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ASSESSING GAMIFICATION GAP IN SPORT APPLICATION FOR INCREASED USER MOTIVATION: AN OCTALYSIS MODEL APPROACH

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ABSTRACT

This study investigates the rapid decline in physical activities among Indonesian populations and explores how such a trend contrasts with the overall growth of electronic sports that utilizes gamification to attract user participation and commitment over an extended period. There is numerous gamified sport applications created to increase exercise participation; however, the continued decline is representative of deficiencies in those applications' motivational frameworks. This work, using the Octalysis model, delivers an in-depth analysis of user motivation into eight core gamification drives, based on the results of a survey presented to 101 users of sports applications. The core drives related to intrinsic motivation—in particular, accomplishment and empowerment—present high effectiveness; however, there are still important deficiencies in social engagement, creative expression, and unpredictability elements. These points have serious implications for an urgent need for targeted refinements in gamification strategies to deliver a more engaging, adaptive, socially interactive experience that is better at sustaining user motivation. Indeed, such strategic adjustments have the potential not only to improve retention rates and further enhance user experience but also to contribute toward broader public health challenges through the fostering of sustainable physical activity patterns. This study gives some very important recommendations for app developers and policymakers seeking innovative solutions that are digitally driven to combat sedentary lifestyle practices, therefore helping to advance health and wellness objectives for a diverse user population across Indonesia.

Keywords: *Sport Application, User Motivation, Gap Analysis, Gamification, Octalysis Framework*

1. INTRODUCTION

Sport is one of the important physical activities to maintain health and wellness as evidenced through research by [1] which revealed that many diseases that are significantly affected by physical activity/exercise emerge later in life, hence continuous participation in sport as an adult will reduce morbidity and mortality. In addition, some sport participation can lead to improved mental wellness, including increased psychological well-being (self-confidence and life contentment) and reductions in psychological distress (anxiety, depression, and stress), as well as higher social outcomes (greater self-restraint, more positive social behavior, interpersonal interactions, and sense of community) (Eather et al., 2023). However, physical exercise is rarely practiced by most people even though the benefits and impacts on our health both physically and mentally are enormous. Based on the results of the 2022 National Sport Development Index (SDI) report conducted by Deputy 3 of the Indonesian Ministry of Youth and Sports (Kemenpora), the level of sports participation of the Indonesian people was 30.93 percent, this figure is lower than the achievement in 2021 which reached 32.80 percent and decreased drastically by 9.20 percent from 2006 (Subagia, 2023). From this phenomenon, it can be concluded that over time, the frequency of exercise in Indonesia has decreased from year to year.

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Figure 1: Sports Frequency in Indonesia (Deputi 3 Kemenpora, 2023)

Research from (Thivel et al., 2018) has revealed that screen time is the primary reason for a person's lack of physical activity and is the main indicator used to measure time spent on sedentary behavior. (Lifespan, 2021) Only 6.5% of Americans meet the minimum physical criteria for work, proving that the other 93.5% are not physically fit for work. In this digital era, the use of screens has undeniably become the most common thing in everyday life, ranging from smartphones, laptops, televisions, to computers have become part of our routine consumption.

According to (Rainer, 2023) with data from data.ai regarding the "State of Mobile 2023" report states that the average use of gadgets or mobile devices per day in Indonesia is more than 5 hours which continues to increase compared to the previous year. Video games are one of the most influential things in increasing daily screen time, especially with the emergence of E-sports which is a form of sport that has a high level of competitiveness and professionalism because players must have excellent skills and strategies to win matches by practicing. These are all elements of physical sports competition in general, it's just that E-sport uses video games as a media.

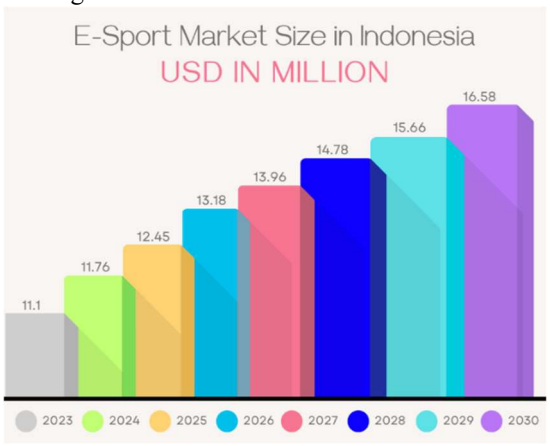

Figure 2: E-Sport Market Size in Indonesia (Stellar, 2023)

The development of E-sports itself from year to year has also been increasing significantly as evidenced by data which explained that Compound Annual Growth Rate (CAGR) for E-Sport in Indonesia is 5,87% whilst daily play is common, with daily sessions lasting 30-60 minutes (Stellar, 2023). Based on the data obtained above, it can be said that the development of E-sports is inversely proportional to the development of the frequency of physical sports which has decreased every year. The main key that causes E-sports to grow rapidly is because it is a more appealing and accessible entertainment alternative (can be played anywhere, anytime, and anyone) and does not require complicated equipment or equipment compared to physical sports in general.

Furthermore, esports also offer the thrilling sensations of competition and achievement that can satisfy human psychological needs through video game elements. After knowing the background of E-sport's success, we can apply it to physical sports to increase the frequency of exercise each year with the application of Gamification, or the application of game elements into non-game activities (Treiblmaier et al., 2018), which can be used to make sports activities more compelling and challenging with the objective of increasing people's motivation to exercise. This gamification method is also supported by literature review-based research by (González-González et al., 2018) which states that gamification can enhance the motivation of children and adolescents in physical exercise and get even better results if the sport is a team sport.

Table 1: Sports Apps, Gamification Elements Used, And Their Ranks In Indonesia

Application	Gamification Element Used	Ranking in App Store and Play Store
Strava: Run, Bike, Hike	Challenge, Clubs, Progress, Achievement, Badges	#1 in Health & Fitness
SelfQuest	Avatar, Equipment, Level, Health, Mana, Power Level, Damage, Class, Achievement, Quest, Challenge, Reward, Side	#2 in Health & Fitness

	Quest, Custom Quest, Shop,Gacha Item	
AYO: Super Sport Community App	Leaderboard, Competition, Sparring, Community, Leveling, Milestone, Achievement, Statistic	#3 in Sports
Home Workout – No Equipment	Challenge, Goal, Equipement, Streak	#4 in Health & Fitness
Step Counter – Pedometer	Goals, Milestone, Achievement	#6 in Health & Fitness
Reclub – Social Sports Nearby	Competition, Achievement Badge, Leaderboard, Social, Community	#7 in Health & Fitness
KUYY!	Social Community	#9 in Sports
Lose Weight App for Men	Generating Plan, Challenge, Mission	#11 in Health & Fitness
Nike Run Club: Running Coach	Challenge, Plan, Club, Achievement, Rewards	#12 in Health & Fitness
adidas Running: Walk & Run App	Challenge, Milestone, Community, Events, Leaderboard, Streak, Goal, Statistic, Badges	#13 in Health & Fitness
Elemen Gamifikasi Terbanyak	Milestones, Challenge, Achievement, Social, Leaderboard	

Based on the phenomenon and data discussed above, it can be concluded that the application of gamification techniques in sports applications might still not be well-utilized as proven by the decline in the frequency of sports in Indonesia every year. By providing a clear gap analysis of eight octalysis core drive between the current condition of gamification in application as sport platform and the objective of gamification itself, declining frequency of exercise in Indonesia can be reversed through a determination of which gamification's element needs to be implemented to increase user's motivation in exersicing. Therefore, a gap analysis of the gamification must be carried out using the "Octalysis Framework" developed by Yu-Kai Chou to find out which core drive is still not fully optimized and fulfill the gamification's objective in order to solve the declining of sport frequency in Indonesia.

2. LITERATURE REVIEW

2.1 Sport

Recent research has highlighted the way in which gamification might increase motivation and engagement within sports and physical education: it simulates the reward-based behaviors of video games, such as achievements, social interaction, and personal challenges (Serrano-Durá & Melero-Cañas, 2021; Sanmiguel-Rodríguez et al., 2022). Mixing game-like learning with interactive teaching methods has had good results for user independence, teamwork, and motivation. This supports Self-Determination Theory by encouraging internal motivators like skills and connections with others (Maher et al., 2022; Kappen et al., 2020).

Results are good, but the literature is less clear about how gamification impacts long-term physical health. Changes in the gamification design elements, for example, social features and reward system—have an impact on its working. Few studies demonstrate long-term fitness improvement. Further research calls for identifying best practices in gamification strategies for physical activity, more toward diverse cultures and a population that is extensive in the use of digital tools (Rodríguez-Ferrer et al., 2023; Camacho-Sánchez et al., 2023). These results help to create better and more attractive sports apps to fight sedentarism.

2.2 Gamification

Gamification is a successful trend in the software industry, increasing user participation, motivation, and retention rates by introducing game-like elements (Kasurinen, Knutas, 2018). Gamification techniques have evolved over the years, and it is recorded that it was first implemented in 1896 by S&H Green Stamps distributed as a reward program designed to encourage customer loyalty (Serice, 2023). Gamification is understood as the application of game systems - competitions, awards,

measuring player/user behavior - to non-game domains, such as work, productivity, and wellness (Woodcock, Johnson, 2018). (Ardeńska et al., 2019) revealed the importance of sports gamification in students' motivation to practice tennis and showed that sports games can play an important role in increasing students' educational achievement. Self-Determination Theory (SDT), Goal Framing Theory (GFT), Theory of Planned Behaviour (TPB), and Octalysis framework are the most frequently used theories to support research on gamification. SDT focuses on intrinsic motivation, GFT focuses on goal-driven behavior, TPB focuses on social norms, while the Octalysis framework focuses on the gamification-driven core (Miao et al., 2022).

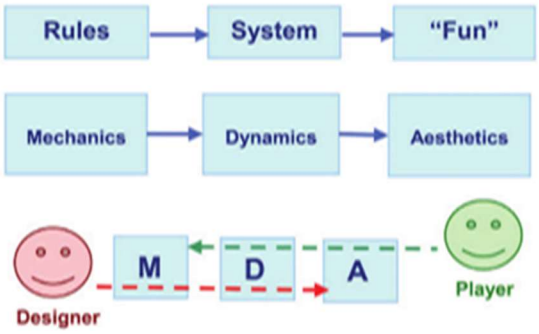

Figure 3: MDA Framework (Hunicke, Leblanc, Zubek, 2004)

The MDA framework consists of three components: mechanics, which describe the principles and mechanics of the game, dynamics, which describes how the rules are manifested during game play based on player feedback and engagement, and aesthetics, which describes the preferred emotional response that users generate when interacting with the gamification system (Marisa et al., 2020). Gamification designers must mix and match components to enhance player effects, creating dynamics that align with all eight aesthetic types (Kusuma et al., 2018). Each component in the MDA Framework has several parts in it (Putra, Yasin, 2021):

- Mechanics are essential components that describe rules, player actions, algorithms, and data structures. These mechanisms are created by the game developer with specific characteristics, which allow players to do actions. Game developers should consider game mechanics to create a well-defined path and promote player participation. Examples of components in mechanics: Genres and Topics, Goals, Platforms, Ratings, and Levels.
- Dynamics refers to the interaction between the mechanism and the player, which determines the player's actions. This is in distinction to mechanics, which are not visible but guide the player to the appropriate path. Dynamics are the visible components of a mechanism, such as buttons or inputs, that enable real-time outcomes. Examples of components in dynamics: Storyline, characters, game controls, challenges, game regulations.
- Aesthetics is the player's emotional response to the game dynamics, which is influenced by several components. Each player's reaction to a game is completely different, and understanding these components is crucial to game design. Examples of components in Aesthetics: sensation, narrative, challenge, discovery, expression.

2.3 Octalysis Framework

In 2014, Yu-Kai Chou invented a gamification design framework called Octalysis, which takes its name from the shape of an octagon with 8 Core Drives representing each side to analyze and construct strategies around various systems that make games more compelling (Chou, 2016). (Marisa et al., 2020) The 8 Core Drives of Octalysis are separated vertically into right brain (creativity, self-expression, social features) and left brain (analytical thought, accumulations, ownership), while horizontally into top (white hat), which contributes to positive aspects of motivation, giving a greater sense of importance and control, and Bottom (black hat), which contributes to negative aspects of motivation, which can be compensated in order to attain the best results.

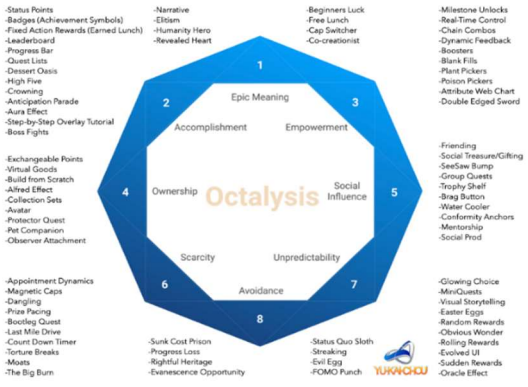

Fig. 4: Octalysis Framework (Chou, 2014)

Recent empirical work analysis by (Marisa et al., 2021) on customer motivation, recommends the usage of octalysis framework to indicate which core drives need to be improved or maintaned in more detail. (Weber et al., 2022) say that the Octalysis framework requires empirical justification and ongoing methodological refinement for effective design practice, a need that applies to other gamification frameworks and methods. The following is an explanation of each core drive contained in the octalysis framework (Marisa et al., 2020):

- Epic Meaning & Calling
  This drive acts as a reinforcement tool to promote a passion for completing tasks based on the good of others rather than personal gain. A person who is motivated to act on the basis that his or her actions involve the fulfillment of a mission that transcends his or her own personal interests and often involves the interests of many people.
- *Development & Accomplishment*
  The urge to act due to the satisfaction for achiveing a goal. Normally, a person performs an action because he or she expects a reward or something that he or she may receive in the future. This drive is the most popular and easy to implement out of the other core drives.
- *Empowerment of creativity & Feedback*
  Having the willingness to discover or create something new, an individual is encouraged to take action because he or she enjoys the independence of being able to do things with his or her hands and being part of this creative experience.
- *Ownership & Possesion*
  This drive works as an encouragement to acquire and aim to upgrade something, based on the idea that the more a person feels a sense of ownership over something, the more he or she will want to preserve and develop it.
- *Social influence & Relatedness*
  Such motivation is driven by people in social interactions and could transform individual behavior. Personal behavior is based on the idea that people act for a wide number of reasons, including the desire to collaborate, to compete, to be influenced by others, or because of an object that represents a memory of the past.
- *Scarcity & Impatience*
  This drive is caused by a desire to undertake an object simply because it is scarce, exclusive, or not in a readily accessible position, or because one is attracted to the object because it is unique and difficult to find.
- *Unpredictability & Curiosity*
  An immediate drive which is encouraged to take some form of activity because of the unexpected aspect of an object. In other words, it works by making a person curious to pursue the item, which is because the stronger a person's curiosity is, the more he or she will try to persecute the item.
- *Loss & Avoidance*
  The drive to accomplish something out of fear of missing an opportunity, which is similar to the drive of curiosity or uncertainty. The distinction between this drive and the other two drives is that this drive is mainly oriented towards the prospect of negative things or the threat of failure, resulting eagerness to maintain the object.

3. METHODOLOGY

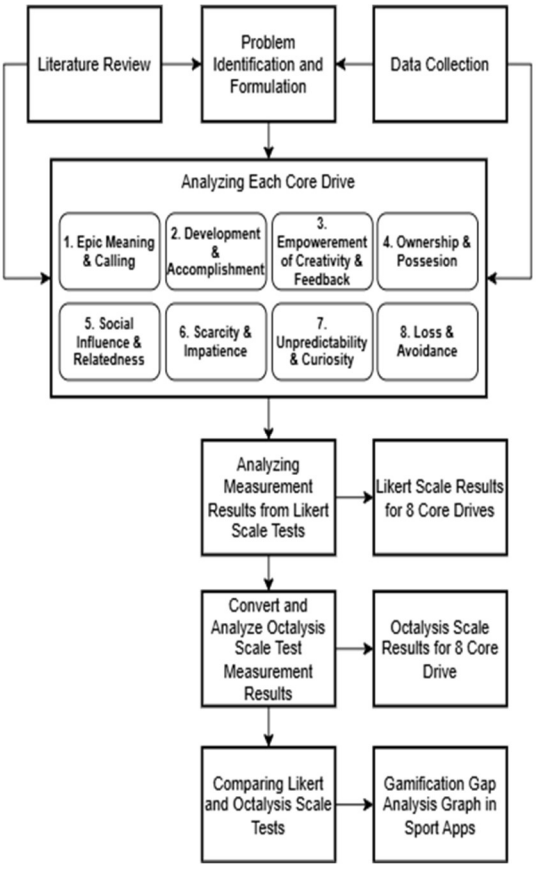

Fig. 5: Research Methodology

3.1 Literature Study, Problem Identification and Formulation, and Data Collection

In this phase, a comparison of similar literature that will help in analyzing existing problems related to sports platform mobile applications that apply the concept of gamification will be held. Furthermore, the data collecting stage is carried out with a questionnaire that uses a Likert scale or psychometric scale that is often used in questionnaires, Likert scales give a helpful way to degree undetectable builds and distributed instructional exercises specifying the method of their advancement have been profoundly powerful (Jebb et al., 2021). Likert-type rating scales have been used extensively in fields such as psychology, psychoeducation, medicine, and economics. Numerous studies have also examined the impact of the number of response options on the psychometric properties of these scales (Alan & Kabasakal, 2020). Determining the number of samples or respondents needed in this study using the Lemeshow formula because the population in this study who are sports application users in Indonesia is not known with certainty. The following is the formula made by (Lemeshow et. al., 1997):

$$n = \frac{Z^2 \times P(1-P)}{e^2}$$

Description:
n: Minimum sample size
Z: Trust level
P: Maximum estimation
e: Error Tolerance Limit

$$n = \frac{1{,}96^2 \times 0{,}5(1-0{,}5)}{0{,}1^2}$$

$$n = \frac{3{,}8416 \times 0{,}25}{0{,}01}$$

$$n = 96{,}04$$

Based on the above calculations, the minimum sample size needed for research is 96 people.

3.2 Analyzing Every Core Drive

At this point, each core drive is measured using a Likert scale, and the results are categorized into four (4) levels on a pre-defined range scale based on the deviation between the product of the weight of the criterion and the cumulative count of responses.

3.3 Analysis of Likert Scale Test Results

Subsequently, a table containing the classification results of each core driver on the Likert scale is created to compare and determine which core driver has the highest or lowest value.

3.4 Conversion and Analysis of Octalysis Scale Test Results

In this phase, the Likert scale results for each core driver are converted into Octalysis scale values, forming an octagonal pattern for each of the eight core drivers analyzed. This generated octagonal pattern is then evaluated by comparing it against a predefined success criterion octagon, which guides the next steps in the evaluation process.

3.5 Comparison of Likert and Octalysis Scale Tests

Finally, the graph of gamification gap in the sports app will be presented by comparing the actual Octalysis scale results that has been analyzed and the target Octalysis scale results.

4. ANALYSIS & EVALUATION

Data analysis in this study will follow a structured approach to ensure the accuracy and reliability of the findings. Anomalies, including outliers, missing data, and inconsistent responses, will be exceuted with appropriate imputation techniques or listwise deletion for missing data. Inconsistent responses will be flagged and reviewed for validity, ensuring that the data set remains robust and reliable for analysis. These rigorous steps in data analysis will enhance the validity of the results, providing actionable insights into the effectiveness of gamification in mobile sports applications.

4.1 Questionnaire Design

The data collection process starts from creating a questionnaire that will be divided into 3 parts, namely demographic questions, responses to sports application users based on 8 core drives, and open-ended questions using Indonesian Language. Each core drive in the "Octalysis Framework" will be represented by one (1) question using a Likert scale with four (4) criteria. The number of respondents who filled out the questionnaire distributed to people from various circles and domiciles in Indonesia within one (1) week was 117 people. However, of these, only 101 people met the target sample who were users of sports applications.

Table 2: Respondent's Gender

Respondent's Gender	Total
Male	52
Female	78
Total	130

Table 3: Respondent's Domicile

Domicile	Total
JaBoDeTaBek (Jakarta, Bogor, Depok, Tangerang, Bekasi)	72
Pulau Jawa	43
Luar pulau Jawa	15
Total	130

Table 4: Respondent's Sport Usage

Respondent's Sport Usage	Total
Ever	114
Never	16
Total	130

Each core drive is assigned a score, which is then multiplied by a weighted value, and the resulting product is used as the final score for evaluation. The average of each score is accumulated and then categorized and classified in accordance with the scope of the classification score classes. The classification for the result categories is established based on the computation of the following mechanisms:

- The smallest range point is determined by the smallest score weight (value = 1) multiplying by the number of respondents (N), which is represented by 1 x N (1 x 108 = 108).
- The determination of the largest range point is obtained by multiplying the largest score weight (value = 4) with the number of respondents (N), denoted by 4 x N (4 x 108 = 432)
- Finding the interval in range which is obtained by subtracting the largest interval point from the smallest intervail point (432 - 108 = 324).
- Finding the interval score which is obtained by dividing the range by the largest weight (324:4=81). This result is used as a criterion for the interval among classifications on the Likert metric measurement scale.
- Establishing the classification of the 4 levels of the metric scale by using the pre-generated value range (81) as the value separator among the classifications. This creates four classifications with the following criteria scores:
  Very Poor is 108 to 189,
  Poor is 189 to 270,
  Good is 270 to 351,
  Excellent is 351 to 432.

4.2 Analyzing Each Core Drive

This phase entails analyzing the eight core drives measured using a Likert scale. Presented below are the analysis results for core drives 1 through 8:

- CD 1: Epic Meaning and Calling

The indicator "The app as a sports platform used has the purpose of providing me and others with a motivation to exercise and stay healthy."

Table 2 : Analysis result of Core Drive 1

Feedback	Respondent Numbers	Score	Amount
Extremely High	74	4	296
High	27	3	81
Low	4	2	8
Extremely Low	3	1	3
∑	108		388

According to Table 2, CD 1 achieved a total score of 388, placing it within the 'very high' classification. This result suggests that sports app users perceive these applications as strong motivators for maintaining regular exercise and supporting overall health. To sustain this high motivation level, continuous strategies are essential to keep users consistently engaged and inspired.

- CD 2: Development and Accomplishment

The indicator "I feel happy after passing the challenges provided by the system mechanisms on the sports platform app used because it is driven by a sense of growth and the need to achieve targeted goals.."

Table 3: Analysis Result of Core Drive 2

Feedback	Respondent Numbers	Score	Amount
Extremely High	69	4	276
High	31	3	93
Low	6	2	12
Extremely Low	2	1	2
∑	108		383

Table 3 explains that Core Drive-2: (Development and Accomplishment) has a total achievement of 383 and is designated as a "very high" classification. Therefore, it can be concluded that the challenges provided in the sports app mechanism can encourage a sense of growth and the need for sports app users to achieve targeted goals. Providing newer and more compelling challenges can be done to improve this core drive while maintaining is also recommended for this condition.

- CD 3: Empowerment of Creativity and Feedback

The indicator "Mechanisms of the app system as a sports platform to provide tools and capabilities to make sports more attractive."

Table 4 : Analysis Result of Core Drive 3

Feedback	Respondent Numbers	Score	Amount
Extremely High	68	4	272
High	26	3	78
Low	12	2	24
Extremely Low	2	1	2
∑	108		376

Table 4 explains that Core Drive-3 (Empowerment of Creativity and Feedback) has a "very high" classification because it obtained a total score of 376. In addition, it can be concluded that the application as a sports platform provides various supporting media to create more interesting sports. This core drive needs to be maintained; therefore, efforts are needed to channel the creativity of application users as a sports platform.

- CD 4: Ownership and Possession

The indicator "The mechanism of the application system as a sports platform used has a user personalization function that motivates me to take responsibility for the existence of my account."

Table 5: Analysis Result of Core Drive 4

Feedback	Respondent Numbers	Score	Amount
Extremely High	51	4	204
High	39	3	117
Low	11	2	22
Extremely Low	7	1	7
∑	108		350

Table 5 explains that the total score obtained on Core Drive-4: Ownership and Possession is 350 which is classified as "high". Meanwhile, it can be summarized that sports app users feel slightly responsible for the personalization and belonging of their accounts. This situation needs to be improved, for example by increasing user personalization facilities in sports apps so that they can take responsibility for their account ownership as well.

- CD 5: Social Influence and Relatedness

The indicator "The mechanism of the app as a sports platform used provides encouragement to be more competitive or collaborate between other friends."

Table 6 : Analysis Result of Core Drive 5

Feedback	Respondent Numbers	Score	Amount
Extremely High	54	4	212
High	35	3	105
Low	12	2	24
Extremely Low	7	1	7
∑	108		348

Table 6 explains that Core Drive-5: Social Influence and Relatedness is classified as "high" because the score only reaches 348. Furthermore, it can be concrete that the sports application has not provided a optimal experience in collaborating with other friends. This condition needs to be improved again by intensifying communication and interaction

between users in sports applications.

- CD 6: Scarcity and Impatience

The indicator "The application as a sports platform used provides rewards or awards after reaching a certain point to increase motivation to exercise."

Table 7: Analysis Result of Core Drive 6

Feedback	Respondent Numbers	Score	Amount
Extremely High	60	4	240
High	32	3	96
Low	12	2	24
Extremely Low	4	1	4
∑	108		364

Table 7 explains that Core Drive-6 has a total gain of 364 which is classified as "very high", which indicates that the sports app is maximized in providing acknowledgement to users after reaching a certain point to increase exercise motivation. Providing unique gifts or rewards after reaching a predetermined point can be done to enhance this core drive to the maximum result while maintaining it, is also considered as sufficient.

- CD 7: Curiosity and Unpredictability

The indicator "The mechanism of the application system as a sports platform used sometimes provides sudden and limited challenges, missions, or competitions so that I have to check frequently so as not to miss the opportunity."

Table 8: Analysis Result of Core Drive 7

Feedback	Respondent Numbers	Score	Amount
Extremely High	47	4	188
High	35	3	105
Low	16	2	32
Extremely Low	10	1	10
∑	108		335

Table 8 explains that Core Drive-7 is classified as "high" because the score obtained is only 335, which proves that sports app users are less enthusiastic about challenges, missions, or competitions that are held suddenly and limited. This condition needs to be improved by providing special prizes or awards for completing sudden and limited challenges, missions, or competitions.

- CD 8: Loss and Avoidance

The indicator "The mechanism of the application system as the sports platform used provides a performance board function that can be known by all users, which encourages me to always maintain/improve my level by being active in sports."

Table 9: Analysis Result of Core Drive 8

Feedback	Respondent Numbers	Score	Amount
Extremely High	69	4	276
High	26	3	78
Low	9	2	18
Extremely Low	4	1	4
∑	108		376

Table 9 explains that Core Drive-8: Loss and Avoidance has a "very high" classification level due to the total score obtained of 376, where it can be concluded that the application as a sports platform can move users to always be active in exercising. This condition needs to be maintained by always providing the latest innovations to apply as a sports platform.

4.3 Analyzing the measurement results of the Likert scale test

Table. 10: Summary of Likert Scale Result for 8 Core Drives

Octalysis Core Drive		Classification
CD-1	Epic meaning & calling	Excellent
CD-2	Development & Accomplishment	Excellent
CD-3	Empowerment & creativity	Excellent
CD-4	Ownership & possession	Good
CD-5	Social influence & relatedness	Good
CD-6	Scarcity & impatience	Excellent
CD-7	Unpredictability & curiosity	Good

CD-8	Loss & avoidance	Excellent

The questionnaire analysis of the 8 Core Drives on a Likert scale classified 4 core drives as "very high" and 4 core drives as "high". These core drives may have the potential to understand users' motivations for using the app as a sports platform. The results of this analysis prove the validity stated by (Liu, Lipowski, 2021) which asserts that the gamification of sports improves college students' learning motivation and academic performance and requires participants' flexibility and teamwork skills. It also claims that sports games have a positive effect on increasing students' intrinsic motivation. Subsequently, this analysis can be used as a guideline for implementing gamification in applications as a sports platform. However, the results may differ or contradict, so further testing is recommended.

4.4 Converting and analyzing Octalysis scale test results

To ensure consistency in the evaluation and recommendation processes, the next step involves testing the collected data using the Octalysis scale. Results from the Octalysis scale test are calculated by applying the Octalysis formula to the questionnaire data. Each core drive is assigned a score ranging from 1 (lowest) to 10 (highest). The process for converting to the Octalysis scale includes the following stages:

- Determining the smallest range point by multiplying the weight of the smallest score (value = 1) and the number of respondents (N), namely 1 x N (1 x 108 = 108).
- Defining for the largest range point by multiplying the weight of the largest score (value = 4) by the number of respondents (N), where 4 x N (4 x 108 = 432).
- Finding the difference in range obtained from subtracting the largest range from the smallest range (432 - 108 = 324).
- Finding the range value to be considered as a criterion of separation among levels in the Octalysis measurement scale, obtained by dividing the difference between the ranges by the largest value (324: 10 = 32.4), rounded to 32.
- Establishing the 10 levels of the measurement scale using the result of the reference interval calculation in the foregoing computation, which is equal to 32.

The levels of the measuring scale are specified in the calibration data:
Scale 1: 108 to 140
Scale 2: 141 to 173
Scale 3: 174 to 206
Scale 4: 207 to 239
Scale 5: 240 to 272
Scale 6: 273 to 305
Scale 7: 306 to 338
Scale 8: 339 to 371
Scale 9: 372 to 404
Scale 10: 405 to 437

Next, the Octalysis scores for the eight core drives are determined using questionnaire values obtained from the data conversion process and measurement scale levels (Table 11). Each Octalysis score listed in Table 11 is then evaluated and aligned with the provided Octalysis scale.

Table. 11: Conclusion of Octalysis

Octalysis Core Drive		Questionnaire Score	Octalysis Scale	Octalysis Score
CD-1	Epic Meaning & Calling	388	9	81
CD-2	Development & accomplishment	383	9	81
CD-3	Empowerment & creativity	376	9	81
CD-4	Ownership & possesion	350	8	64
CD-5	Social influence & relatedness	348	8	64
CD-6	Scarcity & impatience	364	8	64
CD-7	Unpredictability & curiosity	340	7	49
CD-8	Loss & avoidance	376	9	81
Total Score				565

In Figure 6, Each Octalysis score will be entered into the Octalysis scale tool available on the official website (Chou, 2016) at https://yukaichou.com/octalysistool/ using the data from Table 11. The tool then automatically generates an Octagon Graph representing the application as a sports platform based on the input Octalysis scale data.

Figure 9: Octagon Scale

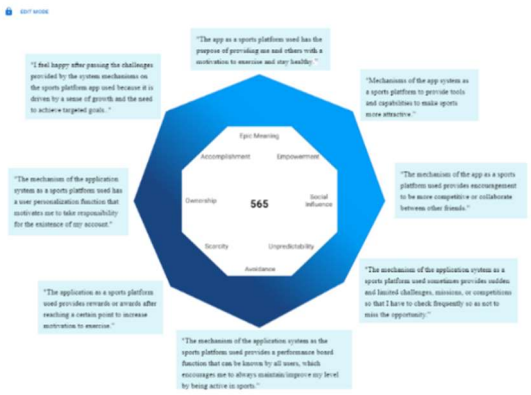

Figure 10: Octagon Graph of Sport Application

Thereafter, the Octalysis Graph will be visualized based on the octalysis scores presented in Fig. 4. Based on the real scores derived from the survey data, this octagon graph shows the balance of each basic drive. The results show a total Octalysis score of 565, which indicates a strong balance between the black and white hats, as well as between the left and right brain. It also indicates a great balance between extrinsic and intrinsic drive.

4.5 Comparing Likert and Octalysis scale test

Table 12: GAP Analysis of Application as Sport Platform with Quesionaire Scale

Octalysis Core Drive		Current	Target
CD-1	Epic meaning & calling	Excellent	Excellent
CD-2	Development & accomplishment	Excellent	Excellent
CD-3	Empowerment & creativity	Excellent	Excellent
CD-4	Ownership & possesion	Good	Excellent
CD-5	Social influence & relatedness	Good	Excellent
CD-6	Scarcity & impatience	Excellent	Excellent
CD-7	Unpredictability & curiosity	Good	Excellent
CD-8	Loss & avoidance	Excellent	Excellent

Table 13: GAP Analysis of Application as Sport Platform with Octalysis Scale

Octalysis Core Drive		Current	Goal
CD-1	Epic meaning & calling	9	10
CD-2	Development & accomplishment	9	10
CD-3	Empowerment & creativity	9	10
CD-4	Ownership & possesion	8	10
CD-5	Social influence & relatedness	8	10
CD-6	Scarcity & impatience	8	10

CD-7	Unpredictability & curiosity	7	10
CD-8	Loss & avoidance	9	10
Average		8.375	10

Tables 12 and 13, along with Figure 5, illustrate the gamification gap between the application's current state, as perceived by users, and the ideal target conditions as a sports platform. To address this gap, a thorough analysis and evaluation using the Octalysis framework are essential, with visualization to support insights.

- Core Drive-1: Epic Meaning & Calling

Target Classification: **Excellent**
Octalysis scale value: **10**
Current Classification: **Excellent**
Octalysis scale value: **9**

It enhances the intrinsic health motivation of its users, though it indeed needs some optimization. Gamification, legacy systems, and value-driven personalization will further improve engagement. It should continue reinforcing its purpose through user narratives and strategic collaborations to further ensure loyalty and long-term health outcomes.

- Core Drive-2: Development & Accomplishment

Target Classification: **Excellent**
Octalysis scale value: **10**
Current Classification: **Excellent**
Octalysis scale value: **9**

Personalized challenges, modulations in difficulty, and encouraging more competition with big time rewards are to be provided through this platform for further engagement and satisfaction.

- Core Drive-3: Empowerment of Creativity & Feedback

Target Classification: **Excellent**
Octalysis scale value: **10**
Current Classification: **Excellent**
Octalysis scale value: **9**

To sustain this, user generated content, recommendations, and personalized feedback must be featured for sustainability. Also, the incorporation of gamification in feedback mechanisms will enhance user participation and creativity for better performance of the platform.

- Core Drive-4: Ownership & Possession

Target Classification: **Excellent**
Octalysis scale value: **10**
Current Classification: **Good**
Octalysis scale value: **8**

This will enable it to create and share challenges, extend levels of choice for personalization, and tap into community involvement through social features and virtual rewards in an inspiring way. Users will proactively participate in and take ownership of the development of an ever connected and engaged experience.

- Core Drive-5: Social Influence & Relatedness

Target Classification: **Excellent**
Octalysis scale value: **10**
Current Classification: **Good**
Octalysis scale value: **8**

To enhance competitiveness and collaboration, the platform should integrate instant chat, group training, and seamless connectivity. Additionally, incorporating leaderboards, rewards, and social challenges will promote teamwork, while interest-based groups can facilitate targeted interactions. Strengthening the "Social Influence & Relatedness" drive will foster deeper relationships and inspiration, ultimately enhancing the user experience.

- Core Drive-6: Scarcity & Impatience

Target Classification: **Excellent**
Octalysis scale value: **10**
Current Classification: **Good**
Octalysis scale value: **8**

While the core drive meets target classification, the Octalysis scale of 8/10 suggests further enhancement is needed. To optimize motivation, the platform should introduce limited-edition rewards linked to achievements, tailored incentives, and a tiered system. Gamifying rewards through surprise elements or lucky draws will increase exclusivity, urgency, and user engagement, driving a more personalized and effective motivational framework.

- Core Drive-7: Unpredictability & Curiosity

Target Classification: **Excellent**
Octalysis scale value: **10**
Current Classification: **Good**
Octalysis scale value: **7**

To enhance engagement, the platform should introduce varied surprise challenges with adjustable difficulty and suspense elements. Customizing challenges based on user performance and offering time-limited rewards will drive motivation and improve the user experience.

- Core Drive-8: Loss & Avoidance

Target Classification: **Excellent**
Octalysis scale value: **10**
Current Classification: **Excellent**
Octalysis scale value: **9**

This mechanism leverages social comparison and recognition, essential for fostering competition and adherence to exercise regimens. To maintain this performance, the leaderboard should introduce optional risk based challenges. Additionally, diverse leaderboards tailored to specific goals and success stories can boost user engagement, allowing users to customize risk management transforms exercise into a rewarding journey, while celebrating achievements and enhancing the overall user experience.

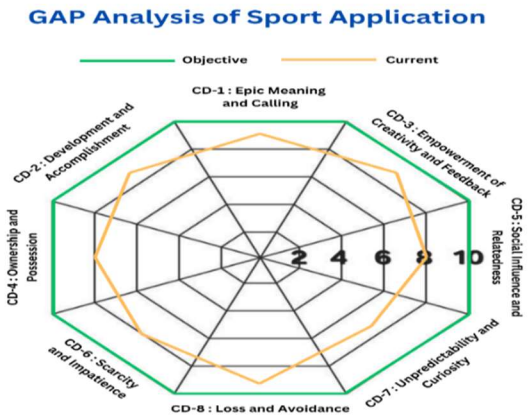

Fig. 11: Gap Analysis of User Motivation in using Sport Application

Optimizing gamification in sports applications involves enhancing core motivational drives, such as achievement tracking, personalized challenges, and social features, to sustain user engagement and satisfaction. By addressing users' intrinsic motivations such as autonomy and mastery through these elements, developers can foster a more immersive and rewarding experience, which has been shown to significantly increase physical activity, particularly when combined with financial incentives [36]. Social influence and empowerment also play crucial roles, creating a sense of community and commitment, as evidenced by sustained usage driven by social impact and self-determination theories [37]. Additionally, elements of scarcity, unpredictability, and competition can create urgency and enhance user engagement, though careful balance is needed to avoid over-engagement or behavioral addiction [38]. Overall, tailoring gamification to individual needs and preferences while maintaining a balance between personalization and standardization can optimize the effectiveness of sports applications, promoting long-term user retention and engagement.

5. CONCLUSION

Altough gamification may not be fully addressed as the underlying reasons for the decline in exersice frequency in Indonesia, this study determines through an Octalysis analysis that while Indonesian sports apps demonstrate decent gamification features, scope for improvement exists in integrating social features, creativity tools and elements of curiosity like limited events to better motivate participation. The gap analysis provides specific recommendations for app developers to capitalize on these opportunities through enhancements across mechanic, dynamic and aesthetic components of gamification. Recent empirical work showed that gamification is extremely advantageous in a variety of contexts where individuals need to demonstrate long-term commitment and perseverance in behavior, and in contexts typically associated with procrastination, which fits well into the context of sport [39].

Moreover, gamification, especially using the octalysis framework, can be used to provide a mechanization option to explore applications as a sports platform that can create and improve core drives more optimally. The limitation for this research is that this analysis focuses on octalysis framework, and variable measurements are needed so that the research can be fully accepted, meanwhile a more comprehensive measurement of static variables is needed, so that it can make more contributions related to the use of gamification in sports apps. Further research is needed to implement the results of this analysis into an app as a sports platform in an aim to fully utilize the full potential of gamification especially in Indonesia.

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