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# A Study about Taxi Mobility as a Service (MaaS) Through an Ad-Tech and Neuroscience Approach: Focusing on the Ad management Module and Programmatic Buying System

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***Abstract***
In 2019, taxi fares in Seoul, South Korea, have been raised and will be increased nationwide in the future. The key issue coming up with the rate hike is that the taxi fare goes up but the service is intact. In addition, the conflicts between the taxi industry and care-sharing companies are deepening into the social problems of the Republic of Korea. In this environment, this study suggests an innovative taxi mobility platform that can reduce the taxi fee burden and improve the service quality. This research proposes two major technological approaches which are Ad-Tech and neuroscience in order to solve the problems. Through the approaches, it is possible to enjoy various contents such as game using eye tracker, AR contents, interesting image clip, and nearby restaurant information, as well as using the advertisement at a low cost and enjoying the traveling time. For advertisers, based on proposed system in this study, it can be used as a platform to advertise diverse and creative forms other than images and opportunities for customer data collection, which can gain additional insights on customer's behavior patterns and The contribution of this study is significant an introductory study for the long-term research for the branded mobility as a part of Mobility as a Service (MaaS).

***Keywords****: Taxi Advertising Platform, Ad-Tech, Programmatic Buying, Real-Time Buying (RTB), Eye-tracking, Mobility as a Service (MaaS), Branded Mobility*

## 1. INTRODUCTION

In 2019, taxi fares in Seoul, South Korea, have been raised and will be increased nationwide in the future. According to the impression, the burden of the citizens is rising. Taxi fare increased by 26% in five years. The rate of increase is 26%, which is an annual rate of 4.73%. Considering that the average salary increase rate of Small and medium-sized enterprises (SMEs) is 1 ~ 2%, it is a rather burdensome figure.

The key issue coming up with the rate hike is that the taxi fare goes up but the service is intact. Consumers are citing not only taxi services increased but also taxi services not improved. In this regard, both the government including the city of Seoul and taxi industries have not been able to offer a breakthrough alternative. Unless a variety of supplementary services are applied to a taxi that simply serves as a means of transportation, it is not easy to solve safety

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accidents caused by riding refusal, picking passengers, abusive driving, or aged drivers.

In addition, the conflicts between the taxi industry and car-sharing companies are deepening into the social problems of the Republic of Korea. The global mobility market is expected to grow to more than 2,000 trillion won within three years. Especially, global Mobility as a Service (MaaS) market is expected to grow to US$ 358.35 Billion by 2025 from US$ 38.76 Billion in 2017[1]. With the advent of various mobility businesses, the position of the taxi industry will become narrower.

In response to this trend, the National Assembly plenary session passed the revision bill for the revision of the Passenger Car Transport Business Act, which focuses on the abolition of tax payments and the implementation of the taxi driver's monthly salary system in August, 2019. In the case of a taxi corporation, profits are expected to decrease due to the full salary system. As taxi companies need to increase their profits, there is a growing sense of crisis that they have to work with the mobility industry to introduce new services. In addition, the Ministry of Land, Infrastructure, and transportation, (MOLIT) announced a plan to revamp the taxi system for innovation growth and win-win development in South of Korea. The reform of the Ministry of Land, Infrastructure, and Transport is a measure to implement the agreement proposed by the Taxi and Carpool Social Compromise Organization (TCSCO), which aimed to release platform taxis that combine IT technology with taxis.

In this environment, this study suggests an innovative taxi mobility platform that can improve the taxi fee burden problem and service quality to costumers, and increase profits for overall mobility industries.

## 2.BACKGROUND

### 2.1 Mobility as a Service (MaaS)

As an emerging concept, the mobility as a Service (MaaS) can be explained as a new idea for conceiving mobility, a phenomenon (occurring with the emergence of new behaviors and technologies) or as a new transport solution (which merges the different available transport modes and mobility services). Hietanen [2] firstly comprehensively defines the MaaS as a mobility distribution model that deliver users' transport needs through a single interface of a service provider. It combines multiple delivery modes to provide customized mobility packages such as monthly mobile phone contracts. Finger, Bert and Kupfer [3] envisioned MaaS to integrate transport modes through the internet. Holmberg, Collado, Sarasini and Williander [4] add to this definition. They emphasized the role of subscription in MaaS, giving the user the possibility to plan his/her journey, in terms of booking and paying the several transport modes that might be required, all in one service. In addition to the definitions above, which emphasize the bundling and subscription aspects of MaaS, there are a few definitions because of a new term. Table 1 presents core characteristics that should be apparent when implementing the definitions (see Table I).

**Table 1:** Description of MaaS' core characteristics based on literature review [5]

| Core Characteristic | Description |
|---|---|
| 1. Integration of transport modes | A goal of MaaS schemes is to encourage the use of public transport services, by bringing together multi-modal transportation and allowing the users to choose and facilitating them in their intermodal trips. Following transport modes may be included: public transport, taxi, car-sharing, ride-sharing, bike-sharing, car-rental, on-demand bus services. Envisioning a service beyond the urban |

| | |
|---|---|
| | boundaries, it will embrace also long-distance buses and trains, flights, and ferries. |
| 2.Tariff option | MaaS platform offers users two types of tariffs in accessing its mobility services: "mobility package" and "pay-as-you-go". The package offers bundles of various transport modes and includes a certain amount of km/minutes/points that can be utilized in exchange for a monthly payment. The pay-as-you-go charges users according to the effective use of the service. |
| 3.One platform | MaaS relies on a digital platform (mobile app or web page) through which the end-users can access to all the necessary services for their trips: trip planning, booking, ticketing, payment, and real-time information. Users might also access to other useful services, such as weather forecasting, synchronization with personal activity calendar, travel history report, invoicing, and feedback. |
| 4.Multiple actors | MaaS ecosystem is built on interactions between different groups of actors through a digital platform: demanders of mobility (e.g. private customer or business customer), a supplier of transport services (e.g. public or private) and platform owners (e.g. third party, PT provider, authority). Other actors can also cooperate to enable the functioning of the service and improve its efficiency: local authorities, payment clearing, telecommunication and data management companies. |
| 5. Use of technologies | Different technologies are combined to enable MaaS: devices, such as mobile computers and smartphones; a reliable mobile internet network (WiFi, 3G, 4G, LTE); GPS; e-ticketing and e-payment system; database management system and integrated infrastructure of technologies (i.e. IoT). |
| 6.Demand orientation | MaaS is a user-centric paradigm. It seeks to offer a transport solution that is best from customer's perspective to be made via multimodal trip planning feature and inclusion of demand-responsive services, such as taxi. |
| 7. Registration requirement | The end-user is required to join the platform to access available services. An account can be valid for a single individual or, in certain cases, an entire household. The subscription not only facilitates the use of the services but also enables the service personalization. |
| 8.Personalization | Personalization ensures end users' requirements and expectations are met more effectively and efficiently by considering the uniqueness of each customer. The system provides the end-user with specific recommendations and tailor-made solutions on the basis of her/his profile, expressed preferences, and past behaviors (e.g. travel history). Additionally, they may connect their social network profiles with their MaaS account. |
| 9.Customization | Customization enables end users to modify the offered service option in according to their preferences. This can increase MaaS' attractiveness among travelers and its customers' satisfaction and loyalty. They may freely compose a specified chained trip or build their mobility package with a different volume of usage of certain transport modes to better achieve their preferred travel experiences. |

Among them, Nemtanu, Schlingensiepen, Buretea and Iordache [6] consider the Information and Communication Technologies (ICTs) as the main component of MaaS systems. ICTs also play a vital part in information integration and convergence between users, providers, and services [5]. The emergent notion in the Internet of Things (IoT), which further accentuates the connectivity between physical objects and virtual data, is a vision of Smart transportation systems to support the Smart City vision [7]. Similarly, Giesecke, Surakka and Hakonen [8] also considered an intelligent use of

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ICTs as the basis for transporting persons through the combination of different means. With the perspective, the main purpose of this study is to provide a taxi with a display and to provide advertising to passengers. Another object of the present research is to grasp the preference advertisement of the passenger by receiving the advertising preference text from the passenger and extracting the valid text based on the ICTs, Ad-Tech. Things have to be done in a smarter and more efficient way and by the full deployment of ICT and a stronger cooperation between public and private transport providers, Maas can result in a better allocation of resources and services, with the citizen as an end-user [2].

### 2.2 B. Programmatic Buying, Real Time Bidding (RTB)

Ad tech. is a combination of advertising with digital technology. Unlike the traditional method, the ad technology market, which measures the customer's money from digital marketing to performance and predicts online customer behavior patterns, is an emerging trend in the advertising market. An advertiser and market can more precisely identify their customers and run ads tailored to their desired targeting based on the data got from the ad technology. Using this data, the program automatically analyzes users and launches targeted advertisements called programmatic buying. The programmatic buying system can help reduce advertising costs and increase conversion rates.

As media forms become digitalized and mobilized, customer contact points are increasing. Although there are many controls of variables, they are already algorithmically analyzed with a combination of many variables through the programmatic system. Before digitization, the tracking area was small and there was not much to measure, but now with so many mediums connected, the customers can be also defined by the programmatic buying and access them in a variety of ways. Programmatic is an automated way of purchasing advertising inventory based on user behavioral data.

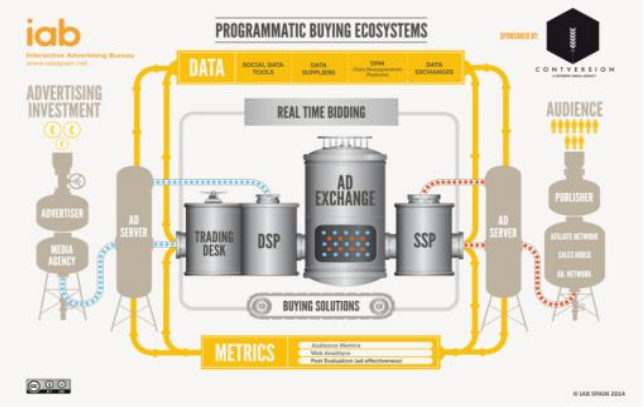


**Figure 1:** Programmatic Buying Ecosystem

Technology is entering the advertising space, connecting numerous media and advertisements between marketers and customers, and platforms are diversifying. In the past, buying and selling advertising products was done directly by people, but since Ad tech. appeared, it could be conveniently used by an automated system with programmatic buying.

The main areas of the programming buying can be divided into Data Management Platform (DMP), Demand Side Platform (DSP), AD-Exchange (ADX), Supply Side Platform (SSP), which are technically connected between advertisers and media companies.

DMP (Data Management Platform) is a platform that manages various data such as advertisement execution data, website visitor data, POS data, and customer ID. It allows advertisers to find granular target audiences. Demand Side Platform (DSP) is a platform that allows the adoption of appropriate media that are considered highly efficient or whose target user's access is known. This allows DMP / DSP to run ads on the targets and the appropriate advertising mediums that advertisers want. On the other hand, there is SSP to help media companies find the advertisers they want to send advertisements. SSP (Supply

Side Platform) is a platform that finds profitable advertisements among various advertising purchases coming from various channels in order to maximize the profits of advertisement media products and also open real-time auctions. Therefore, SSP is a platform that allows media companies to sell well to advertisers who want advertisement products. ADX (AD-Exchange) is an advertising exchange brokerage, which is connected to numerous ad networks and enables cross-network transactions. In the end, advertisers and media companies directly connect DMP platform to find targets and SSP platforms to find advertisers. Through the ADX, Advertisers and media companies can easily and automatically trade with ADX without having to find and trade each other.

Among the various purchasing methods of programmatic buying, RTB is the real time bidding method. RTB (Real Time Bidding) has already been applied to performance ads like Facebook and Twitter, ad networks like GDN, and retargeting ads like Criteo. At the heart of programmatic advertising, advertisers find and bid on the desired ad inventory and expose the right material for their target through the RTB method. RTB has fundamentally changed the landscape of display advertising because (i) allowing per impression transactions scales the buying process across a large number of available ad inventories including the leftovers; (ii) real-time audience data encourages behavior (re-)targeting and makes a significant shift towards buying that is focused on user data [9], rather than contextual data [10].

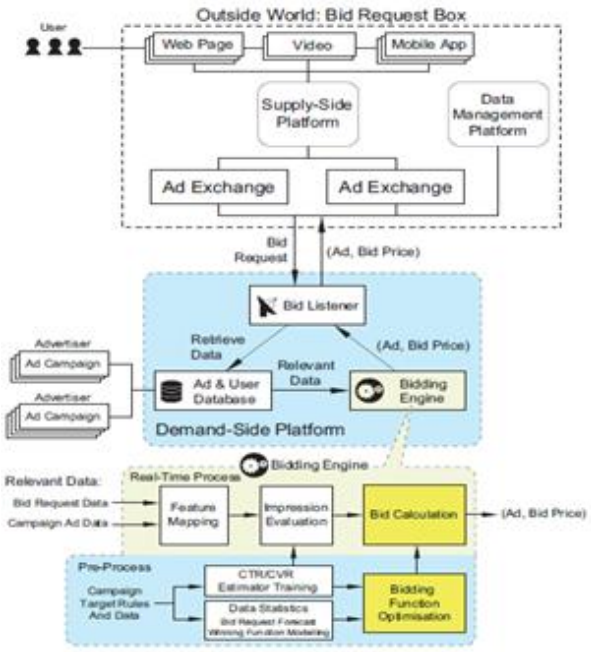


**Figure 2:** An illustration of a demand-side platform and its bidding engine in RTB display advertising [10]

## 3. PROPOSED METHOD

This research proposes two major technological approaches which are Ad-Tech and neuroscience on the MaaS. Two technologies also divided as programmatic buying system and eye-tracking measurement. The basic concept is that the customer watches targeted video ads inside the taxi cab and the taxi buys the basic fare of the passenger with the revenue from it.

The main purpose on the structure is to provide a taxi with a display and to provide advertising to passengers. Another object is to grasp the passenger's preferred advertisement by receiving the advertisement preference text from the passenger and extracting the valid text through it. The third object is to provide more advertisements to the passenger by dividing the display into a first zone and a second zone and simultaneously outputting two advertisement categories. Lastly, this proposed model can provide convenience to the passengers and can lead to interest in advertising through the scroll of the second zone is interlocked and output by reflecting the delay time calculated through the equation when the scroll of the first zone is

manipulated,

In order to achieve above objects, the taxi mobility platform providing system, which is discounted by watching advertisements, is installed in the taxi. It is characterized by four modules. The first is an advertising management module for transmitting the advertisement content to the display received and stored the advertiser's advertising content. It includes both a display for outputting advertisement content in a state formed of a touch screen and an eye tracker for detecting the position and size of the pupil of the passengers.

The second one is a call management module to determine the passenger's location by analyzing the passenger's call signal. The third module is a discount providing module including a watching time measuring unit in order to measure the display watching time of the passenger based on the eye tracker, and a discount rate policy for differentially determining a discount rate for the fare of the passenger according to the display watching time. Last one is a taxi server having a payment module for paying a fare from the passenger based on the discount rate. The detailed configuration with four modules is in shown in Figure 3.

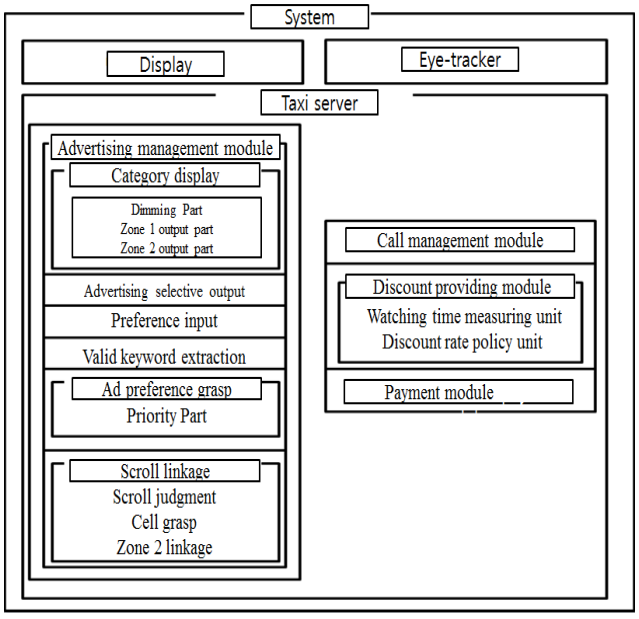


**Figure 3:** Configuration with four modules

As can be seen in Fig. 3, the research model of this system can be largely structured of the taxi server and the display. The taxi server means a main server located in the taxi. It also means hardware with a CPU and a storage means with a passenger terminal as well as a communication unit and transmission means for communicating and transmitting information with the display. Such a taxi server is a kind of program that can be executed in the central processing unit on a hardware basis having a central processing unit (CPU) and storage means such as memory and hard disk. Such a program called as software, can be installed and run, and this research model is set up in units of modules and subunits for the software. In this case, the taxi server may include a random access memory (RAM), a read-only memory (ROM), and a processor that temporarily and / or permanently store a signal (or data). In addition, the taxi server may be implemented in the form of a system on chip (SoC) including at least one of a graphic processor, a RAM, and a ROM.

The proposed research model also includes an eye tracker on one side of the display or one side of a taxi interior separate from the display. The eye tracker is a kind of pupil sensor, and performs a function of grasping a pupil's position and blinking as well as a pupil's position change (movement). At this time, the eye tracker may be positioned to look at the passenger's eyes in order to determine the position and movement of the pupil of the passenger. For example, the display may be located at one side of the display or at a rear side of a driver's seat or a passenger seat, which is a front of a position where a passenger sits in the cabin. The eye tracker performs a function of determining whether the passenger is properly viewing the advertisement content output from the display and whether or not the viewer has watched for a certain time.

With detailed configuration in each module, Fig. 4 shows algorithm design of overall process about

the taxi mobility platform.

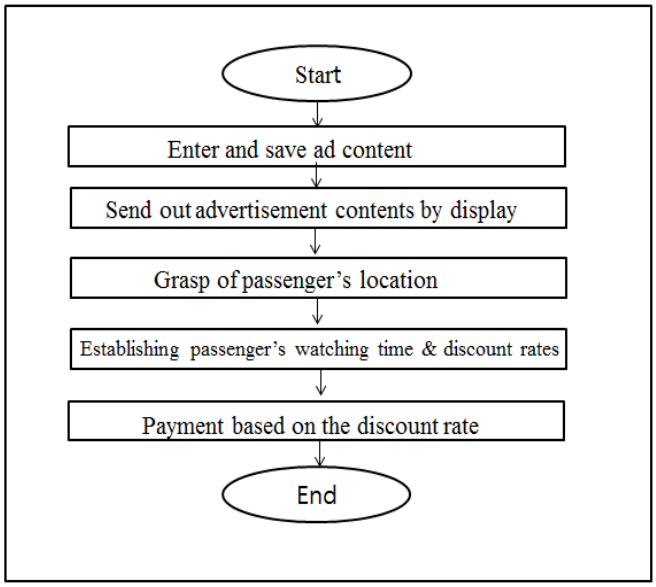


**Figure 3:** Algorithm design of overall process about the taxi mobility platform

The steps of the algorithm of the research model can be implemented directly in hardware, in a software module executed by hardware, or by a combination of them. The software module may include random access memory (RAM), read only memory (ROM), erasable programmable ROM (EPROM), electrically erasable programmable ROM (EEPROM), flash memory, hard disk, removable disk, CD-ROM, or may reside in any form of computer readable recording media. Also, the components of this system may be implemented as a program (or an application) and stored in a medium in order to be executed in combination with a computer which is hardware. Especially, the main server refers to all kinds of hardware devices including at least one processor, and may be understood as encompassing software configurations that operate on the hardware devices according to embodiments. A computing device as an example of a server may be understood as meaning including smartphones, tablet PCs, desktops, notebooks, and user clients and applications running on each device, and it is also not limited to them. For example, the taxi server may be a computer installed in the taxi, or may be a portable terminal (for example, a smartphone) possessed by the driver.

## 4. RESULTS

This study proposed an advertisement management module, a call management module, a discount providing module, and a payment module as a research model of a taxi server with the concept of the MaaS. Among them, this study focuses on proposing algorithm equation for designing Ad management module in order to apply the programmatic buying system into the taxi mobility platform.

The advertisement management module provides a function of transmitting the advertisement contents to the display while receiving and storing the advertisement contents of the advertiser. The advertiser may be an individual or an organization that produces an advertisement for the one to be promoted and provides it to the taxi server, and may be a cost provider that provides a cost for the advertisement content to promote the advertisement content. The advertisement management module may receive and store advertisement contents from various advertisers, and may transmit advertisements stored sequentially or randomly to a display. In this case, it is preferable that it is configured in the form of a picture, sound, image in order to determine whether the passengers watch the advertisement. Rewards for passengers to watch the advertisement (costs provided by the advertiser) can be reduced to a taxi fare or a portion of the advertising fee can be returned to the passenger.

In addition, the advertisement management module may include a category display unit and an advertisement selection output unit. The category display unit provides a function of outputting a plurality of advertisement categories in units of cells on the initial screen of the display, and the advertisement selection output unit receives a specific advertisement category from the passenger through the display in a touch manner

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and belongs to the corresponding advertisement category. It provides a role for outputting the advertising content to the display. That is, the advertisement may be divided into categories and then displayed in units of cells. When the passenger selects such a cell, advertisement content corresponding to the category of the cell may be output.

There may be subcategories for this in the advertisement category. For example, the ad category may be living / food / entertainment / sports / fashion / beauty, and if the user clicks or touches fashion, the sub-category, which is a sub-category of the top / bottom / underwear / baby clothes, can be displayed. If the passenger selects a detailed category, the advertisement content corresponding to this theme can be output and played. Rather than randomly outputting advertisement content by ignoring the passenger's preference or interest, the advertisement's concentration and interest can be improved by providing advertisement content in a passenger's preferred category, thereby improving the advertisement effect.

In addition, the advertisement management module may further include a preference input unit, an effective keyword extracting unit, and an advertisement preference determining unit. Accordingly, the category display unit may include a dimming processing part. The preference input unit serves to receive advertisement preference text from the passenger. As the passenger receives the advertisement content and receives a preference, the passenger's preference for the advertisement can be determined by analyzing the input text.

The valid keyword extracting unit extracts valid keywords through a grouping factor according to the frequency and proximity of keywords included in the preferred text of the advertisement. Advertising preference grasping unit provides a function to determine the advertising preferences of the passenger by analyzing the valid keywords.

The dimming processing part performs a dimming process of a cell corresponding to a specific advertisement category according to the advertisement preference. Generally, dimming is a technique that can remove glare, reduce energy, and produce atmosphere by adjusting the brightness of a lamp. In this case, however, the dimming means differentiating contrast and brightness from one cell to another. From the advertisement preference grasping unit, it is possible to provide a passenger by highlighting a preference category of the passenger by identifying a category corresponding to the passenger's advertising content and visually differentiating the corresponding cell. It can also provide convenience when choosing. The valid keyword may be derived through Equation (1) below.

$$(CF_{ab})_p = \sum_{n=1}^{m} \left( \frac{(CF_{ab})_n}{m} \times \frac{L_s}{|L_{an} - L_{bn}|} \right) \quad (1)$$

$(CF_{ab})_p$ is a valid keyword, $m$ is the total number of groupings, $(CF_{ab})_n$ is the grouping factor of keyword $b$ for keyword $a$ in the $n$th grouping, $L_{an}$ - $L_{bn}$ is the interval between keyword a and keyword b in the $n$th grouping, and $L_s$ is the maximum interval between keyword $a$ and keyword $b$. The valid keyword may be extracted through the valid keyword extracting unit, and the importance of the keyword may be determined based on conditions to be described, and may be derived as the valid keyword. The grouping factor is grouped according to the frequency and proximity of the keywords in the sentence input from the passenger. In detail, two or more terms are repeatedly compared to frequency of appearance and proximity to grasp the importance of each of the keywords in the input text to determine the height of the validity to derive the effective keyword used in the actual analysis.

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The ad preference grasp includes a priority assigning part that prioritizes the ad category by advertiser according to the ad preference. As the zone 1 and the zone 2 are divided screens into two sections, in addition, the first zone and the second zone may be connected to different advertiser servers to perform multitasking tasks for outputting different advertisements. In this case, the first zone and the second zone are preferably divided in the longitudinal direction in order to perform a scroll operation to be described later. The first zone output part provides the ability to output the first zone to the display, arranged in cells along the longitudinal direction of the display for the first priority advertising category. The output part of the second zone outputs on the display a second zone, arranged in cells along the longitudinal direction of the display of the sub-category of advertising categories of the second priority, while the second zone may be placed on the right side of the first zone. That is, the first priority advertisement category is linked to the left side of the display divided into two zones, and the second priority advertisement category is linked to the right side so that the passengers may simultaneously receive categories and advertisements for the two shopping malls.

In addition, the display may vary the output of the cells in the first and second zones according to the scroll operation of the passenger, and thus the advertisement management module may include a scroll linkage. In this case, the scroll linkage unit may include a scroll determination part, a scroll cell identification part, and a second zone linkage part. The scroll judgment part provides a function of determining whether to scroll the cell in the first zone by a scroll operation of a passenger. The cell grasping part identifies the cell located at the top of the cell as the reference cell when grasping the scroll of the first zone based on a predetermined time. The zone 2 linkage part serves to move the cell of the second zone having the same title as the reference cell so that it lies on the same horizontal line as the reference cell. Furthermore, the scroll judgment part may include a function of determining the scroll start and end time and the scroll distance of the cell. When the second zone is moved, the movement delay time of the second zone may be set through Equation 2.

$$T = T_0 - \beta \times \sqrt{\tan(d)^{-1}} \quad (2)$$

$T$ is a moving delay time of the second zone, $T_0$ is a reference delay time, $\beta$ is an adjustment value, and $d$ is a distance scrolled by the first zone [12-16].

The moving delay time refers to a time when the second zone is delayed according to the scroll speed of the first zone when the second zone is scrolled along the first zone through the second zone linkage part after the scroll judgment part has grasped the scroll start and end time of the first zone. In other words, the longer the moving delay time is, the slower the scrolling speed of the second zone is linked to. The reference delay time means a preset delay time, which may be set by a user or already set by an administrator of a server. It also means the speed at which the existing second zone is linked along the same title or associated title cell of the first zone. In addition, the adjustment value may be set by the passenger directly, and the interlocking scroll time of the second zone may be adjusted according to the situation compared to the scroll time of the first zone. Therefore, the moving delay time is smaller than the scroll time of the first zone when the adjustment value ≥ 0, and the scroll time of the first zone and the moving delay time of the second zone are the same when the adjustment value =0. If the adjustment value ≤ 0, the moving delay time is larger than the scroll time of the first zone. On this point, the adjustment value is limited to those that can be adjusted within the range of the $\beta \times tan^{-1}(d) \leq T_0$ . For the graph of $T = T_0 - \beta \times \sqrt{tan(d)^{-1}}$ , the longer the scroll distance

when $d$ is 0, the smaller the delay time. At this time, the graph shape of the above-described formula is initially reduced by a steep slope, and then converges to a predetermined time.

Additionally, the scroll judgment part may further include a function of determining a cell of the second zone having a title mismatched with the reference cell as a mismatched cell. The moving delay time may be a correction delay time corrected through Equation 3.

$$Z_i = Z \times (1 - \frac{n}{m+n}) \quad (3)$$

$Z_i$ denotes the correcting delay time of the second zone, $Z$ is the moving delay time of the second zone, $n$ denotes the number of mismatched cells of the second zone, and $m$ denotes the number of cells excluding the mismatched cells of the second zone.

According to Equation 3, the more the number of mismatched cells is present during the time for determining the moving delay time of the second zone, the shorter the correction delay time is. In this way, the cells of the second zone coinciding with the cells of the first zone can be positioned horizontally in a faster time. As a result, the skipped cells are quickly skipped to position the matched cells horizontally, and the scroll speed of the second zone is increased when there is a mismatched cell.

## 5. CONCLUSION

Contributions of the taxi mobility platform providing system, which is discounted by advertisement viewing, suggested in this study are as follows. By providing advertisements to passengers with a display on the taxi, first of all, it can provide new vitality to the taxi industry, as well as provide a new advertising market to advertisers by opening a paradigm of new advertising methods.

By receiving the advertisement preference text from the passenger and extracting the valid text from the passenger, the customized advertisement optimized for the passenger can be provided by identifying the passenger's preferred advertisement. In this environment, it is possible to provide more advertisements to passengers by simultaneously outputting two advertisement categories.

When the scroll of the first zone is manipulated, the delay time may be calculated through the equation, and the scroll of the second zone may be linked to be output by reflecting the delay time. Through this, it is possible to induce attention to advertisements while providing convenience to passengers.

In a future study, there will be a need for discussion about branded mobility as a part of the MaaS. Branded Mobility refers to a platform business that allows passengers to call an autonomous vehicle and access internal branded products and services while traveling for free, providing enjoyable and productive travel times. More specifically, this system provides more creative and immersive services as an interactive digital out-of-home (DOOH) that contains entertain contents to consumers. It is possible to enjoy various contents such as game using eye tracker, AR contents, interesting image clip, and nearby restaurant information, as well as using the advertisement at a low cost.

For advertisers, based on this system, it can be used as a platform to advertise diverse and creative forms other than images and opportunities for customer data collection, which can gain additional insights on customer's behavior patterns and interests. To create the branded mobility platform, it is necessary to study what kinds of DOOH contents and advertisements can be effective for each type of industry. The contribution of this study is significant an introductory study for the long-term research for the branded mobility in the MaaS.

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