Identifying Customer Satisfaction Characteristics with the Kano Model for the Agile Development of Video Games

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ABSTRACT

Purpose: This study aims to use the Kano Model to identify critical attributes that can be used as features in video games developed using Agile software development.

Methodology/Approach:

Attributes were identified from the literature review and then selected for a survey given to university participants. Survey results were then analysed using the Kano Model table and a scatter plot. The survey identified respondents' preferences in video games. The survey responses were reanalysed using stratification by video game type.

Findings: No one-dimensional attribute was found that would be critical to video game customers. Only a limited number of attractive attributes were identified from the aggregated data.

Research Limitation/Implication: The analysis by type of video games had low sample sizes. Additionally, people from outside the target group responded to the survey.

Originality/Value of paper: This paper identifies attributes to prioritise when developing a product and demonstrates the need to consider market segmentation when using the Kano Model.

Category: Research paper

Keywords: kano model; video games; software development; agile software development; customer satisfaction

Research Areas: Quality by Design; Quality by Innovation

1 INTRODUCTION

Video game playing is a popular form of entertainment around the world (Baeza-González, 2021). Consumers were spending $21.53 billion on video games and related accessories as far back as 2013 (Newbery-Jones, 2015) and estimates for video game-related spending reached 100 billion worldwide (Koch and Artmayer 2019). Annual spending on video games tripled in the ten years from 2008 to 2018 (Impink, et al. 2020) with video game playing undergoing decades of exponential growth and nearly two-thirds of the world's population estimated to be playing video games by 2023 (Cabeza-Ramírez, et al., 2022).

While profits in the video game industry can be high, so are the business risks for the companies developing major new games (Sandqvist, 2015). Companies need to produce games that sell well, to survive in the gaming market (Handrich, 2022). Games with good recommendations tend to sell well (Hernandez and Handan, 2014). If customers are satisfied with a product, the reviews will be favourable (Nan, et al., 2022). Therefore, satisfying end users should be one of the main goals of the video game industry.

One way to reduce the business risks associated with developing major games is to opt for early access or Beta version release. Releasing early also comes with the advantage of being able to collect customer feedback while the production process is still ongoing (Hernandez and Handan, 2014). Being able to gain real-time customer (player) feedback leads to many studios practising a type of continuous improvement called Continuous Development and Continuous Integration (CD/CI) for software development (Koutonen and Leppänen, 2013). Continuous development needs a flexible software development model that centres on the satisfaction of stakeholders. Agile software development and its sub-forms are well suited for this (Koutonen and Leppänen, 2013). This is why Agile software development is prevalent in game development (González García, et al., 2019).

The CD/CI process in the gaming industry results in patches, which are updates, that may fix problems, add new features, or provide general improvements to the game. To develop good patches for the early release version, it is necessary to collect and process user (player) feedback. This processed feedback is used to create and prioritise requirements (Saher, et. al., 2018). One method for the identification and prioritisation of requirements in an Agile environment is the Kano model (Riemann, et al., 2020).

This paper seeks to characterise video game-related attributes using the Kano Model for the agile development of video games. To do so, video game-related attributes were identified and young video game players were surveyed using a Kano Model style survey. The data was then analysed and plotted.

2 LITERATURE REVIEW

Agile software development is focused on increasing team responsibility for individual employees and introducing less control from above, thus allowing company employees to act flexibly, quickly, and with maximum customer orientation (Al-Saqqa, et al., 2020). Agile can be understood as an answer to the constantly increasing speed with which projects, as well as standard daily tasks, have to be processed today. Furthermore, it embraces the realisation that deviations from the plan are the rule rather than an exception. Consequently, creating increased response speeds and overall flexibility are two of the key concerns of agile project management (Al-Saqqa, et al., 2020; Moniruzzaman, et al., 2013). Furthermore, agility in business puts the customer and their needs at the centre. A highly customer-oriented approach with continuous consultations and joint reflection results in an adaptation and re-prioritisation of requirements. In the course of projects, there are always changes in terms of customer opinions or requirements. The changing requirements can be accepted and implemented particularly efficiently by an Agile company, precisely because of the increased reaction speeds and flexibility of the employees described above. This flexibility in turn means that customers tend to feel more understood and are much more likely to receive results that fully meet their expectations. Customer satisfaction is therefore high in Agile companies, resulting in increased customer loyalty and ultimately also better competitiveness (Al-Saqqa, et al., 2020; Sharma, et al., 2012).

Video games may be played on (tablet) computers, smartphones, or wireless devices (Newbery-Jones, 2015). There are many types of video games. For example, some are action games, first-person and third-person shooter games, strategy-oriented games, sports games, puzzle games, driving games, and flight-related games (Hutchinson, 2007). Video games can be very complex, with some having almost realistic digital worlds covering square kilometres and containing populations the players can interact with (Hemenover and Bowman, 2018). When developing video games, the game features desired by the players need to be identified.

How well those features are implemented will directly impact customer satisfaction, which impacts the sales of a game. For example, video game players do not like poor graphics, which is considered to be a major problem (Nan, et al., 2022). Eliciting and assessing features or requirements in an Agile software project can be performed using the Kano Model (Riemann, et al., 2020), as well as for the development of video games (Handrich, 2022).

The Kano Model was developed by Kano, et al. (1984) and is a two-dimensional model. A one-dimensional model would consider customers to be satisfied with adequate levels of quality, while a two-dimensional model might not consider customers to be satisfied just because quality was considered to be adequate (Chen and Ko, 2016). One-dimensional models are linear and do not consider degrees of customer satisfaction (Vaez, et al., 2020).

The Kano Model is frequently used as a part of marketing initiatives to identify attributes for customer satisfaction (Jin, et al., 2021) and helps design a product or service that customers will want, as well as prioritising product or service options to improve (Chen and Kuo, 2011). The Kano Model can be especially useful when customers are unaware of attributes that they may want; the Kano Model can identify attributes for achieving surprising quality (Madzík and Kormanec, 2018).

The implications of the Kano Model in consideration of price categories were assessed by Turisová (2014) and Albuquerque, et al. (2024) used the Kano Model to understand customer satisfaction scores. Johansson, et al. (2024) investigated contributors to satisfaction in coworking spaces using the Kano Model. The Kano Model has also been applied across a wide range of industries, products, and services (Fofan, et al., 2019). Handrich (2022) applied the Kano Model video games and found game innovation to be relevant to success based on a sample of eight expert evaluators. The Kano Model has also been used for hotel stays (Shahin and Ebrahimi, 2021), automobiles (Madzík, 2018), making strategic business decisions (Fofan, et al., 2019), online marketing reviews (Bi, et al., 2019), employee satisfaction (Furlan, 2010), mass-housing (Ek and Çıkış, 2015), an e-learning service (Chen and Kuo, 2011), fast food restaurants (Chen and Chen, 2015), and health care (Materla, et al., 2019b). This study seeks to apply the Kano Model to the Agile development of video games.

3 METHODOLOGY

Potential attributes to use in the Kano Model were identified from the literature. Table 1 shows all possible attributes as well as the source of the attributes.

The attributes for the Kano Model survey were chosen based on clarity, as in easy for survey takers to understand, and on being easily observable by the player. For instance, the existence or absence of cut scenes in a game is easy to observe, while the level of complexity in non-player character conversations is harder to judge. Another ambiguous attribute is playability, which is undefined (Sanchez, et al., 2012). A total of 20 attributes were identified and given an identification number from A1 to A20.

A survey with the Kano Model questionnaire was administered to computer science students in two mandatory computer science courses at the University of Applied Science. The survey asked demographic questions pertaining to age, gender, number of hours of gaming per week, and type of games. The paired questions consisted of "How do you feel if _____ is present in the video game" and "How do you feel if _____ is not present in the video game." The possible responses were "I like it that way", "I expect it to be that way", "I am neutral", "I can accept it that way", and "I dislike it that way".

Table 1 – Possible attributes and sources

Possible Attributes	Source
Avatar creating,	(Trepte and Leonard, 2010)
Avatar creating, save function, increasing difficulty or levels, self-adapting difficulty, combos or hotkeys, leader board features, rewards, graphic features, sound features, storyline narrative, equipment repair, gaining health, rewards, hall of fame for high scores, strategy guides, mission briefing, realistic sounds	(Hull, et al., 2013)
Game physics, character development, variety, complex and interesting dialogue	(Brown, 2008)
Save function, a clear game goal, high paced, relaxed pace, intuitive controls	(Federoff, 2022)
Obstacles to overcome, tasks to complete, external rewards, outcome-based rewards, intuitive user interface, playability, tutorials, hearts and coins, visual and audible rewards,	(Sanchez, et al., 2012)
Fast-paced gameplay, role-playing, puzzles, strategy	(Tondello Nacke, 2019)
Humour, multiplayer features, winning and losing features, sound, graphics, in-game voice chat, in-game text chat, restarting a level, realistic graphics, no end point, violence, drugs, nudity, choice of sex, achievement points, quick-save	(King, et al., 2010)
Loot	(Winter, 2022)
Sound, levelling up, fast loading times, social iteration, rare game items, cooperation, story cut-scenes, graphics, complex story, customisation options, game rewards, different stories, adult content (e.g. drugs)	(King, et al., 2011)
Well-developed characters, a captivating game story, visualised game progress, a clear game story, uniqueness or originality, sound effects, music, social interaction, creative freedom, narratives, easy-to-navigate interface, user-friendly menu	(Phan, et. al., 2016)

4 RESULTS

There was a total of 176 people in the two courses and 143 responses, which is a response rate of 81.3%. The majority of respondents were under 25 years old and over half of the respondents were male. Data was also collected on the average number of hours per week spent gaming, devices used for gaming, and types of games the respondents preferred.

The Kano model questions were assessed using Cronbach's alpha, which tests for consistency between questions. A low value would indicate that the questions are not all measuring the same construct (Streiner, 2003). The overall Cronbach's alpha was 0.787 and the results for functional questions range from 0.7697 to 0.7902. A commonly used value for Cronbach's alpha is 0.7 (Taber, 2018); therefore, all questions are valid.

The questionnaire results were assessed using Table 2.

Table 2 – Kano evaluation table reproduced from Materla, et al. (2019a). Reprinted with permission from Journal of Quality and Participation. © 2019 ASQ, www.asq.org. All rights reserved. No further distribution allowed without permission.

Customer Requirements		Dysfunctional Form				
		1. I like it that way	**2. It must be that way**	**3. I am neutral**	**4. I can live with it that way**	**5. I like it that way**
Functional Form	1. I like it that way	Q	A	A	A	O
	2. It must be that way	R	I	I	I	M
	3. I am neutral	R	I	I	I	M
	4. I can live with it that way	R	I	I	I	M
	5. I dislike it that way	R	R	R	R	Q

The traditional final category for an attribute was identified by looking for the most occurring response for the attribute (Materla, et al., 2019a). The alternative final category for an attribute was based on the summation of A, O, and M and I, Q, and R, with the final category being the most occurring result in whichever group had a higher value (Berger, et al., 1993). The highest category and second highest categories are the percentages of currencies of the first and second most commonly occurring categories, respectively. The difference between the highest category and the second highest category is the final category's strength. The total strength was calculated with the formula according to Robinson (2009):

$$\frac{A+O+M}{M+O+A+I+R} \quad (1)$$

The CSC better was calculated as

$$\frac{A+O}{A+O+M+I} \quad (2)$$

Furthermore, the CSC worse was calculated according to (Liao, et al. 2015):

$$\frac{M+O}{A+O+M+I}. \quad (3)$$

The better and worse CSCs were then plotted in a scatter plot, as shown in Figure 1.

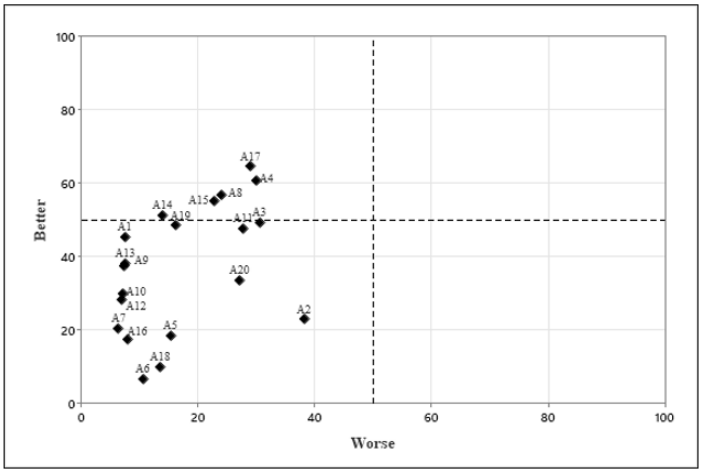

Figure 1 – Plotted Kano Model results

There are many types of video games (Hutchinson, 2007) and the game categories each have different game attributes and features. Games come in many different categories, such as casual games, often played on a cellphone (Tondello and Nacke, 2019), puzzle games (Phan and Chaparro, 2016), console games (Courtier and deLooper, 2017), PC (Personal Computer) games (Alpert, 2006). For instance, casual games rarely have a storyline or a voice chat feature. In contrast, Massively Multiplayer Online Role-Playing Game (MMORPG) games are unlikely to have fixed game boards with level numbers. Therefore, not all of the game attributes listed in the literature apply to all categories of games. For example, a driving game will not have loot that can be collected from a defeated opponent. Therefore, the stratification of results by game type was necessary.

The survey results were stratified based on answers to the type of game question and then reanalysed. The final category for games by player type was calculated using the alternative method. The stratified results are shown in Figure 2.

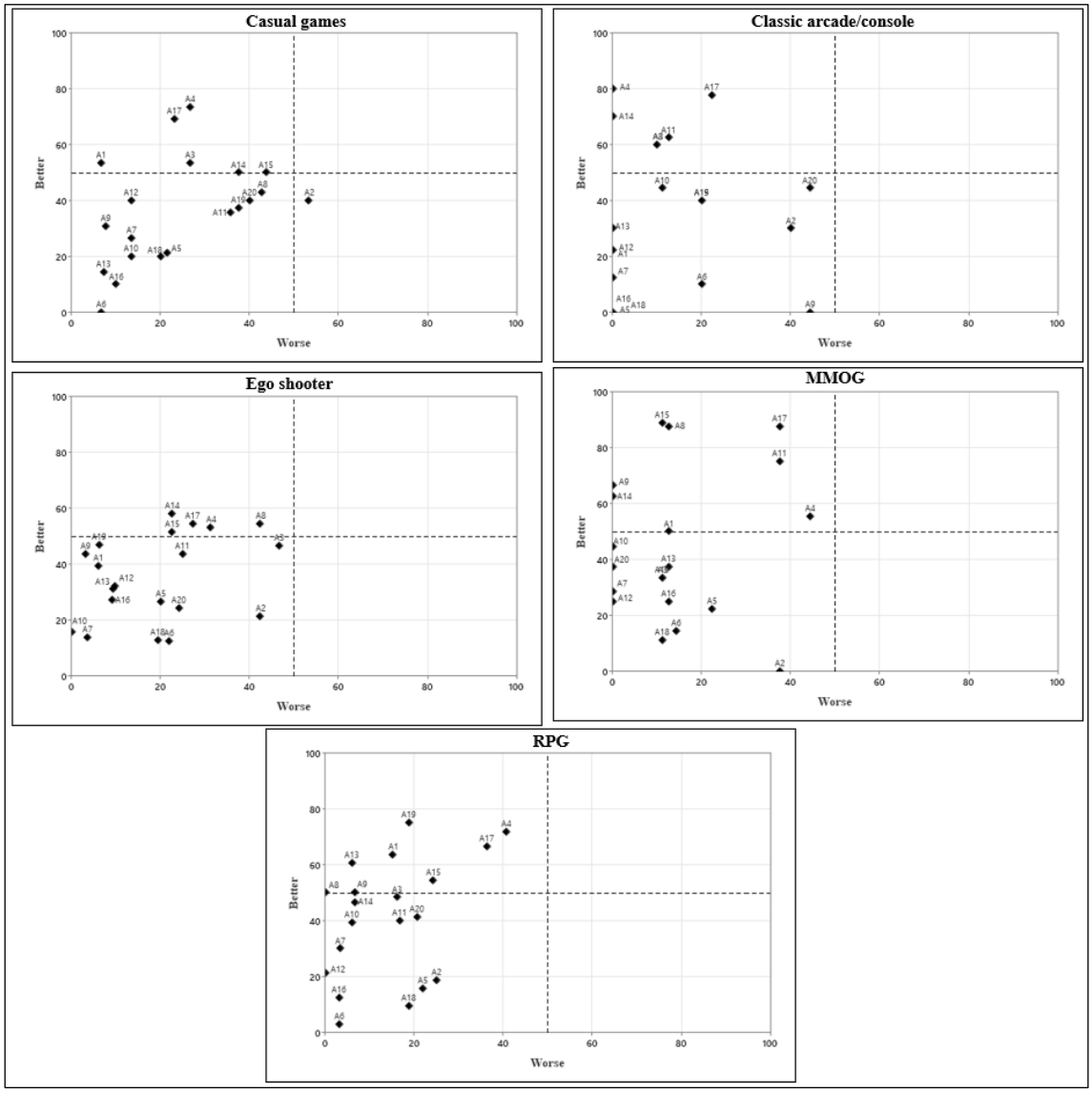

Figure 2 – Plotted Kano Model results stratified by casual game players

5 DISCUSSION

In the aggregate results, there were attributes with low category strength values, such as values in single digits. A low category strength value either indicates that more information is needed, different market segments are combined, or the sample size is insufficient to detect a difference (Robinson, 2009). Therefore, the data were reanalysed after stratification by player type.

Some attributes were rated as indifferent in both the aggregated and the stratified results. This indicates that these attributes are irrelevant across variants that were rated in the indifferent category. Other attributes were only relevant to specific types of games.

A good storyline or narrative was the only attribute rated as attractive by all gamers. As such, a good storyline or narrative should be given a high priority. The

ability to level up a character was rated as attractive by four gamer types and tied with indifferent for classic arcade and console gamers. Therefore, the ability to level up should also be prioritised, unless the game being developed is only for classic arcade and console gamers.

No reverse attributes were found in the stratified results; however, there were three cases where results were tied between indifferent and reverse. There were also no one-dimensional attributes identified, but there were two cases where one-dimensional was tied with attractive and must be

Attributes, such as increasing difficulty or levels, would have been rated as indifferent if the final category was selected using the traditional method of selecting the attribute that occurs the most. However, there were many occurrences of M, O, and A, indicating a preference for attributes that were rated as indifferent. The individual ratings would have been overwhelmed by the number of indifferent occurrences if the alternative calculation for the final category was not used.

There are some limitations to the study. The survey's target audience consisted of one demographic: computer science students. In addition, none of the students in the two courses were older than 40, and some respondents were over 40; therefore, some students must have shared the link to the study with people outside of the two courses. There is also some evidence of this because one of the authors received a request to take part in the study. Students were offered bonus points on an exam, which may have led to excessive enthusiasm for supporting the study. Although not all of the study participants were young computer science students, the majority of respondents fit the correct demographic.

The sample size was 143; however, after stratification by gamer type, the number of respondents for each gamer type was lower. Three respondents gave the same answer to every question. However, they are only approximately 1.4% of respondents, so this is not believed to have a major impact on the results. However, it is clear, in hindsight, that criteria for excluding results should have been established before distributing the study.

6 CONCLUSION

This study used a survey to identify attributes desired in video games by young video game players. The results may be useful for organisations seeking to develop video games of the types included in the study by indicating which features or attributes to prioritise in which game type. For example, it is important to prioritise a good storyline while placing a low priority on cut-scenes.

The study aimed to find critical features to implement when developing a video game based on Kano Model attributes. No one-dimensional feature that makes or breaks a game was found. However, the aggregate results were not representative of individual game types. When using the Kano Model to analyse a group of

products, market segment stratification needs to be taken into account. If the group of products is very diverse, the gained data may not be as representative as desired

The product category analysed via a study using the Kano Model needs to be limited in scope before the study. This can be done with exclusion criteria. If there is a high number of indifferent results, an alternative calculation for the attribute should be considered. Otherwise, attributes desired by many potential customers may be left out of the product.

As demonstrated by this study, the Kano Model provides a method for collecting, evaluating, and prioritising attributes based on customer preferences for a specific product or a narrow product market segment. The entire market for video games is too stratified to be studied by the Kano Model in its entirety. Instead, a more narrow demographic for a type of game should be studied, such as just the group of ego shooter players.

Knowing the Kano Model and its constraints can be useful for Agile software development because Agile continuously collects and prioritises customer wishes. The prioritisation of features, or attributes, is especially important in the gaming market since games need to excite customers to sell well.

Organisations seeking to develop other types of products may also benefit from the lessons learned in this study, such as the need to stratify by customer types when analysing the results and the need to consider the alternative Kano Model analysis calculation. This will help organisations to bring products to market that customers will find desirable.

Organisations seeking to develop other types of products may also benefit from the lessons learned in this study, such as the need to stratify by customer types when analysing the results. The same applies to the need to consider alternative analysis and calculations for the Kano Model.

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CONFLICTS OF INTEREST

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