



Proposal of Artificial Intelligence Convergence Curriculum for Upskilling of Financial Manpower : Focusing on Private Bankers and Robo-Advisors

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Received: February 15, 2022. Revised: March 08, 2022. Accepted: March 15, 2022.

Abstract

Purpose – As new technologies that have led the 4th industrial revolution spread after the COVID-19 pandemic, the business crisis of existing financial institutions and the threat of employee jobs are growing, especially in the financial sector. The purpose of this study is to propose a human-technology convergence curriculum for creating high value-added in financial institutions and upskilling financial manpower.

Research design, data, and methodology – In this study, a curriculum was designed to strengthen job competency for Private Bankers, high-quality employees of a bank dealing with high-net-worth owners. The focus of the design is that learners acquire skills to use robo-advisors as a tool and supplement artificial intelligence ethics.

Result – The curriculum is organized into a total of 16 classes, and the main contents are changes in the financial environment and financial consumers, the core technology of robo-advisors and AI ethics, and establishment and evaluation of hyper-personalized asset management strategies using robo-advisors. To achieve the educational goal, two evaluations are performed to derive individual tasks and team project results.

Conclusion – Human-centered upskilling convergence education will contribute to improving employee value and expanding corporate high value-added business areas by utilizing new technologies as tools. It is expected that the development and application of convergence curriculum in various fields will continue to be advanced in the future.

Keywords: Convergence education, Retraining, Upskilling, Fintech, AI, Robo-advisor, Private Banker

JEL Classification Code: G29, M53, O33

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1. Introduction

New technologies that have led the 4th industrial revolution declared in 2016 are gradually infiltrating our lives, and the COVID-19 pandemic in 2020 further accelerated the commercialization of non-face-to-face technologies. In particular, the financial sector has reached the stage of popularization since the introduction of innovative services that combine finance and technology, called Fintech. As not only traditional financial companies but also tech companies enter the financial market, competition between Fintech and Techfin is heating up. The Bank of Korea predicted that the phenomenon of unbundling of the financial industry by function will intensify as non-financial companies play the role of existing financial companies. In addition, it was expected that the degree of replacement would be low in the order of payment and remittance, asset management, deposits and loans, and virtual currency by the financial service sector. These changes are approaching as a business crisis for existing financial companies and a threat to jobs for employees.

The countermeasures of financial companies are digital innovation based on new technologies such as artificial intelligence (hereinafter 'AI'), big data, blockchain and the training of digital experts. However, while the demand for recruiting IT professionals in each industry including the financial sector is increasing, the supply is insufficient. Accordingly, each company began to directly cultivate professional manpower, and upskilling and reskilling, which are retraining (Hereinafter, 'reeducation' is included) measures for existing employees, are becoming major topics. In particular, the financial field is no exception to the debate about whether AI will replace human jobs, and the robo-advisor, a representative financial service using AI, is a remarkable technology as it erodes the unique job of traditional human advisors. However, for financial companies, it is an opportunity factor for robo-advisors to create new customers and expand the market, but as the market enters maturity and competition intensifies, it is expected to become less attractive due to falling profitability and slowing new customer growth. Therefore, in this study, a convergence curriculum for creating high value-added for financial institutions and strengthening employees' job capabilities is proposed, focusing on private bankers and robo-advisor.





The composition of this study is as follows. Chapter 2 examines related research on robo-advisors and vocational retraining, and Chapter 3 explains curriculum design. Chapter 4 presents the curriculum, and Chapter 5 describes the significance and limitations of this study.

2. Literature Review

2.1. Understanding Robo-Advisors

A.T. Kearney (2015) presented the evolution of the wealth management service model from the traditional human advisor to the current robo-advisor. In the early days, traditional advisors have provided holistic advisory services (asset/liabilities, cash flow, savings plan, tax/accounting, etc.) individuals with high-net-worth. However, robo-advisor, which was born with the development of big data analysis and AI technology, provides an automated investment advisory service that minimizes human intervention and is spreading mainly among wealthy people with low fees (Lee, 2016).

Table 1: Evolution of Wealth Management Service Models

	Traditional Advisor	Discount Brokerages	Online Investment Platforms	Robo-advisor Model
Interaction				
Service	Dedicated advisor	Dedicated advisor	Limited to no human interaction	Fully digital (if desired)
Offering	Holistic advice	Portfolio management + advisory	Transactional investment	Investment management +

			management + minimal advisory	automated diversification
Target customers	Ultra-high net worth and high net worth	High net worth & mass affluent	Across wealth tiers	Mainly mass affluent than others
Pricing	HIGH	MEDIUM	LOW	LOW

Source: A.T. Kearney (2015, June).

Robo-advisor (also spelled robo-advisers, 'RA' for short) is a compound word of robots and investment experts, and refers to an online asset management service that manages portfolios through mobile devices or PCs instead of human private bankers through advanced algorithms and big data (Naver knowledge Encyclopedia). Robo-advisors' service types are largely divided into four types, as shown in [Table 2], depending on whether customers and advisory personnel participate in the property management process. The United States, which is leading the robo-advisor service, has developed around a four-stage service in which robo-advisor directly manage customer assets without human intervention (Financial Services Commission, 2019). In Korea, robo-advisors are prohibited from providing direct advice and entrustment (steps 3 and 4), but the market is expected to become more active in 2019 as non-face-to-face discretionary contract regulations are eased.

Table 2: Classification of Service Types using Robo-advisors

Investor Utilization	Customer (advisory type)	Financial Company (discretionary type)
Utilize RA in Back Office	<Step 1> Advisors provide advice to customers using the RA's asset allocation results	<Step 2> Direct management by management personnel using the results of RA's asset allocation
RA service in front office	<Step 3> RA advises clients on asset allocation results without human intervention	<Step 4> RA directly manages customer assets without human intervention

Source: Financial Services Commission (2016, March).

As shown in [Table 3], Robo-advisors' service procedure is conducted by Customer analysis → Asset allocation → Portfolio selection → Transaction execution → Portfolio rebalance, and is a business model that minimizes human intervention to reduce costs.

Table 3: Robo-advisor Asset Management Process

1. Customer analysis	2. Asset allocation	3. Portfolio selection	4. Transaction execution	5. Portfolio rebalance
Analysis of investor risk propensity and investment purpose	Determination of investment proportion based on investor analysis	Recommendation of optimal financial products by asset class	Execution of investment recommended by RA (automatic or investor)	Market monitoring, portfolio automatic adjustment

Source: Financial Services Commission (2016, August).

Meanwhile, Choi and Ryu (2018) argued that robo-advisor companies need to actively utilize hybrid robo-advisors to secure investors and consumers who are not satisfied with the separate services provided by pure robo-advisors and human investment experts, respectively. The case of the US market reorganized around hybrid robo-advisors supports that the combination of humans and technology is more competitive. In addition, they presented expanded classification criteria for hybrid robo-advisors based on existing research, and they largely divided into portfolio management-oriented types and advice-oriented types. For example, a portfolio management-oriented type is provided to customers who have doubts about the reliability of robo-advisors, and an advice-oriented type is provided to customers with emotional advice or complex financial situations. It is meaningful in that it proposes to provide

customized services. In line with the evolution of the robo-advisor market in Korea, attempts to converge human-advisor and robo-advisor are expected to expand, and it is necessary to lay the foundation for vocational retraining to strengthen human competitiveness and foster talent.

2.2. Skill Gap and Vocational retraining

The World Economic Forum (WEF) predicted in 'The Future of Jobs Report 2020' that changes in the division of labor between humans and machines will eliminate about 85 million jobs by 2025, creating 97 million new jobs more suitable for the new division of labor. In addition, as the skills required throughout the job change over the next five years, the skill gap continues to increase, and retraining for effective manpower conversion is expected to increase. The phenomenon that the demand for manpower with digital capabilities increases but the competence of members cannot keep up with the pace of change is called 'Skill gap', and retraining employees as the most realistic and effective way to resolve the skill gap is drawing attention. Retraining methods can be divided into reskilling and upskilling, where reskilling is to learn skills to perform new tasks, and upskilling is to improve current work skills. The examples are as follows.

- Since 2017, the Singapore Development Bank (DBS) has operated a Professional Conversion Programme (PCP, AI-based learning tools, available 24 hours a day), providing training opportunities for employees to acquire new skills and knowledge, and in the process, more than 500 call center employees have successfully managed 13 new jobs (social media managers, customer experience designers, content creators, etc.) (KB Financial Group Management Research Center., 2020).
- In 2019, Amazon, the world's largest e-commerce company, decided to invest \$700 million in retraining its employees. Vocational training will be conducted for 100,000 people by 2025, and programs will be provided free of charge to help employees move to high-end jobs in-house or find new careers (Joe, 2019).
- Yahoo, Japan, announced in 2021 a retraining policy to make all 8,000 employees talented in the high-tech IT field, including AI, by 2023. Through this, the company plans to create an in-house environment that can create new services or improve work efficiency across the company and foster talent in areas with high value-added. The IT talent to be fostered is data scientists who build algorithms, data analysts who use algorithms for services or in-house work, and human resources who use AI in practice (Kim, 2021).
- In Korea in 2019, the Financial Services Commission announced a plan to cooperate with training institutions, universities, and local governments in the financial sector to reeducate employees of financial institutions as a 'response to changes in job structure in the financial sector'. As an example of retraining, Shinhan Bank opened a contract department (Digital Finance Engineering, etc.) with the Graduate School of Korea University, and after obtaining a master's degree, branch managers work in digital-related departments such as the Global Digital Team and Blockchain Lab. In addition, degree programs (digital MBA) and non-degree programs (digital expert course) were opened through a tripartite agreement between the Financial Services Commission, Seoul and the Graduate School of the Korea Advanced Institute of Science and Technology to foster experts in both fields of finance and IT (Financial Services Commission, 2019).
- In Korea in 2020, the Ministry of Education announced a plan to reeducate 5,000 incumbent teachers as AI professional teachers through a master's degree course at the Graduate School of Education for five years. This course is operated only as a retraining course for incumbent teachers, and various subjects such as understanding AI, educational use of AI, convergence of AI and curriculum, and instructional design using AI are opened and operated. It is expected that trained teachers will play a leading role in innovation in future classroom instruction (Jung, 2020).

As such, it is continuously investing in strengthening employee competitiveness through upskilling and reskilling in various fields around the world, and is expected to expand further in the future.

Meanwhile, Rim, Shin, and Lee (2020) defined 'AI convergence talent' as manpower that creates new technologies, products, and services by combining AI technology with existing major skills or areas of possession, and argued the importance of operating AI education and training programs. Baek (2019) classified the curriculum roadmap into early-stage, basic, practical, and applied according to the level of learning to create a convergence major of AI and finance, and proposed practical subjects as shown in [Table 4].

The title of the case subject is 'Understanding AI and Stock Investment', and it is set as an overview of learning to understand knowledge and technology essential in an era where new technologies, including robo-advisors, have formed a new financial paradigm. Looking at the lecture plan, the theoretical contents of AI and stock analysis are learned in the 1st to 8th sessions, investment practice and trading are practiced in the 9th to 15th sessions, and task

presentation and team projects are conducted. This study is meaningful in that it proposes a case of outline curriculum opening as the first step in creating a convergence major in AI and finance between departments by linking AI knowledge with finance and insurance majors.

Table 4: Overview of 'Understanding AI and Stock Investment'

No.	Topic	No.	Topic
1	AI concept and application.	9	Technical analysis of stocks (1)
2	AI and finance 4.0.	10	Technical analysis of stocks (2)
3	AI and algorithms.	11	Analysis and investment practice of domestic stocks.
4	AI and learning training.	12	Analysis of overseas stocks and investment practices.
5	Index status analysis.	13	Trading systems and algorithms.
6	Basic stock analysis (1)	14	AI-based trading.
7	Basic stock analysis (2)	15	Final examination
8	Midterm examination		

3. Methodology

3.1. The Design Direction of the Curriculum

Private Banker (also spelled private-bankers, 'PB' for short) of a bank is professional manpower who utilizes comprehensive financial knowledge and professional counseling techniques for high-net-wealth people. According to the job classification of the National Competency Standards (NCS), 'PB (Private Banker) sales' is to provide comprehensive and systematic asset management services that meet the needs of customers with a certain amount of wealth or more by identifying financial and non-financial needs. The role of Private Banker is a total solution provider for a better life for customers, a financial advisor and a personal advisor based on long-term relationships with customers. PB also serves as a portfolio manager who comprehensively manages all assets of a customer, and as a customized service provider tailored to the needs of the customer rather than a uniform service.

In Korea, private banking customers entrusted about 143.5 trillion won to the four major commercial banks as of the end of June 2021, and the number of private banking customers was about 70.1 million (Kim, 2021). Major commercial banks are competitively strengthening their Wealth Management (WM) business to diversify their profit structure by increasing non-interest income such as commissions through asset management of high-net-worth owners and securing continuous customers through a succession of wealth. It is busy providing wealth management services that combine the needs of individuals and companies, such as opening specialized stores for high-net-worth individuals and deploying specialized Private Bankers, corporate owner asset management, and family business succession consulting (Lee, 2021). Meanwhile, Shinhan Bank launched 'SOL PB', a mobile service exclusively for high-net-worth customers who transacted through the Shinhan PWM Center in April 2021. 'SOL PB' is a service that smoothly provides differentiated asset management services to customers who are unable to visit the PWM Center due to COVID-19, making it easy to check the overall status and yield trends of operating assets and receive optimal portfolio proposals. A Shinhan Bank official said that it plans to improve customer convenience through continuous service advancement (Kim, 2021). According to Hana Bank's '2018 Korea Robo-advisor Report', high-net-worth owners with financial assets of 1 billion won or more using Private Bankers still prefer face-to-face channels (Kang, 2018), but changes in financial institutions' strategies and financial consumers are detected. As financial services evolve with technological development and financial consumers begin to embrace technological changes in the non-face-to-face environment triggered by COVID-19, Shinhan Bank's attempts will gradually expand to more customers with the participation of other banks.

As shown in [Table 5], the [A] area, which combines human advisors and high-net-worth owners, has entered a period of fierce competition in the current PB market. Accordingly, Shinhan Bank seems to have entered the [C] area, which provides a mobile PB service for high-net-worth owners as an additional service. However, if the non-face-to-face financial environment and the acceptance of technology by financial consumers increase, the service

competitiveness of the [C] area will weaken, and the need for an advanced hybrid advisor will increase. The area [B] is an advanced human-centered service that uses robo-advisors as tools, and job training is required to cultivate the relevant manpower. On the other hand, the market for general wealthy people is expected to be popularized mainly by robo-advisors, as human advisors are reluctant to enter the market because they pursue economies of scale with relatively low asset size and fees. However, from the perspective of financial institutions, there is a concern that the popularized market will become less attractive due to the emergence of several competitors and the decline in profitability due to the stagnation of new customers. Therefore, as a strategy to create a high-net-worth area, the demand for human resources training to enter the [B] area is expected to increase.

Table 5: Classification of Customers by Asset Level and Advisors by Type

Advisor	Public wealthy	High-net-worth
Human	Avoid entry (Asset scale, insufficient profitability)	[A] Growth stage → maturity stage
Hybrid	New entry : Low value-added area (Economies of scale)	[B] New entry : High value-added area
Robot	Introductory stage → Growth stage	[C] New entry : Provide additional services

This curriculum was designed to capture these changes in financial markets and financial services and to cultivate talent in high value-added areas. [Table 6] summarizes its characteristics. The reason why the education target is selected as PB in office is that from the perspective of financial institutions, manpower dealing with high-net-worth owners is a key resource, so demand for education investment will be high, and from the perspective of financial institution employees, job performance and job satisfaction can be improved. The main focus of curriculum design is 'use of technology' and 'complementation of AI ethics'. The goal is to obtain practical technology so that Private bankers can use robo-advisors as job tools, and AI ethics is added to prevent misuse of technology.

Table 6: Characteristics of Curriculum Design

Target	Duties performed	Purpose	Focus 1.	Focus 2.
Private Banker	Private Banking	Reinforcing job competency	[Technology Convergence] Robo-advisors	[Ethics supplement] AI Ethics

3.2. Curriculum Overview

The name of this course is 'Robo-Advisor Convergence Education for Hyper-Personalized and Customized Wealth Management', and it is aimed at PBs with high business ability. The purpose of the education is robo-advisor convergence education for upskilling of PBs in the current bank, and it is self-education conducted by financial institutions to respond to environmental changes. The curriculum consists of a total of 16 weeks (32 hours), and the educational goal is to analyze the digital financial environment and customer experience, understand the core technologies of robo-advisors, seek potential risks and technical and ethical solutions of robo-advisors, and establish and implement hyper-personalized asset management strategies. [Table 7] summarizes the curriculum outline.

Table 7: Curriculum Overview

Item	Content
Course name	Robo-advisor convergence education for hyper-personalized and customized asset management
Target	Current Private Banker (Top group of business capabilities)
Purpose	AI convergence education for upskilling of current employees
Institution	Financial institution self-education

Hours	2 hours × 16 weeks = 32 hours
Place	Face-to-face (set) + non-face-to-face (using Zoom)
Goals	<ol style="list-style-type: none"> 1) Learners can understand the changing digital financial environment and financial consumers. 2) Learners can analyze marketing techniques and customer experience in a digital environment. 3) Learners can explain big data and AI, which are the core technologies of robo-advisors. 4) Learners can identify potential risks of robo-advisors and suggest technical and ethical solutions. 5) Learners can establish hyper-personalized and customized asset management strategies using robo-advisors. 6) Learners can execute hyper-personalized and customized asset management by utilizing enhanced job competency that converges AI technology and human capabilities.
Evaluation and utilize	<ul style="list-style-type: none"> - Evaluation (100 points in total): attendance 10 points, midterm evaluation 45 points, final evaluation 50 points - Usage: Used for job management and personnel evaluation

3.3. The focus of educational content

Comparing Private Bankers' job and Robo-Advisors' process as shown in [Table 8], the main point of the curriculum can be derived. The job unit that robo-advisors are better at is to focus on acquiring and utilizing 'technology', and areas where robo-advisors lack or may cause problems are to supplement 'AI ethics' so that they can use technology centered on humans.

Table 8: Comparison of NCS Job Competency Unit and Robo-advisor Process

PB Sales NCS	RA process	Automation level	education focus
Customer service			
Customer information collection and analysis	Customer analysis	Essential automation	Leverage technology, AI Ethics Complement
Financial asset investment design	Asset Allocation, Portfolio Selection		
Consultation and advice on non-financial assets*			
Customer Suggestion and Execution	Transaction execution	Optional automation	
Investment follow-up management	Portfolio rebalance	Essential automation	Leverage technology, AI Ethics Complement
customer management			
PB Compliance			

* Ability to consult and advise on areas other than financial assets such as real estate, taxation, and real assets to achieve the customer's lifetime financial goals

3.3.1. Technical aspect

Robo-advisors are based on AI technology, and machine learning, deep learning, and big data analysis technologies are the core. To use the robo-advisor as a tool, understanding and practice of core technologies were organized in the curriculum. [Table 9] summarizes the core technologies.

Table 9: Summary of Key Technologies for Robo-advisors

Key technology	Technical content
Machine Learning	<ul style="list-style-type: none"> - One of the algorithms that improve performance by learning big data based on interaction with the environment. - The Machine derives its answers through learning through intelligent functions (learning, reasoning, adaptation, logic, etc.) without human programming. - Cases of use in the financial industry: detection of abnormal transactions (identifying expected patterns or observations), detection of fraudulent transactions (objects of fraudulent or inappropriate transactions), provision of customer promotions (preventing customer risk), customized services (customer behavior-based recommendations), etc.
Deep Learning	<ul style="list-style-type: none"> - Implementing Artificial Neural Networks (ANNs) by imitation of the human brain to classify data and learn correlations to derive answers - There is no task in which humans classify data in advance and then train it, such as in machine learning. - Use cases in the financial industry: investment advisory and trading, credit ratings, personal financial assistant chatbot, financial fraud prevention, stock price prediction, corporate bankruptcy prediction, etc.
Big data & Analytics	<ul style="list-style-type: none"> - Algorithms are very important, because they process and analyze data in a big data environment. - Advanced big data processing technology is required in the investor analysis stage of the robo-advisor service process - In the investor analysis stage, big data storage technology and deep learning technology to minimize overfitting in the sampling process are required, and in the investment purpose analysis stage, a mapping algorithm and clustering technology are required.

Source: Suh & Kim (2019)

3.3.2. Ethical aspect

Suh and Kim (2019) predicted that the robo-advisor service would promote the popularization of wealth management by attracting the wealthy of the general public to the capital market and revitalizing the financial intermediary function of financial companies. On the other hand, there are potential risks due to AI-based automation technology, and there are concerns about consumer damage and social costs. The risks include inducing inappropriate decision-making and investment advice, conflicts of interest and internal control issues, questions about algorithm transparency, errors and hacking, and the possibility of concentration on operating assets.

Financial services using AI technology, such as chatbots, robo-advisors, and robot analysts, have been commercialized in the domestic financial sector, including major overseas countries, to provide ethical alternatives at the financial authorities' level. In Korea, the Financial Services Commission announced and is currently using the 'Basic Operation Plan for Robo-advisor Test Bed' in June 2016, and announced the 'AI Guidelines in the Financial Sector' in July 2021. The guidelines contain four core values: the responsibility of the financial industry, securing the accuracy and safety of data for AI learning, guaranteeing transparency and fairness of AI financial services, and strict guarantee of financial consumer rights. The main contents are shown in [Table 10], which suggests the direction of AI operation to protect financial consumers, the financial industry, and the soundness of the financial market, but uses AI properly or at an initial level that follows the form of 'weak regulation' for AI activation worth learning to do.

Table 10: Main Contents of AI Guidelines in the Financial Sector

No.	Contents	The details
1	Purpose and scope of application	<ul style="list-style-type: none"> - (Purpose) Activating AI and securing customer trust in financial services - (Application) Financial and non-financial companies that use AI systems directly or indirectly
2	Building Governance	<ul style="list-style-type: none"> - Establish AI ethics principles, organize AI organizations, establish risk management policies

3	AI system planning and design stage	- Review compliance with ethical principles, maintain responsibility for decision-making during design
4	Development stage of AI system	- AI Learning Data Quality Management, Privacy and Explainability Considerations
5	AI system evaluation and verification stage	- Selection and management of the appropriate fairness target level and judgment index of the AI system - Improving explainability for services that customers must explain
6	AI system introduction, operation and monitoring stage	- Notifying customers of whether AI is being used and how to remedy rights - Periodic monitoring of AI system performance, the establishment of the best security system
7	Special case for AI system consignment	- Establishment and operation of a periodic reporting and inspection system - Preparation of procedures for compensation for damages

Source: Financial Services Commission (2021, July).

In addition, explainable artificial intelligence (XAI) technology is also something that needs to be learned to properly utilize robo-advisors. XAI is a technology that helps AI actions and decision-making interpret the process in a way that humans can understand or understand why a result was reached (Han, 2021). In many cases, the black box method of deep learning technology can only be applied in practice by solving problems, so the need is growing especially in the fields of handling personal information and assets based on customer trusts, such as finance, insurance, and medical care. The expected effects of XAI include improving the performance of AI systems, acquiring insights, and verifying legal responsibility and compliance (Financial Security Institute, 2018). This curriculum is structured so that it can be understood at the basic literacy level. In the future, it is thought that a specialized course or selection course that can deal with the principles of AI in depth will be needed.

4. Result

This curriculum consists of a total of 16 lessons. The main contents are to experience understanding and use of the financial environment and robo-advisor technology in the first half (chapters 1 to 8), and to use robo-advisors in the second half (chapters 9 to 16) to strengthen hyper-personalized and customized asset management capabilities. Each evaluation index was attached to evaluate the results of learning through the 8th midterm evaluation (45 points) and the 16th final evaluation (50 points).

4.1. Curriculum (First half)

In the first half, content-oriented lecture-style teaching and learning methods are used and individual tasks are evaluated. Looking at each session, the contents of the 1st to 3rd classes are to understand the changes in the financial environment and financial consumers and to examine communication strategies. In the 4th and 5th classes, the core technologies of robo-advisors, such as artificial intelligence and big data, are understood and the role of robo-advisors is covered. The 6th to 7th classes were organized so that the investment process could be executed using robo-advisors and strategies could be checked with test bed operation methods.

Table 11: First Half Curriculum

	Topics and Educational Goals	Educational Content
1	[Topic: Digital Transformation of Finance] ▪ Explain the background and underlying technology of digital transformation in the financial sector triggered by the 4th industrial revolution ▪ Identifying trends in the financial industry and predicting the future of the Fintech era	▪ Digital Transformation Background ▪ Digital transformation-based technology ▪ Trends and prospects of the financial industry ▪ The future of finance, Fintech

2	[Topic: Digital Financial Consumers and Customer Experience] <ul style="list-style-type: none"> Describe the characteristics of new customers, millennials Analyzing the psychology and customer experience of digital financial consumers Share examples of designing customer experiences and using them in your work 	<ul style="list-style-type: none"> Millennial Economy Psychological analysis of digital financial consumers Customer experience analysis of digital financial consumers Customer experience design and case sharing
3	[Topic: Digital Marketing and Communication] <ul style="list-style-type: none"> Understanding digital marketing trends and establishing communication and media strategies Explain Big Data Marketing Presenting a digital marketing case 	<ul style="list-style-type: none"> Digital Marketing Trends Communication and Media Strategy Big data marketing Digital Marketing Cases
4	[Topic: Understanding RA 1] <ul style="list-style-type: none"> Understand and explain the concept of RA Understanding AI and big data technologies, which are the underlying technologies of RA 	<ul style="list-style-type: none"> Concept of Robo-Advisor (RA) Basic technology (AI, big data)
5	[Topic: Understanding RA 2] <ul style="list-style-type: none"> Understanding the RA Market Suggesting how to use RA Explain the role of RA according to wealth management theory 	<ul style="list-style-type: none"> Robo-advisor market How to use robo-advisors Wealth management theory and role of robo-advisors
6	[Topic: RA application practice 1] <ul style="list-style-type: none"> Understanding Investor Analytics with RA Perform asset allocation using RA Explaining the choice of the portfolio using RA 	<ul style="list-style-type: none"> Investor Analysis (Profiling) Asset Allocation Portfolio Selection
7	[Topic: RA application practice 2] <ul style="list-style-type: none"> Conducting investment execution using RA Explaining portfolio rebalancing using RA Understanding how to operate the RA test bed 	<ul style="list-style-type: none"> Investment execution Portfolio rebalancing RA test bed operation plan
8	[Midterm evaluation] Performing and submitting individual assignments (reports) <ul style="list-style-type: none"> Execute investment (asset management) using robo-advisor, and evaluate the asset management process analysis and investment results. Suggest what you learned in technology and how to improve your technology through the results of your investment in robo-advisor. 	

The purpose of the 8th midterm evaluation is for the learner to directly use the robo-advisor to practice the investment process and investment technique, and to derive insights by comparing it with their job and finding what they have learned and what they need to improve. The results were submitted as individual reports, and the evaluation indicators consisted of the appropriateness of technology utilization, the logic of analysis results, the rationality of evaluation of investment results, and creativity of proposals.

Table 12: Midterm Evaluation Index (40 points)

Evaluation items	Score	Evaluation contents
Appropriate use of RA technology	10	<ul style="list-style-type: none"> Did the learner properly use the RA technology to derive a complete result?
Logic of analysis results	10	<ul style="list-style-type: none"> Did the learner logically analyze the investment process according to the asset management process?
Reasonability of evaluation	10	<ul style="list-style-type: none"> Did the learner reasonably evaluate the investment results??

Creativity and realism of the proposal	10	▪ Did the learner express the insights obtained from the investment results with creative ideas?
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4.2. Curriculum (Second half)

The second half is self-directed learning and cooperative learning is performed through the team project, which is the final evaluation. Looking at each class, the contents of the 9th to 10th classes are to understand the potential risks of robo-advisors and technical and ethical solutions. The 11th class deals with ways to strengthen the competitiveness of PB, which combines technology. The 12th to 15th sessions were organized to carry out team projects to integrate robo-advisor technology and human-advisor capabilities. The team project is to establish and implement a hyper-personalized customized asset management strategy for virtual customers and evaluate the results. In this case, it is possible to utilize commercialized robo-advisor technology or propose new technologies (idea level is possible) necessary for job performance.

Table 13: Second Half Curriculum

	Topics and Educational Goals	Educational Content
9	[Topic: Potential risk of RA] ▪ Knowing the Risk Factors of RA ▪ Explain related laws such as the Capital Market Act and the Credit Information Act ▪ Suggesting technical solutions ▪ Suggesting ethical solutions	▪ Risk factors for RA ▪ Relevant laws (Capital Market Act, Credit Information Act, etc.) ▪ Technical solutions ▪ Ethical solutions
10	[Topic: AI Ethics Guidelines] ▪ Understanding domestic and international legal and regulatory trends ▪ Presenting examples of overseas guidelines ▪ Explaining guidelines for AI in finance ▪ Understanding XAI	▪ Domestic and international legal and regulatory trends ▪ Examples of overseas guidelines ▪ Financial sector AI guidelines ▪ Explainable XAI
11	[Topic: Competitiveness of PB work] ▪ Explain the limitations and changes of traditional wealth management ▪ Presenting Human Competitiveness in PB Work ▪ Understanding AI and human coexistence ▪ Presenting the need for hyper-personalized and customized asset management	▪ Limitations and Changes in Traditional Wealth Management ▪ Human competitiveness of PB work ▪ Coexistence of AI and humans ▪ The need for hyper-personalized and customized asset management
12	[Topic: Hyper-personalized asset management strategy using RA 1] ▪ Establishing a technology-based strategy	▪ (Team Project) Organize 4 teams of 5 people to establish a hyper-personalized asset management strategy that combines RA technology and PB competency (1st)
13	[Topic: Hyper-personalized asset management strategy using RA 2] ▪ Establishing a technology-based strategy	▪ (Team Project) Organize 4 teams of 5 people to establish a hyper-personalized asset management strategy that combines RA technology and PB competency (2nd)
14	[Topic: Hyper-personalized asset management practice using RA 1] ▪ Execute the investment based on the established strategy	▪ (Team project) Select a virtual customer based on the strategy established by each team and manage the customer's assets using RA (1st)
15	[Topic: Hyper-personalized asset management practice using RA 2] ▪ Execute the investment based on the established strategy	▪ (Team Project) Based on the strategy established by each team, a virtual customer is selected and the customer's assets are managed using RA (2nd)
16	[Final evaluation] Submission and presentation of team project results (reports)	

	<ul style="list-style-type: none"> ▪ After summarizing the strategies and asset management results established by each team, evaluate the hyper-personalized asset management technique that RA and humans converge. ▪ Suggest ways to utilize the convergence strategy in the future and suggestions for improvement.
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In the 16th session, the final evaluation results prepared as a team project are announced. It aims to share the diversity and scalability of the convergence strategy while the team establishes and executes an investment strategy that combines humans and robots for virtual customers. The evaluation index was composed of creativity of convergence strategy, completeness of asset management technique, rationality of evaluation result, and fidelity of suggestion and teamwork.

Table 14: Final evaluation index (50 points)

Evaluation items	Score	Evaluation Contents
Creativity in RA Convergence Strategies	10	▪ Is the convergence strategy of RA technology and human PB competency creative?
Completeness of asset management techniques	10	▪ Is the convergence asset management technique complete?
Reasonability of evaluation results	10	▪ Is the evaluation of strategy and asset management results reasonable?
Fidelity of suggestions	10	▪ Is the content of future utilization plans and improvements faithful?
Team member collaboration	10	▪ Is the R&R of team members appropriate and cooperative?

5. Conclusion

With the declaration of the 4th industrial revolution and the spread of the COVID-19 pandemic, new technologies have been commercialized, triggering changes in the industrial landscape and jobs. Accordingly, upskilling and reskilling are being implemented as retraining plans for existing employees in various industrial fields around the world. Curriculum that utilizes AI technology or requires an understanding of AI technology has also emerged. In particular, in the financial sector, several innovative services such as AI counselor (chatbot), robot process automation (RPA), robo-advisors, robo-analysts, credit ratings, and Fraud Detection System (FDS) have been introduced and the speed of change is rapid. In the competitive landscape between traditional financial institutions-centered Fintech and new technology companies-centered Techfin, financial services will be differentiated, and competition is expected to intensify.

In such a competitive environment, businesses that generate high profits with new technologies and the advanced competencies of employees are essential for the sustainable management of a company. Therefore, this curriculum was designed as the demand for retraining for upskilling that converges technology and human competency is expected to increase. Robo-advisors are a field that will grow further after non-face-to-face discretionary contracts are allowed in 2019 and will be advanced into a hybrid form like the United States. In addition, Private Bankers are high-level human resources with comprehensive financial knowledge and professional counseling techniques, and using robo-advisors as a tool will contribute to pioneering high-value-added areas. This is the background of planning convergence education between PB and robo-advisors.

The differences in this curriculum are as follows. First, it is a curriculum that combines technology for human-centered upskilling. There is a widespread sense of crisis that AI will replace human jobs, but as can be seen from human history, a shift in thinking that human competence will evolve further if technology is used as a tool is needed. The convergence of humans and technology in the unique area of PB is an attempt to pioneer a high value-added area differentiated from popularized technology and is also a survival strategy for a better life for companies and humans. Therefore, it is necessary to focus on human retraining beyond the development of technology. As mentioned earlier, this is also why global companies constantly invest in employee training. Second, it is a curriculum that includes technical and ethical solutions to make good use of the tool called technology. It is best to prevent the risk of human rights being violated in exchange for technological convenience. Along with the advancement of ethical solutions, it will be more important knowledge in the future for humans to recognize and prepare for problems through education. Third, it is a curriculum that considers not only the use of it in the current job but also the scalability to create new opportunities. This curriculum does not aim to acquire individual skills that are separated from practice. The goal is

to provide an opportunity for professional manpower called PB to upgrade his job as a PB expert and propose creative ideas for technology as a non-developer while comparing his job competency unit and Robo-Advisors' process. This attempt at convergence will lead to the creation of another opportunity and new results. Although this curriculum is organized into 16 weeks due to the nature of the incumbent, it is expected to lead to the expansion of jobs and skills through creative results and the demand for additional in-depth education.

The significance of this curriculum is that it is an upskilling vocational education to converge high-level human resources and Fintech as a strategy for companies to create high value-added businesses, and the convergence of Private Bankers and robo-advisors will be an example. The limitation is that it is a theoretical curriculum in which there are no lessons and evaluations of trial and error to accumulate after the operation of the curriculum. In the future, it is thought that research to analyze and confirm the learning effect by applying it to the actual educational field is necessary. Furthermore, it is expected that attempts to develop a curriculum that converges existing jobs and new technologies in various fields will continue.

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