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Using Experience Map to Assist Kansei Engineering in Collecting Kansei Words: A Study of Value Chain Management in Children's Luggage

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Abstract
Advanced e-commerce shopping in China leads to strong commercial competitiveness of children's luggage, Effective value chains can generate profits for companies, and hence they need to determine the value of children's luggage to improve their competitive advantage. Kansei Engineering Type I is a popular technology that can determine a new product concept. Kansei words collection is a crucial operation of Kansei Engineering Type I. However, the existing models from previous research are unable to systematically collect the Kansei words of all products. Theoretically, Experience Map can be used to collect Kansei words. Therefore, this study was aimed to add knowledge of the way Kansei Words of children's luggage can be collected by using Experience Map. A total of 186 Kansei words and 10 Kansei phrases of children's luggage and 5 categories of children's luggage value were identified. The results will be used to support Kansei Engineering Type I technology to determine the value of children's luggage.

Keywords: *product development, value chain management, Kansei Engineering (KE), Experience Map, user experience (UX), children's luggage*

1. INTRODUCTION

Advanced e-commerce shopping leads to strong commercial competitiveness among companies in China [1]. Children's luggage is also experiencing the strong commercial competitiveness as many electronic products in China. One of the obvious manifestations is that a Tmall (i.e. a Chinese-language website for business-to-consumer online retailer) search for the term "children's luggage" produces nearly 3,000 items. Companies that experience mature business environments should organise themselves to understand the way customer value is created and the manner these processes may be coordinated to provide value [2]. Effective value chains can generate competitive product advantages [3]. Therefore, companies need to determine the value of children's luggage to improve their product competitive advantages and support their sale.

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Due to the parent-child travel popularity, children's luggage sells well online. However, they have not reached perfection currently. For example, children cannot use their luggage independently and need parental assistance in packing because they do not know what to prepare completely and to pack -neatly. Moreover, the current children's luggage has only one function, and it should have more functions added than just to carry belongings. This is supported by [4], who stated that designers should create new products that are solutions which can cater customers' needs including their dreams. Since parent-child travel in China is regarded as an important mode for children's education, and children's luggage as an important product for travelling, the luggage should carry the children's belongings dreams. However, previous researchers only highlighted that a single or several perspectives should be added to children's luggage value. A comprehensive and unified proposal was not created to develop a profitable value chain for children's luggage.

The growing interest in value chain was initiated by Porter's seminal work, namely "Competitive Advantage", and it has increased ever since [3]. Value chain is different from supply chain. In [3] did an in-depth study to understand supply chain and value chain. Supply chain is a term "now commonly used internationally to encompass every effort that is involved in producing and delivering a final product or service from the supplier's supplier to the customer's customer". Value chain can operate in both directions, whereby suppliers will accrue value from the financial resources, payment terms, stability, and future order cover that their customers provide, while customers will derive value from the delivered products and services. Moreover, supply chain focuses primarily in reducing costs and attaining operational excellence, whereas value chain focuses more on innovation in product development and marketing. Therefore, creating a profitable value chain requires alignment between customer wants and what is produced via the supply chain.

Theoretically, Kansei Engineering (KE) Type I has been intensively investigated in product development, and it can be defined as the translating technology of a customer's feeling and image for a product into design elements [5]. Kansei is a Japanese term used to express an individual's impression towards artefact, situation and surrounding [6]. Through the use of KE Type I technology, customer's needs and desires can be identified; hence the product value chains can be managed. Therefore, KE Type I is suitable to determine children's luggage value.

KE Type I technology has its procedure to determine the product value. In [6] divided the KE Type I technology procedure into five steps, in which according to priority were Kansei words collection, Kansei survey, Kansei assessment, Kansei analysis and new product design. Many products were developed by using KE Type I technology, such as children's clothing [7], e-commerce sunglasses [8] and sofa [9]. Nevertheless, these technology applications did not have a universal tool to systematically collect Kansei words of products which are adjectives and nouns that describe the product [6]. Kansei words collection is the first and crucial step when using KE Type I technology, whereby their incomplete collection will affect the accuracy in determining the product value. Since the children's luggage value needs determination by using KE Type I technology, this study finds an effective tool to assist KE Type I technology in

collecting the Kansei words of children's luggage.

Value is a subjective experience that is dependent on context, and it flows from the person (or institution) who is the recipient of resources [3]. Companies need to create value for their customers in the form of experience [10]. Consequently, to generate the children's luggage values, the Kansei words should relate to user's experience. Coincidentally, Experience Map is a tool to illustrate the user's experience while experiencing a product within a given domain. It can systematically analyse the actions, thoughts, emotions and potential route to reach a particular goal [11]. Therefore, Experience Map can be a universal tool to assist KE Type I in collecting Kansei words of children's luggage. The objective of this study is to construct an Experience Map to collect Kansei words and support KE Type I technology to determine the value of children's luggage.

In this study, an Experience Map was created to collect Kansei words of children's luggage. A total of 186 Kansei words, 10 Kansei phrases and 5 categories of children's luggage value were identified. The results were used to support KE Type I technology to determine the product value. The created Experience Map is the main study contribution to assist KE Type I technology.

2. METHODOLOGY

First, this study introduced a general template and procedure for creating an Experience Map in accordance to literature review. Second, it created an Experience Map of children's luggage in accordance to the requirements of KE Type I technology. By creating the Experience Map from scratch, it can be adjusted to assist KE Type I technology to collect the Kansei Words systematically, efficiently and comprehensively.

3. THE INTRODUCTION OF EXPERIENCE MAP

Experience Map illustrates the user's experience towards a product within a given domain [11]. Its elements can be adjusted according to the particular objective. Different context of user and product will affect the elements of the map. Although Experience Maps are context-dependent, they have typical elements. In [11] had summarised the typical elements of a general Experience Map, as shown in Table 1.

Table 1. Typical elements of Experience Map (adapted from [11])

Typical Elements of Experience Map	
1) Phases of behaviours 2) Actions and steps taken 3) Jobs to be done, goals, or needs 4) Thoughts and questions	5) Emotions and states of mind 6) Pain points 7) Physical artifacts and devices 8) Opportunities

To understand the Experience Map better, this study formulated a general template for Experience Map according to cases cited and analysed by experts, as shown in Figure 1. In [11] listed four cases of Experience Map, namely Rail Europe Experience Map, Social Gamer Experience Map, Growing Food Experience Map and Exploratorium Visitor Experience Map. The common content of these Experience Maps has two parts, which are guiding principles and elements. Guiding principles helps to understand the objectives of the Experience Map. It concerns user, product, objective and strategy to reach a particular objective. The elements include two categories, such as output elements and input elements. Output elements are the results that respond to the objective of Experience Map. Input

elements are factors that help to achieve accurately results.

The Rail Europe Experience Map mentioned by [11] was a more influential Experience Map. It was created by Chris Risdon, who also created the Adaptive Path, which is a premier organiser of design events. Based on the Rail Europe Experience Map, this study formulated a general Experience Map template that can be divided into five zones: lens, journey model, qualitative insight, quantitative information and takeaway. The Experience Map deconstruction was consistent with the content of Experience Map from [11]. Lens are guiding principles. Journey model, qualitative insight and quantitative information are the input elements. Meanwhile, a takeaway is the output element. The detailed explanations of the five zones are as follows:

Lens are the guiding principles to create an Experience Map which concern users, product, objectives and strategies to reach a particular objective. Users are specific people who have experienced the product. Products can be goods or services. Objectives have information to illustrate tasks that the Experience Map has to complete, and it can help to identify the output elements of the map. Strategies are the reference to reach the map objectives.

Journey model is an important component to segment the entire user experience into different phases or different channels. It can be rendered in different structures in terms of the user's journey nature. Most journey models have a chronological organisation, in which the arrangement often consists of journey and actions. Actions are things that people do during the journey. An action is a key element to analyse human behaviour. A reasonable segmentation phase or conversion channel can achieve the objectives of the Experience Map better.

Qualitative insight is a component to understand the importance and value of a particular touchpoint for specific users. Touch points are means by which an interaction between user and product can occur. Thoughts and emotions are the typical elements of qualitative insights. Thoughts are ideas and opinions of users on a product, and they are always presented in the form of questions, such as "Is this product easy to use?". Emotions are the feelings of users when using the product, such as frustration, pleasure and so on. The elements of qualitative insight can be adjusted based on the objectives of Experience Map. The way to get information for qualitative insights can be by an interview, survey, observation or other feasible methods.

Quantitative information is a component to present statistics through mathematical graphics, which makes the results more intuitive to a reader. Therefore, the reader can easily understand and refer to the statistics. For example, the Rail Europe Experience Map which was mentioned by [11] was aimed to identify the business opportunities. Rail Europe is the official distributor that represents all European railways and networks. This Experience Map firstly shows the phases in a trip across Europe by train and describes the experience people had when travelling. Then it adds the quantitative information of enjoyability, relevance of Rail Europe and Rail Europe offered assistance for each phase, and thus the company can more intuitively understand the situation at each phase and make a reasonable conclusion. Although the quantitative information has its benefits, it is not an essential element. It can be added or removed from a specific Experience

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Map with regard to the objective requirements.

Takeaway is the result that the researchers want to benefit from the Experience Map which will lead the research to the next project phase. Pain points, opportunities, design artefacts and devices are the typical elements of takeaways. Pain points are the product problems that should be solved. Opportunities are chances for product development. Physical artefact and devices are the strategies or solutions for product development. The elements of takeaways can be adjusted according to the Experience Map objectives.

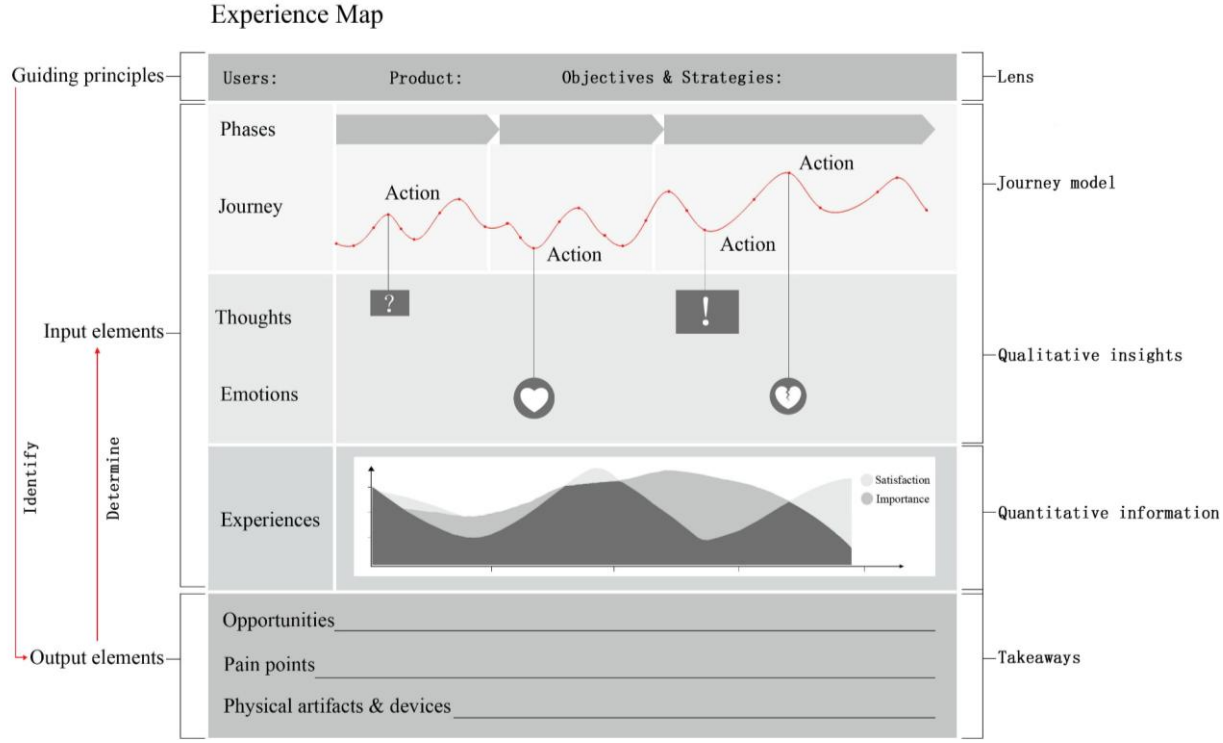

Figure 1. A general template of Experience Map (illustration by author)

Figure 1 shows a general template of Experience Map and illustrates the procedure to create an Experience Map. First the guiding principles need to be understood. Second the output elements must be identified based on the guiding principles. Third the input elements are to be determined according to the needs of output elements. Finally, the content of each element must be completed.

The general template is not universal because it focuses on analysing the pain points and opportunities of a product. If the created Experience Map is focused on reaching other objectives, it should develop a particular template to cater the objectives.

4. CREATING AN EXPERIENCE MAP OF CHILDREN'S LUGGAGE

The general template of Experience Maps is focused on analysing the pain points and the opportunities of a product, but the Experience Map of children's luggage is to collect its Kansei words, which is different from the general template. Therefore, the general template is not suitable for creating an Experience Map of children's luggage. This study needs to create an Experience Map according to procedure. The detailed procedure of creating an Experience Map of children's luggage is as follows:

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Step 1: Understanding the guiding principles. The objective of the Experience Map of children's luggage is to collect Kansei words for children's luggage which supports the KE Type I technology to determine the value of children's luggage. Therefore, Kansei words collection is the first step of KE Type I to determine the value of children's luggage. After the Kansei words are collected, they will be assessed by a conducted survey. Then, they are analysed by using the correlation coefficient analysis and principal component analysis. Finally, the concept of a new product is determined. Therefore, the guiding principles of this Experience Map are clear, and the product of this Experience Map is the children's luggage. Children are users of the Experience Map, and the objective of this Experience Map is to collect Kansei words for children's luggage. Companies must create value for their customers in the form of experiences [10]. Therefore, the Kansei words settings includes adjectives and nouns to describe the positive experiences.

Step 2: Identifying the output elements. Output elements can be identified from the Experience Map objective in Step 1, which are the Kansei words that represent the adjectives and nouns to describe the luggage positive experiences.

Step 3: Determining the input elements. The output elements are different from the general template, and thus, this study has to redetermine the input elements of the Experience Map. To clarify the logic, this study formulated an input-output model to determine the input elements of this Experience Map, as shown in Figure 2.

The use of KE Type I technology to determine the children's luggage value needs a comprehensive collection of the Kansei words to ensure results accuracy. A journey model needs to be rendered first to identify all touchpoints that can generate children' luggage values. Children's luggage caters for children's travel, and thus the travel can be a children's luggage domain to generate value. Actions are the touchpoints to identify the values because value is a subjective experience that is dependent on context [3], while experience is related to action. Therefore, the journey model of the Experience Map of children's luggage can compose journey and actions. It also expresses the parents' perception in the form of sentences, because the Kansei words are adjectives that can be extracted from the sentences. Parents rather than the children are the best candidates for feedback on thepurchase criteria of children's luggage. Lastly, after all perceptions are identified, the Kansei words are sorted out individually.

Overall, to collect the Experience Map Kansei words needs two input elements are needed, which are journey model and perceptions.

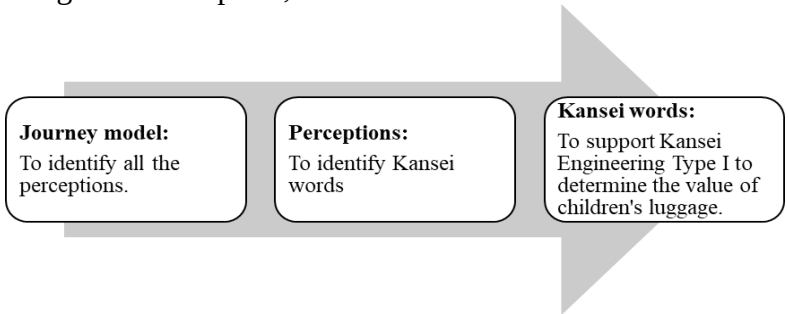

Figure 2. The input-output model of the Experience Map of children's luggage (illustration by author)

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After the input-output model is formulated, the input elements and output element of Experience Map are clear, whereby input elements are the journey model and perceptions, while output element consist the Kansei words. Therefore, the Experience Map template of children's luggage can be designed as shown in Figure 3.

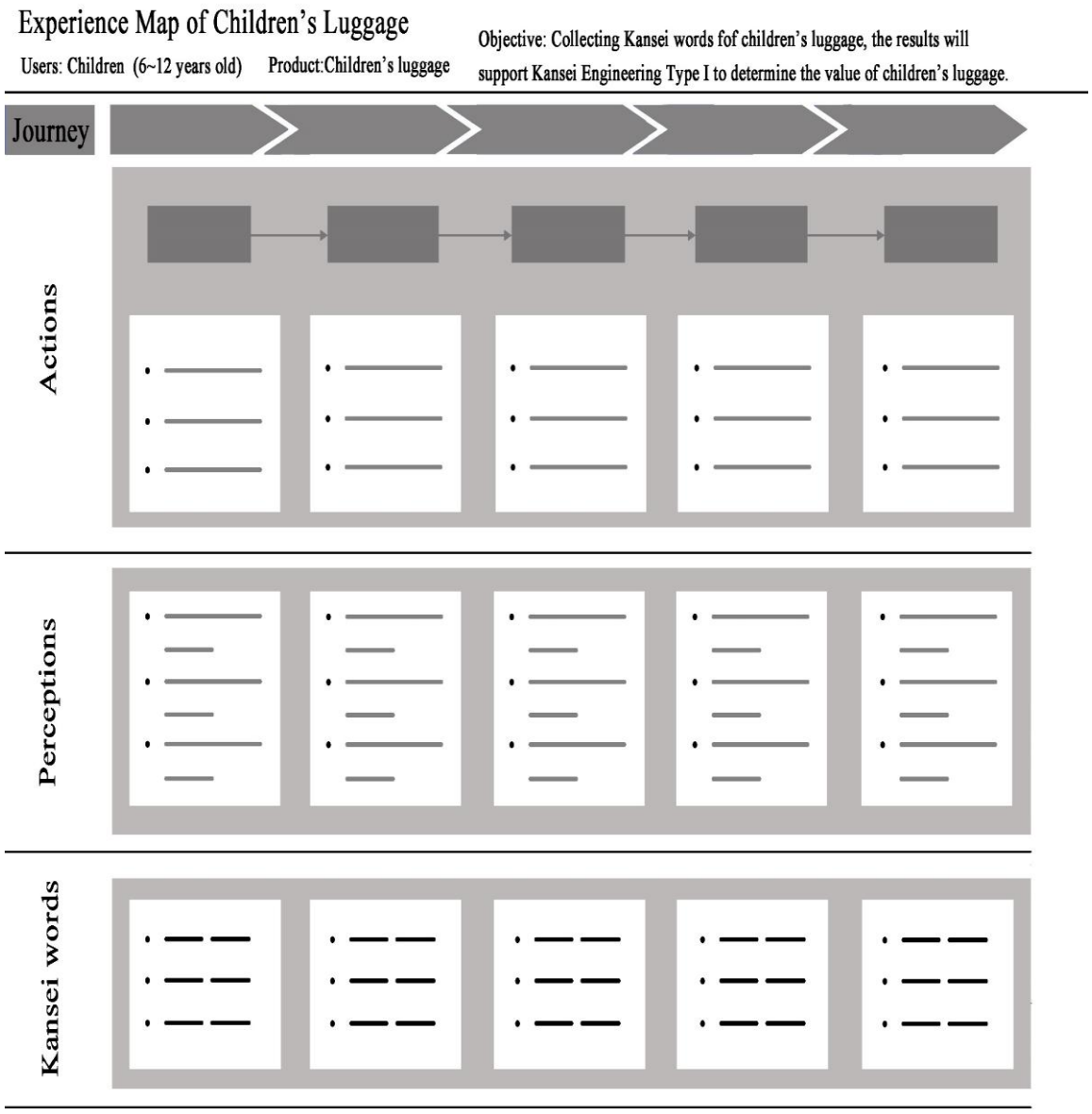

Figure 3. The Experience Map template of children's luggage (illustration by author)

Step 4: Completing the content of each element. In terms of the Experience Map template of children's luggage, two input elements and one output element will be completed according to Step 4. The input-output model simply explains each element. In this step, the completion of each element would be explained in detail. Finally, the Experience Map of children's luggage would be created as shown in Figure 4.

Input Element 1: Journey model. According to the description of the input-output model, the journey model would be a combined journey with action, the journey of children's luggage is the journey of children's travel, and the actions are things that children would do during travel.

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Looking back on children's travel, the children's luggage are used in five scenarios, which are at home, on the way, on the vehicle, at the hotel, and at the attraction. The Experience Map journey is segmented accordingly into five phases based on five different scenarios.

Then the actions of each phase are identified. The children's actions have two situations when they travel. In the first situation the children use of the children's luggage directly. For example, when children pack their luggage, they will directly touch children's luggage; thus, packing luggage is an action of the first situation. The existing children's experiences can be identified by analysing the actions of the first situation. The actions of the second situation are things that the children would do during travel, but they do not use the luggage. For example, when children plan a travel, they get information about the travel, they do not use the children's luggage. Therefore, planning a travel is an action of the second situation. Analysing the actions of the second situation may have added values and the children's latent experiences can be identified. Meanwhile both existing and latent positive experiences can be identified, and the quality of children's luggage can exceed the children's and parents' expectations. Therefore, their satisfaction can be greatly improved. By identifying all actions that children will do during the entire travel is the way to analyse the actions.

Input Element 2: Perceptions. According to the description of the input-output model, the way to analyse the perceptions is to use sentences that describe the positive experiences from each action, and perceptions are from the parents' perspective. For example, when the children pack their luggage at home, they do not know what belongings to prepare and the way to pack them neatly. This is tedious for the children. Otherwise, they need the parents to assist. Therefore, parents may expect that "children's luggage can help their child to pack the luggage independently, sequentially, neatly and quickly", in which the sentence in quotes is an example to analyse perception.

To identify more perceptions, various methods, such as literature review, interview, survey, observation, and group discussion can be used. It should be noted that the perceptions should be consistent with the requirements of Kansei words to avoid targeted confusion.

Output Element 1: Kansei words. Kansei words are the adjectives and phrases to describe the positive experiences of children's luggage in this Experience Map. After the perceptions are identified, the Kansei words are sorted out individually from various points of the perceptions. One perception can sort out as many Kansei words as possible as long as it is needed by the target. For example, "The design of the luggage can cater to the preference of a child and his/her parents", this is part of one perception from which ten Kansei words can be sorted out, such as "Beautiful, cute, cool, fresh, Fantasy, Interesting, Popular, Particular, Childish, Meaningful". This is the way Kansei words are sort out from the perceptions, and the rest of the Kansei words are also similarly extracted. To identify more perceptions, various methods, such as literature review, interview, survey, observation, and group discussion also can be used in this step.

Because the collected Kansei words have various attributes, in order to facilitate the design of the subsequent questionnaire, this study needs a

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reasonable method to classify the Kansei words. The user's response to a product mainly includes four aspects: behavioral response, physiological response, conscious response and emotional response. Therefore, this study classifies the sources of user experiences based on these four aspects, then the user experiences can be sorted out one by one according to the characteristics of each response, in this way, the entire user experiences can be collected in a systematic and complete way. A total of 186 Kansei words and 10 phrases are sorted out from the perceptions, as shown in Figure 4. Among these Kansei words and phrases, some of them have similar meanings or similar attributes, this will have an adverse effect on the questionnaire design. Therefore, this study sorts out and removes the Kansei words with similar meanings and attributes. After removal, a total of 106 Kansei words and 10 Kansei phrases were retained.

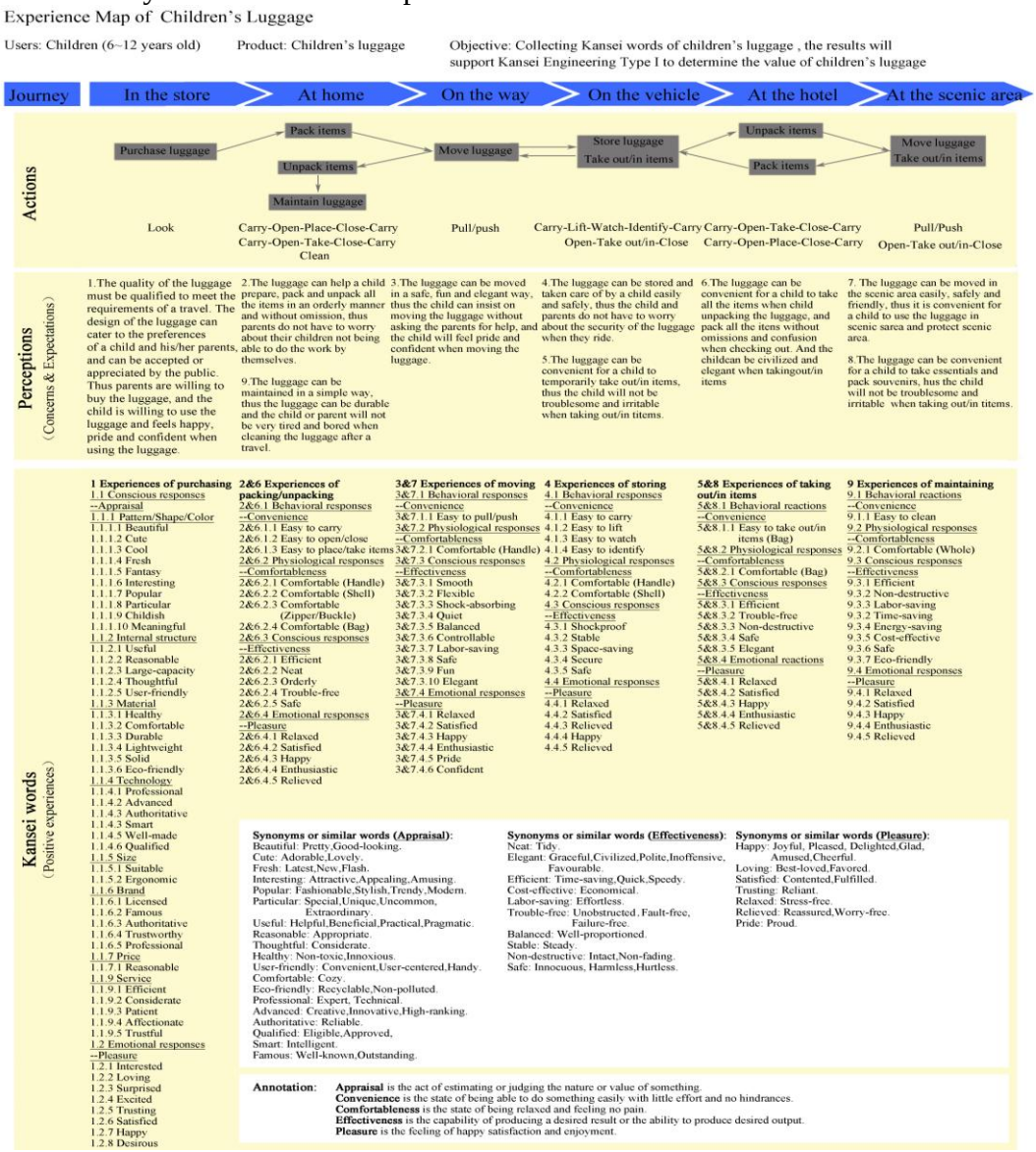

Figure 4. The Experience Map of children's luggage (illustration by author)

The objective of the children's luggage Experience Map is to collect Kansei words, and thus it is completed at this point. The collected Kansei

words are categorised, selected and used to conduct a survey. Through the survey, the Kansei words data are collected, and their relations can be are identified by using data analysis. Finally, the value of a new children's luggage will be determined according to the results of data analysis.

5. RESULTS AND DISCUSSION

In this study, an Experience Map of children's luggage was created. Figure 4 clearly shows the way of the Kansei words are collected from the Experience Map. Firstly, the Experience Map segmented the journey into five phases based on different scenarios, which included at home, on the way, on the vehicle, at the hotel and at the attraction. Secondly, it comprehensively and carefully analysed the children's actions during the journey. Thirdly, it identified the parents' perceptions from in the form of sentences. Lastly, the Kansei words were sorted out from the perceptions. A total of 106 Kansei words and 10 Kansei phrases of children's luggage were collected, the details of Kansei words can be viewed in Figure 4.

By creating the Experience Map, the Kansei words were collected more systematically, efficiently and comprehensively. Hence, the value of children's luggage can be analysed more thoroughly, making the user feel successful rather than just satisfied. Therefore, these Kansei words will support KE Type I technology to determine the value of children's luggage more accurately, and they can also be used to describe the selling points of children's luggage on online stores. Since customers are unable to touch or feel the children's luggage when they purchase online, they will evaluate the value of children's luggage through the selling point described by companies. Besides, what the customers are getting is always pacifying during purchase [12]. Therefore, these Kansei words can be used to describe the children's luggage to attract customers.

By analysing the collected Kansei words, it can be seen that they have different attributes. The user experiences from the behavioral response are concerned with convenience. The user experiences from the physiological response are concerned with comfortableness. The user experiences from the conscious response are concerned with effectiveness and appraisal. The user experiences from the emotional response are concerned with pleasure. The details are shown in Figure 5. Figure 5 does not only show the user experiences of children's luggage during the interaction, it also shows the values of children's luggage. Because the value is experience, which flows from the users. By comparing with previous research on value determination, their conclusions are insufficient. This study provided a more comprehensive value chain of children's luggage through creating an Experience Map of children's luggage, and the research framework in this study can serve as a design criterion for value creation in future children's luggage.

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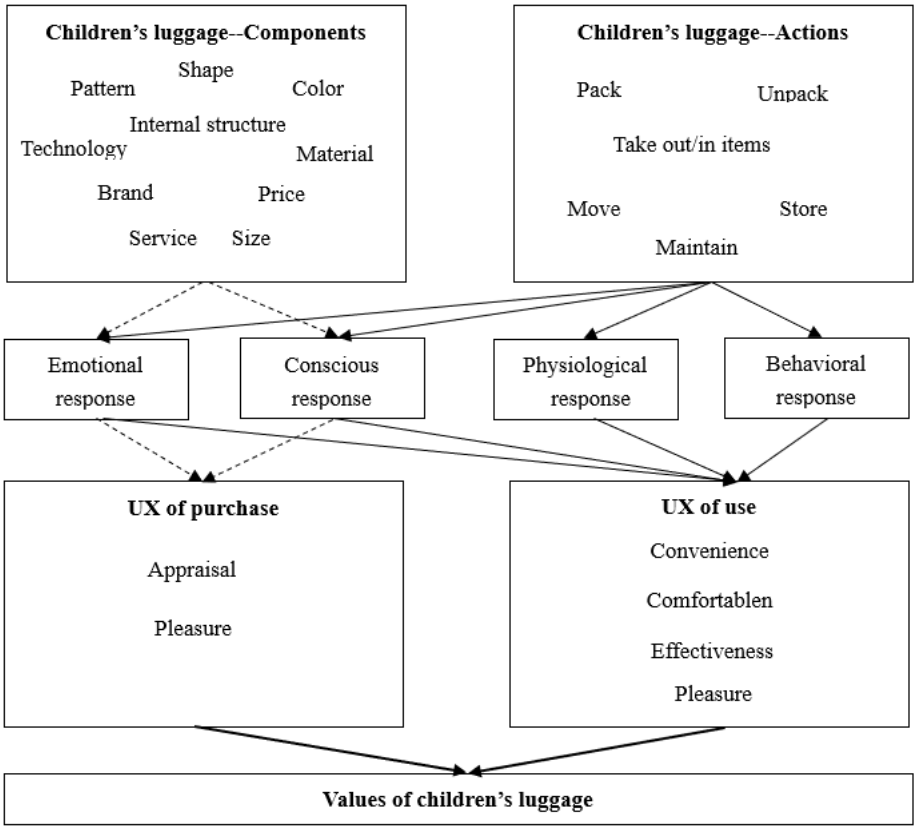

Figure 5. Values of children's luggage (illustration by author)

This study has an important significance for the development of an Experience Map. By comparing the Experience Map of children's luggage with the general Experience Map, the elements of the Experience Map of children's luggage were changed. In the meantime, this Experience Map was adjusted to be a tool to assist KE Type I in collecting the Kansei words. This not only provided a template but also a method to create a new Experience Map which can be adapted to the particular objective. In other words, this study indicated that the Experience Map is not rigid as it can be adjusted by flexibly and be more widely used according to the needs of design methodology.

Based on this study, user experience, value chain, KE Type I technology and Experience Map were linked together as a design model for development, as shown in Figure 6. As previously introduced, value is experience, which flows from the users. Experience Map can systematically manage user experience related to the value, and thus, it can assist KE Type I technology in collecting comprehensive Kansei words to determine the value. Then, with the assistance of Experience Map, KE Type I technology can systematically and comprehensively manage the value chain. In addition, user experience, value chain, KE Type I technology and Experience Map are trends that are focused on product development in human-centred perspective. They cater to the requirements of contemporary product design, and thus, all of them are the epidemic factors for children's product development. By using their respective strengths more scientific and effective users' needs are identified, and thus create a profitable value chain by co-creating and promoting the design of

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children's luggage more humane, valuable and competitive.

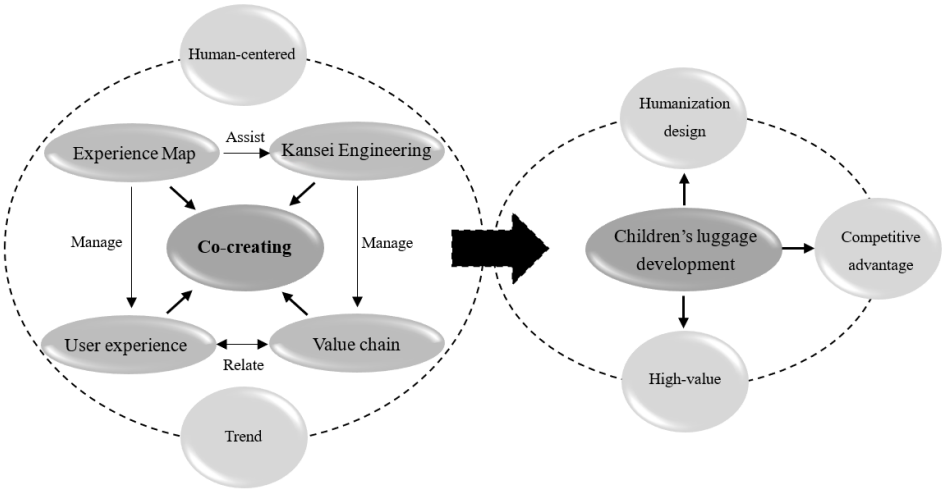

Figure 6. A design model of value chain management in children's luggage (illustration by author)

6. CONCLUSION

This study created an Experience Map of children's luggage that assists the KE Type I technology to collect Kansei words. A template and procedure to create a general Experience Map were introduced. The procedure of creating an Experience Map was also introduced in detail. A design model of value chain management in children's luggage was formulated. A total of 106 Kansei words and 10 Kansei phrase were collected and 5 categories of children's luggage value were identified. The results will support KE Type I technology to determine the value of children's luggage more accurately.

Although this paper provided a template of Experience Map to collect Kansei words, it is not the only template. Different product needs to formulate different templates according to the nature of product and user. For children's products, children and parents have different perceptions on purchasing products, but they are the stakeholders. Excellence in product development can be achieved by integrating various stakeholders' requirements into a winning offering [13]. Moreover, value occurs when needs are met through the provision of products, resources, or services [3]. Travel purpose, education level, advertising, social trends, and economic conditions all will influence customers' purchase decision. Many value chain views can be created, and companies must synchronise the user experience flows with the value flows from stakeholders in the form of rapidly shifting tastes, preferences, and demand. For instance, in [14]-[15] mentioned that customers today concern themselves more on satisfying their emotions than merely their cognition. Therefore, designers should pay more attention to translate customers' emotions (e.g. Kansei) into product design. This paper suggests that future research can identify the perceptions from various important theoretical perspectives and lead the Experience Map to better suit the needs of KE Type I technology in determining the maximum value of children's luggage.

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