

Fundamental Research on Service Design with a Focus on Process

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Abstract: In this paper, our aim is to initiate research into service design by first understanding the current state of service processes. We report on two cases related particularly to the process aspect of “the importance of process and results,” which is taken to be a most basic feature of service. The first case study is a consideration of the state of processes as experienced by users when implementing the service. Here, 46 types of existing services are targeted and process steps are extracted according to, for example, changes in the medium by which the service is provided. Successive steps are evaluated according to 5 items and 16 categories for changes in medium, and cluster analysis is performed according to quantification theory type III to classify changes between steps. Relations between this analysis and existing methods are also examined. The second case is an investigation of user satisfaction after service implementation. Extensive interviews with 46 college students were performed to extract content related to the service satisfaction with respect to past utilization of 7 types of transportation. Results are classified according to Reiss’s profile of basic desires, and relations between transportation type and step are considered.

Key words: *Service design, Service process, Inter-step changes, User satisfaction*

1. Introduction

Services are becoming increasingly important globally [1]. However, services differ from goods in that the evaluation of a service varies depending on the experience and expertise of the user, thus making it difficult to evaluate a service before it has been provided. It is also difficult to pattern or standardize services given that the people and circumstances involved with the provision of a service are different each time, even if the service itself remains the same. At present, attempts to increase the value of services mostly tend to rely on the experience and intuition of the service provider, so service improvements are not being conducted efficiently or adequately.

As a starting point for research on service processes, this study investigates the manner of the processes and user satisfaction experienced when users utilize services from the perspective of segments (steps) of the service process, a concept that is described in detail below, laying particular emphasis on the ‘processes’ in the ‘importance of results and processes,’ one of the fundamental features of a service, in order to understand the current state of service processes.

2. Position of this study

The following 4 basic features of services have been identified: (1) amorphousness, (2) simultaneity of production and consumption, (3) joint production with users, and (4) the importance of results and process [2].

Looking at previous research in relation to (4) ‘results and processes,’ we found two studies, one study focusing on the exchange of ‘things’ and ‘information’ between service providers and service users [3] and another study that divides service processes into several segments and then focuses on trends in user evaluations for each segment [4]. However, the former study first uses certain ranges to segment service processes and then focuses on the individual exchanges that take place between the provider and the user, but does not discuss the nature of the overall service process. While it also discusses satisfaction in exchanges, it does not discuss specific details. Similarly, the latter study does not discuss how to segment service processes, or how to sequence segmented services. Furthermore, reference is made to what users expect in each process, but the current state of services is not evaluated.

Therefore, this study adopts a unique position in that the overall state of service processes experienced by users and the satisfaction obtained thereof have not yet been investigated for existing service cases.

3. Steps in service processes

3.1 How to capture service processes

First, we conducted a survey of previous research [5-12] in order to determine how service processes can be captured.

As a result, we were able to identify five of the main constituent elements of service processes, namely, (1) the service provider (hereinafter, ‘the provider’), (2) the medium through which the service is provided (‘the medium’), (3) the user of the service (‘the user’), (4) the environment in which the service is provided (‘the environment’), and (5) the exchanges between the medium through which the service is provided and the user of the service (‘exchanges’). The relationships between these constituent elements can be expressed as shown in the diagram below.

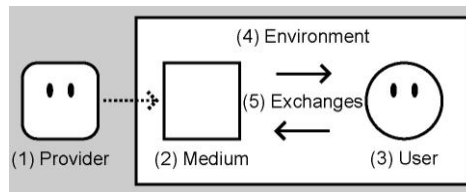


Figure 1. Relationship between main constituent elements of service processes

3.2 How to capture steps

We next considered how to capture steps, based on the constituent elements for capturing service processes that were identified in the previous section.

As a result, in this study we have decided to take a step to be “a state where there is no change in the three constituent elements of (2) ‘medium’, (4) ‘environment’ and (5) ‘exchanges’, excluding the other two constituent elements, namely, element (1) ‘provider’ (changes in which are not directly relevant to the user) and element (3) ‘user’ (which is not relevant when focusing on a particular user). In other words, we decided to view a service process as having progressed to the next step when any of the following took place: for element (2) ‘medium’, a

change to the ‘person or thing’ providing the service; for element (4) ‘environment’, a change to the location where the service is provided; for element (5) ‘exchanges’, an interruption to a sequence of exchanges.

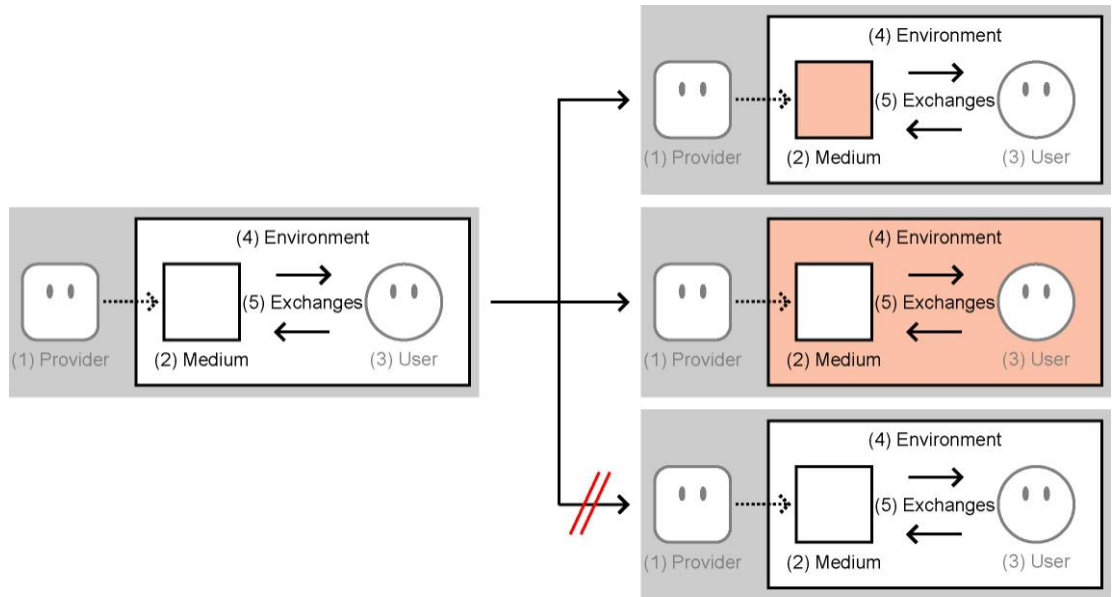


Figure 2. Three kinds of capturing steps

4. Manner of service processes

4.1 Service cases for investigation

In order to collect a wide range of service cases, five graduate students held a brainstorming session to identify service cases regarded as being likely to have multiple steps, referring to Lovelock’s classic service categories [13].

As a result, we were able to identify a total of 46 service cases, including 24 cases corresponding to ‘services directed at people’s bodies’ (such as ‘airplanes’, ‘hospitals’, and ‘intercity buses’), 12 cases corresponding to ‘services directed at physical possessions’ (such as ‘car parks’, ‘dry cleaning’, and ‘hire cars’), 8 cases corresponding to ‘services directed at people’s minds’ (such as ‘watching a baseball game’, ‘movie theaters’, and ‘churches’), as well as 2 cases of ‘services directed at intangible assets’ (such as ‘municipal councils’). Table 1 summarizes these results.

Table 1. 46 service cases

Service categories	Service cases		
Services directed at people's bodies	1 Airplane	2 Hospital	3 Intercity bus
	4 Hotel	5 Subway	6 Ferry
	7 Ropeway	8 Train	9 Restaurant
	10 Car dealer	11 Fast food	12 Bowling alley
	13 Tennis court	14 Hot spring	15 Beauty shop
	16 Driving range	17 Expressway	18 Pool
	19 Fitness club	20 Internet cafe	21 Buffet
	22 Strawberry hunting	23 Karaoke	24 Amusement park
Services directed at goods and other physical possessions	1 Parking lot	2 Dry cleaning	3 Rental car
	4 Gas station	5 Self-service gas station	6 Mobile phone shop
	7 Motorcycle shop	8 Delivery to home of the pizza	9 Photo studio
	10 Car wash	11 Glasses store	12 Rental DVD shop
Services directed at people's minds	1 Watching a baseball game	2 Movie theater	3 Church
	4 Motorboat race	5 Pachinko	6 Lotto
	7 Wedding ceremony	8 Museum	
Services directed at intangible assets	1 Municipal council	2 Licensing center	

4.2 Types of inter-step changes

4.2.1 Creating items for evaluation

We created items for evaluations which capture the manner of “inter-step changes” based on the method of capturing steps examined in section 3.

As a result, for element (2) ‘medium’, we came up with six types of inter-step changes, namely, from one person to another, from a person to a thing, from a thing to a person, from a thing to another thing, from a person to the same person, and from a thing to the same thing. For element (4) ‘environment’, we came up with two further perspectives on the manner of the changes, namely, a perspective relating to the distance from the prior step to the subsequent step (sub-element (4i) ‘distance’) and a perspective relating to the presence of other users when the transition to the subsequent step takes place (sub-element (4ii) ‘other users’). For the former perspective, we came up with three types of inter-step changes: the case where the location of the subsequent step is visible from the prior step, the case where the location of the subsequent step is not visible from the prior step, and the case where the locations are the same. Similarly, for the latter perspective we also came up with three types of inter-step changes, namely, the case where there are a small number of other users, the case where there are a large number of other users, and the case where there are no other users. For element (5) ‘exchanges’, we came up with three types of inter-step changes: the case where the subsequent step takes place within the same day, the case where the subsequent step takes place on the next day or a later date, and the case where the gap between steps is limited to the time required to transition to the subsequent step.

In addition to the three constituent elements selected in the definition of ‘step’, we also decided to add a sixth element that makes the subsequent step itself subject to change, namely, element (6) ‘the manner of selecting the subsequent step’ (hereinafter, ‘selection’). In terms of the manner of inter-step changes, we came up with three types of changes: the case where there are options but the subsequent step has been designated, the case where there are options and the subsequent step can be freely selected, and the case where there are no options.

Table 2 summarizes these results.

Table 2. Elements and types for capturing inter-step changes

Element		Type		
(2) Medium		a person → another person	a person → a thing	a thing → another thing
		a thing → a person	a person → the same person	a thing → the same thing
(4) Environment	(4i) Distance	the location of the subsequent step is visible	the location of the subsequent step is not visible	the same
	(4ii) Other users	a small number of other users	a large number of other users	no other users
(5) Exchange		within the same day	next day or a later date	the time required to transition to subsequent step
(6) Selection		designated	freely selected	no options

4.2.2 Analysis

For the 46 service cases that we collected, we identified the procedural actions that take place within each service case, based on the consensus of the five graduate students above. We then identified steps by reclassifying these procedural actions based on the method for capturing steps defined in this study (Table 3). We then took these inter-step changes as a sample, and applied Hayashi's quantification theory type III and cluster analysis by creating data with evaluation items where the item categories were the four constituent elements considered in the method for capturing inter-step changes and 18 types of manners of changes, based on the consensus of the five graduate students above. Furthermore, we added symbols such as 'Airplane/1' to the sample to indicate the inter-step change between Step 1 and Step 2 for the 'Airplane' service case, for example.

Table 3. Identified steps of 46 service cases

Service cases	Step1	Step2	Step3	Step4	Step5	Step6	Step7	Step8
1 Airplanes	Reservation → Payment	Check-in	Baggage check-in	Security check	Board	Travel	Disembark	Baggage pickup
2 Hospitals	Hospital reception desk	Medical examination	Accounts	Drugstore reception desk	Medicine receipt → Accounts			
3 Intercity buses	Reservation → Payment	Reception desk → Embark	Travel	Disembark				

4.2.3 Types of inter-step changes

We were able to identify a total of 189 service cases with step changes, ranging from a minimum of 2 step changes per case to a maximum of 8, and 143 service cases with inter-step changes, ranging from a minimum of 1 inter-step change per case to a maximum of 7 (Table 4).

Table 4. Relationship between number of step changes, inter-step changes and service cases

Number of step changes	Number of inter-step changes	Number of service cases
1	—	0
2	1	5
3	2	13
4	3	14
5	4	6
6	5	5
7	6	0
8	7	3
Total		46

As a result of analysis, we were also able to classify inter-step changes into four groups: 29 inter-step changes were classified under Group A, including ‘Licensing center/1’, ‘Ferry/2’, and ‘Movie theater/2’; 87 inter-step changes were classified under Group B, including ‘Cable car/2’, ‘Wedding ceremony/2’, and ‘Pool/3’; 10 inter-step changes were classified under Group C, including ‘Bus/1’, ‘Lotto/2’, and ‘Hotel/3’; and 17 inter-step changes were classified under Group D, including ‘Hair dresser/7’, ‘Gas station/1’, and ‘Mobile phone shop/1’. Figure 3 shows the scatter diagram for the sample. In addition, capturing the features of each group based on the appearance of item and category groupings, the flow of subsequent steps in Group A is nearly decided, users in Group B transition to a subsequent step based on peripheral conditions, users in Group C transition to a subsequent step based on their own judgment, and users in Group D individually transition to a subsequent step following directions from providers. Figure 4 shows the scatter diagram for the items and categories.

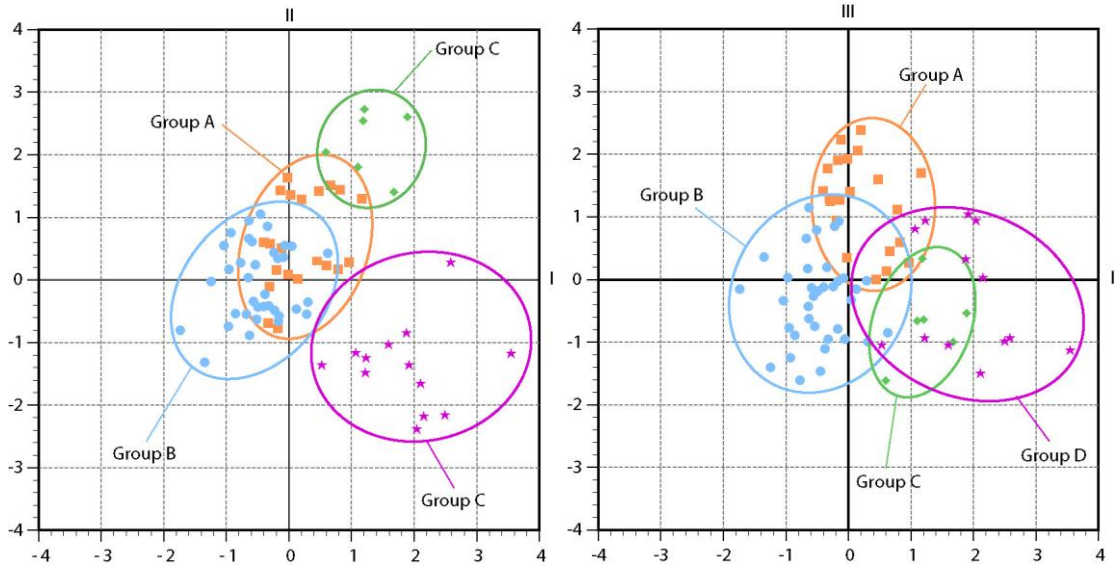


Figure 3. The scatter diagram for 143 inter-step changes (left: I-II, right: I-III)

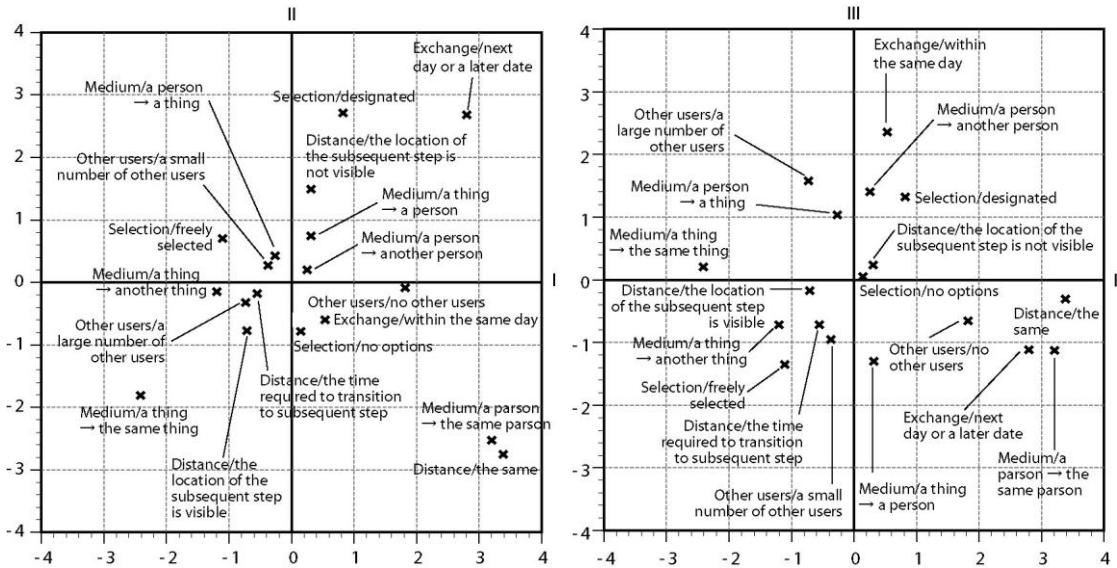


Figure 4. The scatter diagram for items and categories (left: I-II, right: I-III)

From the perspective of processes, services that simply have fewer steps can be described as more desirable for users. For service cases with relatively more steps, it is probably necessary to consider ways to reduce the number

of steps. Looking at the groups of ‘inter-step changes’ included in the 41 service cases for which two or more two inter-step changes were identified, as shown in Table 5, we found 17 cases with inter-step changes in one group, 19 cases with inter-step changes in two groups, 5 cases with inter-step changes in three groups, and no cases with inter-step changes in all four groups. Thus there are service cases that include more than one manner of inter-step change, and we can see that users experience a range of manners of inter-step changes while they use services.

Table 5. Relationship between the groups of ‘inter-step changes’ and service cases

Number of the groups of inter-step changes	Number of service cases
1	17
2	19
3	5
4	0
Total	41

4.3 Relationship between inter-step changes and notification methods

4.3.1 Identifying notification methods

Five graduate students conducted a brainstorming session to consider the different types of “notification methods for subsequent steps observed in inter-step changes” for the 143 locations where inter-step changes were identified. The brainstorming session also identified each “notification method for inter-step changes”. Note that because different notification methods are likely to be used depending on the (1) provider even for the same service, we decided to identify general notification methods based on the consensus of the five graduate students. Moreover, in cases where several types of notification method can be found in a single inter-step change we decided to list all of the notification methods found.

As a result, as shown in Table 6, we were able to identify five types of notification method: “number”, “flow line”, “marker”, “arrow”, and “sound”.

Table 6. Five types of notification method

Number	Flow line	Marker	Arrow	Sound
				—

4.3.2 Analysis

We investigated the relationship between the 4 groups of ‘inter-step changes’ classified in the previous section and the notification methods for subsequent steps seen in ‘inter-step changes.’

4.3.3 Relationship between inter-step changes and notification methods

Looking at the types of notification methods seen in the same inter-step changes, there was 1 location with none, 75 locations with 1 type, 40 locations with 2 types, 23 locations with 3 types, 2 locations with 4 types, and 2 locations with 5 types. Also looking at the number of notification methods for each, there were 22 number locations, 7 flow line locations, 88 market locations, 42 arrow locations, and 83 sound locations.

Looking at the relationship between the categories for the four groups of inter-step changes and the types of notification methods, we found that the following results (Table 7). Group A included 13 number locations, 2 flow line locations, 21 marker locations, 12 arrow locations, and 23 sound locations. Group B included 9 number locations, 5 flow line locations, 55 marker locations, 27 arrow locations, and 39 sound locations. Group C included no number locations or flow line locations, 9 marker locations, 2 arrow locations, and 3 sound locations. Group D included no number locations, flow line locations, or arrow locations, 2 marker locations, and 17 sound locations.

Thus, there appears to be no association between the category of ‘inter-step linkage’ and the type of ‘notification method’. This indicates that (3) ‘users’, who use a range of services in their daily lives, may find different notification methods used even for ‘inter-step changes’ with the same properties, or conversely the same notification method may be used even for ‘inter-step changes’ with different properties. Thus it likely to be necessary to consider the method for notifying subsequent steps in conjunction with inter-step changes.

Table 7. Relationship between the categories for the four groups of inter-step changes and the types of notification methods (upper: number of locations, lower: %)

	Number	Flow line	Marker	Arrow	Sound
Group A	13 44.8	2 6.9	21 72.4	12 41.4	23 79.3
Group B	9 10.3	5 5.7	55 63.2	27 31.0	39 44.8
Group C	— —	— —	9 90.0	2 20.0	3 30.0
Group D	— —	— —	2 11.8	— —	17 100.0

5. Manner of user satisfaction obtained in service processes

5.1 Selecting service cases and identifying steps for investigation

Among service cases widely used in daily life we selected 7 types of public transportation classified from Lovelock’s classic service categories [13] as services directed at people’s bodies and whose core service is ‘travel’ in order to investigate cases in which ‘(2) users’ obtained satisfaction: ‘airplanes’, ‘bullet trains’, ‘trains,’ ‘intercity buses,’ ‘buses,’ ‘taxis’, and ‘ships’. We then identified procedural actions for public transportation service processes and then identified steps by reclassifying them based on ‘how to capture steps’ as defined in this study.

5.2 Relationship between steps and cases in which satisfaction was obtained

5.2.1 Identifying cases in which satisfaction was obtained

We set 46 university students as (3) users, then investigated ‘cases in which satisfaction was obtained’ in the utilization of the 7 types of public transportation selected. More specifically, we conducted an interview survey asking targets to explain the substance of the cases and had them bring an image which expresses their feelings based on the ZMET method [14].

As a result, we were able to collect a total of 159 cases from 92 people, including 28 airplane people (51 cases), 10 bullet train people (14 cases), 10 train people (13 cases), 12 intercity bus people (26 cases), 9 bus people (14 cases), 15 taxi people (28 cases), and 8 ship people (13 cases). Table 8 summarizes these results.

Table 8. Collected cases

	1 Airplanes	2 Bullet trains	3 Trains	4 Intercity buses	5 Buses	6 Taxis	7 Ships	Total
Number of people	28	10	10	12	9	15	8	92
Number of cases	51	14	13	26	14	28	13	159

5.2.2 Analysis

We investigated the relationship between steps and cases in which satisfaction was obtained.

5.2.3 Relationship between steps and cases in which satisfaction was obtained

We looked at the relationship between the 159 cases collected and the above-mentioned steps for each of the 7 types of public transportation, as shown in Table 9. For airplanes, there was 1 case for Step 1 ‘reservation → payment’, 5 cases for Step 2 ‘check-in’, 2 cases for Step 3 ‘baggage check-in’, 1 case for Step 5 ‘board’, 38 cases for Step 6 ‘travel’, and 4 cases for Step 7 ‘disembark’; for bullet trains, there were 14 cases for Step 4 ‘travel’; for trains, there were 3 cases for Step 1 ‘purchase ticket’, 1 case for Step 2 ‘ticket inspection’, and 9 cases for Step 4 ‘travel’; for intercity buses, there were 26 cases for Step 3 ‘travel’; for buses, there was 1 case for Step 1 ‘embark’, 5 cases for Step 2 ‘travel’ and 8 cases for Step 4 ‘disembark’; for taxis, there were 2 cases for Step 1 ‘embark’, 6 cases for Step 2 ‘destination’, 17 cases for Step 3 ‘travel’, and 3 cases for Step 4 ‘payment’; and for ships, there were 13 cases for Step 3 ‘travel’.

Table 9. Relationship between steps and cases

	Step1	Step2	Step3	Step4	Step5	Step6	Step7	Step8
1 Airplanes	Reservation → Payment 1	Check-in 5	Baggage check-in 2	Security check —	Board 1	Travel 38	Disembark 4	Baggage pickup —
2 Bullet trains	Reservation → Payment —	Ticket inspection —	Embark —	Travel 14	Disembark —	Ticket inspection —		
3 Trains	Purchase ticket 3	Ticket inspection 1	Embark —	Travel 9	Disembark —	Ticket inspection —		
4 Intercity buses	Reservation → Payment —	Reception → Embark —	Travel 26	Disembark —				
5 Buses	Embark 1	Travel 5	Payment —	Disembark 8				
6 Taxis	Embark 2	Destination 6	Travel 17	Payment 3	Disembark —			
7 Ships	Purchase ticket —	Embark —	Travel 13	Disembark —				

Thus, while there were cases which corresponded to nearly all steps in the 3 types of services ‘airplanes’, ‘buses’, and ‘taxis’ we found a remarkably high number and a large bias in the number of cases that correspond to the core service of travel. Meanwhile, for ‘trains’ there were cases that only corresponded to the travel step and

steps prior to that, and for the 3 types of services ‘bullet trains’, ‘intercity buses’, and ‘ships’ there were cases that corresponded only to the travel step.

This suggests that the content of services for which satisfaction is obtained from steps prior and subsequent to the travel step for all types of public transportation will be a topic of future study.

5.3 Relationship between steps and types of satisfaction

5.3.1 How to capture desires

As there is a wide variety of different types of satisfaction, we examined previous research on desires.

As a result, we were able to uncover 4 approaches: Maslow’s hierarchy of needs [15], Murray’s psychogenic needs [15], Stephen Reiss’s profile of 16 basic desires [16], and Desmond Morris’s 17 types of happiness [17]. Looking at the content and numbers classified, we used Stephen Reiss’s profile of 16 basic desires (Table 10) below to investigate desires.

Table 10. Stephen Reiss’s profile of 16 basic desires

1 Acceptance	2 Curiosity	3 Eating	4 Family
5 Honor	6 Idealism	7 Independence	8 Order
9 Physical activity	10 Power	11 Romance	12 Saving
13 Social contact	14 Social status	15 Tranquility	16 Vengeance

5.3.2 Analysis

We classified the satisfaction of identified cases based on Stephen Reiss’s profile of 16 basic desires and investigated its relationship to steps. As discussed above, we divided into three major steps, the core service of ‘travel step’ (core service has only this ‘travel step’), ‘prior step to travel (hereafter, prior step)’, and ‘subsequent step to travel (hereafter, subsequent step)’.

5.3.3 Relationship between steps and types of satisfaction

As shown in Table 11, for ‘prior step’, we were able to identify a total of 8 types of desires: 4 types of desires such as ‘order’ for airplanes, 3 types such as ‘social contact’ for trains, 1 type which is ‘idealism’ for buses, and 5 types such as ‘social contact’ for taxis. There were no particular trends when comparing high-percentage desires by type of public transportation. For ‘travel step’, we were able to identify a total of 12 types of desires: 10 types of desires such as ‘social status’ for airplanes, 5 types such as ‘tranquility’ for bullet trains, trains, and intercity buses, 2 types such as ‘idealism’ for buses, 6 types such as ‘social contact’ for taxis, and 5 types such as ‘tranquility’ for ships. We found a high percentage of desires related to ‘tranquility’ when comparing high-percentage desires by type of public transportation. For ‘subsequent step’, we were able to identify a total of 9 types of desires: 2 types of desires such as ‘tranquility’ for airplanes, 6 types such as ‘tranquility’ for buses, and 2 types such as ‘social contact’ for taxis. There were no particular trends when comparing high-percentage desires by type of public transportation.

Thus, for ‘prior step’ and ‘subsequent step’ we did not identify desires in common between types of public transportation, suggesting the possibility of investigating the content of services for satisfying various demands would be possible. On the other hand, based on the content of services that fulfill these desires, the fact that there were many desires primarily related to ‘tranquility’ for ‘travel step’ suggests the possibility of investigating the content of services that fulfill other desires. While the 4 types ‘family’, ‘honor’, ‘physical activity’, and ‘vengeance’ were not present in the 7 types of public transportation or in any of the steps, further study will be

required on the content of services that satisfy these desires based on the fact that this survey targeted only university students.

Table 11. Relationship between steps and types of satisfaction (upper: number of cases, lower: %)

Prior step																	
	1 Acceptance	2 Curiosity	3 Eating	4 Family	5 Honor	6 Idealism	7 Independence	8 Order	9 Physical activity	10 Power	11 Romance	12 Saving	13 Social contact	14 Social status	15 Tranquility	16 Vengeance	Total
1 Airplanes	1 11.1	—	—	—	—	—	—	4 44.4	—	—	—	2 22.2	—	—	2 22.2	—	9 100.0
3 Trains	—	—	—	—	—	—	—	1 25.0	—	—	—	1 25.0	2 50.0	—	—	—	4 100.0
5 Buses	—	—	—	—	—	1 100.0	—	—	—	—	—	—	—	—	—	—	1 100.0
6 Taxis	1 12.5	—	—	—	—	—	2 25.0	—	—	—	—	—	2 25.0	1 12.5	2 25.0	—	8 100.0
Travel step																	
1 Airplanes	4 10.5	6 15.8	2 5.3	—	—	1 2.6	2 5.3	1 2.6	—	2 5.3	—	—	2 5.3	10 26.3	8 21.1	—	38 100.0
2 Bullet trains	—	1 7.1	—	—	—	—	—	3 21.4	—	2 14.3	1 7.1	—	—	—	7 50.0	—	14 100.0
3 Trains	—	—	1 11.1	—	—	1 11.1	—	—	—	—	1 11.1	—	—	1 11.1	5 55.6	—	9 100.0
4 Intercity buses	—	—	—	—	—	—	2 7.7	4 15.4	—	2 7.7	—	1 3.8	—	—	17 65.4	—	26 100.0
5 Buses	—	—	—	—	—	4 80.0	—	—	—	—	—	—	—	—	1 20.0	—	5 100.0
6 Taxis	—	3 17.6	—	—	—	1 5.9	3 17.6	1 5.9	—	—	—	—	6 35.3	—	3 17.6	—	17 100.0
7 Ships	—	2 15.4	—	—	—	—	1 7.7	—	—	—	—	—	1 7.7	2 15.4	7 53.8	—	13 100.0
Subsequent step																	
1 Airplanes	—	—	—	—	—	—	—	—	—	2 50.0	—	—	—	—	2 50.0	—	4 100.0
5 Buses	2 25.0	1 12.5	—	—	—	1 12.5	—	1 12.5	—	—	—	—	—	1 12.5	2 25.0	—	8 100.0
6 Taxis	—	—	—	—	—	—	—	—	—	—	—	1 33.3	2 66.7	—	—	—	3 100.0

6. Conclusion

As a starting point for research on service design, in this study we investigated the manner of the service processes experienced and satisfaction obtained when users utilize services from the perspective of steps defined in this study, laying particular emphasis on the ‘processes’ in the ‘importance of results and processes,’ one of the fundamental features of a service, in order to understand the current state of service processes.

The former suggested the importance of the step perspective in investigating service processes in the future. The latter allowed us to understand the relationship between steps and desires, and suggested steps that should be noted for future service design. We intend to conduct a more detailed investigation in the future targeting particular providers and service cases.

Acknowledgement

This work was supported by JSPS KAKENHI (23611023).

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