Affective Aspect Analysis on Online Games From User's Point of View Using Kansei Engineering

Heru Prastawa
Industrial Engineering Department
Diponegoro University, Indonesia
heruprastawa@undip.ac.id, heru.prastawa@gmail.com

Novie Susanto
Industrial Engineering Department
Diponegoro University, Indonesia
nophie.susanto@gmail.com

Octavia Gultom
Industrial Engineering Department
Diponegoro University, Indonesia
Octavia_gultom@yahoo.com

Abstract

Affective aspect analysis on online games from user's point of view using Kansei Engineering. Currently, Indonesian government and industry players give serious attention to the fulfilment of economic needs in the field of creative economy. One of the subsectors that contribute to the growth of the National GDP is interactive game. However, this subsector contribution is very low compared to others. In recent years, some researchers have focused on researching the interaction between products and users to produce more effective and ergonomic game designs. This research intends to know the relation of online game from affective aspect by utilizing the voice of consumer (game user) specifically game user of DOTA 2 by using Kansei Engineering method formulated through Kansei words specializing in games. The purpose of this research is to analyze the affective aspect in the use of online game DOTA 2, to group the affective aspect indicators according to the desire/perception of the user for the product, and to give recommendation in the form of affective aspect information contained in game which can be considered as important aspect in the next game development. Based on the discussion and analysis, it can be concluded that the affective aspect is one of the vital aspect which can identify the desired game by the user. The information obtained is a collection of Kansei words or affective aspects which are grouped by using cluster analysis.

Keywords
Online Game, Affective Aspect, Kansei Engineering, Cluster Analysis

1. Introduction

Currently, Indonesian government and industrial figures give serious attention on the fulfilment of economical needs in the creative economy field. Creative economy has a few sub-sectors considered to have great potential in improving national economy, namely architecture, art, interactive game, music and also computer services and software. This is shown through the PDB growth of these five sub-sectors, reaching above the average national PDB growth in 2006 (Department of Commerce, Republic of Indonesia, 2008).

One of the sub-sectors that contributed to the National PDB growth is interactive game. But this subsector contributed lesser than other subsectors. The interactive game subsector consisted of creative activities related to the

creation, production and distribution of computer and video games that is entertaining, testing dexterity, and educational (Department of Trade, Republic of Indonesia, 2008). Indonesia is currently entering export market of interactive games in particular, for example *Infectonator Survivors* and *Dreadout keeper of the dark* in Steam owned by the digital game distributor Valve. How does Steam works? First by buying the *game* via Steam and downloading it online to suppress game piracy. But both *games* have yet to obtain a large number of enthusiasts since its launch in 2016. This is shown from the number of players data of *Dreadout Keeper of The Dark* indicated in the SteamSpy Application, in 2017 around 2.180 ± 1.347 players are active from all over the world in the last two weeks.

In the last few years, some researchers have been focusing on examining interaction between user and product (*user experience*) which is a branch of HCI (*Human Computer Interaction*) to produce a more effective and ergonomic game design (Nagalingam & Ibrahim, 2015). *Human Computer Interaction* is a multidiscipline field of science with design as on of its discipline. According to Bates (2004), one of the important principle of *game* design that should be widely known to efficiently and effectively improve user's gaming experience is players' empathy. A good game designer must always have an idea about what is happening in players' mind. Designers must develop the ability to put himself in players' position and anticipate their reaction to each element of the game.

Fun, *enjoyment*, and *emotion* are spontaneous aspects of human life, it is difficult to separate, observe or measure them, but these aspects can be stimulated. As in story and poetry, game is a very important instrument that can trigger emotional responses in an artificial situation. Designing *games* means designing a framework for an experience, whereas the ultimate goal of designing an application is to create pleasure (*fun*) or customer satisfaction (Andersen et al, 2003). Behaviors like feeling, interest, emotional attitude and value is inside the scope of affective aspects. Affective aspects is one of the known important aspects in designing a product to meet customer needs and preferences.

The game developer (*designer*) can use the voice of consumers (*game players*) to develop their game and be more preferable. It is very important to analyze affective aspects of consumers such as emotions or feelings towards the game played and translates it into the right design in the development of the *game*.

Kansei Engineering was proposed as a methodology to handle affective design of a product back in the beginning of 1970 (Nagamachi, 1995). This method translates psychological feelings someone has towards a product for example a motorcycle driver has "fuel efficient motorcycle", "Cute motorcycle design" etc in his/her mind. *Kansei engineering* is able to understand their consumers psychologically, the kansei then analyzed using the statistic methods, and then transferring the analyzed data. Example of *Kansei Engineering* in real life application is Sharp, the Company had succeeded in creating a unique camcorder, called Liquid Crystal that has been developed into a digital camera. However, measuring Kansei is not easy and will always have subjective tendencies, because the method of measurement depends on the reaction of the human studied (Schütte, 2005).

DOTA 2 is an internet-based video game developed and published by Valve Corporation in 9 July 2013 and in every two weeks it is noted that there are approximately one million active Indonesian players. This number was obtained from the SteamSpy application as an application that provides a Steam statistics based on API (*Application Programming Interface*) *Web* provided by Valve that automatically collects data from the Steam's user profiles, analyze it and present it with a simple but interesting way.

This research aims to know the *kansei words* related to *online games* from affective aspects point of view to take advantage of consums'r voice (*game players*) in particular the players of DOTA 2. Thus, the analyzed information of affective aspects of *online games* from the consumers point of view of DOTA 2 using *Kansei Engineering* is obtained.

2. Literature Review

2.1 Human Computer Interaction

Human Computer Interaction is a discipline concerning design, evaluation and implementation of interactive computer system for human use and study of the main phenomenons surrounding it. "(Preece et al, 1999). According to the foremost and latest research, *Human Computer Interaction* is multidisciplinary field. This is shown in figure 1.

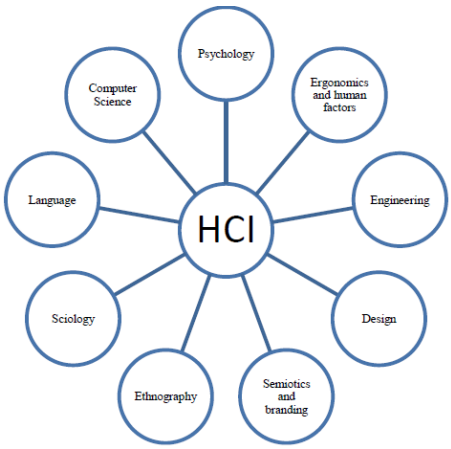

Figure 1 Fields of *Human Computer Interaction*
Source : Nanni, 2004

2.2 Affective Aspects

Affective aspects are aspects related to the character's behavior and values such as feeling, interest, attitudes and emotions. Some experts say that the attitude of a person can be predicted by the time when someone has a high level of cognitive power (Bloom et al, 1956). Affective aspect is divided into five levels, namely: *receiving* or *attending, responding, valuing, organizing* and *characterizing* by a value or complex value.

This type of emotional attribute/motivation is derived from design styles, function, form, usability and experience which result can be built for users/consumers, therefore, the resulting design and the design that has appeared in the market may have the ability to motivate the user/consumers by its consumption. It can be said that the emotions of the user/consumers in the form of emotional responses that can make them happy and upset, excited, frustrated etc. are obtained from the design results. In this situation, the results of the design can motivate the emotions of users/consumers and is stated as emotional/affective design derived from user/consumer's point of view (Ho & Siu, 2012).

Kansei Engineering

Kansei Engineering is a method introduced by Prof. Mitsuo Nagamachi in 1970 in the field of Ergonomics that focuses on customer oriented development of a product. The term Kansei comes from Japanese language that can be interpreted as psychological feelings of human. In the Kansei Engineering concept, goods or new products are made based on the feeling and request of the customers. Kansei engineering aims to develop products based on consumers' deepest feelings (Nagamachi, 1995). Kansei engineering is the first and foremost in product development methodology that translated customers' impression, feelings and desire on a product or concept that already existed to design a solution and concrete design parameters.

Cluster Analysis

Cluster analysis is a data analysis method that aims to classify the observed data or variables into groups wherein the data has the same characteristics into the same cluster and different characteristics to other clusters. Cluster analysis is the first and the foremost algorithm technique and not an inferential statistics tool. Therefore, requirements such as normal distribution of data (as in other statistical analysis tools) or linear relationship between variable is not the conditions of using cluster analysis. However, because the data that is processed in cluster analysis is usually only a small part of the population, so, to make the result generalized, the processed data should reflect the general description or is the representative of the population (Gudono, 2016).

3. Methodology

The research started with an introductory survey to obtain initial information related to DOTA 2 *online game* in Indonesia. The next step is to define the survey mechanism through a questionnaire. The first questionnaire consists of short questions given to 65 respondents to acquire *kansei words* found in an *online game* as seen from 5 elements of a game. Then, a second questionnaire were given to 182 respondents to see the perceptions and feelings/emotions of respondents towards DOTA 2 using *semantics differential* to show respondents' feelings. According to Osgood (1957), the *differential semantics* method is one of the most common methods used in a research, by giving value on a scale of 7 on each *Kansei word* obtained previously. The sampling technique used in this research is *simple random sampling*. In this research respondents who fill the questionnaire are DOTA 2 players in the city of Semarang, Central Java.The selected *Kansei words* can be seen in table 1.

Table 1 *Kansei Word*

Elements of Game Design		***Positive***	***Negative***
Gameplay/Game Mechanics	X1	*Predictable*	*Unpredictable*
	X2	*Relaxing*	*Anxious*
	X3	*Vigorous*	*Lethargic*
	X4	*Easy to Understand*	*Difficult to Understand*
	X5	*Challenging*	*Not Challenging*
	X6	*Up to Date*	*Obsolete*
	X7	*Fun*	*Boring*
	X8	*Explicit*	*Ambiguous*
	X9	*Up to Date Character*	*Obsolete Character*
	X10	*More Character*	*Less Character*
	X11	*Communication with Other*	*Without Communication with Other*
	X12	*Teamwork*	*Solitary*
	X13	*Easy to Play*	*Difficult to Play*
	X14	*Able to Play in low Specification PCs*	*High specification PCs*
Visual Aesthetic Design	*X15*	*Colourful*	*Colourless*
	X16	*Spacious*	*Crowded*
	X17	*Elegant*	*Not Elegant*
	X18	*Sporty*	*Not Sporty*
	X19	*Vivid*	*Gloomy*
	X20	*Comfortable*	*Uncomfortable*
	X21	*Feminine*	*Masculine*
	X22	*Real*	*Unreal*
	X23	*Organized Map*	*Unorganized Map*
Narrative Design	X24	*Simple*	*Complex*
	X25	*Creative*	*Unoriginal*
	X26	*Hero Background with Indonesian Language*	*Hero Background without Indonesian Language*
	X27	*Easy to Understand*	*Difficult to Understand*
Incentive System	X28	*Unsatisfied*	*Satisfied*
	X29	*More Hero's Set Reward*	*Less Hero's Set Reward*
	X30	*Team Score*	*Individual Score*
	X31	*Premium Reward*	*Non Premium Reward*
	X32	*Awards Through Tournaments*	*An award that does not go through the tournament*
Musical Score	X33	*Variety*	*Monotone*
	X34	*Relaxing*	*Anxious*

The validity and reliability test calculation were done on the questionnaire data results to know validity and reliability of the questionnaire used. In this research, the valid and reliable data were as many as 4 elements with 29 perceptions. The data grouping was done by *cluster analysis* using *K-Means Clustering* which is one of the methods of data *clustering* non-hierarchy that classified the data in the form of one or more *clusters*/groups.

4. Results And Discussion

4.1. Closed Questionnaire

The selected *Kansei words* tends to be directed on *gameplay* or *game mechanics* that are *vigorous* (eager) (bright) with a total of 141, the dominant choice.

While for the gameplay/game mechanics element stating able to play only with high specification PCs is a total of 75, this result is not dominant nor unbalanced with the gameplay/game mechanics element stating able to play in low specification PC's which have a total of 73. The recapitulation of questionnaire results can be seen in table 2 below.

Table 2 User perception about the *Online Game* DOTA 2

Elements of Game Design		***Kansei Word* (Negatif)**		***Kansei Word* (Positif)**	
Gameplay/Game Mechanics	X3	*Lethargic*		*Vigorous*	+
	X4	*Difficult to Understand*		*Easy to Understand*	+
	X5	*Not Challenging*		*Challenging*	+
	X6	*Obsolete*		*Up to Date*	+
	X7	*Boring*		*Fun*	+
	X8	*Ambiguous*		*Explicit*	+
	X9	*Obsolete Character*		*Up to Date Character*	+
	X10	*Less Character*		*More Character*	+
	X11	*Without Communication with Other*		*Communication with Other*	+
	X12	*Solitary*		*Teamwork*	+
	X13	*Difficult to Play*		*Easy to Play*	+
	X14	*High specification PCs*	+	*Able to Play in low Specification PCs*	+
Visual Aesthetic Design	X15	*Colourless*		*Colourful*	+
	X16	*Crowded*		*Spacious*	+
	X17	*Not Elegant*		*Elegant*	+
	X18	*Not Sporty*		*Sporty*	+
	X19	*Gloomy*		*Vivid*	+
	X20	*Uncomfortable*		*Comfortable*	+
	X22	*Unreal*		*Real*	+
	X23	*Unorganized Map*		*Organized Map*	+
Narrative Design	X24	*Complex*		*Simple*	+
	X25	*Unoriginal*		*Creative*	+
	X26	*Hero Background wiithout Indonesian Language*		*Hero Background with Indonesian Language*	+
	X27	*Difficult to Understand*		*Easy to Understand*	+
Incentive System	X28	*Unsatisfied*		*Satisfied*	+
	X29	*Less Hero's Set Reward*		*More Hero's Set Reward*	+
	X30	*Individual Score*		*Team Score*	+
	X31	*Non Premium Reward*		*Premium Reward*	+
	X32	*An award that does not go through the tournament*		*Awards Through Tournaments*	+

4.2. Open Questionnaire

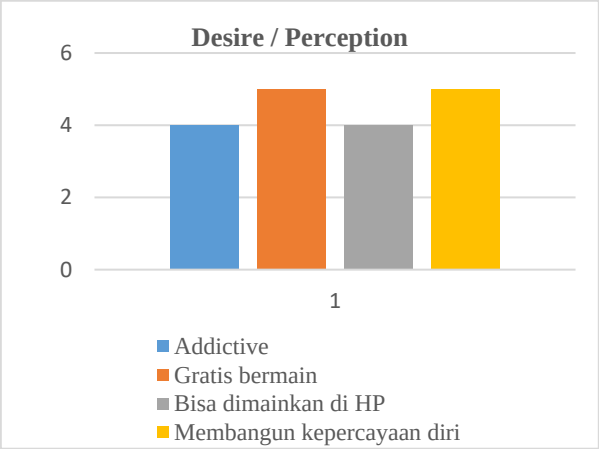

Figure 2 Additional Kansei Word Graph

In the distributed questionnaire, there was a provided media for the respondents to write their perception/desire towards the online game DOTA 2 aside from the elected kansei words mentioned before. This is shown in Figure 2. In summary, there was a desire/perception included on the elected kansei word. Other desires/perceptions that differ from the ones mentioned previously are *addictive*, free to play, can be played in handphone and building self-confidence. There are 4 people that mention addictive, free to play as much as 5, can be played in Handphone as much as 4 people and building self-confidence as much as 5 people with the percentage each at 22%, 28%, 22% and 28%.

4.3. Questionnaire Testing

In introductory research, 34 pairs of kansei word were obtained from 65 respondents from questionnaire spread online, *small group discussion* with some users of DOTA 2 and also journals or literatures.

Then the research was continued by spreading questionnaires to 182 respondents to know the respondents' perception/desire based on 34 pairs of *kansei word* about *online game* DOTA 2. Questionnaire testing is done in the form of validity and reliability test and done based on the collected answers from the respondents. This test aims to know whether the questionnaire can measure and represent the purpose of this research and also to know whether the questionnaire is consistent and can be used as a reference on the next research.

Validity test is done by looking at the comparison value of each element with its total in one perception. The tests is performed on 5 elements with total 34 perceptions. Each perception will be stated as valid when the calculated r value on Corrected Item-Total Correlation is greater than the value of the r table. In this research there are 182 respondents with 5% level of significance, so the r table value can be obtained, as much as 0,1447. The value of r table on each perception that exceed 0,1447 is stated as valid and can be concluded that the questionnaire can be used to measure what will be measured in this research.

Reliability test was done to see the level of consistency of a questionnaire. This test is done by comparing the value of Cronbach's Alpha. The questionnaire results which have a greater value than 0.6 can be stated to meet the reliability test requirements and is reliable.

In the validity and reliability testing that has been done, 4 elements with 29 valid and reliable perceptions were obtained. The four elements were gameplay or game mechanics element with perception X3, X4, X5, X6, X7, X8, X9, X10, X11, X12, X13, and X14, *visual aesthetic design element* with perception X15, X16, X17, X18, X19, X20, X22, and X23, *narrative design element* with perception X24, X25, X26, and X27 and *incentive system* elements with perception X28, X29, X30, X31, and X32.

4.4. Cluster Analysis

4.4.1. Specifying the Number of Clusters

Before performing cluster analysis, the first thing to do is to determine the number of clusters used. The amount of clusters is determined based on merged overall results without separating each elements of the game. This is done because the number of distinguishable factors between elements were very little so that it was decided to merge the respondents.

The number of clusters used was obtained by using Ward method in SPSS 22. According to Santoso & Tjiptono (2004), cluster number inferred from *Agglomeration Schedule* (attachments) and dendogram as a result of clustering. Dendogram is read from left to right. The vertical line indicates merged clusters and the line on the scale shows distance of the combined clusters. The number of clusters formed were assumed as much as 3 cluster units. This number of clusters will then be used for cluster analysis using the *k-means method*.

4.4.2 Cluster Analysis Results

Based on the analysis of cluster using k-means method on SPSS 20, the distribution of respondents in each cluster was obtained. The number of respondents obtained on each cluster is not distributed evenly. The number of respondents in each cluster can be seen in table 3.

Table 3 Distribution of Respondents in Each Cluster

Cluster	1	71.000
	2	96.000
	3	15.000
Valid		182.000
Missing		.000

The following are the average results of the questionnaire according to the perception of users towards *online game* DOTA 2, which can be seen in figure 3.

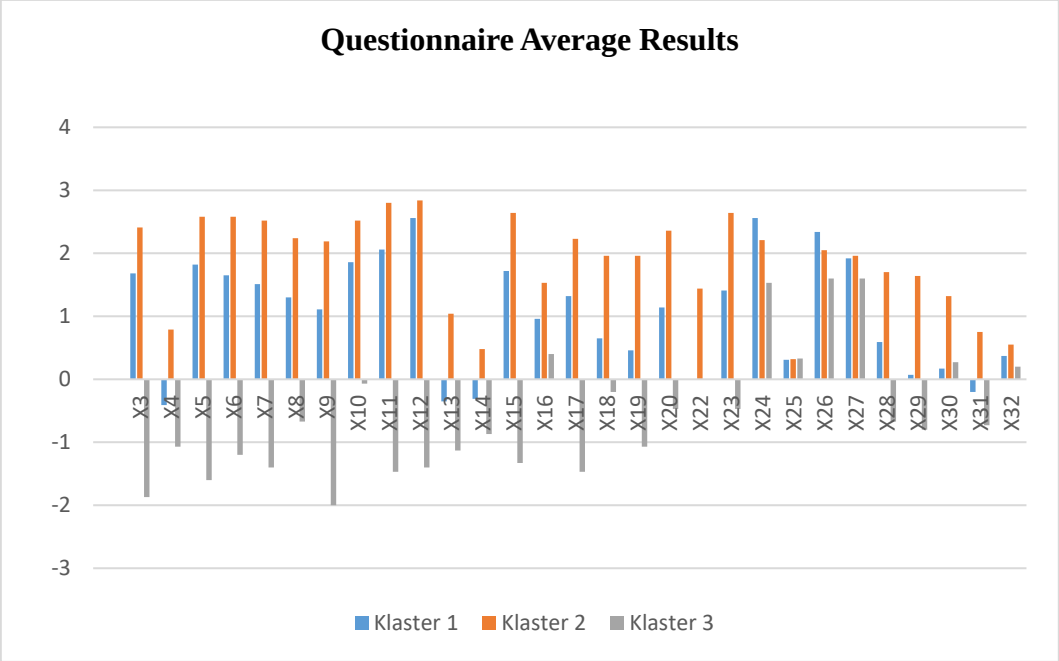

Figure 3 Questionnaire Average Results

In the picture above, it can be inferred that Cluster 1 has average questionnaire value above 0 and some under 0. This shows that the respondents on cluster 1 have a tendency to select positive kansei word perception and a few that selected negative perception. Cluster 2 has average questionnaire value above 0 or positive, while cluster 3 gravitated toward the negative position.

5. Conclusion

Based on the analysis and discussion can be concluded that there are 5 elements in a game is as many as 34 pairs of perceptions. But the valid and reliable perception is 4 elements with 29 pairs of perceptions.

Cluster analysis formed respondent in to 3 clusters. The users on cluster 1 and 2 tend to choose positive *kansei words* compared with cluster 3. The number of respondents in cluster 1 and 2 is greater than the cluster 3. It can be concluded that the affective aspects perception/desire in cluster 1 and 2 can be used as the aspects the vital aspects to be noted in developing future online games, especially for game developers or designers in Indonesia so the games will be preferable and known by the wider community, given the opportunity and great advantage in the development of online game industry.

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Biographies

Include author bio(s) of 200 words or less.

Heru Prastawa is an Associate Professor, member on Work System Engineering and Ergonomic laboratorium, in Industial Engineering, Diponegoro University. He earned B.S. in Mechanical Engineering from Sepuluh Nopember Institute (ITS) Surabaya, Masters in Technology Assesment from Universite Marseille III, Marseille, France. Recently he is a graduate Student in Industrial Engineering from Sepuluh Nopember Institute (ITS) Surabaya. His research interests including human factors, ergonomics, user experience and manufacturing system. He is member of IAE.

Novie Susanto, is currently a fulltime senior lecturer in Industrial Engineering Department, Faculty of Engineering, Diponegoro University. Mrs. Susanto holds a Bachelor degree in Industrial Engineering (S.T) from Diponegoro University and a Master of Engineering (M.Eng) from Gadjah Mada University. She hold her doctor degree (Dr.-Ing) from IAW RWTH Aachen, Germany. Her research interest including human factors and applied ergonomics.