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DESIGN FACTORS FOR SERVICE INTERFACES

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Abstract. *Service has been steadily studied in the aspects of productivity and efficiency, but there are few studies, which focus on the interaction between service delivery systems and customers. Feedback from the service customers is an important factor for service systems processes. In this study, we focused on the design factors, which determined the interaction between service delivery systems and customers, and tried to determine what kinds of factors influence on designing the interfaces of service systems. In so doing, we conducted a survey that asked participants about the interaction between service delivery systems and customers. As a result of the survey and statistical analyses, we can extract design factors for service interfaces and confirm the reliability and the validity of those factors. Design factors identified in this study will contribute to further studies related to service interfaces design.*

Keywords: Service delivery systems, Service interaction, Service interfaces, Service design factors

1. **Introduction.** Service science has been steadily studied so far. A purpose of the service science is to increase the productivity and efficiency of service. Researchers of service science have been focusing not only on developing a quality of service, but also on designing service systems for delivering a service. Service system includes a customer, a service organization that provides services and the service delivered through the interaction between the customer and service organization. In other words, service systems are understood as delivery systems processes. The service delivery systems processes comprise service providers and service consumers. The service providers produce services according to service needs of consumers. Therefore, feedback of service consumers is considered as an important factor of a service system process [10]. The service provider has to design the service delivery system focusing on the interactions, which include the feedback from the service consumers. One of the most important elements for designing service systems is the interaction between the customers and the service delivery systems. This study focused on the interaction between the service delivery systems and the customers, called service interaction. Just as we try to design the product interfaces to improve the interaction between users and products, we need to design the service interfaces, where the interaction between customers and service delivery systems happens, to improve service interaction. Service interface design implies designing a service system based on the interaction between the service delivery systems and customers. This study aims to extract design factors for service interfaces, and to confirm their validities through statistical analyses. First, variables for designing service interfaces were examined through literature review and expert review. Second, a survey was conducted to investigate the design factors for service interfaces based on the examined variables. Finally, the validities of design factors were confirmed through confirmatory factor analysis. As a result of this investigation, we are able to determine the factors, which can be utilized to design service interfaces. The contributions of this study are discussed in the last section.

2. **Related Work.** There were studies that claimed the importance of the service delivery system. Vargo and Lusch [10] argued that the service delivery system should be understood. The interaction between the service providers and the customers is an important part of service delivery systems. Thus, the understanding of a service delivery system is needed to understand this interaction. Further, Lovelock [2] defined the service delivery system as a mixed system that consisted of a manufacturing and a delivery, and focused on the importance of a service delivery system. He studied service delivery systems in the aspects of customers rather than structural factors of service. In addition, there were studies related to the types of providing a service. Lovelock [2] classified services into two types: a manned service that consists of visible actions, and an unmanned service that consists of invisible actions. Thomas [5] also conceptualized the manned service to distinguish between human-centered and equipment-centered service delivery systems. Canxiani [1] noted that the service delivery system is determined by the human-centered characteristics of systems, such as motivation of employees. So he mentioned that it should be considered to train employees when we designed the service delivery system. Stewart [4] has noted the visible service (facilities and equipment) and manned service. He conducted a study to design a service delivery system based on the two types of providing services. He claimed that this service delivery system might be the robust system that could cope with failure of service. These studies involved in interaction factors between the service delivery systems and customers based on the two types of providing service. Manned service is similar to tangible service, whereas unmanned service is similar to intangible service.

3. Method.

3.1. Questionnaire.

Variables for the service interface design were collected from the literature review and examined through expert review. Table 1 shows the variables examined and selected from the literature that was referenced, and the operational definitions of the variables. A total of 18 variables were used as questions for a survey. The questionnaire was composed of two parts. First, overall information about the process of service system was asked to respondents of the survey. These questions included an awareness of interaction between the service system and the customers, a formality of service procedure, and an openness of service procedure (see questions 1∼10 in Table 1). Second, the two types of providing services were asked to respondents of the survey. The two types of providing services are manned service and unmanned service (see questions 11∼18 in Table 1).

3.2. Procedure.

The questionnaire contained 18 questions shown in Table 1. A total of 200 participants took part in a survey. They were asked to respond the questionnaire by indicating the agreeability of 18 questions each in a seven-point Likert type scale, while they reminded themselves of service experiences, including hypermarket, coffee shop, dental clinic and haute restaurant. Survey participants were 102 males (51%) and 98 females (49%). Their average age was 27 years old (standard deviation: 10.3), and thus a majority of participants were in late twenties and thirties.

4. **Results.** Before conducting statistical analyses based on empirical data, eight design factors for service interfaces were derived from 18 variables by literature review and expert review. As shown in Table 2, eight design factors for service interface are 'visualization', 'speediness', 'utilization of customer records', 'formulization', 'quality of unmanned service', 'information of manned service providers', 'separation between manned service and customers' and 'quality of manned service'. 'Visualization' factor includes 'visibility', 'audibility', 'awareness', 'recognition' and 'openness' variables; 'formulization' factor

TABLE 1. Operational definitions of variables used in questionnaire

Questions	Variables	Operational definitions	References
1	Visibility	Degree of being visible to service processes	[6]
2	Audibility	Degree of being audible to service processes	[7]
3	Awareness	Degree of feeling about being served	[11]
4	Recognition	Degree of recognizing extent to which the service is processed	[6]
5	Openness	Degree of noticing service process	
6	Speediness	Degree of speed at which service is in progress	
7	Utilization of customer records	Degree of utilizing customers' past visiting history	[11]
8	Formality	Degree of formalizing procedures or rules about service process	
9	Announcement of formal procedure	Degree of announcing procedures or rules about service process	
10	Compliance of formal procedure	Degree of complying with procedures or rules about service process	
11	Selection of service offers	Degree of selecting freely sources of providing services	[7]
12	Reliability of unmanned service	Degree of relying on unmanned service, such as machine, signboard and announcement	[9]
13	Completeness of unmanned service	Degree of completing unmanned service, such as machine, signboard and announcement	
14	Information of manned service providers	Degree of being able to identify information of employees who provide services	[4]
15	Separation between manned service and customers	Degree of separation between employees and customers through walls, tables or other customers	
16	Consideration of customers in manned service	Degree of considering customers' situation in manned service	[8]
17	Reliability of manned service	Degree of relying on manned service	[4]
18	Positiveness of manned service	Degree of taking a positive attitude to manned service by giving full attention to customers	

includes 'formality', 'announcement of formal procedure' and 'compliance of formal procedure' variables; 'quality of unmanned service' factor includes 'selection of service offers', 'reliability of unmanned service' and 'completeness of unmanned service' variables; and 'quality of manned service' factor includes 'consideration of customers in manned service', 'reliability of manned service' and 'positiveness of manned service' variables. The other factors, such as 'speediness', 'utilization of customer records', 'information of manned service providers' and 'separation between manned service and customers', include their own variables each. Data collected from the survey were analyzed through confirmatory factor analysis (CFA) to investigate reliability and validity of eight design factors for service interface.

4.1. **Reliability.** To investigate reliability of each design factor, internal consistency index (Cronbach's alpha) and composite scale reliability index were calculated. As shown in Table 2, the values of Cronbach's alpha exist between 0.67 and 0.81, and composite

TABLE 2. Design factors for service interface and their reliabilities

No.	Design factors	Variables	Cronbach's alpha	Composite scale reliability index
1	Visualization	Visibility	0.73	0.82
		Audibility		
		Awareness		
		Recognition		
		Openness		
2	Speediness	Speediness	–	1
3	Utilization of customer records	Utilization of customer records	–	1
4	Formulization	Formality	0.79	0.78
		Announcement of formal procedure		
		Compliance of formal procedure		
5	Quality of unmanned service	Selection of service offers	0.67	0.77
		Reliability of unmanned service		
		Completeness of unmanned service		
6	Information of manned service providers	Information of manned service providers	–	1
7	Separation between manned service and customers	Separation between manned service and customers	–	1
8	Quality of manned service	Consideration of customers in manned service	0.81	0.85
		Reliability of manned service		
		Positiveness of manned service		

scale reliability index values are between 0.77 and 0.85. These values show reasonable confidence levels for reliability of factor. Four factors assessed in one variable were not necessary to measure internal consistency.

4.2. **Validity.** Discriminant validity [3] was investigated for the eight design factors (see Table 3). Diagonal values in Table 3 are square root values of an extracted average variance in each factor (AVE: average variance extracted). Each factor should have a larger dispersion value with such as same factor than the dispersion values with other factors (see the underlined value with the diagonal in Table 3). The square root value of extracted average dispersion for each factor in Table 3 is higher than dispersion values with other factors and 0.7. Therefore, it is concluded that eight design factors show their discriminant validity.

5. **Conclusions.** In this study, we derived eight design factors from 18 variables, which were collected from literature and examined by experts, and verified reliability and validity of eight design factors for service interfaces based on empirical data. The results of this study can contribute to service interface design in two aspects. First, with eight design factors we can measure status quo of service interfaces related to general service process, sources of service, quality of service and so on, which means that eight design factors can show types of interaction between service delivery system and customers. Second, we can consider eight design factors as design criteria for service interfaces. Since eight design factors cover essential areas of service interfaces, the changes in eight design factors may lead to the changes of whole service delivery systems. In addition, this study may be interpreted with the consideration of following items. First, this study provides

Table 3. Discriminant validity of design factors

Square root value of extracted average dispersion								
	Visualization	**Speediness**	**Utilization of customer records**	**Formulization**	**Quality of unmanned service**	**Information of manned service providers**	**Separation between manned service and customers**	**Quality of manned service**
Visualization	0.723							
Speediness	0.575	1						
Utilization of customer records	0.584	0.258	1					
Formulization	0.663	0.507	0.682	0.789				
Quality of unmanned service	0.508	0.397	0.461	0.594	0.776			
Information of manned service providers	0.547	0.337	0.561	0.558	0.674	1		
Separation between manned service and customers	0.241	0.492	0.262	0.428	0.338	0.371	1	
Quality of manned service	0.641	0.398	0.626	0.665	0.668	0.761	0.331	0.853

only fundamental design factors for service interfaces. Since there exist a variety of service processes, a further study should deal with more design factors in various service processes. Second, this study derived and verified design factors with general service process, but a further study needs to derive and verify various design factors, which reflect the characteristics of specific service industry sectors and each stage of service processes.

REFERENCES

[1] B. F. Canxiani, Leveraging customer competency in service firms, *International Journal of Service Industry Management*, vol.8, no.1, pp.5-25, 1997.

[2] C. H. Lovelock, Classifying service to grain strategic marketing insights, *Journal of Marketing*, vol.47, pp.9-20, 1983.

[3] D. Barclay, C. Higgins and R. Thompson, The partial least squares (PLS) approach to causal modeling: Personal computer adoption and use as an illustration (with commentaries), *Technology Studies*, pp.285-324, 1995.

[4] D. M. Stewart, Piecing together service quality: A framework for robust service, *Production and Operations Management*, vol.12, no.2, pp.256-265, 2003.

[5] D. R. E. Thomas, Strategy is different in service business, *Harvard Business Review*, vol.54, no.4, pp.158-164, 1978.

[6] E. Spiekerrmann, *Stop Stealing Sheep & Find out How Type Works*, Adobe Press, 2014.

[7] H. Pyo and W. Lee, *Service Design Innovation*, Ahn Graphics Press, 2012.

[8] J. H. Gilmore and B. J. Pine, *Authenticity: What Consumers Really Want*, Harvard Business School Press, Boston, 2007.

[9] M. Stickdorn and J. Schneider, *This is Service Design Thinking: Basics, Tools, Cases*, Wiley Press, 2011.

[10] S. L. Vargo and R. F. Lusch, Service-dominant logic: Continuing the evolution, *Journal of the Academy of Marketing Science*, vol.36, no.1, pp.1-10, 2008.

[11] T. Levitt, *Ted Levitt on Marketing*, Harvard Business School Publishing Corporation, 2006.