

Research on a Method and System of Communication Data Product Evaluation

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Abstract: The homogeneity of data products of domestic communication operators is serious, and the industry competition is particularly fierce. At the same time, the data package products are too complicated, and there is serious product overlap and crossover phenomenon, which wastes the resources of enterprises on the one hand, and causes confusion among consumers when choosing products on the other hand. Therefore, it is necessary to evaluate the communication data package products and screen key products. However, at present, the systematic research on the evaluation of data package products in the telecom industry is still relatively scarce, and this paper constructs an evaluation system and method for communication data package products by drawing on the research experience of previous scholars on telecom products. Through the well-designed data product evaluation system and method, and based on the combination calculation method of subjective and objective weights, the data package product evaluation model is constructed. Operators can use the evaluation system and method of communication data package products to screen key products of their own data products and make effective product recommendations for customers. Finally, experimental verification is carried out to evaluate and screen the operator data package products of China Mobile, which shows that the model has good effect and application value.

Keywords: data package products, evaluation system, evaluation model, key product screening.

1 INTRODUCTION

In recent years, the homogeneity of domestic communication operators' data products has been serious, and the industry competition is particularly fierce, with the promotion of 5G commercialization, new technologies have allowed the three major operators to return to the same line. In 2019, with the announcement by the Ministry of Industry and Information Technology of the introduction of customer number portability measures, major operators are facing an unprecedented customer battle once again. In the face of the forward trend of the times, changes in the market situation, and increasingly fierce competition, the original marketing strategy can no longer meet the competitive requirements of the new situation, and operators are accelerating their transformation efforts.

However, the competition in the communication market has also evolved from a single price war to a competition of various forms of data package products. On this basis, in order to meet the needs of individual users in the market data use, major operators have launched various data products to promote 5G development, drive data growth, deepen and maintain data operations rapid growth. China Mobile launched a deepening data management strategy: starting from the four main driving factors of data: scale, package, terminal, and content application, it strengthened operations and promoted continuous high data growth. Expand the scale of Internet customers, expand the scale of 5G packages and overlay packages, do well in matching the terminal network rate and increasing the promotion of large-data applications.

Data package products are service-supported product, that is service models with different grades, different resources, and different uses designed for various business scenarios according to the needs of different users [5]. Data package products are the carrier of price and service, and its essence is also price competition, while the diversification and differentiation of data package products make it difficult for competitors to imitate. Consumers can also get certain discounts from the data package products. Therefore, data package products have become a powerful competitive weapon for operators. Major operators have launched various data package products, which not only triggered a new wave of waste, but also dazzled consumers.

Therefore, telecom operators should evaluate various data package products within their brands, measure the actual value of data package products, and delete meaningless products. Starting from this foothold, this paper analyzes from multiple aspects, establishes the value evaluation model of data package products, designs the index system of the data package evaluation model, and tests the evaluation model through empirical research.

Regarding the evaluation of telecom products, scholars have carried out a series of research. Hu believes that the establishment of a scientific and systematic comprehensive evaluation system for enterprise product innovation, and the use of scientific evaluation methods for comprehensive evaluation, are important issues that telecom enterprises need to solve at present [3-4]. Chen et al. introduced the comprehensive evaluation method of SQI product operation quality, built a product overall operation quality health assessment model, and established a comprehensive evaluation index [1]. Dong elaborated on the design of the evaluation system for telecom enterprises investing in new products from the perspectives of the establishment of the evaluation system for new product projects, the setting of organizational structure, the work process and methods, and index systems [2]. Aiming at the typical curve of the life cycle of telecom products, Sun proposes to combine curve fitting and second derivative to study and evaluate the life cycle of telecom products [9]. From the perspective of consumers, Liu selects the loyalty factor method of brand equity value evaluation as the original model, and combines the characteristics of industry competition and products of telecom operators to construct a brand equity value evaluation method that conforms to telecom operators [6]. Su proposed the "fuzzy gray comprehensive evaluation method", constructed a product performance evaluation index system in the telecom industry according to the balanced scorecard theory, and constructed a set of scientific, feasible and adaptable product performance evaluation methodology [7-8].

As to the value evaluation problem in the field of telecom data products, this paper draws on the research experience of previous scholars on telecom products to construct an evaluation system and method for communication data package products. Through the well-designed data product

evaluation system and method, and based on the combination calculation method of subjective and objective weights, the data package product evaluation model is constructed. Operators can use the evaluation system and method of the communication data package product to screen the key products of their own data products, and make effective product recommendations for customers. Finally, experimental verification is carried out to screen out the key products of mobile operators, which have good application and effect.

2 INTRODUCTION OF DATA PRODUCT SYSTEM

Due to the large number of data package products, in order to meet the market development strategy, product demand intensity and other factors, it is necessary to evaluate product priorities and screen key products. Through the system combing of data products, the complexity is deleted and simplified, and according to the substitution relationship between many data packages, the low-order rate data package products are gradually removed; At the same time, screen key marketing products, plan product recommendation catalogs, prioritize recommendations, etc., and improve marketing conversion.

2.1 Data Product Classification System

In order to understand the attributes of each data package clearly and match products quickly, it is necessary to systematically sort out the data package products. This paper classifies and sorts out the product system from the attributes such as type, cycle, price, and resource volume of data packages.

2.1.1 Data Package Type

From the dimensions of product usage restrictions and function settings, there are 12 types of data overlay packages, show in table 1. Among them: the number of general data package products is the largest, with a total of 650 files, and the number of subscribers and users is also the largest, followed by APP directional data package.

Table 1: The type distribution of data packages.

Type	Number	Rate
General data package	650	49.28%
APP directed data	391	29.64%
Regional directed data	161	12.21%
5G Single Mode data	2	0.15%
International roaming data	31	2.35%
Daily rent data package	7	0.53%
Night/leisure time data	10	0.76%
Data sharing package	2	0.15%
Speed-up	4	0.3%
Rest assured /refueling package	15	1.14%
Data reminder	31	2.35%
Other(data)	16	1.21%

General data package refers to a mobile Internet data resource with a specific size. Generally, it refers to data packages which contain N MB and costs X¥ ,it include the local version and roaming version of the general data package. General data packages include a variety of data specifications, suitable for all customer application scenarios, mainly to meet the data requirements of graded times.

APP directional data package is designed for the data data generated when the user's mobile phone accesses a specific IP. These data data is marked and classified for users within the scope of access, the data generated by the APP or website can be used free of charge. APP directional data packages are mainly to meet the needs of cooperative APP or website to improve enterprise customers stickiness, such as Tencent Video directional data package.

Regional directional data package is a data generated by users using mobile phones to access the Internet within a fixed area, which belongs to regional directional data, such as campus area data packages.

2.1.2 Data Package Period

From the perspective of the validity period of the product, there are 11 cycles, which can be divided into short-term packages (daily package, 3-day package, 5-day package, 7-day package, half-monthly package, 30-day package), monthly package, two-month package, quarterly package, half-year package and annual package. Among them, monthly packages are the most conventional package which is accounting for 83.8%.

In addition, in marketing activities, the design of data overlay package products is often carried out in the form of monthly package + contract period, such as campus area data package in the form of monthly package (80G/month) + contract (4 years). In response to customers' short-term international roaming requirements, the overlay package is configured as 3-day, 5-day, and 7-day short-term packages.

For the market of China Mobile, the distribution of data packages for duration is shown in table 2.

Table 2: The duration distribution of data packages .

Duration distribution	Tariff quantity	Rate
daily package	29	2.4%
3-day package	15	1.3%
5-day package	11	0.9%
7-day package	38	3.2%
30-day package	4	0.3%
Daily rent data package	62	5.2%
monthly package	1001	83.8%
two-month package	3	0.3%
quarterly package	14	1.1%
half-year package	9	0.8%
annual package	10	0.8%

2.1.3 Price Distribution of Data Package

Data overlay package is a more commonly used means in all kinds of marketing, from the perspective of price comparison, there are 10 gears, except for 0 yuan package, the price of data package stall distribution basically conforms to the normal distribution, of which the prices of data packages between 5-20¥ accounts for a relatively high proportion. show in table 3:

Table 3: The price distribution of data packages .

Price distribution(¥)	Tariff quantity	Rate
0	412	34.4%
<=1	23	1.9%
(2,5]	99	8.3%
(5,10]	235	19.6%
(10,20]	158	13.2%
(20,30]	86	7.2%
(30,50]	70	5.9%
(50,100]	53	4.4%
(100,200]	41	3.4%
>200	19	1.6%

2.1.4 data Resource Distribution

From the perspective of the volume of data resources, there are 15 gears classified according to the data resources contained in the data package, and the distribution of gears of the data package resources basically conforms to the normal distribution, among which 5-20G accounts for a relatively high proportion, show as in table 4. Directional data packages, regional data packages and international roaming packages are usually designed for high resource volume. For products with resources less than 100M, some of them are old superimposed packages in the 2G era. Although the products are removed from the shelves, they are still effective and used by existing users. It is suggested to clean up or transfer the old tariff with high data unit price in line with the concept of "customer-oriented".

Table 4: The resource distribution of data packages.

Resource distribution	Tariff quantity	Rate
<=10M	37	3.1%
(10,30]M	48	4.0%
(30,100]M	47	3.9%
(100,200]M	26	2.2%
(200,500]M	67	5.6%
(500M,1G]	98	8.2%
(1,2]G	78	6.5%
(2,3]G	62	5.2%
(3,5]G	95	7.9%
(5,10]G	143	12.0%
(10,20]G	198	16.6%

(20,30]G	98	8.2%
(30,50]G	93	7.8%
(50,100]G	77	6.4%
(100,200]G	29	2.4%

2.1.5 Core Products of Data Packages

According to the sales situation of the company's data package products, the core products of current communication products are sorted out, which are mainly concentrated in the following categories:

General data package of 10-50 yuan

Directional data packages within 10 yuan

Area data package of 5/10 yuan

3GB flow refueling package

Data speed package of 3 - 5 yuan

Data assured package of 0-10 yuan

20 Single mode flow package

30-60 yuan pass-through package

2.2 Data Product Relationship

In order to avoid user subscription failure due to product mutual exclusion, ensure the success rate of marketing recommendation of data products and improve user satisfaction, it is necessary to sort out the relationship between data package products, such as conflict relationship, supplementary relationship, and combination preferential relationship; At the same time, the relationship between the data package product and other products is sorted out.

2.2.1 Product Relationship Definition

(1) Absolute mutual exclusion

If Product A and Product B are absolutely mutually exclusive, it means that the user cannot apply for Tariff A and Tariff B at the same time; For example, short-term data packages A and B perform mutual exclusion under the same period.

(2) Logical mutual exclusion

If product A and product B are logically mutually exclusive, it means that when the tariff B is processed, the tariff A will automatically become invalid; For monthly stacked package products, apply for monthly superimposed package A, and then apply for superimposed package B of the same category, and the appointment of A will automatically end.

(3) Complementary relationships

Data refueling package and main package: The dedicated network speed recovery tariff after the specified speed limit tariff can only take effect after the main plan is limited, which is a rare use case.

data Assurance Package and Main Package: the data of the main package is user up, the Rest Assured Package is prioritized after the data package is ordered, and the data rules outside the package are temporarily not executed.

Data acceleration package and main package: divided into long-term speed package and short-term speed package, once the long-term speed package is ordered, the speed limit package will cancel the speed limit regulations; The short-term speed limit package can only guarantee that the speed limit package network speed will be restored during the subscription period, and the speed limit rule will still be enforced if the speed limit is not in the billing period.

2.2.2 Product Relationship Sorting

The details of China Mobile's current data product relationship are shown in table 5- table 8:

Table 5: Logical mutual exclusion products.

PROD_PRC_NAME	Product classification
5G special data package 30G/20¥	Data Package-General data
Data package 30G/20¥	Data Package-General data
Domestic data overlay package 4G/25¥	Data Package-General data
Monthly data package (5G single mode) 10G/5¥	Data Package-General data
...	...

Table 6: Order relationships can be superimposed due to single orientation.

PROD_PRC_NAME	Secondary product classification
Migu reading directional data 30G	Data Package-Directed data
Bilibili Directed data package 15G/9¥	Data Package-Directed data
PPTV Directed data package 15G/9¥	Data Package-Directed data
Toutiao Directed data package 15G/9¥	Data Package-Directed data
...	...

Table 7: Combination marketing package, logical mutual exclusion under the same product.

PROD_PRC_NAME	Secondary product classification
Mobile filial piety bag 2022 20¥	Data Package-General data
Student exclusive discount package 18¥	Data Package-General data
Mobile filial piety bag 2022 10¥	Data Package-General data
Student exclusive discount package 38¥	Data Package-General data
...	...

Table 8: Supplementary relationship with the main packages.

PROD PRC NAME	Secondary product classification
Paid Cloud Storage 100M/10¥	Paid Cloud Storage
Paid Cloud Storage (2020) 8¥	Paid Cloud Storage
Main package exclusive upgrade domestic data 3G/15¥	Data Package-General data
Main package exclusive upgrade domestic data 1G/10¥	Data Package-General data
...	...

3 DATA PACKAGE PRODUCT EVALUATION METHOD

For a large number of data package products, focusing on the three aspects of product classification, business recommendation, and customer group marketing, it is necessary to use the data package product evaluation model and the data package adaptation model to adapt personalized products for users. At the same time, explore the marketing potential customer groups in different scenarios for the data marketing scenario model system, so as to achieve efficient marketing with model linkage and promote the improvement of marketing success rate and customer service.

3.1 Design of Data Package Products Evaluation Indicators

3.1.1 Design of data package products evaluation indicators

(1) Market value considerations

Market competitiveness: market share can be expressed by the market demand corresponding to the company's products indirectly ;

Market demand force: market demand can be expressed by the existing scale of the market and the sustainability of the market scale, that is the market heat;

Financial ability: can be measured from the revenue scale, profit income and overall return of the product;

(2) User value considerations

User scale: reflects the current user value of the product;

Continuous customer acquisition: reflects the potential future user value of the product;

User retention: reflects the product's ability to continuously meet the needs of users;

User experience: reflects the recognition of the product which is the basis for the product to maintain market competitiveness;

User evaluation: is the commercial feedback of the product, which can affect the continuous development and optimization of the product;

(3) Product value considerations

Product substitution: mainly depends on homogeneous products, including the quantity and practicality of homogeneous products;

Product cost performance: it depends on the price of the product and the purchasing power of the corresponding user.

Product continuity: mainly for the nature of the data product, including the superposition ability and carryover ability of the product.

3.2 Construction the Method of Data Package Products Evaluation Model

This paper proposes a product evaluation model based on subjective and objective weight combination calculation for the product value evaluation of data packages, which is mainly divided into four stages: framework formulation, weight assignment, data collection and processing, and model evaluation and optimization.

3.2.1 Framework Development

The outline of the model framework is designed using the OIDS analysis method, namely: "setting goals - sub-indicators - finding data - building systems"; In the process of formulating the framework, the evaluation system is discussed, the indicators are selected initially, finally the evaluation system is established.

2.2.2 Weight Assignment

In this paper, the combined weights based on subjective and objective weights are used to calculate and correct each other in two ways.

(1) Subjective weight calculation based on analytic hierarchy Process method:

Analytic hierarchy Process (AHP) is a decision-making methods combination of quantitative and qualitative [11]. This paper adopts an improved method of AHP, namely the scale expansion method of AHP. The judgment matrix determined by this method is consistent, no consistency test is required, and the sorting vector is easy to obtain, which can greatly reduce the amount of calculation. The judgment matrix $A = (a_{ij})_{n \times n}$ established by the AHP method should meet the following conditions:

$$\begin{aligned} a_{ij} &> 0 \\ a_{ji} &= 1 / a_{ij} \\ a_{ii} &= 1 \\ a_{ij} &= a_{ik} \times a_{kj} \quad (i, j, k = 1, \dots, n) \end{aligned} \tag{1}$$

Where, a_{ij} represents the scale value of the i-th element compared to the j-th element, and its meaning is shown in table 9:

Table 9: The meaning of the scale value.

Scale	meaning
1	equal importance
1.2	slightly more importance
1.4	significantly more importance
1.6	very obviously more importance
1.8	Extremely more importance

According to expert opinions, compare n evaluation indicators in pairs and obtain the relative importance of indicators, which can calculate all element values in the judgment matrix in turn, and obtain the judgment matrix:

$$A = \begin{bmatrix} 1 & t_1 & t_1 t_2 & \dots & t_1 t_2 \dots t_{n-1} \\ 1/t_1 & 1 & t_2 & \dots & t_2 t_3 \dots t_{n-1} \\ 1/t_1 t_2 & 1/t_2 & 1 & \dots & t_3 t_4 \dots t_{n-1} \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ 1/t_1 t_2 \dots t_{n-1} & 1/t_2 t_3 \dots t_{n-1} & 1/t_3 t_4 \dots t_{n-1} & \dots & 1 \end{bmatrix} \quad (2)$$

The judgment matrix is consistent, so the subjective weight values of each index can be calculated directly according to the judgment matrix A:

$$v_j = \frac{\sqrt[n]{\prod_{i=1}^n a_{ij}}}{\sum_{j=1}^n \sqrt[n]{\prod_{i=1}^n a_{ij}}} \quad (3)$$

v_j is the subjective weight value of each indicator obtained by the improved AHP method.

(2) Objective weight calculation based on improved entropy weight method

The entropy weight method is an objective empowerment method, which uses the information entropy to calculate the entropy weight of each index according to the degree of variation of each index, and then corrects the weight of each index through the entropy weight, so as to obtain a more objective index weight [10]. The improved entropy method is based on the entropy method, using standardized transformation and coordinate translation methods to improve the entropy weight method, which can overcome the defect of zero and negative values which can not be able to handle, and the specific calculation steps are as follows.

The original data matrix $X = (x_{ij})_{m \times n}$ is constructed with the values of m evaluation items and n evaluation indicators:

$$X = \begin{bmatrix} x_{11} & x_{12} & \dots & x_{1n} \\ x_{21} & x_{22} & \dots & x_{2n} \\ \vdots & \vdots & \dots & \vdots \\ x_{m1} & x_{m2} & x_{m3} & x_{m4} \end{bmatrix}_{m \times n} \quad (4)$$

where x_{ij} is the evaluation value of the i -th item under the j -th indicator.

Standard value transformation: each index unit is different, in order to facilitate comparison, align for standardized transformation, as follows:

$$y_{ij} = (x_{ij} - \bar{x}_j) / S_j \quad (5)$$

Where, \bar{x}_j is the mean value, and S_j is the standard deviation. To eliminate possible negative values in calculations, you can shift the coordinates, the index value y_{ij} becomes $z_{ij} = C + y_{ij}$ after coordinate translation, where C is amplitude of coordinate translation.

Determine the entropy value of the evaluation index H_j and index difference coefficient G_j :

$$e_j = -\frac{1}{\ln m} \sum_{i=1}^m f_{ij} \ln f_{ij} \quad (6)$$

where,

$$f_{ij} = z_{ij} / \sum_{i=1}^m z_{ij}, i = 1, 2, \dots, n; j = 1, 2, \dots, m \quad (7)$$

then,

$$G_j = 1 - e_j \quad (8)$$

The larger the value of G_j , the greater the effect of indicator j on the scheme.

w_j is objective weights of evaluation indicators:

$$w_j = \frac{G_j}{\sum_{j=1}^k G_j} = \frac{1 - e_j}{\sum_{j=1}^k 1 - e_j} \quad (9)$$

And

$$\sum_{j=1}^m w_j = 1, 0 \leq w_j \leq 1 \quad (10)$$

It can be seen from the above equation that the smaller the entropy value S , the greater the weight, indicating that the greater the amount of information of the corresponding evaluation index, the more important the evaluation index; Conversely, the smaller the entropy of an indicator, the less important it is.

The Combination Weight can be determined:

v_j is The subjective weight vector, w_j is The objective weight vector, r_j is the combination weight. According to the principle of minimum discriminative information, make the combination weight $r_j(i)$ as close to $v_j(i)$ and $w_j(i)$ as possible to build the objective function:

$$\begin{aligned} \min F &= \sum_{i=1}^m r(i) \left[\ln \frac{r(i)}{v_j(i)} \right] + \sum_{i=1}^m r(i) \left[\ln \frac{r(i)}{w_j(i)} \right] \\ \text{s.t. } & \sum_{i=1}^m r_j(i) ; \quad r(i) > 0 \end{aligned} \quad (11)$$

Using the Lagrange multiplier method, the combined weight formula can be obtained:

$$r_j = \frac{\sqrt{v_j(i)w_j(i)}}{\sum_{j=1}^m \sqrt{v_j(i)w_j(i)}} \quad (12)$$

3.2.3 Data Collection and Processing

Collect relevant data of the live network and third-party data, including qualitative and quantitative data, and perform dimensionless processing on the data to make it comparable; The data obtained includes:

(1) Internal live network data

Extract the live network data of each data package product within the company, including: product content, product price, sales data, etc.

(2) External industry market data

Industry market competition data, competitive product data, etc., including data such as content, price, and sales volume of similar data package products of Telecom and Unicom.

(3) Comment data

Comprehensively integrate the review information of each channel about the data package products, as well as the complaint data about the data package products recorded by customer service, etc.

(4) Expert qualitative data

Qualitative index data obtained by relying on expert scoring, such as product substitution, product continuity, etc.

3.2.4 Model evaluation and optimization

By designing calculation rules such as linear weighting method to synthesize the model, the final evaluation model is obtained, and the model is optimized according to the calculation results.

- 1) Calculate the upper and lower bounds of the objective weights of indicators at all levels:

$$\begin{aligned}\theta_j^+ &= \max\{\alpha_{1j}, \alpha_{2j}, \dots, \alpha_{nj}\} \\ \theta_j^- &= \min\{\alpha_{1j}, \alpha_{2j}, \dots, \alpha_{nj}\}\end{aligned}\quad (13)$$

- 2) The N weighted reasonable intervals are δ_1 , secondary processing is carried out for index weights that exceed a reasonable range:

$$\begin{aligned}\delta_1 &= \theta_j^+ - \theta_j^- \\ \delta_2 &= \alpha_{j\max} - \alpha_{j\min} \\ \alpha_j^{new} &= \delta_1 * \alpha_j + \frac{1 - \delta_1}{N}\end{aligned}$$

N is the number of indicators (14)

- 3) The model is synthesized by linear weighting method to obtain the final evaluation model:

$$\alpha_j = \beta \alpha_{j(sub)} + (1 - \beta) \alpha_{j(obj)} \quad (15)$$

According to the final weight result, output the value evaluation results of each product.

- 4) Model optimization according to the calculation results. According to the value assessment results, the knowledge and experience of multiple experts are used to verify the results, and appropriate adjustments and optimizations are made to the situations that do not meet expectations.

4 CONCLUSIONS

4.1 Evaluation Index System

The data product evaluation system starts from the market, users and products, according to the market development strategy, product demand intensity and other elements, from the three dimensions of market value, user value and product value, covering a total of 11 secondary indicators and 20 third-level indicators, the specific indicator system is shown in the following table 10:

Table 10: The evaluation index system.

	primary indicator	secondary indicators	Level 3 indicators
	Data package product value evaluation index system	market value	Market competitiveness
Market demand			Market heat
			Market size
Financial capacity			revenue scale
			Profit income
			Overall return
		User value	User size
Continuous customer acquisition			The scale of potential customers
			the number of new users
User retention			the number of users churn
User experience			The number of user retention
			User experience assessments
User Reviews		User satisfaction	
		User complaints	
Product value		Product substitution	The number of homogeneous products
			the practicality of homogeneous products
			The unit price of the product
			Product price and user purchasing power
	Product cost performance	Product price and user purchasing power	
		Product price and user purchasing power	
Product Continuity	Product stack ability		
	Product carry ability		

4.2 Indicator System Weight Results

The formulation of index weights at each level is calculated by combining weights based on subjective and objective weights, and the reference weights of indicators at all levels are provided by consulting market and product experts with their market experience, and subjective weights at all levels are obtained by using the improved analytic hierarchy method (AHP) in this paper. At the same time, according to the objective weight of the calculation indicators at all levels proposed by Ontology to improve the entropy weight method, the calculation results are as follows table 11:

Table 11: Indicator system weight .

primary indicator	Level 1 index weight		secondary indicator	Level-2 index weight	
	subjective weight	objective weight		subjective weight	objective weight
market value	30%	22%	Market competitiveness	40%	47%
User value			Financial capacity	60%	53%
Product value	45%	57%	User size	20%	37%

			Continuous customer acquisition	20%	17%
			User retention	30%	32%
			User experience	15%	9%
			User Reviews	15%	5%
Product value	25%	21%	Product substitution	40%	37%
			Product cost performance	40%	57%
			Product Continuity	20%	6%

4.3 Communication Market Data Package Product Scoring Results

Through the above product evaluation model based on subjective and objective weight combination calculation, the mobile communication data package products are evaluated and the score is calculated, and we select TOP10 data package products, and the results are as follows table 12.

The product evaluation system and method proposed in this paper can effectively screen the key market products through the problem of a wide variety of current market data products. This method is the basis for the refined operation of users of communication market data products, according to which the key products can be screened, and at the same time provide effective support for the user's targeted and personalized product adaptation mechanism, so as to provide product marketing conversion rate and customer satisfaction. At the same time, the group valuation method constructed in this paper can be extended to the valuation application of other industries or other products, and provide guidance for product valuation in different industries.

Table 12: Communication Market Data Package Product Scoring Results-TOP10 .

PROD_P RCID	PROD_PRC_ NA ME	CLA SS	PERIO D	market_value score	customer_value score	product_value score	scor e
BCAX883 3	Internet Enjoyment Package 30G/10¥	direct ed data	long_t erm	97.28	75.58	74.66	81.0 10
BCAG863 1	Data Insurance Monthly Package (Excess Shutdown) 5¥	gener al data	long_t erm	88.02	78.95	72.75	79.8 82
BCAY667 9	Region_A Data Monthly Package 30G/10¥	regio nal data	long_t erm	88.7	76.02	69.64	77.8 49
BCAY980 7	Data Monthly Package 60G/300¥	gener al data	long_t erm	59.29	90.89	62.06	76.0 43
BCAY300 8	Group Data Package Of Tiktok App	direct ed data	long_t erm	70.9	85.5	60.76	76.0 13

BCAY1170	High-Value Data Monthly Overlay Package (20Th Edition) 3G/10¥	general data	long_term	79.33	81.7	57.72	75.568
BCAY2659	2 Days Package 5G/5¥	general data	short-term	53.14	85.68	74.31	74.604
BCAY3430	5G Special Data Package 10G/30¥	general data	long_term	80.11	71.62	72.77	74.091
BCAY5303	Summer Holiday Data Package 10G/10¥ (Phone Bill Version)	general data	short-term	67.82	77.67	69.55	73.241
BCAX2104	Region_B Data Monthly Package 30G/18¥	regional data	long_term	88.26	70.92	60.73	73.084

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