

THE EXTENDED INTEGRATED MODEL OF KANSEI ENGINEERING, KANO, AND TRIZ INCORPORATING CULTURAL DIFFERENCES INTO SERVICES

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ABSTRACT

The fulfilment of customers' emotional needs (*Kansei* in Japanese) tends to be highly expected, especially in growing industries such as the service industry. Recent research shows that emotion is just as important as cognition in service-related encounters. Thus, service providers should not overlook the significant roles of both emotional and cognitive aspects in achieving service excellence for customers. In modeling how to capture and translate customers' emotional needs into services, Kansei Engineering (KE) is used. This study aims to integrate Kansei Engineering with the Kano model and the Theory of Inventive Problem Solving (TRIZ). The Kano model is used to identify the relationship between service attribute performance and customer satisfaction, whereas TRIZ is utilized subsequently to generate designs for improvement with the lowest contradiction between the proposed service design solutions. Due to relatively unexplored cultural differences in Kansei research, cultural factors are also considered and incorporated into the integrated model. It is hoped that further insight into the emotional needs of customers from different cultural backgrounds will be better understood, so that the improvement strategies will be suitable. In addition, to illustrate the applicability of the integrated model, an empirical study in a medium-sized restaurant that takes into account both Indonesian and non-Indonesian customers will be discussed.

Keywords: Cultural differences; Customer service; Kano; Kansei Engineering; TRIZ

1. INTRODUCTION

Quality is not only for products, but also for services (Nagamachi & Lokman, 2011; Hartono & Tan, 2011). Positive customer perceptions impact both cognitive and emotional satisfaction, known as total customer satisfaction. For understanding customers' emotional needs in product/service design and development, Kansei Engineering has been intensively used (Nagamachi, 1995; Hartono et al., 2013) as a quality management system that grasps the customer's emotions and improves the quality level to always satisfy them. The application of Kansei Engineering in the service industry is relatively new. The challenge for service providers is to deliver a consistent Kansei all the way through all main processes, ranging from pre-purchase to post-purchase activities.

Similar to a previous study by Hartono and Tan (2011), the current study also applies the SERVQUAL model as the service attributes, regarded as the stimuli for customers' Kansei. It is deployed in five different dimensions: tangibility, reliability, responsiveness, empathy, and assurance (Parasuraman et al., 1988). Although all service attributes are important,

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a prioritization strategy is required due to limited resources (e.g., funding, labor, and available hours) and relative impact level on customers' Kansei. This is supported by the fact that in many cases, the relationship between improvement levels and customer impressions is unnecessarily linear, which reflects a weakness of SERVQUAL's service gap analysis. The Kano model has the potential to fill this gap. The model's attractive needs indicators are quite related to customers' Kansei, and posit that delighted customers will promote and remain loyal to a company. In service context, delighted customers refer to the ones who show their utmost positive emotions. Through a Kansei Engineering methodology (Hartono & Tan, 2011; Hartono et al., 2013), critical service attributes with the highest impact on Kansei (categorized as attractive [A] in the Kano model), widest negative gap in service performance, and largest number of Kansei influenced, will be prioritized for improvement. Determining how to fulfil the needs for improvement is then explored via the intensive use of the House of Quality (HoQ) matrix (Tan & Pawitra, 2001; Hartono et al., 2013). However, service design and improvement mostly rely on inspiration, the past experiences of service designers, and similar existing designs, which is a weakness in service design (Chai et al., 2005). According to Chai et al. (2005), the Theory of Inventive Problem Solving (TRIZ) is appropriate for involvement in the service design and development process. TRIZ is distinguished from other problem-solving methods by its superiority in generating breakthrough ideas and solutions without contradiction. Moreover, since Kansei is time- and culture-dependent, cultural differences must be involved in Kansei evaluation for service improvement. However, there has been little exploration of the effect of individual cultural backgrounds on customer perceptions of service quality (Mattila, 1999; Weiermair, 2000).

Building on Hartono et al. (2014) and Hartono and Raharjo (2014), this study proposes an extended model of Kansei Engineering, the Kano model, and TRIZ that incorporates cultural differences to generate service excellence. In addition, an empirical case study is used to illustrate how TRIZ can contribute to Kansei Engineering and the Kano model in service design. Lastly, the contributions and managerial implications of the study will be discussed.

2. LITERATURE REVIEW

2.1. Quality and Kansei Engineering

A good quality product is defined as a product that meets the customer requirements and preferences, such as price, function, shape, and color. Some customer needs will change periodically, others do not. Surprisingly, many companies do not truly understand what the customer needs or wants, which potentially makes their products fail in the market (Nagamachi & Lokman, 2011).

Designing and developing products that appeal to the deepest aspects of customers' needs and wants will generate better and more valuable products for the market. Product value is not only about usability and functionality; rather, products and services should offer something beyond customer satisfaction; the fulfillment of latent or unspoken needs.

Nagamachi (1995) proposes that Kansei Engineering can win over the market. As an ergonomics-based product development technology, Kansei Engineering unites customer preferences and emotions (*Kansei* in Japanese) with the engineering discipline. According to Nagamachi and Lokman (2011), Kansei refers to the condition in which knowledge, emotions, and passions are united.

2.2. The Kano Model

What constitutes customer delight, which is surprising a customer by exceeding his or her expectation and satisfaction which drives positive emotions, should be of greatest interest for any service provider. In line with what Kansei involves, customer delight may produce an

emotional bonding mechanism between service providers and customers. The Kano model has the potential to distinguish between service performances (Kano et al., 1984); namely, (1) must-be [M], (2) one-dimensional needs [O], and (3) attractive needs [A]. To be more competitive in the marketplace, services must demonstrate all of these quality performances. Referring to must-be [M], a service provider has no choice about whether to overlook this need. More fulfilments of this need will not significantly increase the satisfaction levels, yet the lack of it will create trouble for a company. According to Hartono and Tan (2011), a company should focus their efforts more on the fulfilment of one-dimensional [O] and attractive [A] needs. Once these have been extensively fulfilled, they may produce higher satisfaction levels. The greatest challenge is to find and maintain an attractive need. It is known as a delighter, the fulfilment of which can have a great impact on customer delight. In this study, service attributes [O] and [A] are chosen as the main analytical focus for service improvement.

2.3. Theory of Inventive Problem Solving (TRIZ) in Services

The new service development (NSD) process has been growing rapidly in recent research. Similar to the new product development (NPD) process, NSD starts with idea generation and ends with market commercialization. However, the details of the idea generation stage have not been adequately addressed (Kelly & Storey, 2000). Thus, there is a need for developing a method for identifying, generating, and evaluating potential solutions to service problems with regard to novel and innovative ideas.

Among the many phases in the service design process, idea generation is considered to be one of the most critical activities (Chai et al., 2005). Existing conventional methods for idea-generating research, such as brainstorming and lead-user research may rely heavily on designers' and customers' past experiences. This may lead to cognitive inertia, which is a state whereby humans tend to rely on familiar assumptions and are reluctant to accept any modification to them. Determining what is unknown or unspoken by potential customers or service designers are a big challenge, and are often overlooked. According to Chai et al. (2005), service design tools (e.g., service blueprinting, structured analysis and design techniques, quality function deployment, and root cause analysis) have limited capability for generating ideas and overcoming potential cognitive biases.

To overcome the limitations of the idea generation process and service design tools, TRIZ is proposed. TRIZ is a structured problem-solving process that incorporates a set of problem definition and resolution tools derived from patent analysis. It begins by defining the problem, followed by problem resolution and solution evaluation. A series of TRIZ tools can be utilized, such as the Innovative Situation Questionnaire, the ideal final result, function analysis, the 40 inventive principles, the four separation principles, the algorithm of inventive problem solving (ARIZ), and 76 standard solutions (Altshuller, 1997). The distinctive superiority of TRIZ is that it includes a universal basis of invention that is regarded as the creative invention formulation

3. MODEL DEVELOPMENT FRAMEWORK AND METHODOLOGY

Based on the principles of Kansei Engineering, the Kano model, and TRIZ, a conceptual integrated model for service design is proposed. Four main stages are involved: (1) affective measurement, (2) service attribute categorization, (3) synthesis and modeling, and (4) service design and improvement, as shown in Figure 1.

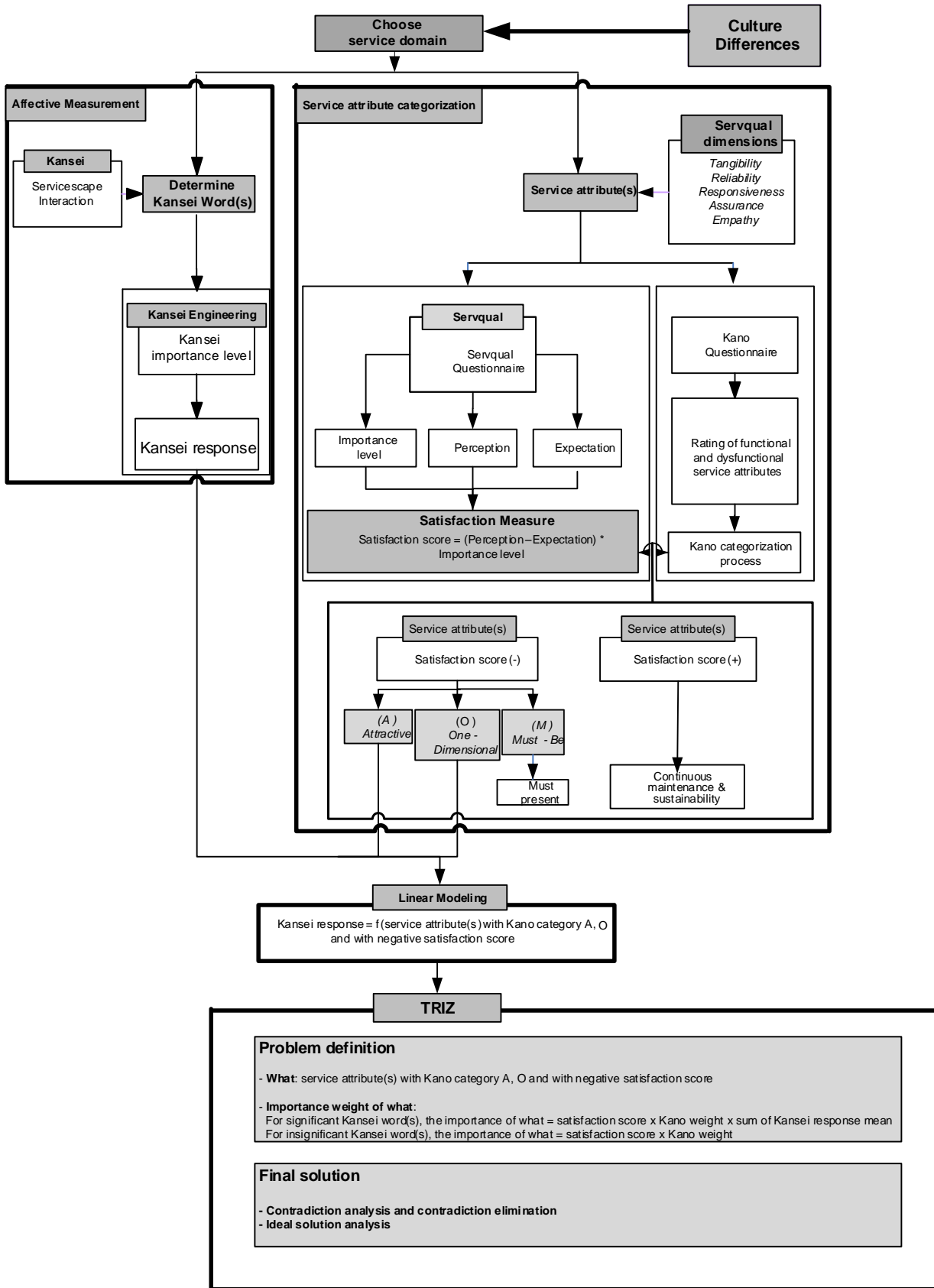


Figure 1 The extended integrated model of Kansei Engineering, the Kano model, and TRIZ in service sector

With respect to the conceptual framework of Kansei and TRIZ (Hartono et al., 2014), this study has both extended and refined it by incorporating cultural differences and the details of each stage. Stage 1, affective measurement, begins with the exploration and formulation of Kansei words to represent emotional needs. Stage 2, service attribute categorization, deals with the identification of service attributes as the main stimuli for Kansei, and uses SERVQUAL dimensions (Parasuraman et al., 1988) to represent Kansei stimuli (Hartono & Tan, 2011). The Kano model is deployed to categorize service attribute performance, followed by the measurement of customer satisfaction. The highest negative satisfaction score with regards to the [A] or [O] Kano categories will be of the highest priority for service design and improvement. A higher negative satisfaction score implies that the service attribute has a higher gap in terms of perceived service and expected service. At stage 3, the selected service attributes from stage 2 will be linked with Kansei to reveal significant relationships. Lastly, stage 4 involves confirming the defined problem based on the significant models. This stage is in line with the first phase of TRIZ. The defined problem will be weighted and prioritized according to the negative satisfaction score, the Kano weight, and the sum of the Kansei response mean. It is called “the importance weight of **WHAT**.” Here, **WHAT** refers to the most critical service attributes due to their greater impact on Kansei. The greater “the importance weight of **WHAT**”, the more important the service attribute is. Thereafter, among weighted and prioritized service attributes, we performed contradiction analysis and elimination, followed by ideal solution analysis.

4. EMPIRICAL CASE STUDY

In order to illustrate and verify the viability of the proposed extended model of Kansei Engineering combined with the Kano model, and TRIZ, a case study in the domain of restaurant services was conducted. The idea of integrating the Kano model, TRIZ, and Kansei Engineering with cultural differences was inspired by previous work (Hartono & Tan, 2011; Hartono et al., 2014). The findings of this study can hopefully be used as a generic model that can be applied to the resolution of problems associated with many different service domains.

This study was conducted in restaurant services involving Indonesian and non-Indonesian customers. In total, 100 Indonesian and 50 non-Indonesian customers participated in the study. A medium-sized restaurant with a capacity of 100 guests was selected. A face-to-face questionnaire was utilized, and 10 Kansei words were formulated and finalized: happy, comfortable, satisfied, friendly, trusted, relief, quiet, welcome, interesting, and modern. Twenty Kansei-related service attributes were also formulated, and those with a negative satisfaction score and an [A] or [O] Kano category were clustered, the results of which are provided in Table 1.

Regarding Kansei words, all Kansei-related service attributes, as shown in Table 1, have been linked to each of the Kansei words through their perception values. Through multiple linear regression analysis, the results of significant models are shown in Table 2. Thereafter, the importance weight of each significant service attribute is provided in Table 3.

Referring to Table 3, both samples (i.e., local and foreign customers) have a common problem, which is that the service attribute “prompt and accurate service {AL₆}” is presented as the highest importance weight. Prompt and accurate service in a restaurant is related to Kansei “welcome” and “comfortable” for local and foreign customers, respectively. According to the 40 principles of TRIZ and the TRIZ contradiction matrix (Altshuller, 1997), this problem refers to the speed section of TRIZ principles. The speed section, however, may have contradictions with the adaptability section. We need more speed to fulfil what the customer needs. However, restaurant staff often needs additional time to adapt and get used to faster service speed.

Table 1 Service attributes with a negative satisfaction score and an [A] or [O] Kano category

No.	Service attribute [notation]	Satisfaction score	Kano
Indonesian customers			
1	Consistent service [AL ₁]	-1.971	O
2	Prompt and accurate service [AL ₆]	-1.818	A
3	Staff knowledgeable about menu options [AL ₇]	-1.265	O
4	Staff greets and shows gratitude [AL ₁₃]	-0.683	O
5	Staff are friendly and have good communication skills [AL ₁₀]	-0.288	O
6	Staff are willing to promptly help customers as requested [AL ₉]	-0.22	O
7	Easy and good access to free wireless Internet service [AL ₁₂]	-0.182	A
8	Staff have an appealing and professional attractive and neat appearance [AL ₁₆]	-0.043	O
Non-Indonesian customers			
1	Prompt and accurate service [AL ₆]	-1.503	A
2	Staff are willing to promptly help customers as requested [AL ₉]	-0.205	O
3	Easy and good access to free wireless Internet service [AL ₁₂]	-0.198	O
4	Staff have an attractive and neat appearance [AL ₁₆]	-0.67	O

Table 2 Significant linear model of Kansei

No	Kansei word [notation]	Sig. value	Linear model (for local customers)	Linear model (for foreign customers)
1	Happy [K ₁]		N/A	
2	Comfortable [K ₂]	0.1	$K_2 = 3.713 + 200 AL_{16}$	$K_2 = 2.15 + 0.12 AL_6$
3	Satisfied [K ₃]		N/A	
4	Friendly [K ₄]		N/A	
5	Trusted [K ₅]	0.038	$K_5 = 3.760 + 0.182 AL_{12}$	N/A
6	Relief [K ₆]		N/A	
7	Quiet [K ₇]		N/A	
8	Welcome [K ₈]	0.024	$K_8 = 3.053 + 0.303 AL_6$	$K_8 = 5.345 + 0.349 AL_{16}$
9	Interesting [K ₉]	0.01	$K_9 = 4.199 + 0.295 AL_7 + 0.252 AL_{13}$	N/A
10	Modern [K ₁₀]		N/A	

Table 3 The importance weight of WHAT

No.	Notation	Satisfaction score	Kano Category	Kansei Weight	Kansei word	Mean	Importance weight
Indonesian customers							
1	AL ₆	1.818	A	4	Welcome	4.27	31.05
2	AL ₇	1.265	O	2	Interesting	4.37	11.05
3	AL ₁₃	0.683	O	2	Interesting	4.37	5.97
4	AL ₁	1.971	O	2	N/A	1	3.94
5	AL ₁₂	0.182	A	4	Trusted	4.46	3.25
6	AL ₁₀	0.288	O	2		1	0.58
7	AL ₉	0.22	O	2	N/A	1	0.44
8	AL ₁₆	0.043	O	2		4.37	0.38
Non-Indonesian customers							
1	AL ₆	1.503	A	4	Comfortable	4.12	24.77
2	AL ₁₆	0.67	O	2	Welcome	4.01	5.37
3	AL ₉	0.205	O	2		4.04	0.17
4	AL ₁₂	0.198	O	2	N/A	4.14	0.40

To resolve the contradiction between the speed and adaptability sections, which are based on the 40 principles of TRIZ, we are concerned with the principles of dynamicity, prior action, and copying. According to Chai et al. (2005), dynamicity means to design the characteristics of an object to be optimal or to find an optimal operating condition. For instance, a restaurant

should provide additional staff whose duty is to regularly check whether all guests have been served. It should also reduce the waiting time, which is sensitive to guests. Prior action deals with performing the required change of an object or system (either fully or partially) before it are needed. For example, to shorten the cooking and serving time, it is critical to prepare seasoning and cooking ingredients before they are requested, especially for favourite, routinely ordered items on the menu. Copying is related to copying creative service concepts from different industries. For instance, the concept of self-service at retail banks using touchscreen tablet PCs can be adopted and applied to provide a self-ordering system located at the guests' dining tables.

After performing contradiction analysis and implementation, the ideal solution chosen to address this problem should incur as little cost as possible with regards to the provision of maximum benefits to the customers and service providers. Among ideas proposed in terms of speed and adaptability, the simplest, most innovative, and most practical solution is to provide a touchscreen tablet PC at the each of the dining tables. Food menus, including their visualization and price, can be uploaded onto the tablet, and guests can choose and order from them, independently and promptly.

5. DISCUSSION

5.1. Contribution

At present, the need to fulfill customer satisfaction is a must, not only its cognitive aspect but its affective or evaluative aspects as well. By integrating the Kano model with Kansei Engineering, a service provider may have the ability to decide which service attribute(s) to prioritize with regards to customers' Kansei, given very limited resources.

In regards to service design and improvement, service designers mostly rely on past experiences and existing designs. This is called cognitive inertia, which is a strong tendency of thoughts to endure once formed. This condition makes it difficult to adapt effectively to any market or environmental change. Hence, TRIZ is utilized to resolve this issue during the service design and improvement processes (Chai et al., 2005). This method has the potential to generate breakthrough and innovative ideas, given freedom from inconsistencies. By doing so, it is hoped that the proposed integrated model of Kansei Engineering, the Kano model, and TRIZ may deliver innovative solutions for service design and development with regards to customers' emotional satisfaction.

5.2. Managerial Implications

From a practical point of view, this study provides guidelines for service providers in deciding which service attributes are the most eligible to be continuously improved with regards to customer delights. The continuous improvement strategy can be formulated based on previous innovations highlighted by TRIZ. This proposed model is quite helpful for less experienced service providers to think about and deliver creative improvement initiatives (Chai et al., 2005). By incorporating cultural differences, the model can be useful for service developers in formulating appropriate culture-based service strategies. Developing such strategies is critical in contemporary globalized business markets.

6. CONCLUSION

This study proposes an extended framework that integrates Kansei Engineering, the Kano model, and TRIZ with cultural differences in regards to the service industry. It is a new approach that focuses on the customer's emotional needs (i.e., Kansei) as the main input for the service design and development process, and can be used to generate innovative solutions.

Provided as a formal research model, this study offers the potential to delight or satisfy customers via innovative ideas free from contradiction.

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