Kansei Affinity Cluster for Affective Product Design

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Abstract— **In recent years, product emotion and affective design has received encouraging attention from the industry as well as academia all over the world. Several methods and tools exist and used to assist the process of evaluating users' emotional experience, and the proceeding associated procedure. Previous studies involving the assessment of emotion have seen different ways used to represent verbal description of the subjective emotion. Most of them set their basis on several keywords that somehow fit to describe the study domain. However, these have lead to many cases of poor semantic dimension, since a good reference for affinity of words does not exist. This research aimed to develop a full-range of emotional keywords and their affinity cluster by the use of KJ Method. As a result, a total of 820 words were derived and forty-three clusters were generated. The resulting cluster is developed into Kansei Affinity Cluster, which will be a good reference for all studies involving the assessment of emotion. It will benefit the industry as well as academia towards accessing users' subjective emotional experience with product design.**

Keywords; Affinity Diagram; Kansei; Kansei Engineering; KJ Method; Product Emotion; Affective Design

I. INTRODUCTION

The emotional power of products has never been doubted [1], and emotion has played a major role in marketing and advertising [2]. Skilled designers understand the powerful appeal of emotions and have used their intuitions and artistic skills to exploit this emotional appeal. But despite the strong intuitive appeal, emotions have played little formal role in the design profession [3-6]. Moreover, within engineering and the disciplines of Human-Computer Interaction and Cognitive Ergonomics, emotions are seldom mentioned [1,3]. Emotional user experience research offers a new perspective on the user-oriented view of interactive product quality [6]. The field emerged from traditional approaches regarding the consideration of user's subjective evaluation of an interaction that focused on the concept of user satisfaction. A variety of previously established user experience measurement methods exist, and they differ with respect to their foundation and comprehensiveness in the target measurement and its underlying knowledge interpretation.

The process of accessing the subjective emotion commonly begins with the identification of representative emotional keywords. This has been done in different ways such as free selection method, regression analysis, and by document review. The literature revealed that a good reference for emotional keywords and their affinity does not exist. This paper describes the work in developing a full-range of emotional keywords, and clustering their affinity by the use of KJ method. The outcome will be beneficial to the research involving emotional assessment, since it provides a reference to possibly a full-range of emotional keywords and their affinity cluster.

The remainder of the paper proceeds as follows. In the following section, the background leading to Kansei affinity is reviewed. Section 3 presents the detail research method to solve affinity problems. In section 4, the result of classified affinity by KJ method is described. General implications and conclusions are provided in section 5.

II. BACKGROUND REVIEW

Definition of design goes around human experience, skill and knowledge which concerned with man's ability to conceive, plan, and realize products that serve human beings in the accomplishment of any individual or collective purpose [7-8]. In the discipline, there are design principles that generally apply to any piece of work one may create. The creativity in applying those principles determines how effective a design is in conveying the desired message and how attractive it appears. The principles are various and used in all visual design fields, including graphic design, industrial design, architecture and fine art. They differ both between the schools of thought that influence design, and between individual practicing designers. Among the principles, there are balance, unity, harmony, contrast, and emphasis [9-11].

A prominent scholar in product emotion, Donald Norman, has brought a strong case of needlessness of badly designed everyday objects [1]. While his view counterparts Nielsen's in their reasoning of user experience in terms of product functionality and usability [1,12], he shifted to emotional aspect of a product after he realized that attractive things really do work better [1]. Although he used to be known as a critic of unusable things but he has transformed himself into an advocate for pleasurable and enjoyable products. He asserted that successful products should be a pleasure to use, and convey a positive sense of self, of accomplishment, and pride of ownership [1]. Since then, scholars have argued on the need to use design method that is founded to scientific knowledge that underpin the structure of the targeted emotion in the artifact [3,6].

The people who will use the final product or artefact to accomplish a task or goal is called users or consumers [13]. Good design begins with the needs of the user, and no design, no matter how beautiful and ingenious, is any good if it does

not fulfil a user need [1]. Different designers use different methods, combining techniques of market research, user testing, and prototyping and trend analysis. Scholars have come to consensus that affect, or sometimes referred to as emotion, influence aspects such as decision making, perception, attention, performance, and cognition [1,4,14]. Emotion is one of the strongest differentiators in user experience namely because it triggers unconscious responses to a product [15]. While being unconscious as it is natured, the dimension of product emotion is complex. [3] found that every product characteristic affects user experience, which can be complex and multi-faceted. The author discussed three components or levels of product experience: aesthetic pleasure, attribution of meaning, and emotional response. Emotion is also subjective experiences from an individual point of view. The idea of emotional experience is parallel with [1] that asserted emotion as having a crucial role in the human ability to understand the world, and how they learn new things. According to the author, user's affinities for an object that appeal to them are due to the formation of an emotional connection with the object [1]. From dispositions of the above literature, it is reasonable to conclude that the design of a product affects human emotion, and good product design is the design that elicits positive appeal to users.

The main challenge for affective design is to grasp the implicit affective needs of user and how to design product that match this needs [16]. Furthermore, affective state is subjective and it is difficult for one to translate something they are not sure of. Kansei Engineering (KE) was established to deal with this subjectivity and provide means to access the implicit emotion people would have when interacting with products. It has been recognized as the technology that enables assessment of implicit emotion and translates it into product characteristic, thus enable incorporation of user's emotion into new product design [17]. Since this kind of product is designed to match user's emotion, it will evoke user's emotional connectivity with the product and thus will attract users.

Currently, there are at least eight types of KE implementation techniques in different domain such as automobile, cosmetic, lingerie, landscape, airplane and many more [17]. The types are Category Classification, KES, KE Modelling, Hybrid KE, Virtual KE, Collaborative KE, Concurrent KE, and Rough Set Kansei Model. In the assessment of emotion, it uses several means of psychological and physiological method. Physiological measure targets to capture consumer behaviours, response and body expressions [17,25]. This can be done by means of analysis of brain waves by electroencephalogram (EEG), muscular loads measurement by electromyography (EMG), eye movement and so on. On the other hand, a psychological measure deals with human mental state such as consumer behaviour, expression, action, and impression. This can be measured using self reporting system such as Different Emotional Scale (DES), Semantic Differential (SD) scale or free labelling system.

Other assessment of emotion can be seen in the use of Conjoint analysis [18], Semantic Description of Environments (SMB) [19], Quality Function Deployment (QFD) [20], and PrEmo [3]. KE share the same basis with SMB accepts SMB only focus to architectural artefact. KE is also seen to be more powerful than SMB by its capability to discover relationship between emotion and product characteristic. On the other hand, KE is seen possible to be integrated into conjoint analysis method, where conjoint analysis has looked only at different product alternatives of available product in the market. The lacking in terms of analysing design elements against user experience makes conjoint analysis methods less powerful. In terms of QFD, it addresses voice of customer by interviews, observations, customer's complaints or internal error statistics [21]. QFD and KE are looking at the same point, which is the voice of customer. However QFD focuses on use value such as functionality, usability and usefulness. On the other hand, KE targets specifically on the aspect of emotion. Additionally, although [3] provides a sound method to overcome cultural issues in the measurement of emotion, it only offers tool to evaluate emotion per se, and does not connect the findings with product design elements. While the evaluation tool is remarkably interesting, the relationship between emotional responses to product design is not covered. This makes it difficult to understand how certain design elements elicit emotion.

In every means of the assessment of emotion, core technique ground to the translation of the implicit emotion into verbal description. Whether by the use of self reporting technique, animation, facial expression and others, ultimate access to users' emotion is commonly guided with the use of emotional keywords. In KE these keywords are called Kansei Word (KW). In the selection process of KWs, researchers commonly used domain specific KWs synthesized from technical magazines, pertinent literature, domain experts, expert users, technical documents and so on [17,21,25]. To assess the full range of emotional state, [17] suggested including every possible KW until no words can be associated.

However, although it is of advantage to use the original number of words, which could be huge, it can be tricky when in comes to Kansei evaluation. Problem could arise when recruiting people to provide input to the evaluation [22], and researcher could suffer excessive cost in coding the emotional classification due to the amount of work needed. Additionally, the statistical power may suffer from a low number of participants [17,23]. The quality of the gathered data will also be relatively poor due to effects of fatigue on the participants [22] as well as researcher. As the literature suggested, a huge number of KWs may cause poor data quality which will affect the overall result. Hence, it is highly reasonable to reduce the number KWs, provided that the most relevant and significant once are included.

One possible way to reduce number of KWs in a study is by manual selection among the lists by domain expert [17,22]. Unfortunately, this method has risk of vague assumptions due to the sensitivity of the expert to Kansei. This will ultimately results poor semantic significance and will cause limited span of Kansei dimension. A common way to reduce number of KWs is by Semantic Differential ratings and regression analysis [17]. Another possibility is with the use of affinity diagram by experts [22]. In this method, experts will be asked to brainstorm emotional keywords that could be used to describe particular artefacts, and manually classify their

affinity before concluding a representative keyword for the cluster. Most of research involving KE adoption implements the first method, and regard this as limitations [2,16-17,22-23]. A good reference for desirably full range of KWs is provided by [2], where he provided a list of about 200 KWs. However, it is in Japanese language, and the affinities are not provided. This paper describes the work in developing a full-range of KWs, and clustering their affinity by the use of KJ method. The outcome will be beneficial to the research involving KE since it provides a reference to possibly full-range of KWs including their affinity.

III. RESEARCH METHODS

The research was performed based on KJ Method. KJ method (sometimes referred to as affinity diagram) named after its inventor, Kawakita Jiro, in 1960s as one of the Seven Management and Planning Tools for successful project planning [24]. It allows groups to quickly reach a consensus on priorities of subjective, qualitative data (Spool, 2004; Mimura, 2005 as in [25]). Spool conducted a study to compare results of affinity cluster developed by 15 different teams, and proven that they produced exactly the same result. This amazing output provide prove of the accuracy of KJ method to produce objective results. KJ method can be used as a tool to gather large amounts of language data (e.g. ideas, opinions, issues) and organizes them into groupings based on their natural relationships [24]. Fig. 1 illustrates this research methodology involving the adoption of KJ method to group affinity of KWs.

In this research the method is divided into four phases, namely Initial Study, Exploratory Study, KJ Method, and Confirmatory Study. The first phase of the method begins with determination of focus domain as a starting point to generate KW. Although its source of idea is founded to one domain, this only serve as a starting point and the result is to be regarded as general. For this research case, the selected domain to generate the initial KW was web design. Thus, initial KWs were synthesized from pertinent literature in web design, expert users, and designers.

In the second phase, the research recruited three language experts to generate full range of KWs. The experts have high degree of skill and knowledge in English literature, and have more than 5 years experience in their field of expertise.
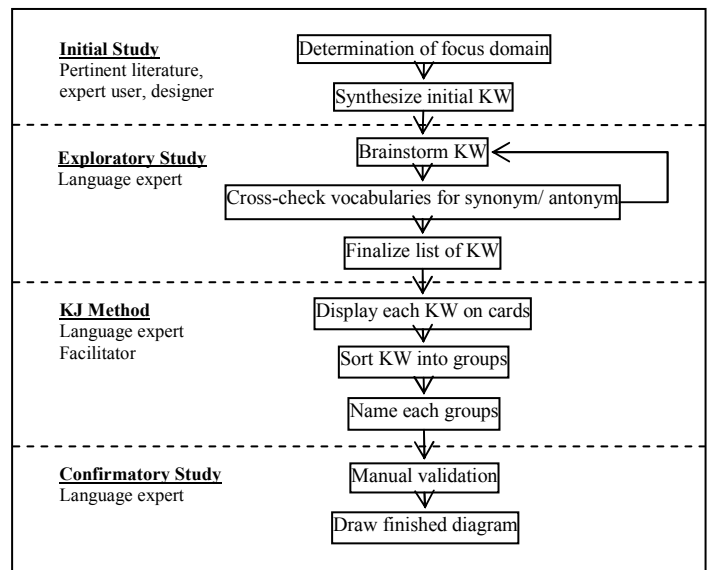

Figure 1. The Research Methodology

The experts were requested to brainstorm KWs based on the initial set of words and perform cross reference to dictionaries and glossaries to check their synonyms and antonyms. This is done repeatedly until all possible KWs are identified. The third phase involved the adoption of KJ method to investigate affinity of all the KWs. In this phase three language experts having similar expertise as in the second phase were used as participants. To begin with the session, all KWs were written on cards in advance. These cards were then displayed at a large table in a random manner, leaving plenty room for sorting. The displayed cards are illustrated in Fig. 2.
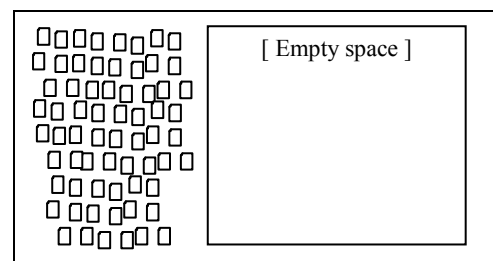

Figure 2. Illustration of the displayed notes.

Then, before beginning with the session, three important conditions to conduct the affinity process are described to participants. Firstly, is to conduct affinity silently to encourage unconventional thinking and prevent one person from steering the procedure. Secondly, is to react quickly to what they see to avoid deliberations. Thirdly, is to handle disagreements simply. That is, they can freely move words and rearrange until the grouping makes sense. If by any chance consensus cannot be reached, make a duplicate of words and place one copy in each group. One facilitator participated in the session to guide participants step by step throughout the session. Participants were requested to begin with looking for two words that seem related in some way and place them together

in another part of the table. Then find words that are related to those already set aside and add them to the group. If they find other words that are related to each other, they are instructed to establish new groups. This process is repeated until the team has placed all of the words in groups. Also, if there are words that don't fit any of the groups, they should let them stand alone under their own headers without forcing them into groupings. The sorted words are illustrated in Fig. 3.
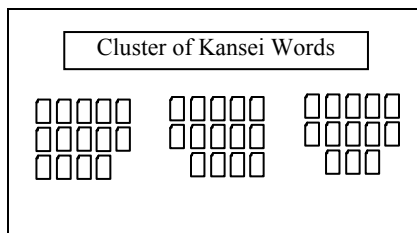

Figure 3. Illustration of the sorted words.

When the participants stop the procedure, and conclude the groupings, they were then requested to put a header for each group. In creating headers, participants were requested to ask themselves whether the header adequately summarizes the words in the grouping. Then, spend sufficient time to finalize the best keyword to avoid vagueness or conflict by discussion. One possibility to help the process is by finding already existing words within the groups that will serve well as headers and placing them at the top of the group of related words. When all header keywords are created, participants are requested to find related group, and decide whether a super-header can be created as parent to two or more headers.

Finally, participants were asked to validate the word grouping and the header in manual way. They were asked to review the final diagram whether the grouping and header represent the semantic space sufficiently directly after the clustering.

IV. RESULT

From the initial study, forty KWs were identified. Among the words are "lovely", "sophisticated", "old-fashioned", "empty", and "friendly". The exploratory study has expanded the number due to the process of expert study and cross reference to glossaries. As a result a total of 820 KWs were finalized. Among the added words are "rough", "casual", "complicated", "flexible", and "dynamic". The KJ Method phase and confirmatory phase have enabled the research to group the affinity of KWs into forty-three cluster. The final affinity diagram is illustrated in Fig. 4.
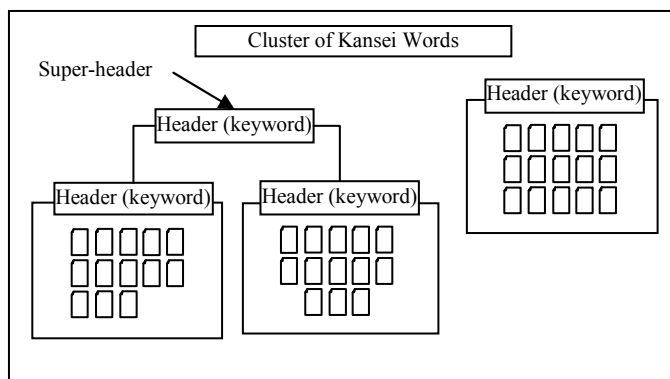

Figure 4. Illustration of the final diagram

The full range of KWs, its header and grouping is developed into Kansei Affinity Cluster, as shown in Table 1.

TABLE I. THE FULL SET OF KANSEI AFFINITY CLUSTER

Cluster Name	Kansei Words
Adventurous	Capable, Drastic, Energetic, Exposed, Extreme, Valiant, Vigorous, Modern, Outdoor, Radical, Revolutionary
Basic	Common, Familiar, General, Normal, Plain, Regular, Simple, Standard, Typical, Usual
Coarse	Adequate, Ambiguous, Approximate, Boorish, Brief, Heterogeneous, Impure, Informal, Loose, Ordinary, Rough, Slanted, Vague
Compromising	Acceptable, Adaptable, Affordable, Appropriate, Balanced, Cheap, Considerate, Cost-effective, Direct, Encouraging, Frank, Halfway, Hopeful, Make-sense, Mild, Moderate, Motivating, Partial, Reasonable, Satisfactory, Satisfying, Straightforward, Suitable, Tolerating
Creative	Innovative, Inspiring, Persuasive, Puzzling, Skilful, Witty
Decent	Adorable, Appealing, Approaching, Attractive, Awakening, Blooming, Casual, Captivating, Chic, Desirable, Flourishing, Lovely, Presentable, Pretty, Shining, Stimulating, Vibrant, Well-dressed
Degree	Average, Classified, Economical, Effective, Few, Grand, Great, High Level, High Quality, Incomplete, Lasting, Major, Minor, Notable, Noticeable, Overwhelming, Recognizable, Sseeming, Tasty, Temporary, Top, Visible, Vast, Vital
Density	Accomplish, Complete, Concentrated, Concise, Congested, Crowded, Deep, Developed, Excellent, Fine, Focus, Heavy, Important, Inadequate, Intermediate, Linked, Messy, Packed, Sufficient, Thick, Total
Difficult	Complicated, Different, Hard, Hard To Adapt, Hard To Use, Hectic, Inconvenient, Particular, Rigid, Risky, Troubling, Turbulence
Dynamic	Beneficial, Brand-new, Changeable, Contemporary, Elastic, Flexible, Functional, High Potential, Influential, Late, Latest, New, Periodical, Practical, Precocious, Recent, Renewing, Talented, Useful, Variegated
Easy	Easy-to-adapt, Easy-to-see, Easy-to-use, Effortless, Gentle, Just Nice, Kind, Lenient, Manageable, Ordered, Organized, Painless, Safe, Tender, Understandable,
Emotional	Big-hearted, Expressive, Generous, Honest, Kind-hearted, Lively, Moving, Sincere, Thoughtful, Warm
Elegant	Advance, Arousing, Artistic, Charming, Clear,

	Delicate, Deluxe, Dignified, Distinguished, Erotic, Exotic, Exclusive, Enchanting, Exceptional, Extraordinary, Famous, Fantastic, Fascinating, Fashionable, Flamboyant, Gallant, Genuine, Gorgeous, Gracious, Graceful, Impressive, Intellectual, Intelligent, Intentional, Magnificent, Mature, Novel, Outstanding, Passionate, Precious, Romantic, Sexy, Smart, Sophisticated, Splendid, Sporty, Stylish, Sweet, Symbolic, Tasteful, Thin, Trendy, Ultimate, Valuable, Versatile, Well-known
Feminine	Aromatic, Beloved, Caring, Comforting, Delicate, Glitter, Glossy, Lady-like, Modest, Nostalgic, Sensitive, Smooth, Soft, Soft-hearted, Womanly
Fruitless	Bitter, Cheerless, Garish, Less, Passive, Restless, Senseless, Separated, Shameless, Tasteless, Terrible, Unreasonable, Useless, Wasting
Global	In-house, Local, International, National, Public, Unisex, Universal
Happy	Amusing, Bright, Brilliant, Calm, Cheerful, Compliment, Delightful, Enjoyable, Fragrant, Funny, Harmonious, Humorous, Joyful, Leisurely, Light, Light-hearted, Nice, Pleasant, Pleasant-looking, Pleasing, Pleasuring, Positive, Prosperous, Relieving, Shiny, Smiling, Spirited, Striking, Unstressed, Welcoming, Wonderful
Indecisive	Blur, Confusing, Dark, Hazy, Inconsistent, Irregular, Sluggish, Unrefined, Unreliable, Unstable
Inferior	Dependant, Failing, Incapable, Poor, Protective, Unimpressive
Innocent	Beautiful, Boyish, Childish, Clean, Cute, Down-to-earth, Fresh, Humble, Immature, Naïve, Pure, Refreshing, Toy-like, Understated, Young, Young-looking, Youthful
Masculine	Male, Male-targeted, Manly, Mannish, Noble, Physical, Powerful, Real, Rich, Robust, Severe, Spartan, Steady, Strong, Superior, Tough, Wise
Negative Attitude	Annoying, Anxious, Bad, Cold-hearted, Clumsy, Cowardly, Defensive, Foolish, Hard-hearted, Harsh, Impatient, Impossible, Inconsiderable, Inflexible, Irrational, Narrow, Nasty, Nervous, Pessimistic, Prejudice, Pretentious, Prohibitive, Rude, Sighing, Show-off, Spoiled, Stubborn, Suspicious, Tarnished, Tedious, Thoughtless, Unaffected, Unconsidered, Undignified, Unemotional, Unfavourable, Unfriendly, Ungrateful, Unpleasant, Unsatisfactory, Untidy, Untrustworthy
Negative Feeling	Awful, Bad Feeling, Dirty, Disgusting, Disregarding, Frightening, Frustrating, Horrible, Irritating, Monotonous, Tense, Terrifying, Unhealthy
Negative Perception	Bad Atmosphere, Bad Colour Combination, Bad Colour Tone, Bad Condition, Bad Design, Bad Looking, Bad Quality, Bad Style, Bad Visibility, Conservative, Conventional, Disappointing, Disengaging, Doubtful, Long-Winded, Low Class, Low Cost, Low Level, Low Potential, Obnoxious, Overstressed, Primitive, Unimaginative, Unusual
Negative Physical	Disordered, Flat, Forceful, Fragile, Gutless, Low Performance, Low Quality, Poor Condition, Poor Design, Poor Finishing, Poor Quality, Poor Shape, Rushed, Smelly, Unattractive, Unsightly, Violent
Occupied	Busy, Engaged, Existing, Filled, Fully-used, Handful, Utilized
Old	Adult-like, Affective, Aged, Antique, Aware, Classy, Emotional, Exhausting, Existent, Grown-up, Historical, Homely, Lingering, Old-fashioned, Old-look, Old-style, Original, Orthodox, Out-of-date, Outdated, Past, Peaceful, Ponderous, Preserved, Private, Quiet, Relaxing, Reserved, Rural-like, Sensible, Slow, Tiring, Traditional, Ugly, Unappealing, Unclear, Uncomfortable, Undesirable, Unique, Unstylish
Personality	Characteristic, Charismatic, Independent, Individual,

	Interesting, Loud, Personal, Responsive, Serious, Uninteresting
Positive Behaviour	Certain, Clever, Concerned, Confident, Consistent, Expert, Favourable, Friendly, Good Hobby, Grateful, High Sense, Highly Efficient, Insistent, Obedient, Orderly, Persistent, Reliable, Realistic, Resolute, Understanding
Positive Physical	Active, Brave, Courageous, Figurative, Firm, Fit, Formative, Good Atmosphere, Good Balance, Good Colour Combination, Good Colour Tone, Good Condition, Good Design, Good Environment, Good Feeling, Good Finishing, Good Looking, Good Pattern, Good Presentation, Good Quality, Good Shape, Good Style, Good Touch, Good Visibility, Healthy, Neat, Sharp, Tidy, Well, Well-Decorated, Well-Designed, Well-Organized, Well-Prepared
Quantity	Comprehensive, Empty, Full, High, Huge, Intensive, Large, Low, Numerous, Obvious, Representative, Small, Substantial
Rebellious	Aggressive, Arrogant, Boast, Booming, Chaotic, Confronting, Dangerous, Daring, Exaggerating, Fanatic, Flashy, Free, Hot, Intolerant, Militant, Moody, Mysterious, Noisy, Offensive, Open, Quick, Rapid, Remaining, Repelling, Speedy, Suppressing , Tight, Wide, Wild, Zany
Refined	Compact, Complex, Connected, Detail, Emphasized, Even, Extensive, Grown, Improved, Inclusive, Itemized, Perfect, Polished, Precise, Refining, Replicating, Specific, Streamline, Symmetric, Unified, Upgraded, Vivid
Trendy	Amazing, American-style, Awesome, British-look, British-style, City-style, Colourful, Cool, Country-style, Dandy, Dazzling, Decorative, Dressy, Eastern-contemporary, Eastern-style, Ethnic, European-style, Exciting, Fabulous, Fancy, Gaudy, Highlighted, Incredible, Japanese-contemporary, Japanese-style, Modern-east, Modern-west, Multicoloured, Oriental, Pop, Popular, Rhythmic, Sensual, Showy, Sparkling, Thrilling, Town-like, Up-to-date, Urban-style, Western Contemporary, Western Feeling, Western Style
Trustworthy	Appreciative, Associated, Assuring, Attached, Careful, Cautious, Compliant, Contenting, Convincing, Confidential, Determining, Efficient, Faithful, Family-like, Good, Ideal, Idyllic, Liberal, Liberty, Logical, Meaningful, Memorable, Optimistic, Polite, Rational, Respectable, Successful, Tolerant, True, Truthful, Unpretentious
Sad	Cloudy, Cold, Depressing, Displeasing, Disturbing, Dull, Fatigue, Gloomy, Homesick, Ignored, Inactive, Lazy, Lonely, Negative, Painful, Pastel-toned, Shy, Solemn, Stressful, Stupid, Touching, Unexpected, Weak, Worry
Seasonal	All-season, Autumn-like, Cultural, Dry, Forrest-like, Futuristic, Marine-like, Natural, Oceanic, Spring-like, Summer-like, Tropical, Wet, Windy, Winter-like
Sophisticated	Abstract, Branded, Distinctive, High Class, High Cost, High Impression, Elite, Expensive, Formal, High Style, Intellect, Limited, Luxury, Official, Premier, Professional, Special, Significant, Stunning, Top-class, Vogue
Spatial	Interior, Comfortable, Spacious
Static	Actual, Changeless, Concrete, Homogeneous, Linear, Solid, Stable, Stiff, Strict, Uniform
Technological	Artificial, Automatic, Convenient, Custom, Enhanced, Fast, Geometric, Handy, High Performance, High Power, High-tech, Manual, Mechanical, Multi-dimensional, Multi-function, Multi-purpose, Scientific, Secure, Specialized, Systematic, Technical, User Friendly
Surreal	Conceptual, Dream-like, Fake, Fantasy, Ghostly, Imaginative, Magical, Mystic, Science-fiction,

	Supernatural, Unrealistic
Weird	Abnormal, Awkward, Boring, Contrasting, Funky, Isolated, Maniacal, Odd, Panic, Peculiar, Silly, Strange, Uncommon, Uneven, Unfamiliar, Unnatural, Unorthodox, Vulgar

V. CONCLUSIONS

The research has outline list of 820 KWs and their affinity cluster by KJ Method. The result will be beneficial to studies involving the adoption of KE in the assessment of emotion and designing emotional evocative product, which incorporates user's emotional experience towards particular product design. One possible use of the developed cluster is towards development of Kansei mining system for affective product design.

Another possible use of the Kansei Affinity Cluster is during the process of synthesizing emotional keywords in studies involving emotional values. One can search for possible missing keywords, or even to be used as starting point when facing difficulties to find the semantics. This is a common problem because emotion by its nature is implicit, and inexperienced researcher may have problem to uncover the verbal descriptors to represent the emotional state.

Nevertheless, the use of the cluster may have to be adapted to one study domain. This is due to the uniqueness of the emotional experience users may have with different product [25]. Hence, should one require valid KW for a particular study domain, he or she may execute post-hoc regression analysis to confirm the most influential KWs to the domain.

ACKNOWLEDGMENT

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