider in their next housing choice (logistic regression)

№	Variable	Coff	Standart erorr	Z	Sig
Internel factors 44м²					
2	Living room	0.70	0.375	1.88	0.060**
3	Bedroom	0.853	0.491	1.74	0.082**
External design and spacing					
	A unique interior design solution for housing	0.674	0.388	1.73	0.083**
	A pool and lounge	-1.414	0.508	-2.78	0.005***
Environmental factors					
	Outside noise	0.087	0.063	1.37	0.170*
	Wide sidewalk and exit	0.856	0.462	1.85	0.064**
	Street layout	-1.081	0.485	-2.23	0.026***
Locational factors					
	Close to trade centers	-0.977	0.488	-2.00	0.045**

An analysis of internel and externel factors that middle aged families consider in their next housing choice (logistic regression)

№	Variable	Coff	Standart erorr	Z	Sig
Internel factors 45-87 m²					
1	Living room	0.719	0.371	1.93	0.053**
2	Bedroom	0.749	0.372	2.01	0.044**
Environmental factors					
1	Outside noise	0.111	0.068	1.63	0.103*
2	Pollution	0.174	0.067	2.58	0.010**
3	Pathway	0.420	0.231	1.81	0.070**
4	Wide sidewalk and exit	0.417	0.213	1.96	0.070**
Locational factors					
1	Bus station	0.253	0.186	1.98	0.068**

An analysis of internel and externel factors that middle aged families consider in their next housing choice (logistic regression)

№	Variable	Coff	Standart erorr	Z	Sig
Internel factors mora than 88 square meters					
1	Balcony	0.527	0.262	2.01	0.045***
Environmental factors					
1	A pool and lounge	0.689	0.260	2.64	0.008***
Environmental factors					
1	Air pollution	-0 392	0 197	1.98	0.047***
2	Street layout	0.344	0.204	1.68	0.093**
3	Wide sidewalk and exit	0.309	0.215	1.78	0.083**
Locational factors					
1	Close to hospital and health center	2.852	1.300	2.19	0.028***
2	Close to the theatre and entertainment places	-2.161	1.11	-1.94	0.053**
3	Bus station	1.40	0.841	1.67	0.095**

Conclusion

To summarize this study, which solely aims to determine the impact of internal and external factors on the choice and purchase of housing for middle-income families:

As the interest in living in settled areas increased, people migrated massively and settled in one place densely to build towns and settlements, thus the need for housing increased accordingly, people likely to choose housing based on its external and internal comfort.

1. Out of the internal factors of housing, large rooms and kitchen balconies were regarded as important indicators.
2. Survey participants have answered that the external design factor is unsatisfied in their current housing so, they make choices taking into account greenery, design, swimming pool, and outdoor space.
3. Out of natural factors, noise, soil pollution, street layout, walkway, air pollution, and road light are regarded as important.

Out of location factors, bus stations, hospitals, and health centers are considered as important. As a result of the survey, middle-aged families' preference is to stay away from noise. And they would choose housing far from theaters, entertainment places, and trade centers.

THANK YOU

A study to identify factors affecting the sustainable performance of human resource in the university

Prof. Ailtgui Khandmaa
Associate Prof. Terbish Myagmarsuren
2024-05-31

Objective: to examine factors affecting the sustainable performance of human resource at some universities of Mongolia

Sustainable performance is defined as employees who are thriving, engaged, and demonstrate better overall performance, less burnout, and more commitment and job satisfaction.

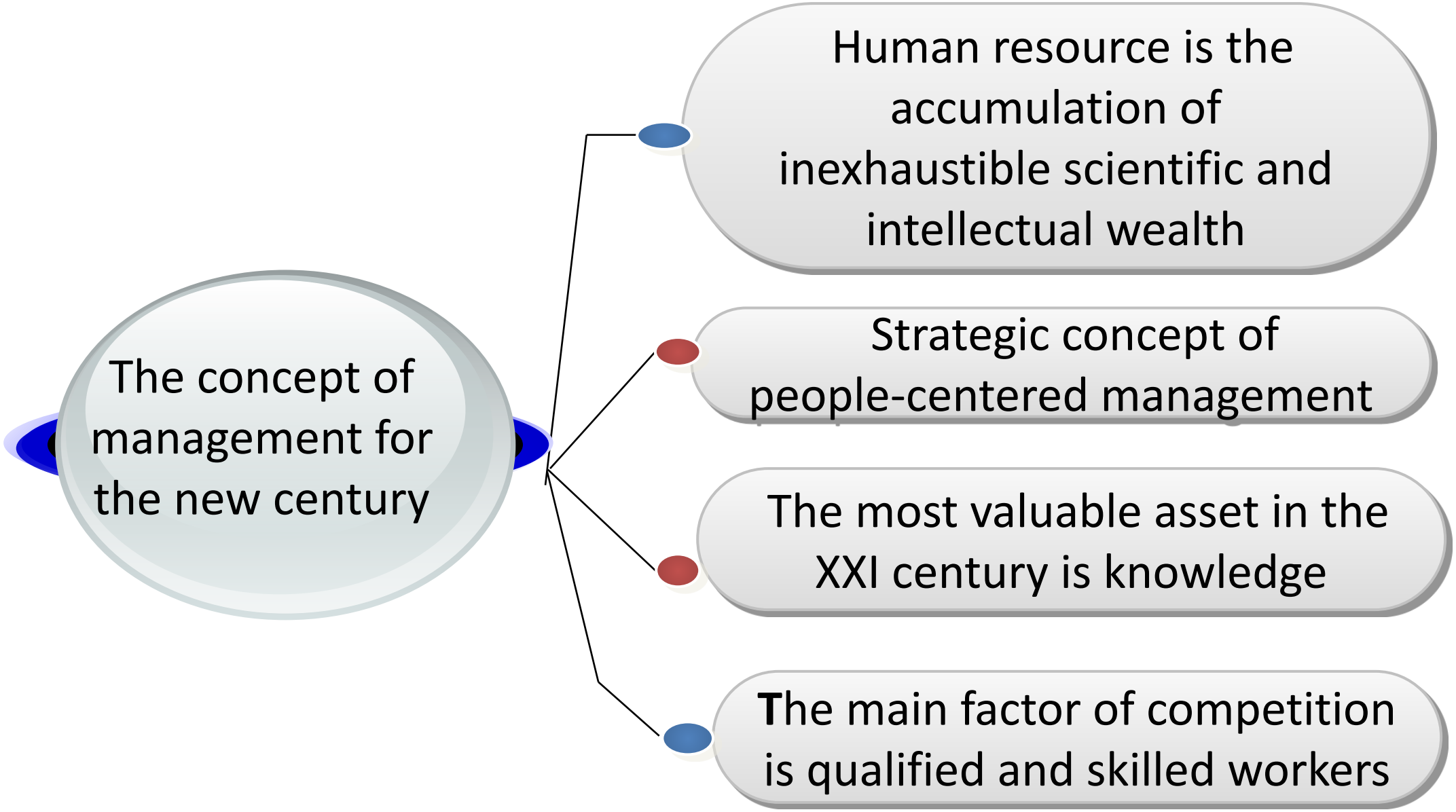
Gretchen M. Spreitzer, Christine L. Porath (2012)

Sustainable performance refers to achieving long-term efficacy by optimizing resources and simultaneously achieving economic, social, and environmental objectives.

Flavia Fechete, Anisor Nedelcu (2019)

Sustainable performance of a practice as the combination of its economic, social and environmental performances

Emilie Chardine-Baumann, Valerie Botta-Genoulaz (2014)


The concept of management for the new century
Human resource is the accumulation of inexhaustible scientific and intellectual wealth
Strategic concept of people-centered management
The most valuable asset in the XXI century is knowledge
The main factor of competition is qualified and skilled workers

Important points about management in the new century

- Hire workers with a good attitude and then constantly develop them in the workplace , as a result they are employed for a long period of time

- Hire qualified workers for a suitable job and provide them suitable conditions and management support , as a result their future work attitudes and stable working conditions will improve and the organization's performance will have a positive impact on the economy

"The sustainable performance" is used together with the concept of "quitting job".

Quitting a job = turnover intention

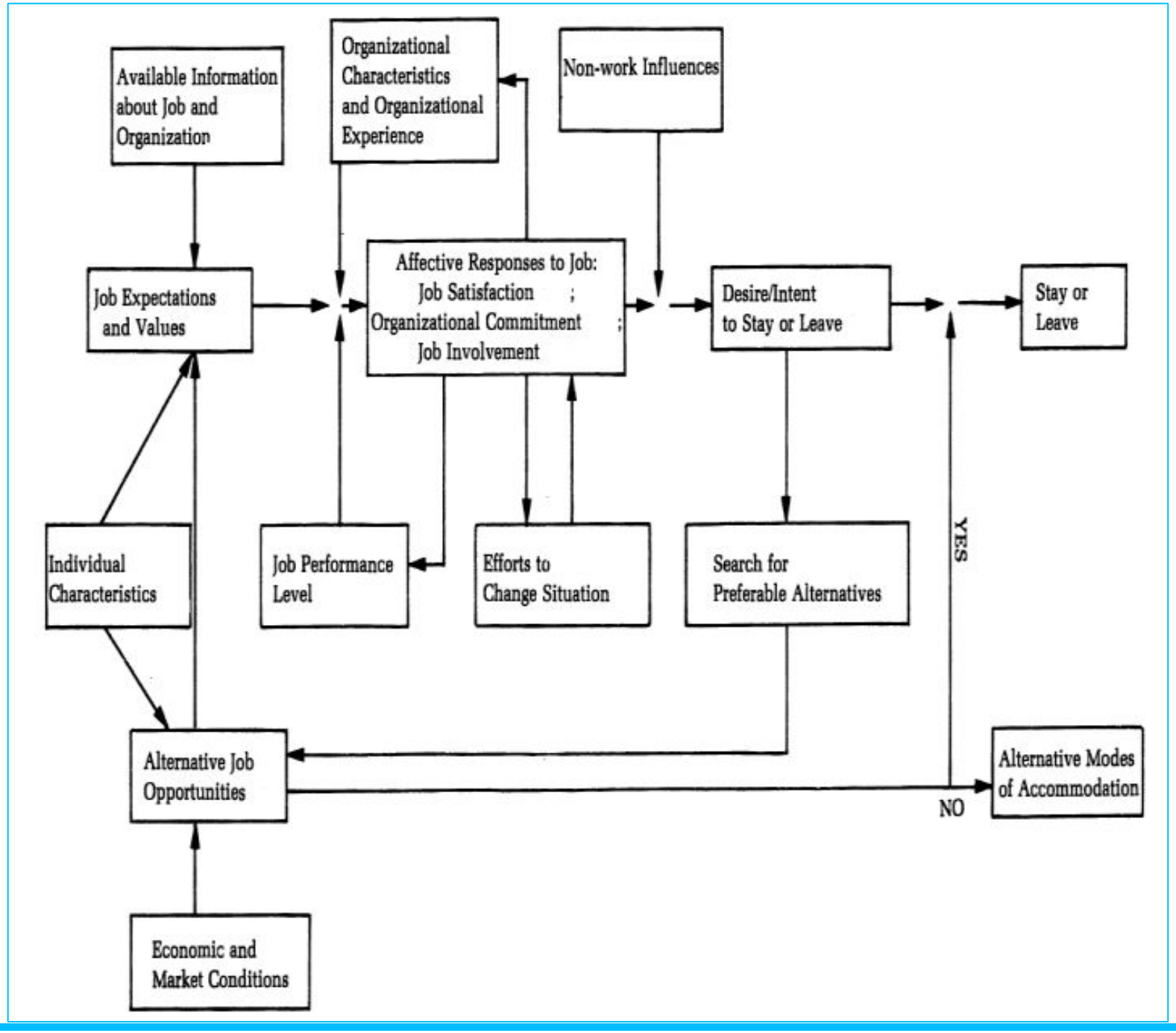
The turnover intention is defined as the employee's behaviour to quit from their current job.

(Ahmad Rasmi AlBattat, Ahmad Puad Mat Som, Abdulah Saleh Helaltat, 2013)

The most classic model was developed by Mobley (1977), tenure and main factors leading to the intention to leave the job was studied by Mobley, Griffith, Hand, and Maglino (1979).

Mobley's (1977) Model of the Turnover Process

March and Simon model (1958)
(Source: Adapted from Ramesh (2007))



Steers and Mowday turnover Model(1981)
(Source: Adapted from Ramesh (2012))

Factors affecting sustainable operation of employee

- Personality-related factors
- Work and profession-related factors
- Factors related to organization
- Factors related to local and social resources

Blok,V., Wesselink, R., Studynka, O and Kemp, R. (2015)

Factors affecting in sustainable performance of human resource in the university

1. Salary and performance appraisal
2. Organizational regulations
3. Manager's approach and attitude
4. Colleague relation
5. Location of the organization and its environment
6. University lecturer skills
7. Political situation
8. Job demand
9. Code of ethical conduct for university lecturers

based on the concept of Mobley's Model
and other models

Figure1. Affecting factors of quitting job

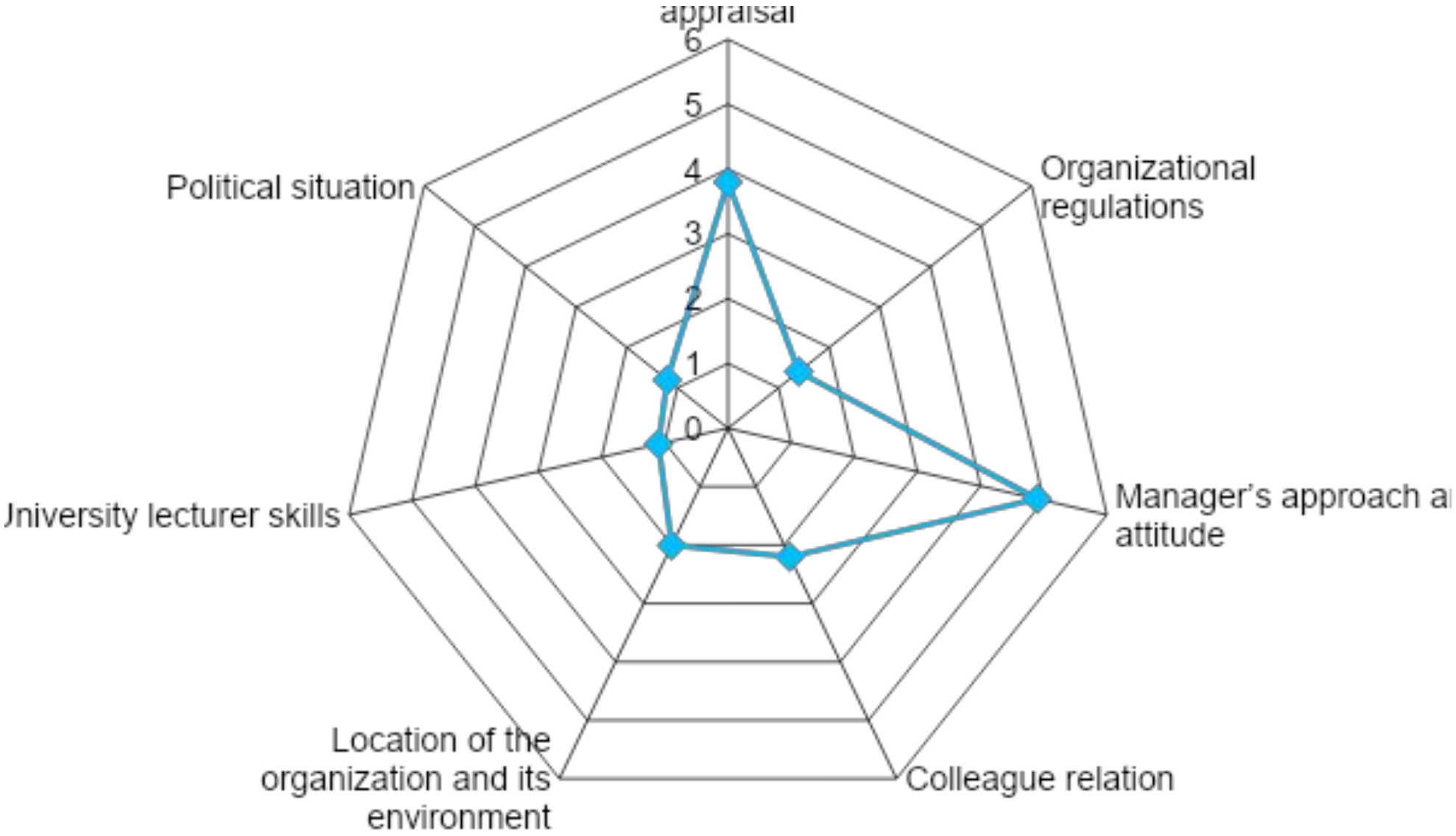
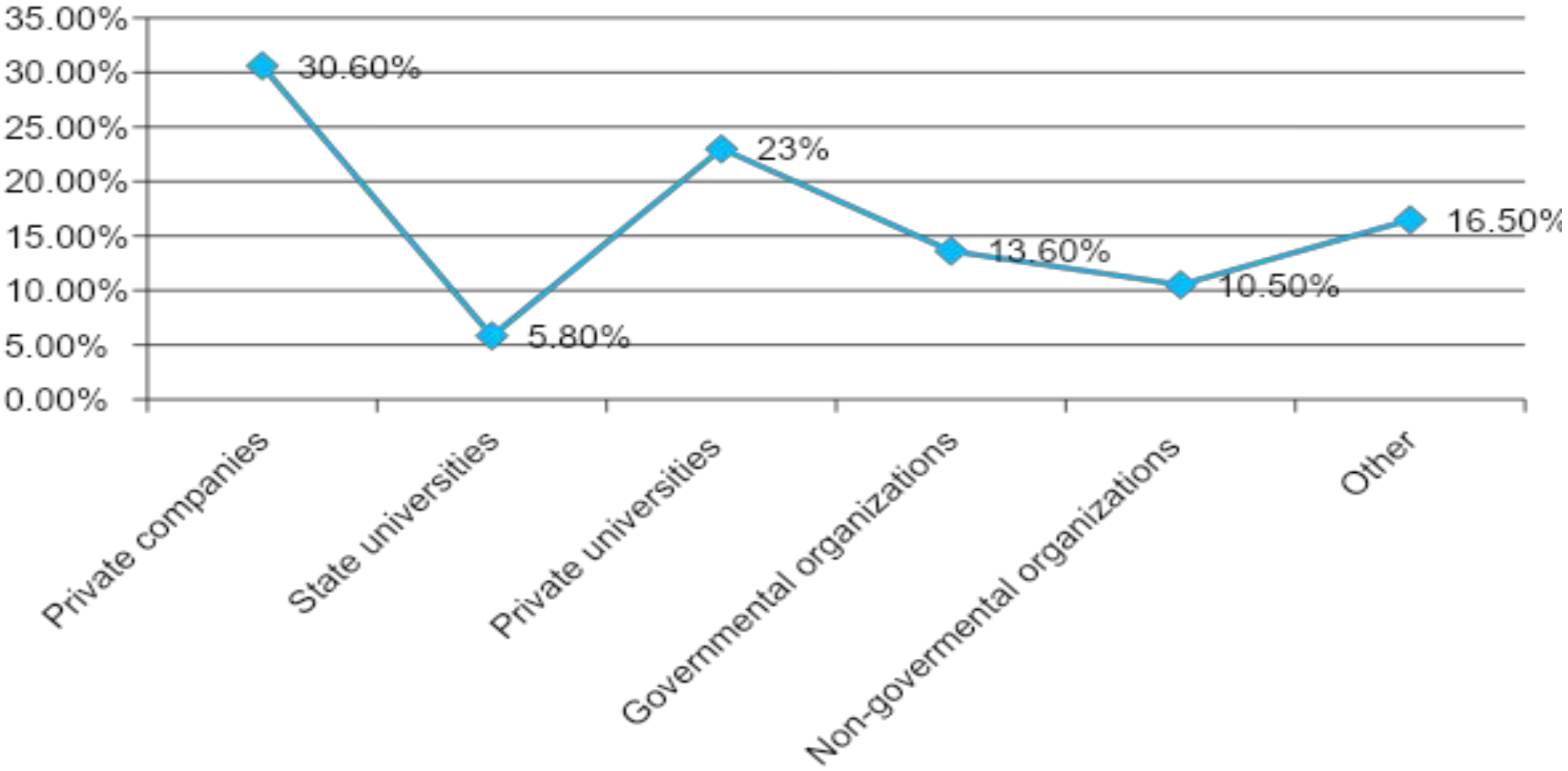


Figure 2. Organizations where the teachers quitted their previous work



The opportunities of improving the sustainable operation of the human resources of the organization

1. Management communication skills
2. Training and development
3. Discount
4. Rewards
5. Providing services such as medical services, etc.

Conclusion

- The development of the university is directly related to the sustainable performance of skilled teachers.
- The sustainable performance of scholars and professors is directly related to management ability.
- The basis of the development of the university can be seen from the level of development of scholars and teachers.

Therefore, it is time for governmental organizations and universities to pay attention to the fact that there will be a shortage of scholars and professors if they do not find ways to sustainably employ university teachers.

Thank you.

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