

Improvement of Way-finding Sign System at Subway Stations

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1. Introduction

Public transportation such as subway is known as a convenient mode of transportation among many commuters in large bustling cities because it is free from traffic congestion and delivers outstanding on-time performance. The fact that it is underground and that subway vehicles operate in both directions, however, require a clear guide system or otherwise cause some passengers to take the opposite direction from what they're supposed to take. This mistake is made more frequently by first-time passengers (including foreign tourists) [2] and even regular commuters get confused with the directions in transfer stations. Objective of this research is to analyze issues in order to minimize the frequency in which passengers take the wrong direction and propose solutions. To this end, the research reviewed guide system as-is and surveyed passengers. Figure 1 indicates flow chart of the research.

2. Current guide system and problem statement for subway

This research reviewed subway map [8] and references to analyze guide system of subways in Korea and overseas as-is and analyze issues. It also conducted a survey to identify passengers' inconveniences in taking the subway in Korea. Analysis into subway guide system at both home and abroad indicated that geographical name of first stop or last stop, or number were used for name of subway route and different colors were used to mark each route (Figure 2). There are some subway routes in Korea that go by a geographical name of a first stop or last stop but most of them go by route number. But, there is no subway route that guide passengers by up or down direction of vehicle operation.

Major frustrations passengers face during subway transfer as presented in other studies are lack of a well-defined guide system, non-hierarchy of information display and signs in an improper location [3, 4] of which they could all be easily observed in site survey. Others include descriptive sign and inconsistencies in guide signs.

According to the survey, around 90% of passengers responded that they got confused in the transfer direction and 12% of passengers took a subway for the opposite direction at their own expense separately [6]. To address such issues, Ho-Nam Chang [5] proposed a solution to specify letters at the first stop and at the last stop so that passengers can easily recognize direction of vehicle operation, if not geographical name and Ji-Sun Kim et.al[1], suggested changes in the colors in order to make guide signs more visible and enable passengers to more clearly figure out the direction. This, in short, indicates the need to show a single route into two different routes based on direction and to improve subway route map design so that passengers can effortlessly recognize which direction a subway will take in order to minimize the mistake of taking the wrong subway [7].

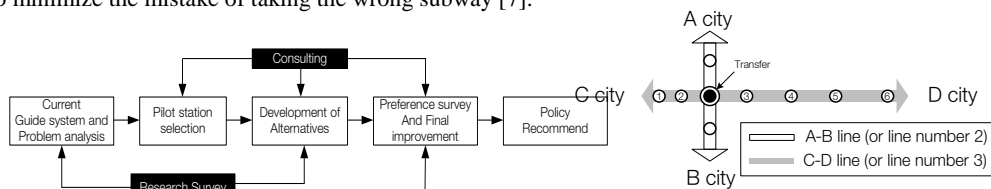


Figure 1. Framework of research Figure 2. Route guide concept of subway

3. Direction for improvement and pilot station selection

This research came up with two alternatives to guide direction of vehicle operation. The first alternative is to specify a consecutive alphabet letters such as A or B by each direction of operation in a single route. Objective of the first alternative is to help passengers better recognize direction of vehicles operation. The second alternative is similar to the first one in that it makes geographical names and route number uniform but goes further from the first one by suggesting English abbreviations (N, S, E, W) on north, south, east and west under a first stop or a last stop. Indication of all directions across the route map may help passengers recognize directions but is not an effective alternative since it is practically hard for passengers to have a clear sense of direction underground. The first alternative of specifying alphabet letters in a last stop was selected by survey respondents (87.3% of all survey respondents). The research also suggested an idea to put dotted lines along the existing full lines so that passengers can identify direction of vehicle operation by intuition as presented in Figure 4~6.

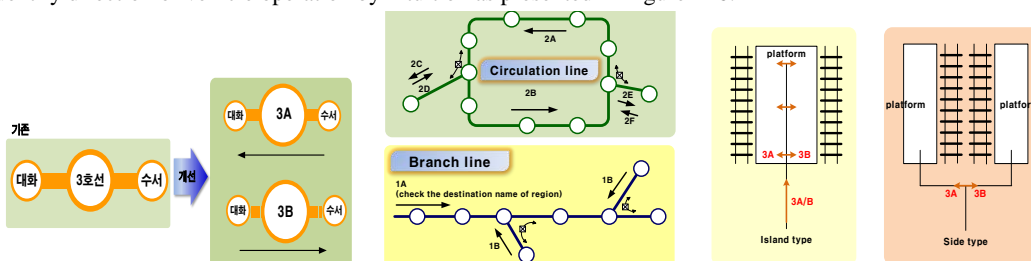


Figure 4. Alternative by operating DirectionFigure

5. Alternative by line typeFigure

6. Alternative by platform type

This research put focus on guiding subway's direction of operation for an improved transfer guiding system and selected a pilot station to apply the proposed map design since it cannot be applied to all stations. The research

selected Jong-no 3-ga station in Seoul as the pilot station since it is a bustling station with three transfer lines, attracts a large number of passengers and serves as a gateway to Seoul for many foreign tourists. The research ran a simulation to the pilot station via VR simulation program and the results will be used for conducting a survey to passengers and eventually determining the best alternative.

4. Solutions to improve guide system on direction of subway vehicle operation

The research put alphabet letters in order to better recognize up or down direction of subway vehicle operation in a single route, thus minimize the mistake of taking the opposite direction, and suggested an alternative to put a dotted line along the existing full line for visual recognition as shown in Table 1. The existing guide signs have arrows to indicate direction of subway vehicle operation but they don't quickly jump into the eyes.

The alternative suggested in this research was applied to Jong-no 3-ga station via VR and the research came up with the best alternative based on survey results to passengers. Figure 7 shows application of the alternative to Jong-no 3-ga station via VR.

[Table 1] Alternatives of way-finding sign system at subway line number 3 in Korea

Category	For Dae-hwa	For Su-seo
Current Design		
Alternative Design		



Figure 7. Application example using VR to the Jong-no 3ga station

5. Conclusion and Discussion

A subway has a first stop and a last stop, which indicates that a single route has two opposite directions. Passengers occasionally fail to find the right direction as many subway route guide systems in Korea and abroad guide direction based only on geographical name of the first stop and the last stop, which passengers cannot easily recognize. An improved guide system and route number system are needed for passengers to easily recognize direction of vehicle operation. This research suggested an improved route map design so that passengers can intuitively recognize direction and an idea to put alphabet letters in the existing guide systems so as to better indicate two directions of operation in a single route. But these are only conceptual alternatives that need in-depth review by experts to see if they're applicable and viable. Routes that work as a branch route or cases in which the last service subway does not go all the way to the last stop need to be taken into account. As it can be a burden for related authorities to apply the alternative across routes, they should consider it in crowded transfer stations on a pilot basis to gauge its effectiveness.

6. References

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