Integrated Text Mining and Kansei Engineering Methodology for Excellent Amusement Park Services

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Abstract

The excellent service with full emotional (Kansei) satisfaction for an amusement park is a must. Today the customers expect not only for the amazing show itself, but also the friendliness of staff, the cleanliness of the area, and the benefit package for family as family is the targeted segment for any amusement park industries. In fulfilling the full satisfaction of customer, the amusement park service provider should always provide what the customer needs and close the gap between what expected and perceived by the customer. The challenge is that customer not always at the right time and moment revealing what their expectations and critics. One way to get what genuinely customer feels about the service is through the reviews gathered from social media. In addition, there will be abundant and various customer feedbacks unconstrainted by time or any pressures. Hence, we proposed text mining and Kansei Engineering methodology taken an empirical study on an amusement park services in Indonesia. It was found that the critical Kansei was "safe" and the service attribute was "the amusement park rides for family". Adding new amusement park rides and providing its regular maintenance schedule might be considered as sufficient solutions, with regard to limited resources.

Keywords
Kansei Engineering, amusement park, service excellence, mining

1. Introduction
Kansei Engineering (KE) method has evolved. It has been applied extensively in physical products and non-physical services. Due to the complexity of customer Kansei, an approach in investigating and finalizing the "real" and representative Kansei has been proposed. It is a new approach in refining the exploration process of Kansei words. Hartono et al (2021) have tried to propose a study of Kansei-based mining and robust design for internet service provider. It is a refined KE methodology with confirmatory analysis (Hartono, 2020) incorporating mining process. The rationale is that how do we collect Kansei accurately and then match it to the service design items and attributes? It leads to a question, are the Kansei words really representative? Are they robust enough? Though, an opportunity to refine the methodology due to the dynamics of problem and customer Kansei is always open.

KE has received a lot of attention from scholars and industries. It aims to incorporate the customer emotional needs into the design elements that fulfilling the customer Kansei satisfaction. The main challenge for KE stems from the difficulty in mapping the subjective impressions of customers, namely Kansei, to the perceptual service design elements and attributes. This study intends to develop explicit decision support to improve the Kansei mapping process by reusing knowledge from past sales records, customer feedbacks, and service experiences.

With the rapid development of global markets and advanced technology, it is most likely that many similar services will be found functionally equivalent. Customers may find it difficult to differentiate and choose from the various service offerings. If all service offerings have the same features and usability, it raises a confusion to customers, which one is the best and profitable? Hence, it is very crucial to design services by incorporating customer emotional needs and attention so as to differentiate among service offerings.

This paper discusses an empirical study on amusement park services by identifying customer Kansei through mining process, mapping the significant relationship between Kansei words and amusement park service attributes, and setting prioritized improvement strategies. This service setting is deemed to be interesting and critical as it is one of tourism industries. With regard to post pandemic period, the tourism industries are expected to rise. People like to hang out with their family members and enjoy the moment together. The tourism industries are hoped to adapt, innovate, and collaborate well. Adaptation means a new practice and regulation to be formulized in facing new transition from pandemic to new normal lifestyle. Innovation shows new ideas of service offerings with regard to adjusted rules and procedures applied in amusement park. Collaboration promotes positive and well-defined win-win solution between service provider of amusement park and its prospective stakeholders. Overall, the objective is to fulfil, retain, and level up the customer emotional satisfaction (Kansei response).

1.1 Objectives
There is a two-fold objective for this study: (a) to provide a refined integrative framework of KE-based mining process for promoting service excellence, and (b) to show the practicability of the proposed integrative framework by taking an empirical study on amusement park services.

2. Brief Literature Review

2.1 Kansei Engineering Updates
KE has been developed in both product and service design. The main objective is to achieve customer and user satisfaction. In general, KE is well known as a method for interpreting and translating customer emotional needs into product or service design elements and components (Nagamachi, 1995). There were at least 6 types of KE proposed by Mitsuo Nagamachi, covering the application in home interior designs, automotives, cosmetics, and homewares. Recent study of Kansei has tried to engage KE methodology with technology-enabled stuffs such as virtual reality, augmented reality, and apps-based products (Nagamachi & Lokman, 2011; Nagamachi & Lokman, 2015). More recent KE studies adopted the Kansei modeling to reduce any potential uncertainties and complexities in connecting the Kansei words and visual expressions. A generic methodology of KE is provided in Figure 1.
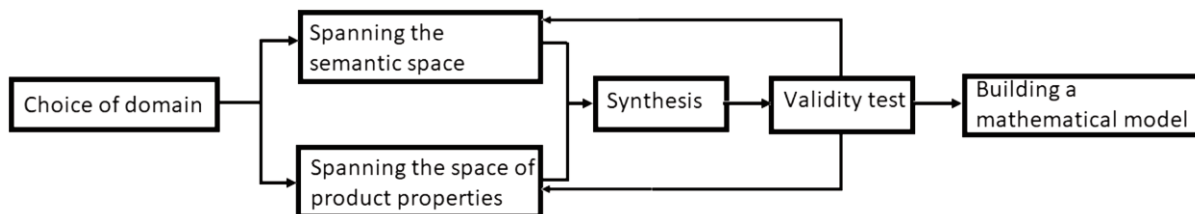
Figure 1. General Kansei Engineering methodology (Schütte et al., 2004)

Nevertheless, using any modified KE methodologies, the well-known model is that Kansei is set to be a function of perceived products or services interaction and experience. There are two important entities in the KE ecosystem, namely, user or customer and product or service attributes. Apart from the diverse application of KE in product and service, the evolution of KE was also incorporating relevant quality tools for the refinement and modification of KE

methodology. Referring to Hartono & Tan (2011), a popular service quality called as Kano model has been inserted into KE phases in order to enhance the efficiency and flexibility of the KE methodology. Kano model is used to identify and map out the level of service attribute performance based on customer experience and evaluation. Moreover, other quality and product/service development tools and methodologies were also integrated, such as, Quality Function Deployment (QFD), Design Thinking (DT), Taguchi, and mining process (Hartono, 2022). QFD is bridging the customer needs (named as WHAT) and physical design characteristics (named as HOW). DT puts the emotional needs (Kansei) as the most critical part in empathy phase. Taguchi is used to explore the robustness of proposed solution. Finally, the mining process is proposed to gather and utilize valuable emotional needs and responses of customer due to product or service experiences.

2.2 Kansei Mining Process

The main challenge and opportunity for Kansei-based design and development is that to capture the customer needs (Kansei) correctly and translate them into service attributes accurately. Once the service design elements and attributes are finalized, it should be ensured that the perception of product/service performance fits the customer Kansei. However, it is not that always easy since there is different cultural backgrounds or linguistic origins. Due to difficulty in translating Kansei into verbal descriptions, it leads to imprecise customer emotional needs (Helander & Khalid, 2005). In addition, the collected Kansei words are short-lived lasting. It contributes to the ambiguity of perceived Kansei. Thus, Kansei mining process is proposed. Studies of mining process applied in services have been conducted such as hotel services (Liu et al., 2017) and online products (Wang et al., 2018).

3. Method & Framework

This study took an exercise according to the previous studies using a modified framework of Kansei-based engineering text mining process taking a case study on amusement park services. As seen in Figure 2, it starts with customer feedbacks as voice of customer and ends with improvement strategy. The general methodology of Kansei mining process has been proposed (see Hartono, 2021) and refined according to the case on amusement park service excellence (see Figure 2).

Once the customer feedbacks through web harvesting are collected, the process is continued to text mining and sentiment analysis. It is split into two parts, namely, service attribute gap analysis and Kansei perception analysis. In the section of service attribute gap analysis, the satisfaction analysis will be conducted. If the result is positive satisfaction, then the company should keep up the good quality standard, otherwise, it continues to linear modeling engaged with Kano categorization. The result is that the critical service attributes, and then wrapped up with improvement strategy through House of Quality (HoQ).
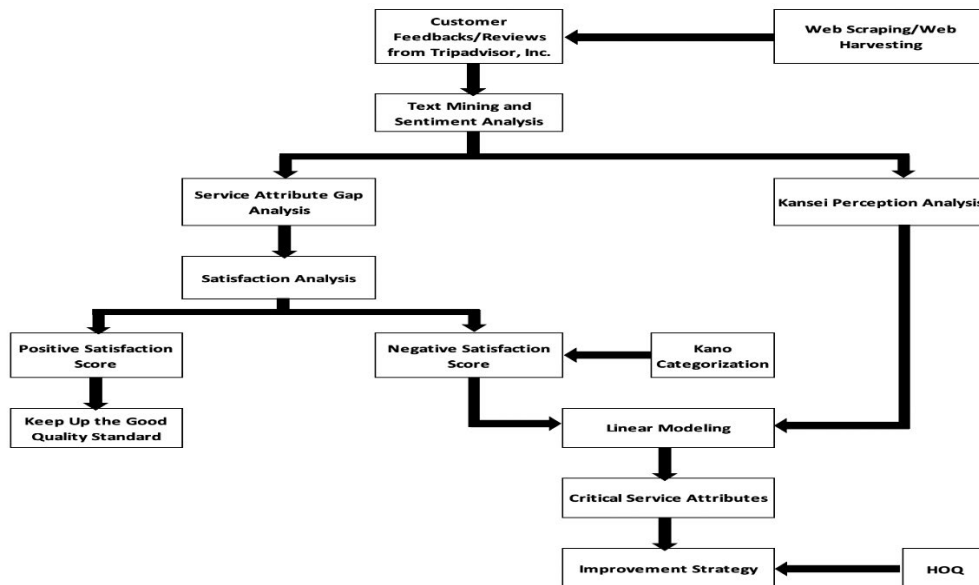

Figure 2. Integrated Framework of Kansei Mining for Amusement Park Service Excellence

There were two kinds of data collected, i.e., (i) primary data (i.e., survey through questionnaire using the purposive sampling method), and (ii) secondary data (i.e., 200 online feedbacks taken from Tripadvisor using web scraping. It is a website and mobile app with user-generated content used for comparing shopping experiences. It started with secondary data collection and followed by primary data collection.

4. Data Collection, Results and Discussion
Through NVIVO software, text mining and sentiment analysis have been done. The result of text mining (in Bahasa Indonesia) is provided in Figure 3. Sentiment analysis especially in gathering Kansei words, the adjective form of emotional needs was used.

Figure 3. Word cloud

There were 13 service attributes and 11 Kansei words finalized, provided in Tables 1 and 2. In those tables, the linear relationship between Kansei and perceived service attribute performance and the importance weight of service attributes for prioritization of improvement are shown.

Table 1. Linear model of Kansei word and perceived service attributes

No	Kansei word	p-value	R^2	Regression Model*
1	Safe	0.000	0.360	Safe = 1.943 + 0.323 (A2) + 0.219 (A1)
2	Prompt	0.000	0.255	Prompt = 2.099 + 0.486 (RES2)
3	Educative	No significant service attributes correlated		
4	Spacious	No significant service attributes correlated		
5	Satisfied	0.000	0.343	Satisfied = 1.882 + 0.342 (RES2) + 0.262 (T1)
6	Interesting	0.000	0.277	Interesting = 1.850 + 0.291 (R3) + 0.259 (T4)
7	Nerve-wracking	No significant service attributes correlated		
8	Comfortable	0.000	0.115	Comfortable = 2.820 + 0.322 (R1)
9	Friendly	0.000	0.181	Friendly = 2.288 + 0.425 (E2)
10	Suitable	0.000	0.214	Suitable = 2.627 + 0.365 (R3)
11	Affordable	0.000	0.307	Affordable = 1.961 + 0.518 (A4)

the description of service attribute code is available in Table 2

Table 2. Importance weight and decision for prioritized improvement

No	Code	Service attributes	Kano category	Importance weight*	%	Cumulative %	Improve?
1	R3	The amusement park rides for family	A	46.49**	20%	20%	Yes
2	A4	Affordable ticket price	A	40.96	18%	37%	Yes
3	RES2	Prompt response of staff	O	34.43	15%	52%	Yes
4	R1	Cleanliness of area	O	25.23	11%	63%	Yes
5	T4	Attractive area	O	17.06	7%	70%	Yes
6	A2	Secured area	O	12.02	5%	75%	Yes
7	E2	Friendliness of staff	O	11.62	5%	80%	Yes
8	T1	Maintained amusement park rides	M	11.57	5%	85%	Yes
9	A1	Safety for children	O	11.14	5%	90%	Not
10	T3	Comfortable temperature	A	10.98	5%	95%	Prioritized

No	Code	Service attributes	Kano category	Importance weight*	%	Cumulative %	Improve?
11	T2	Green area	O	5.08	2%	97%	
12	R2	Functionality of facilities	O	4.82	2%	99%	
13	A3	Secured parking lots	O	2.40	1%	100%	

Importance weight = |satisfaction score| x Kano weight x number of significant Kansei x Kansei average score
**the example of how to calculate the importance weight for attribute R3 (The amusement park rides for family). Importance weight = |1.46| x 4 x 2 x 3.995 = 46.49.*

According to Pareto principle, there were 8 service attributes prioritized for improvement (as shown in Table 2), and it was found that the service attribute "the amusement park rides for family" deemed to be the most critical one. Through literature review and benchmarking process, there were several improvement initiatives, such as adding new amusement park rides for family, regular maintenance schedule for amusement park rides, and providing user-friendly apps for amusement park rides. The service provider should prioritize which one of these three improvement initiatives is chosen due to limited resources or possible constraints.

5. Conclusion

Fulfilling customer emotional needs (Kansei) is quiet challenging. It is not only because of the translation process, but also how to ensure appropriate and representative Kansei. Both external and internal factors influencing customer Kansei should be considered and put in the service design and development, especially for tourism industry which is of interesting in today's economy. Hence, text mining and Kansei Engineering methodology taken an empirical study on an amusement park service in Indonesia was proposed. This study might be enhanced especially in the relationship between Kansei and perceived service attributes. Due to Kansei dynamics, more appropriate methods are welcome to investigate, and might also include usability analysis for technology-enabled products/services (Prastawa et al., 2019). It is also supported by the complexity of product or service experiences. More complex product or service will lead the more complex Kansei.

6. Acknowledgement

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Biography

Markus Hartono is a Professor in the Department of Industrial Engineering, University of Surabaya, Indonesia. He earned B.Eng in Industrial Engineering from University of Surabaya, MSc and PhD in Industrial and Systems Engineering from National University of Singapore, Singapore. He has published journal and conference papers in the area of ergonomics, Kansei engineering, service quality and management. He serves as the member of affective design technical group in International Ergonomics Association (IEA).

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