

Article

# Perspectives of Platform Operators, Content Producers, and Information Receivers toward Health and Fitness Apps

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**Abstract:** The interactive mechanism among platform operators, content producers, and information receivers is increasingly complex in human–computer symbiosis. The purpose of this study is to identify the interactive value among platform operators, content producers, and information receivers with regard to information through the health and fitness apps by adopting an advanced Analytic Hierarchy Process (AHP) method derived from professional perspectives of app users and operators, key opinion leaders, scholars, and officers. The AHP method was allocated weightings to the evaluation criteria from the twelve panelists from three groups of platform operators, content producers, and information receivers. After focus group interviews were conducted, four dimensions and twelve sub-dimensions of the initial health and fitness apps were obtained as follows: (1) Content category: Monitoring, exercise, journaling, and sleeping; (2) User reviews: Functionality, interactivity, and criticism; (3) Content updates: New feature, correctness, and new language; (4) Platform terms: Privacy, accuracy, ownership, and right of use. The study integrated the panelists' opinions toward health and fitness apps and analyzed the weight of each indicator according to their importance by Power Choice V2.5. The results revealed that the weights of dimensions of health and fitness apps were sorted by content category, user review, platform terms, and content update, as well as that the weights of the top six sub-dimensions were followed: monitoring, exercise, functionality, interactivity, privacy, and accuracy. Content producers suggested increasing the popularity of their products by adding new features, whereas information receivers preferred to correct problems. Content producers and information receivers graded platform terms as less essential, whereas platform operators rated platform terms higher. This study can contribute to assisting the health and fitness industry and the overall strategic operative process by identifying how the effectiveness in the procedures, estimative process, and cost-down can enhance competitiveness to further improve users experience and satisfaction.

**Keywords:** analytic hierarchy process (AHP); health and fitness apps; platform ecosystem

## 1. Introduction

Wireless sensor networks have developed rapidly to create smart living environments. The Web 4.0 paradigm has strengthened interactive read–write execution between information receivers and applications (apps), machine interpretation and calculation, and correlation identification within data, and it has also referred to the established goal to determine programs and methods for execution to achieve automation in technologies, including smart devices, digital life apps, multimodal human–computer interaction, and home network security [1,2]. To increase the quality of the apps,

operators have begun to be concerned with the interaction to different content and service available in whole communication channels [3].

According to the model of player in a platform ecosystem [4], this study reinterprets the concept of three roles in health and fitness apps: platform operators, content producers, and information receivers. Platform operators and interface providers formulate management terms and provide user interfaces to content producers and information receivers; content producers showcase their products and services in apps; information receivers purchase these products or services as well as exchanging opinions and information within the apps [4]. Health and fitness apps are used for system management such as fitness assessment, venue and equipment management, event management, and sports forums. However, through mobile devices, these apps can now access data related to information receivers to organize communities and monitor information. The financial industry has collected data on recipients' exercise or physical activity through their health and fitness apps to design consumer discounts and premium reductions. Information receivers' level of information use differs according to their relationships with app content producers, information sources, and content. Therefore, it is essential to focus on an in-depth research on the perspectives of platform operators, content producers, and information receivers in order to use the health and fitness apps to achieve their goals.

The previous studies on health information have been focused on database development and app management, both of which establish the foundation for the operation of health and fitness apps and include system management [5], database establishment [6], fitness guidance and assessment [7], the intelligent management of venues and equipment [8], information-sharing platforms [9], and outdoor sports forum [10]. Moreover, apps are designed to provide suitable information services to content producers and meet the personal needs of information receivers. The previous studies in the field of health and fitness apps emphasize on the information receivers' perceived utility, trust, ease of use, usefulness, enjoyment, actual use, and intention [3]. Those studies on the communication effects of health and fitness apps, content producers, and information receivers have been scarce [10], rendering the interaction among the three roles in the communication process difficult to understand.

In human–computer symbiosis, the roles of platform operators, content producers, and information receivers as well as the content of delivered information and interaction models, experience dynamic changes and exert mutual effects. In particular, millions of people at home during the COVID-19 pandemic have increased the tremendous information flow to impact on the platform ecosystem of health and fitness apps, which highlights the importance of understanding the topic of the intention to use the apps by the population [3]. Therefore, the establishment of mutual goals among platform operators, information receivers, and content producers and the assessment of information quality and effectiveness require further discussion. This study explored the interactive value among platform operators, content producers, and information receivers with regard to information through the health and fitness apps of different platform operators.

The main contribution of this research is its use of existing data, correct of the comprehensive perspective, and a continuous monitoring system to assist the health and fitness industry in making predictions, simplifying its operating procedures on the basis of its needs, systemizing the estimation process, and strengthening the reliability and validity of results, which can reduce uncertainty and costs. Secondly, informational value depends on information exchange to further influence the conversion of target behaviors of information receivers. Content producers of health and fitness information can reference the study results to adjust information content, thereby increasing opportunities of the target behavior conversion rate of information receivers and predicting the characteristics of potential information receivers. Thirdly, to evaluate the value of sports and health information, this study collected data from open databases and incorporated theories with big data. The relevance of health and fitness information on platforms in related enterprises and industries can be estimated to enhance the input and output efficiency of the health industry.

## 2. Materials and Methods

### 2.1. Measurement

This study identified the top 50 health and fitness apps on Google Play daily from July to November of 2019. The popular health and fitness apps during the 5 months were scored according to their rankings, and their arithmetic averages were calculated. This study aimed to compare the perspectives of the platform operators, content producers, and information receivers on health and fitness apps. The first step was to identify previous studies and develop a questionnaire of “The Relative Weights of Future Development of Health and Fitness Apps [11–14].” The first dimension of content category was developed by collecting and clustering the most popular health and fitness apps on Google Play [11]; the second dimension of user reviews was referred to by the measurements of health evaluation and user criticism [5,12]; the third dimension of content update was selected by the functions of apps maintenance and update [12,13]; the fourth dimension of platform term was constructed by Mason’s four ethical issues of the information age [14]. After expert evaluations were conducted, four dimensions and twelve sub-dimensions were obtained: (1) Content category: monitoring, exercise, journaling, and sleeping; (2) User reviews: functionality, interactivity, and criticality; (3) Content updates: new feature, correctness, and new language; (4) Platform terms: privacy, accuracy, ownership, and right of use.

### 2.2. Focus Groups in the AHP Process

Focus groups are an established mechanism for data collection across qualitative, mixed method, and quantitative methodologies [15]. Focus group interviews could be adjunct to collecting quantitative data, appear to center on task-focused aims, and review methodological assumptions [16]. The analytic hierarchy process (AHP), a multilevel analysis method, was used to deconstruct a problem at a dendritic structure level to establish a class structure level with a mutual influence and to facilitate an individual or organization in making a decision accurately when confronted with multiple solutions for various problems [17]. During problem evaluation, panel members consider the weight of solutions as a reference for decision making [18]. Two items at each level with different measurements were compared and the comparative matrixes were paired, which can be established to calculate the number of featured vectors and to represent the priority of crucial elements at structural levels [19]. The featured value was then calculated, which formed an evaluative basis for judging the level of consistency and the extent of influence on each comparative matrix [20]. This worked by establishing an expert system for investigating the respective weight of a group of variables relevant to the research subjects [19]. This study employed the AHP to determine each panelist’s perspectives on health and fitness apps collected using the questionnaire. The AHP should be conducted to avoid decision-making fatigue caused by the presence of too many weight comparisons among panel members. Each dimension had a maximum of seven questionnaires [21]. The four steps for the AHP are as follows: (1) finalization of the evaluation criteria system; (2) questionnaire evaluation; (3) allocation of weighting and consistency clarification; (4) calculation of the weighted values of each evaluation [20,22,23].

The questionnaire surveyed the opinions of three types of individuals with different roles in app operations. Specifically, by end of April 2020, three types of panel members included three information receivers who had used health and fitness apps before, three content producers who were key opinion leaders, and six experts and scholars who represented platform operators, and participated in a focus group interview to generate in-depth discussion. Table 1 listed the background of panel members. Then, the weights of the dimensions were determined.

**Table 1.** The Background of Panel Members.

Type	Panel Member *	Specialty
Platform Operators	1, F, 56	Sports management, sports and health management, and track and field training method
	2, F, 57	Sports philosophy, sports sociology, sports leisure, and health behavior
	3, F, 55	Welfare and long-term care for the elderly
	4, M, 56	Sports administration, sports current affairs, school sports management, and management
	5, F, 55	Tourism administration and planning
	6, M, 57	Sports policy and legal practice sports service consumption protection
Information Producers	1, M, 43	Sports marketing, event management, international trade
	2, F, 27	Operating Facebook fan page related to heavy machinery
	3, M, 30	Running swimming YouTube sports platform
Content Receivers	1, M, 24	The Nike Training Club app User
	2, M, 24	30 Day Workout app User
	3, F, 23	Nike Run Club app User

\* n, female or male, years of age.

The AHP method analysis “Power Choice V2.5,” a comparison matrix established to test the consistency of the dimensions, was used to integrate the opinions of information receivers, content producers, and platform operators toward health and fitness apps and calculated the weight of each indicator according to their importance after the focus group interview was conducted to generate an in-depth discussion of the factors influencing the importance of each dimension’s development. For instance, the process of the AHP questionnaire by applied Power Choice V2.5 was the following: The pairwise comparison on the platform dimensions was carried out. The platform dimensions were divided into Content category, User review, Content update, and Platform terms. The respondents through the pairwise comparison among four dimensions defined the importance and hierarchy. The major index was consistency ratio (CR) value which should be lower than 0.1 was used to indicate the acceptance of the reliability (see Figure A1 in Appendix A).

### 3. Results and Discussions

#### 3.1. Consistency Ratios of the Questionnaire

On the basis of the role interaction model for health and fitness apps, this study divided platform analysis into four dimensions, namely, the content producer’s content category and content updates, the information receiver’s comments, and platform terms. Weights were assigned to the four dimensions according to their importance. The AHP was conducted to investigate the opinions of the three parties on health and fitness apps index. The totals of 12 valid questionnaires used in the hierarchical analysis were encoded using digits. The questionnaire of “The Relative Weights of The Future Development of Health and Fitness Apps,” comprising four dimensions and twelve sub-dimensions, was used to survey the opinions of platform operators, content producers, and information receivers on the development of health and fitness apps. All 12 questionnaires yielded CRs of < 0.1 and met the consistency ratio requirement, indicating that the questionnaires were valid. Table 2 presents the consistency ratios (CRs) for the pairwise comparisons of survey responses from platform operators, content producers, and information receivers.

**Table 2.** CRs of the Questionnaires.

Dimensions	Values of CRs					
	PO1	PO2	PO3	PO4	PO5	PO6
Content category	0.1	0.06	0.1	0.09	0.07	0.09
User review	0.07	0.04	0.04	0.07	0.07	0.07
Content update	0.08	0.07	0.07	0.07	0.00	0.03
Platform terms	0.09	0.09	0.03	0.06	0.00	0.09

Dimensions	Values of CRs					
	CP1	CP2	CP3	IR1	IR2	IR3
Content category	0.09	0.05	0.05	0.08	0.10	0.08
User review	0.06	0.08	0.04	0.07	0.07	0.07
Content update	0.06	0.09	0.00	0.08	0.07	0.08
Platform terms	0.09	0.08	0.07	0.06	0.09	0.06

PO: Plate operators; CP: Content producers; IR: Information receivers.

### 3.2. Overall Weights of Panel Members

The weights of the content category, user review, platform terms, and content update dimensions of health and fitness apps were 43.17%, 23.25%, 22.04%, and 11.52%, respectively. The six most influential sub-dimensions were monitoring (19.84%), exercise (14.62%), functionality (12.10%), interactivity (8.71%), privacy (7.96%), and accuracy (7.60%), in Table 3. In terms of overall weights, the content category and user review dimensions were weighted the highest. Among the sub-dimensions, monitoring and exercise were the highest weighted. Among the most popular sports apps, monitoring and exercise-based apps were more numerous than journaling and sleep-based apps. According to current trends, content producers who wish to receive more attention on a health and fitness apps may consider providing monitoring and exercise content. According to the weight assignments by platform operators, content producers, and information receivers, platform operators of health and fitness apps may respond to functionality and interactivity, as suggested by user reviews, when launching subsequent versions of apps. Such updates are helpful to information receivers when they use the platform. Studies have indicated that platforms that receive more comments tend to be ranked higher. Moreover, a focus on user reviews can provide content producers with clear directions for product optimization.

**Table 3.** Overall Assessments of Panel Members.

Dimensions	Weight	Sub-Dimensions	Sub-Weight	Overall Weight	Rank
Content category	43.17	Monitoring	45.97	19.84	1
		Exercise	33.87	14.62	2
		Journaling	11.26	4.86	8
		Sleeping	8.90	3.83	10
User review	23.25	Functionality	52.05	12.10	3
		Interactivity	37.48	8.71	4
		Criticality	10.47	2.48	13
Content update	11.53	New feature	39.15	4.51	9
		Correctness	51.29	5.91	7
		New language	9.56	1.10	14
Platform terms	22.05	Privacy	36.11	7.96	5
		Accuracy	34.47	7.60	6
		Ownership	14.52	3.20	12
		Right of use	14.90	3.28	11
	100%		100%	100%	

Weights (%).

### 3.3. Weight of Platform Operators, Content Producers, Information Receivers

Table 4 indicated that content producers and information receivers assigned the highest weight to content category (43.67% and 63.17%, respectively), whereas the platform operators assigned the most weight to platform terms (37.30%). Overall, the platform operators attached more importance to platform terms and content category (37.30% and 33.03%, respectively); content producers ranked content category and content updates (43.67% and 25.54%, respectively) as highly essential; and the information receivers ranked content category and user reviews (63.17% and 17.51%, respectively) highly.

Both content producers and information receivers believed that the health and fitness apps should focus on developing high-quality content. Platform operator 1 made the following remarks:

*“The platform terms resemble the rules of a game. Fair and clear rules must be established so that the content produced meets the public’s needs.”* (PO 1)

The median absolute deviation (MAD) was used to compare the weight assignment differences among the panel members with different roles in health and fitness apps. A MAD value above 2 indicates consistency among opinions. By contrast, a high MAD value indicates disagreement among the opinions. The sub-dimensions of content category and user reviews exhibited high consistency with MAD values above 2. Panel members in the three roles had different views toward new features in content updates (MAD = 3.30). Platform operators and information receivers ranked new features as ninth and tenth in terms of importance, respectively, whereas content producers ranked it second. New features are crucial to content producers because they can increase the exposure of health and fitness apps and attract more attention. However, Information Receiver 3 stated:

*“Whether the content is effectively improved is the most important thing.”* (IR 3)

The content producers wished to increase the popularity of their products by adding new features, whereas the three information receivers prioritized correcting existing problems in the products.

The overall weight rankings of platform terms, namely, the sub-dimensions of accuracy, ownership, and right of use, all yielded high MAD values (3.77, 3.77, and 3.11, respectively), implying inconsistent opinions among the panel members. Table 4 indicated that both content producers and information receivers rated platform terms as less essential, whereas platform operators ranked the three sub-dimensions of platform terms in the second, fifth, and sixth place, respectively. The MAD values indicated that platform operators attached more weight to platform terms. Information receiver 2’s response was as follows:

*“Users are required to accept platform terms when downloading an app, so it is less important.”* (IR 2)

Platform term is an inherent component of platforms for information receivers. Because users must accept the platform terms to use a health and fitness apps, the follow-up services of the product are more crucial. Both content producers and information receivers attached importance to privacy in the platform terms. This was associated with an increased awareness of personal information security. Therefore, content producers should provide clear explanations of privacy matters to allow users to feel safe when using the platform.

**Table 4.** Three Types of Panel Members Assessments.

Dimension	Sub-Dimension	PO Weight	PO Sub-Weight	PO Overall Weight	Rank	CP Weight	CP Sub-Weight	CP Overall Weight	Rank	IR Weight	IR Sub-Weight	IR Overall Weight	Rank	MAD
Content category	Monitoring	33.03	54.98	18.16	1	43.67	49.99	43.68	1	63.17	28.52	18.01	2	0.44
	Exercise		27.93	9.22	4		23.16	10.11	3		56.55	35.72	1	1.11
	Journaling		9.82	3.25	9		14.51	6.34	7		8.12	5.13	6	1.11
	Sleeping		7.27	2.40	11		12.34	5.39	8		6.81	4.30	8	1.33
User review	Functionality	20.69	61.33	12.69	3	21.03	40.31	8.48	5	17.51	51.22	8.97	3	0.88
	Interactivity		29.3	6.06	7		46.72	9.82	4		40.28	7.05	4	1.33
	Criticism		9.37	1.94	12		12.97	2.73	12		8.49	1.49	11	0.44
Content update	New feature	8.98	34.12	3.06	10	25.54	58.15	14.85	2	9.89	39.41	3.91	9	3.30
	Correctness		57.88	5.20	8		28.08	7.17	6		52.92	5.24	5	1.11
	New language		8.00	0.72	13		13.77	3.51	10		7.67	0.76	13	1.33
Platform terms	Privacy	37.3	25.07	9.35	4	9.77	51.27	5.00	9	9.43	52.46	4.95	7	1.77
	Accuracy		35.81	13.36	2		29.04	2.83	11		28.80	2.71	10	3.77
	Ownership		20.36	7.59	5		12.65	1.23	13		6.29	0.59	14	3.77
	Right of use		18.76	7.00	6		7.04	0.69	14		12.45	1.17	12	3.11
		100%	100%	100%		100%	100%	100%		100%	100%	100%		

Weight %.

The opinions of the three types of panel members analyzed using the AHP revealed that platform operators believed that platform terms are the criterion of interaction among platform operators, content producers, and information receivers on health and fitness apps. Accordingly, accurate and transparent terms must be established for health and fitness apps. Content producers and information receivers were more concerned with product content. This result is congruent with the basic operation of information platforms [3]. Because they are providing products and services, content producers focus on the nature of their products in health and fitness apps. Because they are purchasing products and services, information receivers regard content category and whether their reviews reach the producers as significant evaluation criteria.

The managerial implications could be that platform operators should focus on characteristics of health and fitness apps that can shape perceptions of usefulness and ease of use, as they lead to stronger usage intention of content producers information receivers by improving the apps’ features such as perfecting the privacy matters, safe access of sensitive information, offering a good design, and matching their demands [23]. It is important that platform operators continually develop functionality within their apps that enables content producers and information receivers to customize their experience while enhancing the enjoyment from interacting with health and fitness apps in the future [24]. Furthermore, in the era of content as king, content producers generate abundant health and fitness content to meet people’s health needs and information receivers sustainably provide their feedback after use to respond to a desire for health to platform operators and content producers. The platform ecosystem can operate sustainably by cooperating between all actors.

#### 4. Conclusions and Future Suggestions

This study analyzed the three roles of platform users by mining the data of the 50 most popular health and fitness apps. By using the AHP, the weights assigned to each dimension in operating health and fitness apps by platform operators, content producers, and information receivers were compared. Overall, the panel members were more concerned about the content, followed by users’ comments, platform terms, and content updates (Figure 1). Among the sub-dimensions, the monitoring and exercise content categories were ranked at first and second place, followed by the functionality and interactivity of user reviews (third and fourth place), and platform privacy and the accuracy of platform terms (fifth and sixth place). Such prioritization by the panel members can inform the more precise allocation of resources for health and fitness app operations.

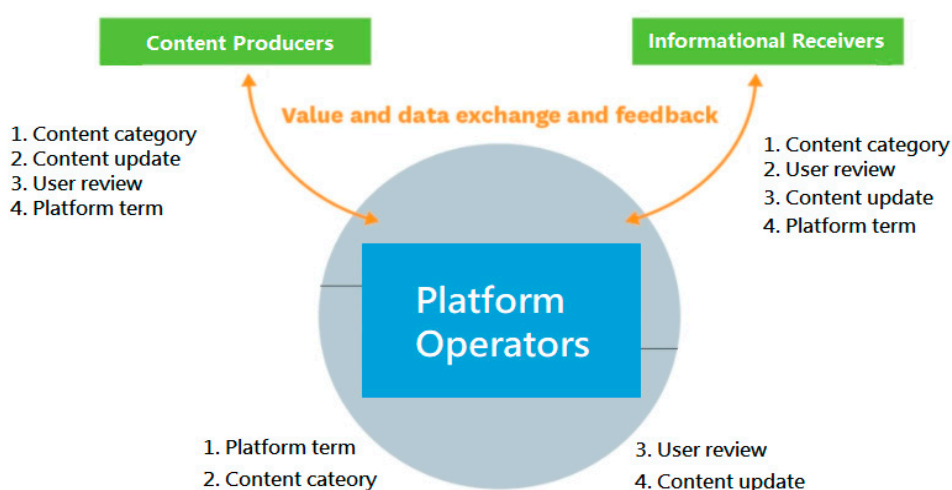


Figure 1. Priority Assessment in the Platform Ecosystem.

Based on the original role interaction mechanism [4], we discovered that the interaction between content producers and information receivers can be used for platform role analysis in different dimensions. Follow-up analyses may reference the interaction between content producers and



information receivers. Future studies may incorporate the iPhone operating system. This inclusion can enable researchers to compare user roles between the two major platforms and analyze interplatform differences to expand discussion on platform interaction mechanisms.

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## Appendix A



Figure A1. Processing of Power Choice v2.5 of the Analytic Hierarchy Process (AHP) questionnaire.

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