Real-Time Statistical Method for Marketing Profit of Japanese Cosmetics Online Cross-Border E-commerce Platform

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Abstract. In the cosmetics online cross-border e-commerce platform, the real-time statistics of marketing profits are very important. Taking the marketing profit of Japanese cosmetics online cross-border e-commerce platform as the research object, the development status and trend of Japanese cosmetics market are analyzed. Relying on the e-commerce platform to automatically evaluate the pledge value, the internal circulation of marketing profit is realized. The multi-level classification statistical analysis of marketing profit using the support vector machine in the SLS-SVM algorithm, and the real-time statistics of platform marketing profit are realized.

Keywords: Japanese cosmetics · Online cross-border e-commerce platform · Marketing profit · Real-time statistics · Principal component analysis · Support vector machine

1 Introduction

In recent years, online shopping has become a habit in people's daily lives and people's lives are being quietly changed by e-commerce. E-commerce platform is a platform for businesses or individuals to conduct transactions and communication. Both consumers and businesses can use e-commerce platforms to carry out business activities, but in the face of a large number of goods, the quality of goods on e-commerce platforms varies, so consumers need to spend time and effort to choose the quality goods they need [1, 2]. At this time, it is relatively difficult to meet the needs of consumers who pursue quality and efficiency at the same time. With the development of the country, the residents' consumption is developing in the direction of high quality and high quality. If the demand exists, the market exists, and with the upgrading of consumption, a large number of e-commerce businesses are also on the rise. Data research continues to grow in importance in business and finance, and because of the rich data environment that exists in the cross-border e-commerce market, data from economic and financial markets are more integrated and complete than ever before, and are gradually resulting in more systematic and accurate collection of data on a large number of variables, which, together with the rapid development of computer hardware and software, makes it possible to use statistical learning methods to deal with complex, high-dimensional data analysis. Cross-border

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e-commerce is developed based on the Internet, and cyberspace is a new space relative to physical space, a virtual but objective world consisting of URLs and passwords [3–5]. The unique value standards and behavioral patterns of cyberspace profoundly affect cross-border e-commerce, making it different from traditional transaction methods and presenting its own characteristics. The network is a borderless media body with global and non-centralized characteristics. Cross-border e-commerce, which is dependent on the network, also has global and non-centralized characteristics. An important feature of e-commerce compared with traditional trading methods is that e-commerce is a borderless transaction, losing the geographical factor that traditional transactions have. Internet users do not need to consider crossing borders to submit their products, especially high value-added products and services, to the marketplace. The positive impact of the global nature of the Web is the maximum sharing of information, and the negative impact is that users must face risks arising from cultural, political and legal differences. Anyone with certain technical means can get information into the network at any time, anywhere, and connect with each other for transactions. In its fiscal report, the United States Department of the Treasury noted that taxing e-commerce activities based on globalized networks was difficult because: e-commerce was based on virtual computer space, losing the geographical element that was present in traditional trading methods; and manufacturers in e-commerce were prone to conceal their domicile, which was indifferent to consumers. For example, a very small Irish online company could sell its products and services over the Internet through a web page that could be clicked on and viewed by consumers around the world, provided that they had access to the Internet. It is difficult to define exactly within which country this transaction is taking place. The development of the Internet has led to the prevalence of digital transmission of products and services [6]. Digital transmission takes place through the concentration of different types of media, such as data, sound and images, in a globalized network environment, which appear as computer data codes in the network and are therefore intangible. The transmission of an e-mail message, for example, is first broken down by the server into millions of packets, which are then transmitted over different network paths to a destination server and reorganized for forwarding to the recipient according to the TCP/IP protocol, all in an instant over the network. For networks, the speed of transmission is independent of geographical distance [7–9]. In traditional transaction mode, information exchange methods such as letters, telegrams, faxes, etc., there is a time difference of different lengths between the sending and receiving of information. In contrast, the information exchange in e-commerce, regardless of the actual space-time distance, one party sends information and the other party receives information almost simultaneously, just like face-to-face conversation in life. For certain digital products, transactions can also be settled instantly, and orders, payments and deliveries can all be completed in an instant.

The cosmetics market is constantly expanding, and consumer demand for various categories and grades of cosmetics is increasing dramatically. Many overseas cosmetic companies are using cross-border e-commerce platforms to expand their user markets. Many Japanese and Korean cosmetic brands not only occupy a place in the international cosmetic market, but are also popular in the Chinese market, where both brand culture and product quality are well received [10–12]. Shiseido, as the leading cosmetics group in Japan, has been ranked in the top ten in terms of market share of cosmetics in each

country for the past decade. Japanese cosmetics are marketed through online cross-border e-commerce platforms, which not only facilitate consumers' purchasing behavior, but also effectively reduce the investment in offline counters and enhance the marketing profit of the company, and it is worthwhile to pay more attention to its experience in the development of online cross-border market. This study will analyze the issue of real-time statistics on the marketing profits of Japanese cosmetics online cross-border e-commerce platforms. This paper analyzes in detail the development mode of cross-border e-commerce platform, designs the route of the platform for supply chain enterprises at all levels to raise funds, and solves the financing difficulties of small, medium, and micro enterprises through three main lines: cooperation with core enterprises, financial industry and supply chain service platform. The innovation point is in the multi-level classification statistical analysis of marketing profits using the support vector machine in the SLS-SVM algorithm.

2 Overview of Japanese Cosmetics and Online Cross-Border E-commerce Platforms

2.1 Cross-Border E-commerce Platform Development Approach

In the specific market analysis, products with high-end positioning are developing at a faster pace than those with low- and mid-range positioning. Online sales platforms are increasingly valued by major cosmetic companies, which have all opened their own online flagship stores, such as Sephora, Guerlain and Skin Key, which have opened official online stores on the Tmall website. Compared to domestic brands, multinational cosmetic companies are still extremely competitive, such as building a better brand image and improving product quality, using strong research and innovation capabilities to develop products, and more effective marketing techniques. These have contributed to multinational cosmetic companies continuing to maintain their leading position in the cross-border market. The current main business models of cross-border e-commerce (export) can be divided into: B2B, B2C, B2B2C, C2M, O2O, etc.

(1) B2B model

B2B mode is Business-to-Business, refers to the online transaction mode between enterprises and enterprises, is one of the earliest cross-border e-commerce (foreign trade e-commerce) mode, and can be divided into platform mode and independent station mode. The platform model has a low entry barrier, relatively low investment, and can quickly use the platform's own traffic to obtain orders for conversion, the disadvantage is homogeneous competition and serious copying behavior. Under the price war of peers, the chances of small enterprises to obtain orders are getting smaller and smaller, and the head customers have established a more stable supply and demand relationship, it is not easy to break this balance [13]. Independent site model is relatively high cost of entry, need to spend costs to buy servers, space, domain names, and invest costs for website development, and the need for greater investment is the operation and promotion of the site, as a new independent site, traffic is zero, conversion is zero, trust is zero, all these need to

spend a larger cost to obtain. And the advantages are obvious, the user traffic is very accurate, in the case of product cost-effective guarantee, the conversion rate is relatively high. And as a website independent of the platform, no dependence on the platform, relative to the annual fixed fee cost of the platform, it seems that the long-term cost of the independent site is lower.

(2) B2C model

The B2C model, Business-to-Customer, is a direct-to-consumer e-commerce model for merchants, and like B2B, B2C can also be divided into a platform model and an independent site model.

(a) B2C platform model: the current mainstream business model of cross-border e-commerce, of which Amazon, eBay, and Sotom are typical representatives of these platforms, merchants through the release of goods on these platforms, consumers place orders to buy after the formation of valid orders, through the unification of information flow and capital flow, logistics (some platforms build their own logistics) three flows, forming a complete closed loop of transactions.

(b) B2C independent site model: different from the platform model, independent site is a website with independent domain name, with online transaction function, not bound by the rules of the platform, generally focus on a certain product line or category [14]. Relatively speaking, the entry barrier of B2C platform business is relatively low, which is mainly reflected in many aspects such as products, registration, logistics, collection and traffic.

Product: Most of the platform sellers are still in the primary stage of "buying and selling", they mostly do not pay attention to the development of the product itself, to earn the price difference as the main way of profit. There are two typical phenomena: a) Through simple data analysis, they find a relatively popular product line and then adopt a swarm of follow-the-wind sales. They buy these products in bulk on some wholesale websites and post them on foreign B2C platforms for sale, using simple and brutal methods such as low prices and low quality standards, until they finally make a category into a red sea and then switch to another product line. b) Mass SKU method, that is, sellers upload a large number of products on the platform, but do not purchase these products themselves, and then go to the market to purchase goods and mail them to customers abroad after customers place orders on the platform. Both ways lack attention to the products themselves, and the quality of products varies.

Registration: Among the above-mentioned platforms, Amazon, which claims to have the strictest audit system, can also register multiple accounts through multiple personal information or business information, and the information required is only basic information such as photocopies of ID cards, utility invoices, company business licenses, and rental information. The account audit of eBay and Selling is more lenient [15–17]. Only niche vertical niche platforms such as Houzz and Wayfair need to have the requirement of a US registered company.

Logistics: From commercial express lines to dedicated logistics, many logistics service providers can provide a variety of options for cross-border logistics. Commercial express lines such as DHL, FedEx, etc. have high timeliness and generally take only 3–7 working days to arrive from China to the U.S., but the cost is higher; dedicated logistics

can solve the delivery problems of certain specific markets, such as Australia, Northern Europe and other regions, and the cost is moderate, but the disadvantage is that the scale is smaller and the trust is lower.

Collection: Cross-border e-commerce collection has always been a concern for practitioners, and various platforms are launching their own collection policies and channels, such as eBay using its own PayPal for collection, but the 3% commission is expensive to start with; Selling is using Alipay as a collection tool; Amazon has opened up the collection channel, and companies with collection qualifications can be audited and adopted by platform sellers, such as Payoneer and WorldFirst. Amazon has opened up the collection channel, and companies with collection qualifications can be vetted and adopted by platform sellers, such as Payoneer, WorldFirst, etc. The fees range from 1% to 3%. However, since the money is first paid by the buyer to the platform, if there are complaints or serious problems with the account/store, the fees will be withheld or penalized by the platform.

Traffic: platform means a large number of users and the aggregation of traffic, to the Amazon U.S. site, for example, according to the 2015 statistics, the average daily visits up to 738 million, so huge traffic dividends. As long as good product image display, product copy, station advertising and a reasonable price range can bring a lot of traffic conversion, platform sellers do not need to focus on where to get customers from, more research on how to attract traffic and convert traffic, the platform comes with traffic can easily help sellers quickly achieve sales products to gain profits [18].

In general, B2C platform business work is easier, most sellers will choose to station in the B2C e-commerce platform as the starting point of cross-border e-commerce business. The three aforementioned Amazon, eBay, and Speedy Business have become the first choice for sellers to be stationed in the triad of cross-border e-commerce platform model. There are also some emerging platforms that also vigorously carry out investment promotion, such as Wish, a mobile shopping platform, Lazada, a Southeast Asian e-commerce platform, and Cdiscount, a French e-commerce platform, which have also achieved good performance. The mainstream model of export cross-border e-commerce B2B2C has a seamless connection between B2B and B2C business at its core. Using the B2B business experience accumulated for many years, the channel sinks to the C-terminus, solving the problem of being familiar with the target market and the target consumers, and realizing the integration of supply chain, channel and marketing, the cross-border e-commerce business can be made bigger and stronger.

2.2 Development Status and Trends of the Japanese Cosmetics Market

In the last five years, the Chinese cosmetics market has been dominated by foreign companies, such as the European and American giants of the daily chemical industry like P&G, L'Oreal and Unilever, as well as the Japanese Shiseido. Leaving aside local brands and European and American brands, Japanese and Korean cosmetic companies developing in China, led mainly by the Japanese company Shiseido, have been in the forefront all year round.

As can be seen from Table 1, the market share of Japanese Shiseido in China declined year by year from 2016 to 2019, and rebounded slightly in 2019, but in terms of all

Table 1. Top 7 Japanese cosmetic companies in terms of market share in China (Unit: %)

The company	Shiseido Co Ltd	ROHTO Pharmaceutical Co Ltd	Kao Corp	DHC Corp	Pigeon Corp	Fancl Corp	Kosé Corp
2016	3.64	0.54	0.74	0.69	0.27	0.46	0.39
2017	3.37	0.57	0.75	0.54	0.28	0.32	0.34
2018	3.21	0.65	0.59	0.44	0.26	0.33	0.27
2019	3.04	0.61	0.54	0.42	0.21	0.31	0.22
2020	3.15	0.63	0.52	0.37	0.24	0.27	0.25

Japanese and Korean companies developing in China, there are far more Japanese cosmetic companies than Korean ones, such as ROHTO, Japanese Kao, and Japanese DHC, all of which have reputable cosmetic companies in China.

3 Real-Time Statistical Methods for Platform Marketing Profits

3.1 Relying on E-commerce Platforms to Automatically Assess the Value of Pledges

The sharing economy is when one party with idle resources gives up the right to use them to another party for a fee. When the subject of the transfer is the right to use capital, the sharing economy becomes shared finance, and supply chain finance is a form of shared finance. One of the mainstream financing models of supply chain finance is the pledge financing of movable assets, in which the provider of funds gets the return and obtains the pledge right, and the financing enterprise gets the right to use the funds. Compared with real estate, movable assets have the characteristics of liquidity and difficulty in preserving value, and the price of movable assets is in constant fluctuation, which is prone to depreciation during the pledge period. In addition, in practice, affected by the wide variety of pledged items and opaque prices, it is difficult to judge the true market value of the financing enterprise if it only relies on the purchase contract and purchase and sale invoices issued by the financing enterprise. As commercial banks are not qualified to supervise movable assets, they are highly dependent on third parties for movable pledge financing, and their risk appetite is low, which makes them gradually raise the threshold of movable pledge, making movable pledge financing a "chicken and egg" business for banks [19]. However, MSMEs are the main force in choosing chattel financing, which leads to banks not being able to solve the problem of difficult and expensive financing. Actively establish user data; connect all the service scenarios online and offline, and build an e-commerce platform ecosystem, cross-border e-commerce purchase has a huge amount of SME customer resources, and holds the whole process transaction information of online and offline shops, covering real-time price information of multi-category products. The supply chain finance platform is fully connected with the information system in the whole ecosystem, realizing the "four streams" of business flow, capital flow, information flow and logistics, and forming a closed loop in the ecosystem and establishing

a more complete database. The real-time transmission of supply chain finance data has efficiently solved the capital needs of upstream and downstream small and medium-sized enterprises in the supply, production and marketing chain [20]. In movable assets pledge financing, relying on data resources within the ecosystem, information technology such as artificial intelligence is used to grasp information on the value of movable assets at all stages of the financing business and realize real-time value assessment of pledges.

3.2 Internal Circulation of Marketing Profits

Through the multi-line layout, it allows internal and external enterprises at all levels to directly access the platform's marketing profit statistics, reaching out to multi-level enterprises in the internal and external supply chains, and using technologies such as big data and cloud computing to reduce the information asymmetry between the fund provider and the demand side and improve the financing efficiency of enterprises. Through star products such as chattel pledge financing, order financing, bill discounting and credit financing, it revitalizes various resources lying on the accounts of enterprises for a long time, accelerates the flow of funds between supply chains, and makes funds sink straight down to the bottom-level entity enterprises at all levels to meet their financing needs, as follows.

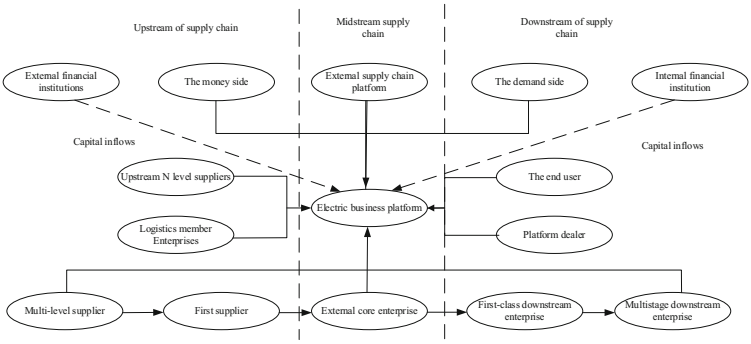

Fig. 1. Roadmap of the platform to help supply chain enterprises at all levels to raise finance

Through three lines of cooperation with core enterprises, financial peers and supply chain service platforms to solve financing problems for small, medium and micro enterprises. Line 1 provides financial services for enterprises and users at all levels upstream and downstream, solving the financing problems of its own upstream and downstream suppliers, distributors and users; Line 2 helps external core enterprises build supply chain financial services capabilities and helps enterprises outside the platform's own supply chain achieve financing. Line 3: Helps supply chain service platform connect the capital side with the demand side. Through strengthening the cooperation with internal and external financial institutions, we can obtain a continuous inflow of funds. It realizes the "internal circulation" of part of the capital flow and makes the parties form a substantial community of interests.

3.3 Multi-classification and Statistical Analysis of Marketing Profits

Through the performance analysis of e-commerce platform, the overall development trend and internal investment trend make some level of reference, combined with the latest basic theory of statistics, the current support vector machine based and e-commerce platform marketing profit characteristics of multi-classification and performance related problems are explored in depth. This part is based on the kernel function of principal component analysis and the least squares support vector machine theory of sparse matrices to explore in depth the statistical classification study of multi-classification rather than binary classification problems. According to the new classification method, it is necessary to make certain categorization and synthesis of various characteristic variables of listed companies and to train the research indexes practically according to the main theories of statistics. Considering the SLS-SVM as an iterative operation, first initialize the index sets A and B of all sample data SV, $A = B = \{1, 2, \ldots, l\}$, where the sets A and B are the index sets of non- SV and SV samples, respectively. The iterative operation of the SLS-SVM algorithm uses the back-fitting rule to add a new SV each time, thus giving the resulting solution sparsity. Since the support vector in the SLS-SVM algorithm increases with the number of iterations, we need to iteratively solve for the decision coefficient p and the corresponding threshold q of the function.

To simplify the computational difficulty, the pairwise problem is transformed into the form of a matrix as follows.

$$\min\left\{f = \frac{1}{2}\left[qp^T\right]\begin{bmatrix} 0 & 1^T \\ 1 & \overline{K} \end{bmatrix}\begin{bmatrix} q \\ p \end{bmatrix} - \left[qp^T\right]\begin{bmatrix} 0 \\ y \end{bmatrix}\right\} \tag{1}$$

$$\text{Where, } \overline{K} = K + \frac{1}{2\alpha}I \tag{2}$$

$$K_{ij} = k\left(m_i, m_j\right) \tag{3}$$

From this, it can be found that the computational complexity of solving the decision coefficient p and the corresponding threshold q of the function using Eq. (1) is $O\left(n^3\right)$. Suppose that when the s th exercise data of the $(n + 1)$ th iteration operation is treated as a support vector, to solve the decision coefficient p of the function and the corresponding threshold q, the inverse of the matrix is computed once again.

$$R^{n+1} = \begin{bmatrix} 0 & 1^T & 1 \\ 1 & \overline{K}_{AA} & \overline{k}_s \\ 1 & \overline{k}_s^T & \overline{K}_{ss} \end{bmatrix}^{-1} \tag{4}$$

According to the Sherman-Morrion equation, we can obtain the calculation of R^{n+1} and transform the calculation of R^{n+1} into an iterative calculation of R^n. Due to the greedy nature of backfitting, we need to find a reasonable condition for termination in the actual operation process, and first use the KPCA method to process the sample and its features, which is used to reflect the overall characteristics of the data and reduce the complexity of the operation. According to the previous principles of SVM model construction, Gaussian function is selected as the kernel function, and the optimal parameters are

selected by interleaved experiments. SVMLS, on the other hand, the least squares support vector machine kernel function is selected to construct the model, as well as to finally obtain the best model parameters that can statistically represent the real characteristics and situation inside the data.

4 Conclusion

The platforming of cross-border e-commerce third-party services, as a cross-border e-commerce operation service provider, is only a very segmented part of the cross-border e-commerce industry chain, and with the emergence of more and more competitors, the industry gradually presents phenomena such as homogenization and price wars. Therefore, through the opening of its own resources and the integration of external resources, it is crucial to provide high-value and cost-effective quality services for the industry through the combination of breadth and depth. The above-mentioned content mainly focuses on the study of real-time statistical methods for marketing profits of Japanese cosmetics online cross-border e-commerce platforms, hoping to provide reference for the better and faster development of e-commerce platforms.

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