

Measurement and Evaluation in Service Engineering

Sakae Yamamoto¹, Miki Hiroyuki², and Hirohiko Mori³

¹ Tokyo University of Science, Faculty of Engineering,
11-3 Kagurazaka, Shinjuku-ku, Tokyo, 162-8601, Japan

² Oki Electric Ind. Co., Ltd.

³ Tokyo City Univ.

sakae@ms.kagu.tus.ac.jp, hmiki@cf.netyou.jp, hmori@tcu.ac.jp

Abstract. This paper discusses how to advance the service engineering research. The service engineering is still established as study, and has not been completed. However, it dared to take up how to advance the service engineering research. As for the reason, the following three points are thought. First of all, the methodology of an original service engineering cannot establish it yet. The secondly, researchers involved in the service engineering have taken an active part to the research in various fields. Thirdly, the service engineering is researched therefore based on each one's current knowledge. It has been thought that it is necessary to devise a method that manages to be unified. Of course, what respect you should note while thinking about the system of the service engineering now is described. Especially, it is thought that the finding of a deeply related field to the Ergonomics is needed in the service engineering.

Keywords: Service Engineering, Kano Theory, Industrial Engineering.

1 Introduction

1.1 Service

Up to now, it had been used with service in the field that was called the third industry used by economics. Moreover, it has been used in the field like the service-producing industry and the service industry, etc. because of the industry specification classification. Service relates to IT, the software industry, and the net industry recently. When service is defined there, it is "The one that hardware and software can be offered to the user is served". It will be accepted by a lot of people that it is this definition. However, I want to discuss the relation of the essence of the service and the viewpoint of Ergonomics and HCI.

1.2 What Is the Service Seen from the Ergonomics?

First of all, the usability and accessibility are thought as for the service seen from the ergonomics. It is the same as providing of the product and the system with service for the user to achieve the usability and accessibility. Therefore, this service means it is guaranteed that the product is easy-to-use.

The concept of service is taken up in the standard of ISO/IEC Guide 71: 2001 and ISO 9241-20:2008 in ISO. These standards are intended to help developers enable ICT equipment and services (and forthcoming novel or innovative equipment and services) so that they can be used by the widest range of people, regardless of their capabilities or disabilities, limitations or culture. In addition, these standards are declared for service to be provided the user in using hardware and software.

The thing offered to the user by the viewpoint of the ergonomics indicates usability and accessibility. Furthermore, Universal Design that is these broader concepts is indicated. In short, it thinks whether make it the product of the offered thing every the user.

An important thing is to make the engineer understand the idea of providing service for the product related to IT. The viewpoint of a current engineer of making the preferable product that the user wanted for the user was insufficient. Especially, they were not making the product by the viewpoint "It is possible to use it" for the person where the user had the senior citizen and the trouble. Then, the standard such as Guide71 and ISO9241-20 has come out.

It is thought the following two points are large and it is related to the background in which it has come to relate the usability and accessibility to service.

1. First of all, the advancement of ICT (Information Communication Technology) is given. That is, ICT cannot be separated from the advancement of the computer. The computer advances and has infiltrated our society. This brought various changes to our society. For instance, the word ubiquitous society was made to appear. However, what happiness did this society bring to our life? The advantage has not been shown yet as a concrete image. This made us expect new service to appear. In addition, the big role that this service plays has come into view. This gives the society a big impact, and the expectation that creates a further product and the system is becoming a reality. This also has not only manufacturing but also the influence on the information-technology industry. In addition, the expectation to which the user also receives a big favor is rising.
2. To see the favor to the user concretely, the design that reflects the user's favor and opinion and demand is requested. The user's reproof or demand relates to this design. Moreover, there is a technical improvement, and, in addition, user requirements evolve, too. In a word, contents of service always are evolving, too.

It thinks about consideration to the elderly person and the widest range of people who have not received the favor up to now based on these movements.

2 Service Engineering

The idea of services of the present age is different from the conventional mentality. The source of this modern idea is an idea called SSME (Service Sciences, Management and Engineering) that United States IBM advocated in 2004.

The service engineering is a research field in which it thinks how to achieve the service that has been described in the above-mentioned. It was described that the idea like the usability and accessibility was related to service in the viewpoint of the Ergonomics in the above-mentioned. It is to present the method of materializing

the usability and accessibility to the product and the system. Not only the ordinary user but also the elder person and the disorder person can use the product and the system in recent years, and service that aims mastering it is thought ideally. What information is useful for that? The creation of service that is new and seems wonderful is requested.

2.1 Notes of Practice of Service Engineering

There is an overarching point though it has not been pointed out so much up to now by the service engineering research. It is that service changes. It is necessary to create service while understanding this respect. This idea is the same as the idea of the attractive quality method developed by Dr. Kano.

We were watching television, and for instance, it went to the place of the T.V. set of the television and we had changed the channel when we wanted to change the channel before. And, this is thought that we are natural, it was accustomed to this action, and this action has become natural.

However, it will end even if the channel tuning in and the loudness control by remote control can be done when a remote controller is developed, and it doesn't go to the T.V. set of the television separately. This becomes accustomed to this very conveniently. Then, remote controller becomes a natural function.

It connects it in remote control in addition, and it is possible to think, and to connect it to DVD and the network by putting various functions the hope of the user. This becomes an attractive function for the user.

The change in function of such a product very often occurs in our surroundings. For instance, a mobile phone is the same. The functional alteration of the product will change the content of the service provided for us like this. Therefore, it is important that the designer understand the service change. In addition, the change is closely related to user requirements.

Of course, it is a problem to accept user requirements without regard to principles. Moreover, it is not easy to reflect user requirements from a technical viewpoint. A newer requirement appears when the requirement is met. As for this, it is necessary to think about the change in service. This suggests that there be various levels in service.

This means the Dr. Kano's theory used by the quality control applies also in the service engineering. That is, the finding of the quality control is not to be able to disregard it in the service engineering. If service is considered to be a quality of course, there is not a sense of incompatibility and either it is likely to be accepted.

It is not said that any service engineering and the quality engineering are the same here.

Certainly, the improvement of the quality gives the user large benefit. In addition, the favor will change the usage of products in daily life and working. That is, not only the voice call function of the cellular phone but also E-mail (sending and receiving of the character) function and photograph function were added. It not only used an individual function but also a new usage became possible. For instance, shopping seeing the photograph of the commodity from carrying became possible. This shows that the form of shopping changed. Up to now, it has been shown that the user who has not shopped by telephone can shop even by carrying. Of course, it is shown that the sales form greatly changes into shop managers. In a word, the change in the

quality function influences user and managers' purchasing. That is, the method of providing service changed. This is not only a story of a quality improvement alone.

In addition, it is appearance of the result of expanding, and using the influence to its maximum. The difference between the service engineering and the quality control of aiming was shown.

3 Object

The possible application of the theory in fields other than the service engineering is discussed, and the methodology for that is brought together.

3.1 Level of Service (Three Levels of Kano Theory)

According to Dr. Kano, the quality is constructed by three stages, and he explained these as three levels. The first level is called the "Must-Be quality", and the evaluating point is that the products are satisfying the basic function or not satisfying. It is guaranteed to talk over the telephone anywhere if it is a cellular phone.

The second level means the customers' satisfaction, and this level was considered after the competitor was able also to have the "Must-Be" function.

The quality at the first level is achieved, and the customer requirement develops the product to fill it afterwards. An important evaluation point is how it was able to meet the demand at that time. Therefore, the second level is defined as a satisfaction rating of the specified demand of the customer.

The third level indicates the state that cannot compete only by customer satisfaction with the other companies. The designers need to recognize the customer's potential

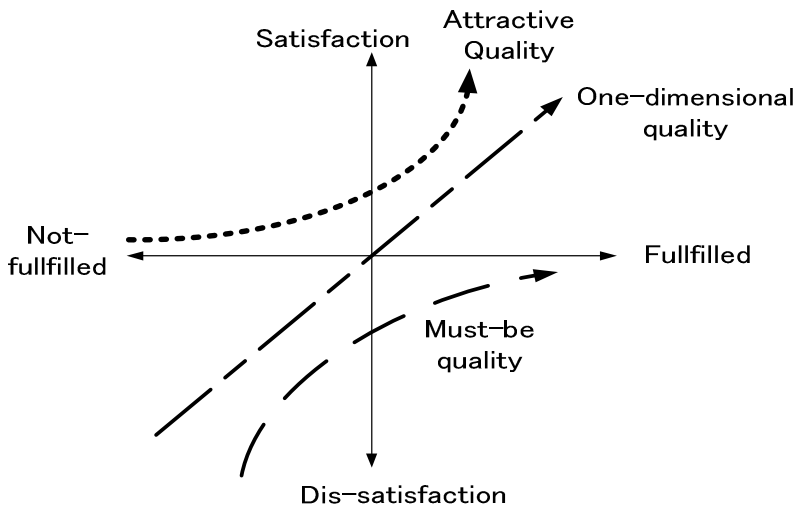


Fig. 1. The three levels of Kano theory (Figure of Kano (1) was modified)

demand. If designer make the product which satisfied the customer's potential demand, the customer accept the product with pleasure that exceeds the customers' expectation. It can be said that the achievement of customer delight. These three levels quoted Dr. Kano's classification. Kano calls the first level Must-be Quality, calls the second level, and One-Dimensional Quality and the third level are called Attractive Quality.

4 Meaning of Change in Service

The reason for the factor to cause the change in service is that user requirements change as described in above-mentioned in "Level of service". Catching the change in this demand mentioned that the change in service would be caught above. Then, in order to examine the change in user requirements, the questionnaire will be useful means. Whenever each level is achieved, do we research using the questionnaire? Of course, though then, we need check between the demands and the technical development.

Then, when a unified quality is invented from the must-be quality without taking the questionnaire again when user requirements are filled, it is likely to have to think about the following of that. Thinking the structure between each factor is clarified by analyzing the factor to invent a unitary quality for that is important.

5 Evaluation of Service

It demands generally from the user in the questionnaire survey. At this time, it is necessary to clarify scale of assorted traits. That is, the statistical technique that can be used according to each standard at the same time as distinguishing nominal scale, ordinal scale, interval scale, and ratio scale is different. When it makes a mistake in this, a significant result is not obtained. When it makes a mistake in this, a significant result is not obtained. Moreover, you should check this because there is a method of taking out the key word of a free description, too recently. How to summarize data has not been solved yet. It is easy for the principal component analysis and the factorial analysis to interpret it when bringing it together from three at most in four.

6 Cognitive Method and Industrial Engineering (IE) Method

When the user's behavior is examined, the action analysis and the motion study are often used. Especially, there is a purpose of examining it from cognitive viewpoint. Therefore, a mere action is not analyzed but the reason for the action why man acted like this is clarified. As a result, the operation process when man uses the product can be clarified. Thus, it becomes possible to clarify the operation that cannot use the product well, and to examine the reason.

A necessary thing is how to find out the reason for the manipulatory behavior by questioning from the operator here. Then, verbal protocol method is used. As a result, it becomes possible to clarify the reason for the operation, and to clarify the background how user requirements have come out. The persona method and the scenario method are used recently. These are called cognitive viewpoint. However, a basic technique often uses the IE method. When the IE method applied to the field, there

were many failed cases in the past. Actually, the means restrict the target, and it fails. Users are devising the method of IE because we are borrowing the IE technique as an analysis technique now that the purpose is different. However, human analyze by means of IE method. It worries about whether poke one's head inside to the above-mentioned failure unconsciously.

The current state of IE today has changed. The application only of the technique is not thought. The problem solving on the field is a purpose of IE. It thinks whether this problem solving becomes a new service creation by the service engineering. When the technique is used, a meta idea might be needed. Especially, what service develop by you while thinking about the change in service is demanded now.con

7 Peroration

It took a general view from a peripheral study area where the service engineering was surrounded of the service engineering. And, it thought about the influence given to the service engineering by discussing the possible application of peripheral study.

Acknowledgements. This paper was described around having noticed in the discussion with Dr. Noriaki Kano. Dr. Kano taught me the hint of the Kano theory and service engineering, and I touched the essence of Kano theory moreover. I wish to express my gratitude deeply for here.

If my paper made digression from the Kano theory, I had the responsibilities in this.

References

1. Kano, N., et al.: Attractive Quality and Must-Be Quality. The Journal of Japanese Society for Quality Control 14(2), 39–48 (1984)
2. Kano, N.: Quality crisis that Japan faces. DAIWA Review (9), 4–13 (2003)
3. Stauss, B., et al. (eds.): Services Science, Fundamentals, Challenges and Future Developments. Springer, Heidelberg (2008)
4. Salvendy, G., Karwowski, W.: Introduction To Service Engineering. John Wiley & Sons, New Jersey (2010)