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Interacting with Service App: Reviewing Users' Body and Hand Gestures on Ride-hailing Mobile App

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***Abstract*:** *Amid its ease of use and availability, ride-hailing service has become apparent and easily found in Indonesia. As a result, ride-hailing app is increasingly popular and commonly used by Indonesian commuters, especially those within the city limit and its surrounding urban area. Yet, despite its high usage, no studies have been found on how effective users' body and hand gestures work when utilizing the app on a mobile phone display. This study aimed to observe people's body and hand gestures when using ride-hailing apps on mobile phones, exposing the possibility of making a better design recommendation. Users' body and hand gestures were observed and categorized into various types of body gestures, arm movements, and dominant hand usage. Seven main gestures and ten sub-gestures are exposed. Results show that most users act to use two-hands coordination by standing gestures with both arms raised. This result becomes valuable insights in understanding users' actual behaviors and may serve as a supporting reference for the development of similar service apps in the future.*

Keywords: *body and hand gestures, ride-hailing application, service app*

1. Introduction

Smartphones are one of the smart devices that are highly used by people [1], and people in developing countries are no exception [2]. In Indonesia, the number of smartphone users in 2021 is estimated to reach 199.2 million users or 72.7 percent of the Indonesian population [3]. The data indicates that smartphone usage has been one of the main necessities of most Indonesians.

The ease of use and availability of the internet and smartphones have provided opportunities for various service companies, one of which is the application-based ride-hailing services [4]. With smartphones, ordering transportation services can be performed online anywhere and anytime. Ride-hailing services are designed to provide their users with private access to travel, connect and order services from nearby drivers, and keep a record of travel history via online platforms [5].

In the ride-hailing service, applications have become one of the essential products. Previous studies have proposed several factors that provide positive experiences and perceptions in the service order quality through applications, one of which is the design aspect of users and application interaction [6]. Experience with higher efficiency and convenience in using the application impacts the satisfaction aspect for ride-hailing service users [7].

The quality of the application can not only be determined by the efficiency of use. The context of use is also one of the crucial aspects of achieving appropriate results. According to Chamorro-Koc et al. [8], the context of use is the correlation between the conditions, activities, and usage in the interaction between the user and the product. According to da Silva et al. [9], the context of use determined the product's suitability for its task. The context of use becomes increasingly relevant because ride-hailing users are primarily commuters.

Despite the importance of the context of use aspect in ride-hailing applications, research that identifies people's body and hand gestures when using ride-hailing applications in Indonesia has not been conducted to our knowledge. Therefore, in this study, we aimed to identify the people's body and hand gestures when using a ride-hailing application on mobile phones. To achieve the objectives of this study, we conducted non-participatory field observation of people's body and hand gestures when using a ride-hailing application on mobile phones. Users' body and hand gestures were categorized into various types of body gestures, arm movements, and dominant hand usage. This result becomes valuable insights in understanding users' actual behaviors and may serve as a supporting reference for the development of similar service apps in the future.

2. Methods

2.1. Study method

This research was conducted using an anonymous and non-participatory field observation method. This observational study aimed to identify the commuters' body and hand gestures when using ride-hailing apps. The subjects of this observational study were commuters who order transportation services via ride-hailing apps on their mobile phones. The objects of this observational study were body gestures, arm movements, and dominant hand usage when the subjects were using ride-hailing apps on mobile phones.

2.2. Data collection and analysis

The observation was executed for two days in two mall lobbies in Bandung City, Indonesia. We observed 18 commuters (12 men, six women) using ride-hailing apps on mobile phones. The observation data were analyzed by categorizing the variety of gestures that were grouped based on body gestures, arm movements, and the dominant hand used by the observation subjects when using the ride-hailing app. The observation data were presented in a table containing illustrations of the subjects' body gestures, the activity descriptions, and the category. Subsequently, the categorised gesture varieties were analyzed by quantifying the percentage of the frequency with which gestures are performed when the observation subjects used the ride-hailing app. The results of the percentage quantification became the conclusions of this study.

3. Results

3.1. Categorization of Users' body and hand gestures

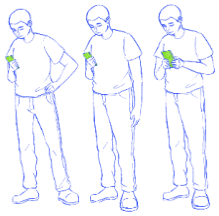
Gesture categorization is carried out to simplify the identification of the body and hand gestures of the observation subjects to facilitate the process of quantifying the percentage of gesture categories carried out in the subsequent step. The categorization of gestures was identified based on the observation of subjects' body gestures, arm movements, and dominant hand usage when using the ride-hailing app on mobile phones. "Table I: Categorization label of body and hand gestures of ride-hailing app users" exposes the category-labelling system of the users' body and hand gestures when using the ride-hailing app on mobile phones.

According to Table I, it was found that the categorization of body and hand gestures of 18 commuters when using the ride-hailing app with mobile phones resulted in a total of seven main gestures with ten sub-gestures within the main gesture categories. There were four types of body gestures, namely sitting, standing, standing while leaning, and walking. There were three types of arm movements, namely forearm raised, elbow supported, and forearm on lap. There were two types of dominant hand usage, namely one-handed and two-handed. Subsequently, the gesture labels that had been determined in the categorization were cohered with the results of observations on each subject. "Table II: Description and the categorization of the observed subjects' body and hand gestures when using the ride-hailing app on mobile phones" exposes illustrations of the gestures, body and hand gesture descriptions, and the gesture category of each observed ride-hailing app user.

TABLE I: Categorization label of body and hand gestures of ride-hailing app users

Gesture Category	Gesture Sub-category	Body Gesture	Arm Movement	Dominant Hand Usage
A	A1	Sitting	Forearm raised	One-handed
	A2	Sitting	Elbow supported	One-handed
	A3	Sitting	Forearm on lap	One-handed
B	B1	Sitting	Forearm raised	Two-handed
	B2	Sitting	Forearm on lap	Two-handed
C	C1	Standing	Forearm raised	One-handed
D	D1	Standing	Forearm raised	Two-handed
E	E1	Standing while leaning	Forearm raised	Two-handed
F	F1	Walking	Forearm raised	One-handed
G	G1	Walking	Forearm raised	Two-handed

TABLE II: Description and categorization of the observed subjects' body and hand gestures when using the ride-hailing app on mobile phones

Subject	Gesture Illustration	Description	Category
1		• **Body gesture:** Standing, and then walking at a slow pace. • **Arm movement:** One forearm was raised when holding the phone with one hand. Both forearms were raised when holding the phone with two hands. • **Dominant hand usage:** Holding the phone with two hands when intensively interacting with the phone screen. Holding the phone with one hand (right hand) when the interaction intensity with the phone screen is low.	C1; D1; F1
2		• **Body gesture:** Standing, and then walking at a slow pace. • **Arm movement:** Both forearms were raised. • **Dominant hand usage:** Holding the phone with two hands.	D1; G1
3		• **Body gesture:** Sitting. • **Arm movement:** Both forearms were raised. Both elbows were supported by both thighs. • **Dominant hand usage:** Holding the phone with two hands.	B1
4		• **Body gesture:** Standing. • **Arm movement:** Both forearms were raised. • **Dominant hand usage:** Holding the phone with two hands.	C1

5	 	• **Body gesture:** Walking at a slow pace and then sitting. • **Arm movement:** When he sat down, both forearms were on his lap. • **Dominant hand usage:** Holding the phone with one hand (right hand) when walking. Holds the phone with two hands when sitting.	F1; B2
6		• **Body gesture:** Sitting. • **Arm movement:** Both elbows were supported by both thighs. The right forearm supports the face. The left forearm is raised. • **Dominant hand usage:** Holding the phone with one hand (left hand).	A2
7		• **Body gesture:** Sitting. • **Arm movement:** Both elbows were supported by both thighs. When he held the phone with one hand, the right forearm was raised, and the left forearm was in the lap of the left thigh. • **Dominant hand usage:** Holding the phone with two hands when intensively interacting with the phone screen. The right hand held the phone, while the left hand interacted with the phone screen. Holding the phone with one hand (right hand) when the interaction intensity with the phone screen is low.	A3; B1
8		• **Body gesture:** Sitting while eating. • **Arm movement:** Right forearm was raised. • **Dominant hand usage:** Holding the phone with one hand (right hand).	A1
9		• **Body gesture:** Sitting. • **Arm movement:** Both forearms in the lap of both thighs. • **Dominant hand usage:** Holding the phone with one hand (right hand). Holding the phone with two hands when the subject needed to type on the phone screen.	A3; B2
10		• **Body gesture:** Sitting. • **Arm movement:** Both forearms on the lap of both thighs. Occasionally both arms were raised, and both elbows were supported by both thighs. • **Dominant hand usage:** Holding the phone with two hands.	B2; B1
11		• **Body gesture:** Sitting with the left arm supporting the body. After sitting down, he walked. • **Arm movement:** When sitting, the right forearm was raised. When walking, the right forearm was also raised. • **Dominant hand usage:** Holding the phone with one hand (right hand) when sitting and walking.	A1; F1

12		• **Body gesture:** Standing, and then walking at a medium pace. • **Arm movement:** Right forearm was raised. • **Dominant hand usage:** Holding the phone with one hand (right hand).	F1
13		• **Body gesture:** Standing with the back leaning against the wall. • **Arm movement:** Both forearms were raised. • **Dominant hand usage:** Holding the phone with two hands.	E1
14		• **Body gesture:** Standing. • **Arm movement:** Both forearms were raised. • **Dominant hand usage:** Holding the phone with two hands.	C1; D1
15		• **Body gesture:** Standing. • **Arm movement:** Both forearms were raised. • **Dominant hand usage:** Holding the phone with two hands. Occasionally, holding the phone with one hand.	C1; D1
16		• **Body gesture:** Standing with the right upper arm leaning against the wall. • **Arm movement:** Both forearms were raised. • **Dominant hand usage:** Holding the phone with two hands.	E1
17		• **Body gesture:** Standing. • **Arm movement:** Both forearms were raised. • **Dominant hand usage:** Holding the phone with two hands.	D1
18		• **Body gesture:** Standing. • **Arm movement:** Both forearms were raised. • **Dominant hand usage:** Holding the phone with two hands.	D1

3.2. Quantification of users' body and hand gesture categories

There are 28 gesture activities found in this study. The gesture category with the highest number is D1, with a frequency of six cases. Then followed by categories C1 and F1, with a frequency of four cases; categories B1

and B2, with a frequency of three cases; categories A1, A3, and E1, with a frequency of two cases. The gesture categories with the lowest number are A2 and G1, with a frequency of one case. The frequency and percentage of the performed gesture categories when the subjects use the ride-hailing application are projected in Fig. 1 below.

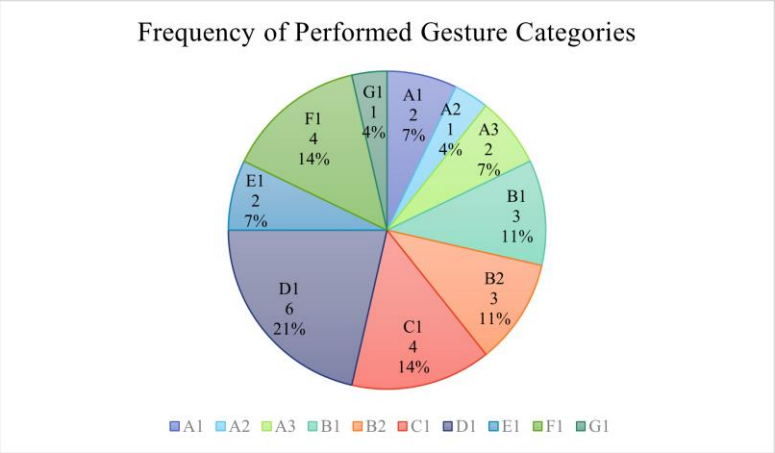


Fig. 1: Pie chart of the frequency of performed gesture categories in observing body and hand gestures of ride-hailing app users.

This study shows that most ride-hailing app users act to use two-hands coordination by standing gestures with both arms raised. It suggests that standing allows the users to move quickly yet remain in a stable enough state to use the app. The users prefer to use two-hands coordination for easier use of smartphones. Despite the two-hands coordination being the highest frequency of hand usage, gestures with one-hand coordination also had a high number of frequencies. However, the high frequency of one-hand coordination only applies with a combination of standing and walking gestures. It suggests that the users also prefer to use one-hand coordination if they need to move or be ready to move.

Meanwhile, ride-hailing app users are less likely to act to use one-hand coordination while sitting with their elbows supported. It indicates that the users might need to move easier anytime since they expect their drivers' arrival. Therefore, these users do not prefer to sit when using the ride-hailing app. In addition, the combination of one-handed coordination and the supported elbow is less likely to allow the users to move efficiently. Contrary to the ease of moving, the users also do not prefer to walk with two-hands coordination. It indicates that walking with two hands holding the phones does not efficiently allow users to use the ride-hailing app.

4. Conclusion

Overall, this study observed ride-hailing app users' body and hand gestures by dividing the gesture into three components, namely body gestures, arm movements, and dominant hand usage. Observational analysis was carried out by categorizing gestures composed of a combination of the three gesture components. The results showed that most ride-hailing app users preferred to use the app by standing gestures with two-hand coordination and raised forearms. It indicates that the users need to be in a position that eases them to move if they need to approach the booked drivers immediately. However, this study has limitations. Due to the time and resource limits, this observational study was only conducted on 18 commuters in two mall lobbies in Bandung, Indonesia. In future studies, it would be better if observations could be performed on a higher number of ride-hailing app users in more varied location conditions. The results of this study can be valuable insights in: (1) understanding user behaviors, (2) as references for app usability tests with tasks that are more accurate to the context of use, and (3) as references for the development of similar service apps in the future.

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