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Behavioral Analysis of Personality, Branding and Emotional State in e-Sports

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Abstract. E-sports have grown in popularity on a worldwide scale. Recent assessments place the industry's value at more than $612 million, with operations spanning Europe, North America, and Asia's emerging economies. Nowadays, e-Sports are being hailed as a highly effective marketing channel for businesses. The current study attempted to analyze the personal profiles of e-sports players in order to offer them with marketing privileges that would enable them to promote their companies more effectively. Three self-report questionnaires were used to collect data: the Profile of Mood States, the Eysenck Personality Questionnaire, the Emotional Intelligence Questionnaire, and the Brand Personality Appeal Questionnaire. The collected data were analyzed using appropriate transformations to provide a suitable format for implementing the corresponding machine learning algorithms available in the R software package. The findings of this study demonstrate, among other things, that mood state, emotional intelligence, and brand personality can all serve as critical variables and are prevalent in marketing literature covering a broad range of topics, including evidence that the mood state, emotional intelligence, and brand personality profiles of e-sports players can all serve as significant variables.

Keywords. Behavioral Analysis, Emotional State, Brand Personality, e-Sports, Emotional Intelligence, Data Mining

1. Introduction

E-Sports is not a novel technology nor a recent craze. It is a sea change in entertainment and culture in the area of digital information systems, with young people receiving a geometrically rising amount of time and attention first, and the rest of the population second. Specifically, e-Sports are a collection of competitive video games that are broadcast live to the public over the Internet. While live events and tournaments have been a part of video game culture for a long period of time, internet live streaming has significantly increased the audience, whether they are actively participating or not. A worldwide community of over 148 million passionate individuals, which has doubled in size over the past decade, has developed into the so-called e-Sports community, which they can be proud of. Players may earn seven-figure salaries and will almost certainly be hailed as rock stars. Tournaments are held in front of tens of thousands of spectators in sold-out stadiums. In recent years, it has been possible to attend college while receiving an e-Sports scholarship. Large marketing firms and businesses with well-known brand names are pursuing an acceptable strategy to e-Sports in order to engage actively, influence, and gain value from these new gaming ecosystems. Additionally, eSports

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yearly generates over $500 million in sponsorship revenue, with industry giants like as Coca-Cola, Red Bull, Intel, and Nissan participating (Casselman, 2015). Additionally, 42 colleges and universities in the United States are members of the National Association of Collegiate eSports (NACE, 2017), which recognizes "varsity" eSports teams, many of which are sponsored by the athletic department and provide scholarships to these "student athletes." E-sports' philosophy may serve as a foundation for marketing science, as it allows for the depiction of marketing behaviors via the personal profiles of e-sports' participants. The current study makes an attempt to view e-sports not only as a "online game addiction," which it undoubtedly is given its widespread popularity over the years (Kim et al., 2008), but also as a marketing challenge, demonstrating among other things that mood state (POMS) (McNair, D., Lorr, M., & Droppelman, L. 1971), personality dimensions (EPQ) (Eysenck & Eysenck, 1968), emotional intelligence (TEIQue) (Petrides & Furnham, 2006;2003) and brand personality (BPA) (Aaker, 1997) of the e-sports players can affect as crucial variables and can be prevalent in the marketing literature covering a wide range of topics, including highlight marketing habits.

1.1. Profile of Mood States (POMS)

Mood is a term that refers to a good or negative emotional state of variable intensity that changes according to an individual's perception of daily life situations. Two fundamental dimensions have been identified in the literature via a study of the major components of numerous mood reports. These dimensions correspond to four broad moods: positive high activation (enthusiastic, thrilled, happy), and positive low activation (calm, relaxed, peaceful). There are two types of activation: positive high activation (worrying, angry, twisted) and negative low activation (sad, dejected, dissatisfied). The Profile of Mood States (POMS) scale was developed to assess an individual's mood. This is a self-referral questionnaire consisting of 65 items designed to evaluate a person's positive and negative mood, more precisely the intensity, anger, sorrow, tiredness, bewilderment, and vitality. Each phrase begins with an adjective, such as anxious or furious. Respondents indicate on a five-point scale if each adjective describes how they feel in the past week. There is an abbreviated version of the questionnaire available with just 30 questions (McNair, D., Lorr, M., & Droppelman, L. 1971).

1.2. Eysenck Personality Questionnaire (EPQ)

Eysenck's personality dimensions are distinct kinds of individuals, each with a unique set of characteristics traceable back to their habits and responses. What is suggested is the identification of an individual's unique responses, which will provide proof of his typical reactions and therefore of his typical conduct. This enables inferences to be made about some aspects of his personality. These characteristics are regarded as the components of each of the three aspects of personality (types). Because of the connection between the responses and their frequent occurrence, they serve as solid criteria for ascribing certain traits to a person's personality. Eysenck's 1947 graphic identified two fundamental aspects of personality, depicted by two crossing axes. The maximum and lowest values of the dimension Eysenck dubbed "Emotionality or Instability or Neuroticism" were put at the vertical axis's two poles. The highest score indicated the presence of instabilities, such as neuroticism, while the lowest indicated the presence of emotional stability. On the horizontal axis, the second dimension of personality, Inwardness - Extraversion, was plotted. As with the vertical axis, the highest value denoted the extroverted personality qualities, while the lowest value denoted the introverted personality traits. In particular, the three suggested personality dimensions are as follows:

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- Extraversion-introversion [Activity, Sociability, Assertiveness, Expressiveness, Ambition, Dogmatism, and Aggressiveness]: Extroverts are sociable, like parties, have plenty of friends, and dislike reading and studying. Also, craves passion, seizes chances, enjoys risk, responds quickly, and is usually impulsive. Excluding extremely close friends, the typical introvert is reserved, controlled, avoids strong emotions, takes daily issues seriously, likes a planned existence, regulates his moods, is trustworthy, pessimistic and values moral principles highly. Extroverted and introverted people behave differently.
- Neurotism - Instability - Emotional Stability [Inferiority, Unhappiness, Anxiety, Dependence, Hypochondria, Guilt, and Obsessiveness]: Neurotism is characterized by overall emotional instability, emotional reactivity, and a propensity to develop neurotic symptoms under stress. Anxious, unhappy, and frequently sad are high neurotic values. Extroverted neurotic people are impatient, restless, and sometimes violent. To the contrary, low prices indicate a person with moderate emotional reactions and a steady set of beliefs, attitudes and behaviors.
- Psychoticism [Risk-taking, Impulsivity, Irresponsibility, Manipulativeness, Sensation-seeking, Tough-mindedness, Practicality]: One of Eysenck's personality dimensions that appears in the population as a whole - that is, in healthy and divergent - is one that manifests in the form of response patterns and is symptomatic of the emergence of psychotic components. This variable relates to subjective personality characteristics and is termed "Psychotism" (P). This tendency occurs in all people to different degrees, and only a high score may indicate psychosis. These findings led to the creation of a measuring scale for the three dimensions of personality (E, N, P) and a supplementary dimension of the L, which assesses the falsity of the respondent's responses. The Eysenck Personality Questionnaire (E.P.Q.) (Eysenck & Eysenck, 1968).

1.3. Trait Emotional Intelligence (TEIQue)

The TEIQue is a self-report questionnaire designed to cover the whole trait EI sampling domain. To explain the emphasis of this study, three benefits of the TEIQue over other EI questionnaires must be mentioned. First, the TEIQue is founded on a psychological theory that incorporates differential psychology. Second, the TEIQue covers all 15 aspects of the trait EI sampling domain. Several studies have shown that the TEIQue can predict criteria (outcomes) better than other questionnaires (Cooper & Petrides 2010). Third, the entire TEIQue is psychometrically sound. Finally, the TEIQue has been utilized in several research assessing emotional components of personality. These include studies in neuroscience, relationship satisfaction, psychopathology, addictions, response time, general health, and behavioral genetics, to name a few. The TEIQue operationalizes Petrides and colleagues' personality-based model of EI. These include well-being, self-control, emotionality, and sociability (Mikolajczak et al., 2007). As described by Dr. Petrides, the TEIQue is a constellation of emotional self-perceptions seen in lower personality hierarchies. Trait EI operationalizes the emotional elements of personality. Emotional intelligence is the ability to recognize, analyze, and manage one's own and others' emotions (Cooper & Petrides 2010). In the workplace, these beliefs strongly influence job satisfaction, job stress, leadership, collaboration, organizational citizenship, and organizational commitment (Petrides & Furnham, 2006;2003).

- Well-being consists of three traits: happiness, optimism, and self-esteem. They assess people's overall life satisfaction.

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- Self-control: This component indicates how far individuals believe they can control their inclinations. It has three aspects: impulse control, stress management, and emotional regulation.
- Emotionality: This characteristic includes Empathy, Emotion Perception, Emotion Expression, and Relationships. They show how attentive you are of your own and others' emotions. These characteristics seem to indicate how much you value emotional literacy and how you utilize it.
- Sociability: This trait defines how individuals feel in social situations ranging from parties to business meetings (Gkintoni et al., 2016;2015; Togias et al., 2015).

1.4. Brand Personality Appeal (BPA)

A trademark's personality is a mix of human traits connected with it. Consumers utilize a brand's personality to identify themselves, but also to place the product, resulting in a personality identity with the brand's personality. A brand is no longer susceptible to financial transaction, recognition, or even customers. Consumers use brands to identify, locate, and recognize themselves. This adaptability is dependent on the mark's capacity to attract customers. As a result, the brand personality must be subtle, appealing, and recognisable. These brand qualities influence a brand's personality and ability to reach customers. Brand personality enables customers to express themselves by developing and strengthening the connection between brands and consumers. As a result, customers prefer to establish and deepen their brand relationships (Aaker, 1997). The Brand Personality Appeal Scale:

- H1: Brand relationship quality has a positive effect on WOM transmission.
- H2: Brand personality appeal has a positive effect on brand relationship quality.
- H3: Brand personality appeal has a positive effect on WOM transmission.
- H4: Attitudes toward advertising have a positive effect on brand personality appeal.
- H5: Attitudes toward advertising have a positive effect on brand relationship quality.
- H6: Attitudes toward public relations have a positive effect on brand personality appeal.
- H7: Attitudes toward public relations have a positive effect on brand relationship quality *(Aaker, 1997).*

Also, except for Aake's study on human characteristics associated with a brand, a host of other studies about brand personality based on personality psychology has been published in marketing journals *(e.g., Branaghan and Hildebrand 2011; Eisend and Stokburger-Sauer 2013; Maehle, Otnes, and Supphellen 2011).*

1.5. Brand Names and Psychological Affect in e-Sports Players

Interests and actions of e-sport participants should be investigated to better understand their psychological profile. This feature will allow brands, trademark businesses, and sponsors to better interact with e-Sports fans and meet their gaming requirements. Identifying a company's most successful strategy to e-Sports users and customers begins with a thorough knowledge of the e-Sports consumer for optimum marketing efficacy, whether psychological or otherwise. For the online gaming business to support and recover in a strategic manner the brand interaction points with the e-sport consumer, knowledge of e-sport users' behaviors, demographics, psychological profile and how it is coupled with personality is important. For example, e-sport consumers prefer trademark businesses as e-sport sponsors. 5 of the top 10 e-sport consumers' favorite brands were athletic companies, according to recent study. The e-sports sector was largely unknown a year or two ago, but big-name companies like Coca-Cola,

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Monster, and RedBull got involved early and benefitted from early backing (Ahmad & Thyagaraj, 2015). Larger consumer brands like Comcast, HP, and SAP have recently entered the market. According to a SuperData brief from May 2015, the worldwide e-sports industry is valued $612 million with 134 million spectators. The 2013 League of Legends final sold out the Staples Center, while the 2014 League of Legends global championship on ESPN had 27 million concurrent viewers.

1.6. Psychological Profile, Personality, Emotional Intelligence in e-Sports Players

Nowadays, more individuals are passionate gamers. Gaming culture is rapidly growing in popularity. It's impossible to deny that gaming is getting a lot of attention, especially among younger generations who spend 20-40 hours a week playing video games. So, what is it about video games that is so appealing? Can video games help people learn new skills? Is gaming even healthy? Each question relates to the gamer's reaction. It's really about the psychological impact of video games.

Video games have a bad reputation. Negative gaming impacts ideas like social alienation. Social detachment is the withdrawal from a variety of social activities (Ahmad & Thyagaraj, 2015). Aggression and social isolation are two typical detachments linked with video gaming. Violent video game play is believed to cause increased aggressiveness. School shootings, lack of compassion, and other negative extremely aggressive relationships have been linked to increased player aggressiveness. Due to the absence of real-life interactions, the gamer loses social skills and becomes socially isolated. Some studies argue that it is not the violence in the video game that generates increased aggressiveness, but rather how the game interacts with each individual's traits. People and real-life interactions may create social alienation in video games. People don't understand that it's not the game that separates the player, but the gamer's personality. The person who decides to play the game already feels socially isolated (Nguyen, Nguyen, & Svein, 2016).

While it seems that more individuals who play video games have social impairment, this is not related to video games. Video games have developed to enable us to interact with others through titles like Halo, Call of Duty, World of Warcraft, and many more. Video games are now the focus of many parties, clubs, and even a new element of gaming called e-sports. Previous study has focused on the impact of shyness, anxiety, loneliness, melancholy, and self-consciousness on the amount of Internet usage (Park et al., 2011). Other research has linked internet gaming addiction to impulsivity, neuroticism, psychoticism, and the Eysenck personality subscale. Also, personality characteristics including sensation seeking, self-control, aggressiveness, neuroticism, state anxiety, and trait anxiety were linked to online gaming addiction. Online gaming addiction was associated with five personality traits: neuroticism, sensation seeking, trait anxiety, state anxiety, and aggressiveness. While further research is required to confirm the results, it seems that certain personality characteristics may be essential in the development and maintenance of online gaming addiction (Nguyen, Nguyen, & Svein, 2016).

However, little is known about the characteristics of ‘‘at-risk" people who are addicted to online games, particularly violent ones. To investigate the connection between online e-sports gaming, psychological mood, Eysenck Personality Inventory, and Trait Emotional Intelligence Questionnaire (TEIQue). Each of these variables is anticipated to influence or be influenced by gaming.

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2. Methodology

This study used computational methods to assess and correlate e-Sports players' Profile of Mood States (POMS), Brand Personality Appeal (BPA), Personality Dimensions (EPQ), and Emotional Intelligence (TEIQue). The chosen technique includes three distinct stages. First, electronic surveys were developed and uploaded on http://www.cicos.gr. Then the data were preprocessed from the questionnaires. The data set for study included respondents' gender, birthplace, current location, educational background, parents' employment, and subscales of the POMS, BPA, EPQ, and TEIQue tests. The data set was examined using Data Mining methods in the third step. We used classification techniques to explain the hidden patterns in the data. Decision trees are a strong method to depict and assist psychological statement analysis, consisting of consecutive choices and changing outcomes across time.

2.1. Data Mining Techniques

Data mining is a newer method of obtaining relevant information from big scientific and commercial datasets. The explosion of such databases imposes it. Data mining often derives rules from high dimensional category or numerical data. Data mining tasks include classification, grouping, and association. Classification is a common data mining job (Maimon, & Rokach, 2010). A collection of characteristics is used to categorize data into specified classifications. Various schemas may represent the retrieved knowledge. The most common are decision trees, if-then rules, and neural networks. In the literature, several methods for extracting classification rules from big relational databases have been suggested, such as symbolic learning algorithms such as decision trees (e.g., C4.5), behavioral data mining analysis (Antonopoulou et al., 2020, 2021), and rule-based algorithms (e.g., CN2). Association rules describe common patterns in data as relationships between concept characteristics. The market basket issue is a particular example where concepts-attributes represent goods, and the starting database is a collection of client purchases (transactions).

2.2. Mining Association Rules

It is a method of finding correlations between multiple variables. For learning association rules, Apriori is a classic algorithm. Apriori is intended to work with databases that include transactions (like survey data) (R Development Core Team 2008). In association rule mining, given a collection of item sets, the algorithm searches for subsets that are shared by at least C of the item sets.

Apriori works from the bottom up, expanding frequent subsets one at a time and testing groups of candidates against the data. A successful extension ends the algorithm. Apriori counts candidate item sets using breadth-first search and a tree structure. It creates k candidate item sets from k 1 item sets. Then it prunes candidates with rare sub patterns. The candidate set includes all common k-length item sets. Then it searches the transaction database for common item sets among candidates.

Association rules present association or correlation between item sets. An association rule has the form of A →B, where A and B are two disjoint item sets.

The Goal: studies whether the occurrence of one feature is related to the occurrence of others. Three most widely used measures for selecting interesting rules are:

- ✓ **Support** is the percentage of cases in the data that contains both A and B,
- ✓ **Confidence** is the percentage of cases con**t**aining A that also contain B, and
- ✓ **Lift** is the ratio of confidence to the percentage of cases containing B.

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3. Results

3.1. General Statistics

Demographics Factors:

Total Sample size: n=300, 110 females (36,7%), 190 males (63,3%) (Figure 1) and were integrated into three (3) age clusters:

- First cluster included male (n=49) and female (n=35) in age range between 18-21 years (Total n=84),
- Second cluster included male (n=91) and female (n=62) between 22-24 years (Total n=153) and
- Third cluster included male (n=50) and female (n=13) above the age of 25 years old (Total n=63).

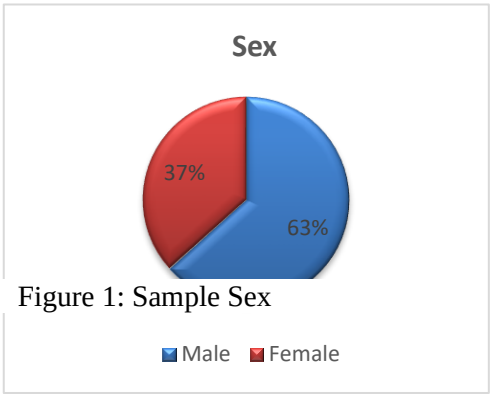

Figure 1: Sample Sex

3.2. Apriori rules visualization

Grouped Matrix plot: Antecedents (columns) in the matrix are grouped using clustering. Groups are represented as balloons in the matrix (Figure 2).

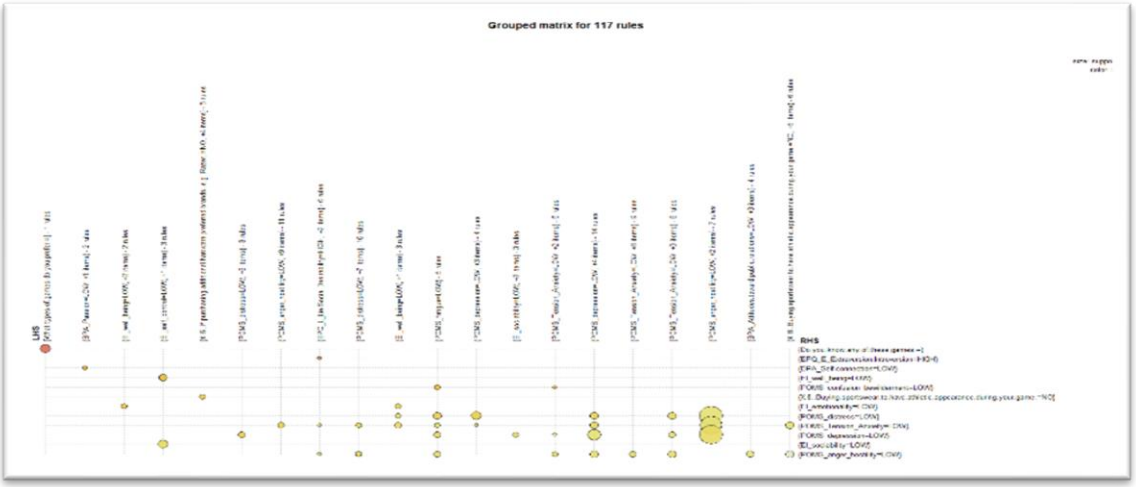

Figure 2: Grouped Matrix Plot

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Graph: Represents the rules (or itemsets) as a graph (Figure 3). Specifically of our use, the parameters that were altered are: control=list (type="items")

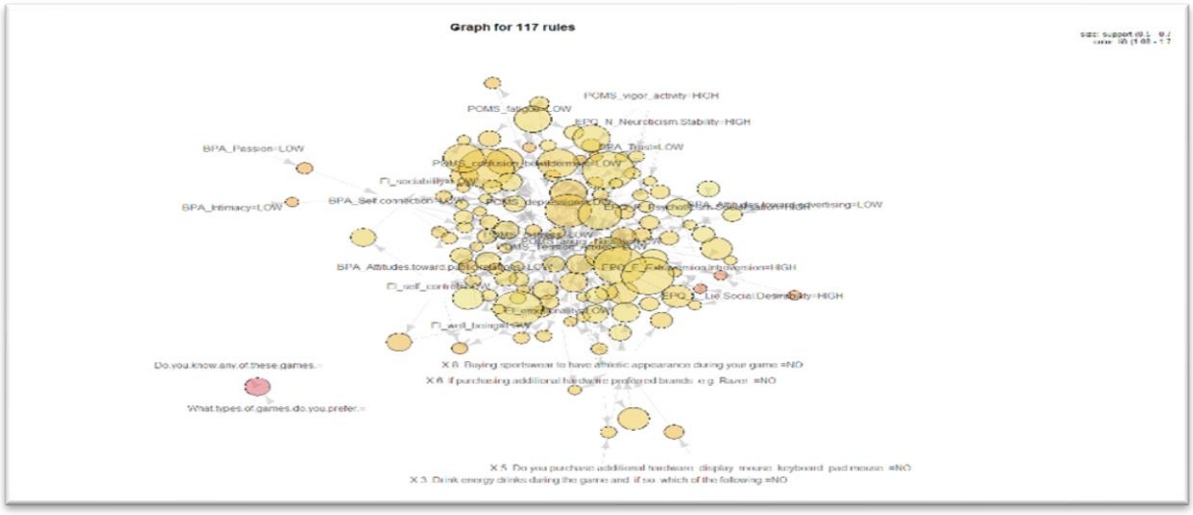

Figure 3: Rule Graph

Paracoord: Parallel coordinate charts are a visualization that consists of N amount of vertical axes, each representing a unique data set of 61 rules, with lines drawn across the axes. The lines show the relationship between the axes, much like scatter plots, and the patterns that the lines form indicates the relationship (Figure 4). We can also gather details about the relationships between the axes when you see the clustering of lines. Let's take a look at this using the chart below as an example. Specifically of our use, the parameters that were altered are: control=list(reorder=TRUE).

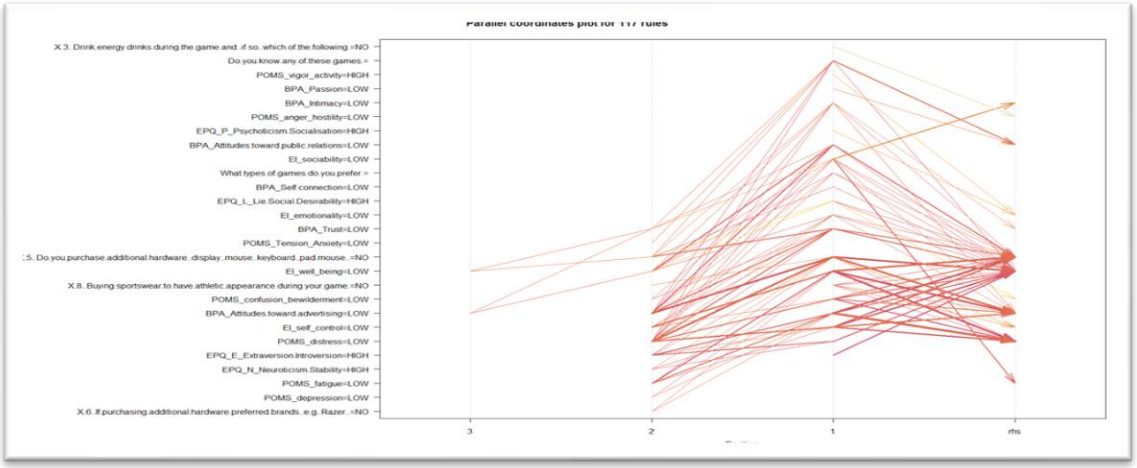

Figure 4: Paracoord

Apriori rules

For the top 117 rules that were extracted from the apriori the following parameters were altered (Table 1):

- support: A numeric value for the minimal support of an item set
- confidence: A numeric value for the minimal confidence of rules/association hyperedges

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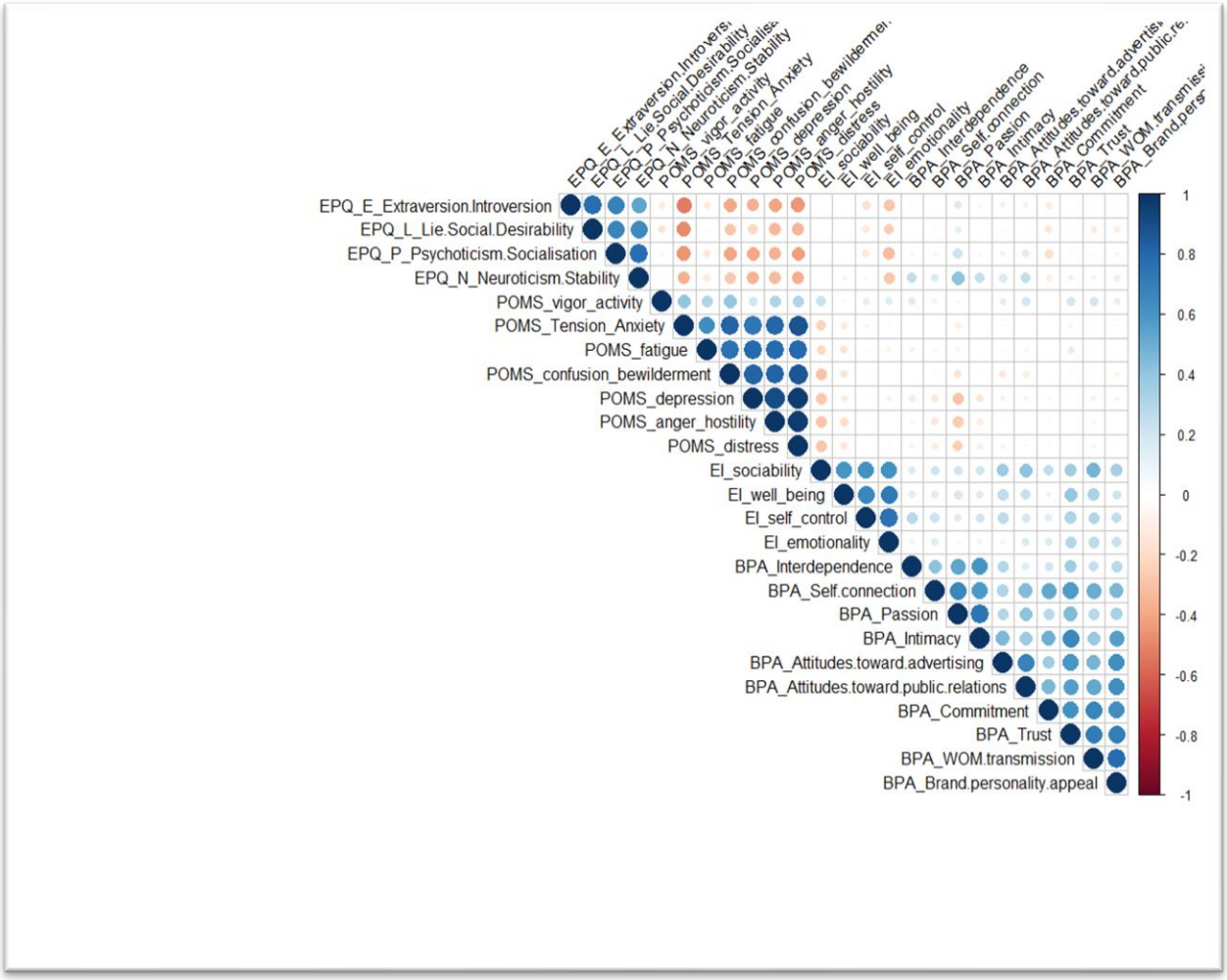
Specifically of our use: Support: 50%, Confidence: 90%

The top 6 rules

{EI_sociability=LOW, POMS_distress=LOW}	{POMS_depression=LOW}	0.6041667	1.0000000
{EPQ_E_Introversion=HIGH} {BPA_H1=HIGH}	{POMS_Tension_Anxiety=LOW} {BPA_H2=HIGH}	0.6250000 0.6345008	0.9677419 0.9478915
{Do.you.buy..sportswear.to.have.athletic.appearance.during.your.game.=NO, POMS_anger_hostility=LOW} {BPA_H6=HIGH}	{POMS_Tension_Anxiety=LOW} {BPA_H7=HIGH}	0.6041667 0.6845667	0.9354839 0.9554832
EI_emotionality=LOW, POMS_distress=LOW}	{POMS_anger_hostility=LOW}	0.6041667	1.0000000
{EI_well_being=LOW, POMS_Tension_Anxiety=LOW}	{EI_emotionality=LOW}	0.5208333	0.9259259
{EI_self_control=LOW, POMS_Tension_Anxiety=LOW, POMS_anger_hostility=LOW}	{EI_emotionality=LOW}	0.5208333	0.9615385

Table 1: Top 6 Rules

3.3. Correlation Analysis



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Correlation is any of a broad class of statistical relationships involving dependence, though in common usage it most often refers to the extent to which two variables have a linear relationship with each other. As it is shown above (Figure 5), the is high negative correlation between EI and POMS questionnaires and some low positive correlation between EI and the emotion factor of the BPA questionnaire. If the measures of correlation used are product-moment coefficients, the correlation matrix is the same as the covariance matrix of the standardized random variables $Xi / \sigma(Xi)$ for $i = 1, ..., n$.

3.4. K-means Clustering Analysis

K-means clustering is a method of vector quantization, originally from signal processing, that is popular for cluster analysis in data mining. k-means clustering aims to partition n observations into k clusters in which each observation belongs to the cluster with the nearest mean, serving as a prototype of the cluster (Figure 6).

For each cluster iteration, the cluster centers are multiplied by the first loading of the principal components of the original data. Thus, offering a weighted mean of each cluster center dimensions that might give a decent representation of that cluster (this method has the known limitations of using the first component of a PCA for dimensionality reduction).

The second split is a good one (in the manner that it splits the first cluster into two clusters which are not “close” to each other).

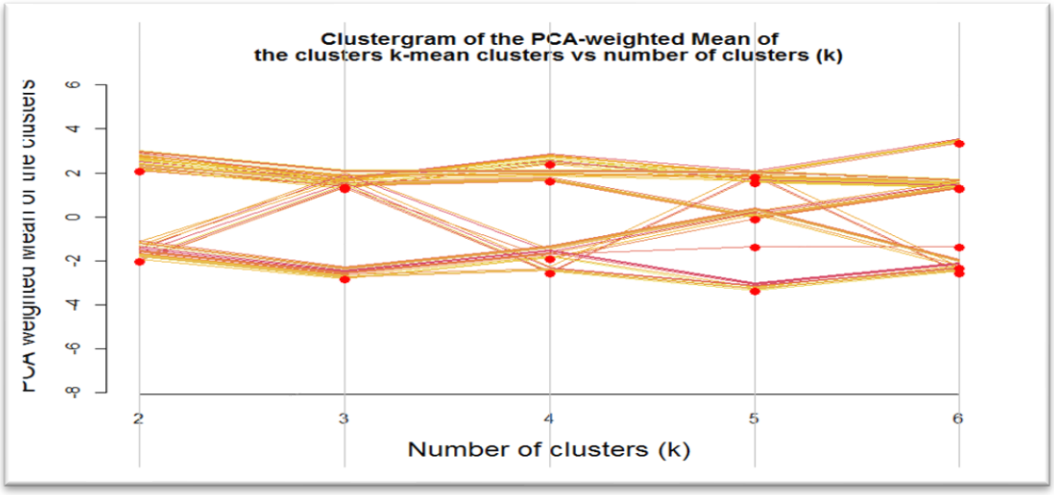

Figure 6: Cluster gram

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Silhouette plot (Figure 7): Gives the silhouette width information for each data point, average silhouette width for each cluster and for the whole data. Silhouette Width is a measure to estimate the dissimilarity between clusters. A higher silhouette width is preferred to determine the optimal number of clusters.

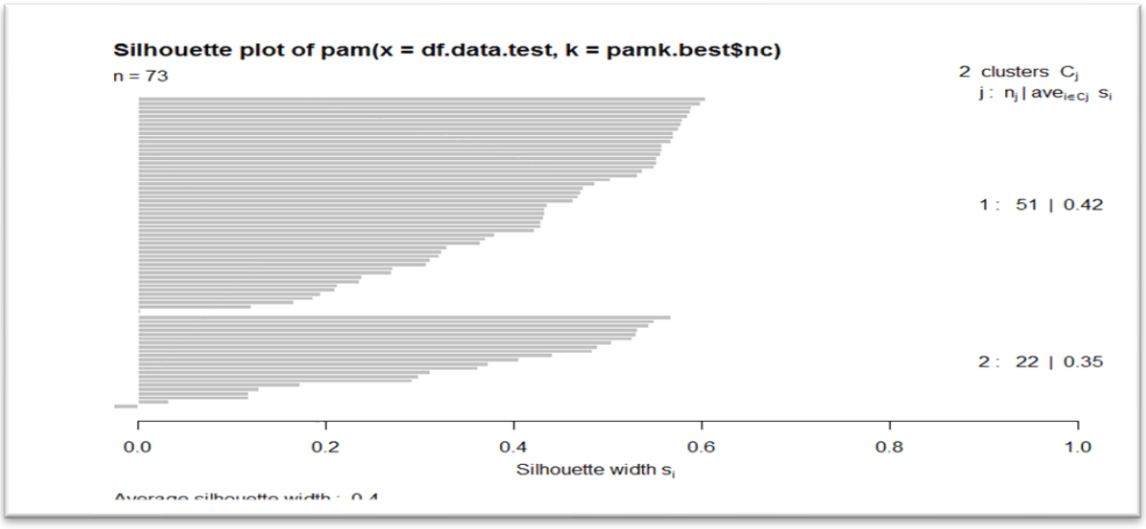

Figure 7: Silhouette Plot

4. Discussion - Conclusion

The results of the study showed up the parameters of personal profile and temperament of e-sports players (personality traits, emotional intelligence, mood state) and as crucial factors in marketing for brand promotion provide privilege in e-sports industry by highlighting the brand personality. Firstly, the personal profile examined through the administration of psychometric scales that have being referred extensively in the part of Methodology. Among others, the results underlined that the psychological affect of e-sports in the temperament and personality of players and more specifically in the negative indexes and parameters of the administered instrument Profile of Mood States (POMS): depression, distress, tension, anxiety were in low levels. Moreover, the occupation with e-sports, should completely divert their attention and distracts them from other activities and, as a result, do not strongly reflect the above situations. Also, another parameter of POMS, anger and hostility was also in low levels which indicates the truth that players of e-sports express this kind of emotions during gaming that represents a means of exclusive relief of adverse mood state. There has been great suspicion and speculation in research community as indicated from other studies, on whether the increase in player killing in the game world would facilitate the gamers to be aggressive, hostile or act violently in the real world *(Kim et al., 2008;Whang, 2004).* Although some studies have reported that the amount of violent video game play is correlated with self-reported levels of aggression, other studies conclude that aggression has not been associated with online game killing of virtual opponents *(Kim et al., 2008; Gentile, 2005; Griffiths, 2000; Vastag, 2004; Villani, 1999).*

As far as the parameters of Eysenck Personality Questionnaire, Introversion was in high level whereas to Extroversion indicating the poor social skills of e-sport players who participated in the study. The results of the present study have supported previous findings of a significant relationship between the level of Internet addiction and the psychological states such as loneliness and social anxiety *(Harman, 2005; Lo et al., 2005; Whang et al., 2004).* However,

it is still unclear as to whether a poor interpersonal relationship is a cause or a consequence of excessive online game addiction. It could be that the addictive use of online games is associated with a deficit of e-gamers to communicate with family members or to make social relationships and because of this they become socially isolated and as the time goes by, they become no longer able to socialize in a normal way *(Kim et al. 2008).*

Emotional intelligence of e-sport players in the four parameters of EI scale, well-being, self-control, emotionality and sociability that were examined, was in the bottom limit level and this finding seems to be consistent with previous findings of other studies that is, internet addiction among young people is related to their lack of self-control, and Internet addicts are weaker at controlling their emotions than average Internet users *(Kim et al., 2008; Niemz et al., 2005; Oh, 2003).*

Another parameter that was examined and has not being referred in previous studies was if an e-sport-player can develop a brand personality by playing its favorite electronic e-sport game.

In order to better understand the psychological profile of e-sport players, it is important to investigate interests and activities of players. We supposed that this element will offer opportunities to brands trademark companies and sponsors to connect with e-Sports users and better address their needs for gaming. Realizing that brand personality plays an important role in the success of a brand, we investigate the impact of brand personality appeal on brand relationship.

A data analysis of hypothesis H1 as it is described in the conceptual model of BPA, brand relationship quality had a positive effect on WOM transmission. Hypothesis H2 proposed a positive relationship between brand personality appeal and brand relationship quality. Hypothesis H3 proposed a positive effect of brand personality appeal on WOM transmission.

Further, attitudes toward advertising had a positive impact on brand personality appeal supporting hypothesis H4. Finally, attitudes toward public relations had positive impacts on both brand personality appeal (H6) and brand relationship quality (H7).

Concluding, mood state, emotional intelligence brand personality can serve as crucial variables and can be prevalent in the marketing literature covering a wide range of topics; including evidence that profile of mood state emotional intelligence and brand personality of the e-sports players can highlight marketing habits and may promote effectively publicity politics.

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