

# Research on the Competitiveness Evaluation of Pupu Supermarket in the Context of Digitalization

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**Abstract.** This paper, analyzes the development status as well as competitive advantages and disadvantages of Pupu Supermarket in Wuhan in the context of digitalization. In the empirical research part, the competitiveness evaluation of Pupu supermarket was divided into five first-level indicators. Based on the questionnaire survey, the data were studied by analytic hierarchy process and fuzzy comprehensive evaluation method. Based on the empirical research, combined with the actual development of Pupu supermarket in Wuhan, this paper analyzed consumers' purchase intentions, and put forward countermeasures and suggestions to enhance competitiveness and increase the attractiveness to consumers.

**Keywords.** Pupu supermarket, digitalization, competitiveness, fuzzy comprehensive evaluation

## 1. Introduction

The development of the digital economy has brought new models such as e-commerce, sharing economy, and platform economy, which have had a disruptive impact on traditional industries. The fresh e-commerce industry needs to undergo digital transformation and deeply integrate digital technologies to enhance competitiveness[1].

Founded in 2016, Pupu Supermarket is characterized by "pure online operation + pre-warehouse distribution", providing 30-minute express delivery service. The company has developed its own APP and WeChat mini-program to provide online ordering and instant delivery services. Pupu Supermarket cooperates with more than 2,000 suppliers and uses the digital middle platform to provide timely feedback on sales data as well as optimize the supply chain. Pupu Supermarket's digital transformation encompasses multiple aspects such as technology, business model, marketing, and user experience. In order to maintain competitiveness in the fierce market, Pupu Supermarket needs to continue to build on its own competitive strengths and make up for their shortcomings and improve its competitive strategy through competitiveness evaluation research. How can the fresh food e-commerce industry improve its competitiveness? The fresh food industry is developing rapidly. In the context of the continuous expansion of the scale of the fresh food market, scholars' research for the fresh food e-commerce industry began to appear, mainly focusing on marketing and service, such as the

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transformation of marketing strategies for graduate fresh food e-commerce companies, and the improvement of online and offline service levels. Meanwhile, research on competitiveness is more in the manufacturing industry, tourism industry, etc., and less for the fresh food e-commerce field. With the changes in the market context, the existing research based on the competitive context is still in its infancy. This paper investigated the competitiveness of Pupu Supermarket based on its competitiveness evaluation indexes in order to analyze the important factors that affect the competitiveness of Pupu Supermarket. The research objective of this paper is to find the factors affecting the competitiveness of Pupu Supermarket, analyze the consumers' purchase intention and propose countermeasures to increase the attractiveness to consumers. This paper filled the relevant research gaps, thus helping Pupu Supermarket to improve its competitiveness in the future competition and providing references for other fresh food e-commerce enterprises.

2. Theoretical analysis

Pupu Supermarket is growing rapidly in Wuhan thanks to ultra-fast delivery and high customer adhesion. Since its arrival in Wuhan, Pupu Supermarket has seen a rapid growth in users, thanks to Pupu Supermarket's ultra-fast delivery, which greatly facilitates consumers' lives and reduces their waiting time. The delivery staff of Pupu's Supermarket is highly qualified, with enthusiastic and polite service, and will thoughtfully provide some convenient services to create a warm and considerate experience. High customer bonding is one of the major advantages of Pupu Supermarket. Pupu Supermarket platform often carries out some preferential activities. For example, by issuing coupons and other marketing strategies, it stimulates consumers' enthusiasm for consumption, so as to increase their loyalty to the platform. At the same time, the platform users can forward the coupons to their friends and relatives to use, thus implementing the publicity mode of "one band with many, old with new, loyal users drive non-loyal users". This way of publicizing is low-cost and highly effective. The operation model of Pupu Supermarket is pre-warehouse + online traffic + business closed-loop. Figure 1 below shows Pupu's operating model[2].

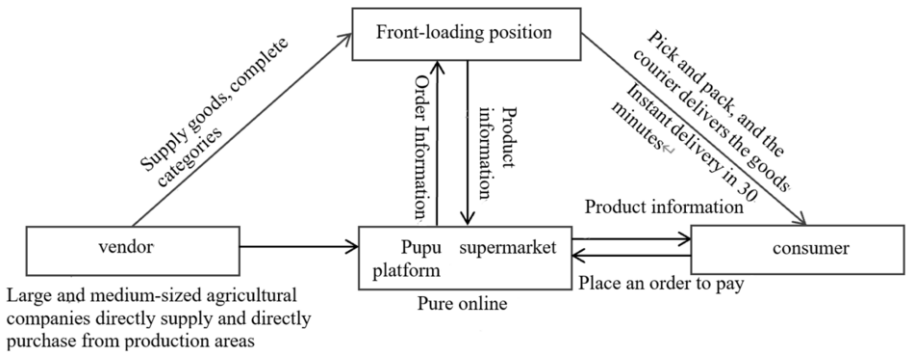


Figure 1. Pupu operation mode

Foreign scholars have conducted research on competitiveness evaluation, and put forward reference strategies and suggestions for retail industry to enhance competitiveness. Fresh food e-commerce is rapidly penetrating into customers' lives.

Scholars have analyzed the current situation of the scale of fresh food e-commerce, the evolution of the development stage model and the development trend. Taking Daily Fresh and JD to Home as examples, their specific warehousing and logistics, user promotion, management, cost and profitability are discussed in detail from the aspects of users and platforms, so as to explore their competitive advantages[3]. Logistics distribution have an important impact on the competitiveness of fresh food e-commerce enterprises. The intensification of competition in the e-commerce industry and the improvement of the logistics supply chain system of fresh food can enhance the competitiveness of e-commerce retail enterprises in the industry.

In recent years, consumer demand in the field of fresh food e-commerce has surged, forcing many middle-aged and old-aged groups to become new customers. Retaining market share and new customers will help fresh food e-commerce enterprises to stand firm in the competition in the industry. The speed of delivery, freshness of products, hygiene services up to standard, strength of offers and after-sales service attitude all have an impact on competitiveness. For the operation mode of Pupu Supermarket, analyze the core strengths that form the development of the enterprise in order to fundamentally improve its core competitiveness.

3. Competitiveness evaluation of Pupu supermarket

3.1. Construction of competitiveness evaluation index system

3.1.1. Construction of evaluation index system

Drawing on the pre- research as well as previous studies, evaluation indicators were identified. Brand trust affects eWOM, which in turn affects consumers' propensity to repurchase[4]. Electronic word-of-mouth spread by social media has a great influence on the purchasing decisions of customers, which rational information has a greater impact than emotional information. At the same time, a customer's personal perceptions on social media likewise influence his or her purchasing behavior[5].The competitiveness evaluation index system of Pupu supermarket is shown in Table 1. This paper hypothesizes that the following indicators will have an impact on the competitiveness of Pupu Supermarkets.

Table 1. Pupu supermarket competitiveness evaluation index system [6-9]

Target layer	Criterion layer	Indicator layer
Pupu supermarket competitiveness evaluation index system A	The core competitiveness of the product is B <sub>1</sub>	Product qualityC <sub>1</sub> Richness of product varietyC <sub>2</sub> Reasonableness of product pricesC <sub>3</sub>
	Customer perception B <sub>2</sub>	The perfection of the platform interfaceC <sub>4</sub> Ease of shoppingC <sub>5</sub> Service satisfactionC <sub>6</sub>
	Supportive Services B <sub>3</sub>	APP technical supportC <sub>7</sub> The ease of return or exchangeC <sub>8</sub> Professionalism in after-sales serviceC <sub>9</sub>
	Market conditions B <sub>4</sub>	BrandingC <sub>10</sub> Customer preferencesC <sub>11</sub> The degree of promotion of fresh e-commerceC <sub>12</sub> Discount strengthC <sub>13</sub>
	Delivery servicesB <sub>5</sub>	The punctuality of the delivery personC <sub>14</sub> The service attitude of the delivery staffC <sub>15</sub>

	Satisfaction with takeaway packagingC <sub>16</sub> Rationality of deliveryC <sub>17</sub>
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3.1.2. Description of evaluation indicators

Product Core Competitiveness B<sub>1</sub>: The core competitiveness of the fresh food industry refers to the products that can provide the company with relative competitive advantages, the abundance of products and the reasonableness of product prices. Customer perception B<sub>2</sub>: Customer perception refers to the evaluation based on the cognitive understanding of the customer's intuitive response to the interface of the Pupu Supermarket shopping platform when using the Pupu Supermarket shopping platform, as well as the reflection of the profile of the degree of shopping convenience and service satisfaction it brings. Supportive services B<sub>3</sub>: APP technical support, ease of return and exchange, and after-sales service professionalism. Market conditions B<sub>4</sub>: There are producers, consumers, participants, market and demand, i.e., customer preference, degree of fresh food e-commerce publicity, and discount strength. Delivery service B<sub>5</sub>: the degree of punctuality and service attitude of delivery staff, takeaway packaging and delivery fee.

3.2. Questionnaire and data analysis

Regarding the questionnaire designed for the evaluation of the competitiveness of Pupu Supermarket, the first part of the questionnaire contains the basic information of the subjects, i.e., gender, age, and the number of purchases, and the second part of the questionnaire is an evaluation of each evaluation index in the competitiveness evaluation system of Pupu Supermarket utilizing the Likert five-level quantitative scale. Through the judging of the evaluation indexes, the subjects select one out of the five different scoring criteria. On the whole, this questionnaire was designed to be easy to understand and easy for the subjects to fill in.

A total of 113 valid questionnaires were collected. As shown in Table 2 below, the alpha coefficient of each index is more than 0.8, and the overall reliability is 0.960, indicating that the questionnaire data is highly credible and the competitiveness evaluation index system is relatively perfect.

Table 2. Results of reliability test

index	Number of projects	$\alpha$ coefficients
The core competitiveness of products	3	0.895
Customer perception	3	0.840
Supportive Services	3	0.852
Market conditions	4	0.875
Delivery services	4	0.898
Overall reliability	17	0.960

Through SPSS analysis, the validity results were summarized in Table 3, the KMO value was >0.8, the P-value=0, and the coefficient of each factor exceeded 0.7, indicating that all indicators were well verified.

Table 3. Results of validity test

Level 1 indicators	Secondary indicators	Factor load	KMO value	P-value
The core competitiveness of products	Product quality	0.897	0.748	0
	Richness of product variety	0.918		0
	Reasonableness of product prices	0.911		0

Customer perception	The perfection of the platform interface	0.862	0.727	0
	Ease of shopping	0.871		0
	Service satisfaction	0.879		0
Supportive Services	APP technical support	0.859	0.723	0
	The ease of return or exchange	0.878		0
	Professionalism in after-sales service	0.901		0
Market conditions	Branding	0.865	0.798	0
	Customer preferences	0.895		0
	The degree of promotion of fresh e-commerce	0.815		0
	Discount strength	0.840		0
Delivery services	The punctuality of the delivery person	0.892	0.842	0
	The service attitude of the delivery staff	0.861		0
	Satisfaction with takeaway packaging	0.890		0
	Rationality of delivery	0.855		0

3.3. Index evaluation and analysis

3.3.1. Analytic hierarchy process

Table 4. Judgment scale definition

scale	Importance level
1	The first element is equally important as the second
3	The first element is slightly more important than the second
5	The first element is significantly more important than the second
7	The first element is more strongly important than the second
9	The first element is extremely important than the second
1/3	The first element is slightly less important than the second
1/5	The first element is significantly less important than the second
1/7	The first element is stronger than the second element and is not important
1/9	The first element is extremely unimportant than the second

Note: {2,4,6,8,1/2,1/4,1/6,1/8} indicates that the importance is {1,3,5,7,9,1/3,1/5,1/7,1/9}.

In this paper, the analytic hierarchy process (AHP) method is used to establish a pairwise comparison discriminant matrix based on the 1-9 scale method based on the 1~9 scale method (Table 4), and the weight calculation is carried out. Combined with the actual situation of Pupu supermarket, the first-level indicators of competitiveness evaluation were compared in pairs, and the judgment matrix was obtained as shown in Table 5 [10].

Table 5. Total Goal Judgment Matrix

Competitiveness evaluation	The core competitiveness of products	Customer perception	Supportive Services	Market conditions	Quality of staff	$w_i$
The core competitiveness of products	1	2	1	1/2	1/5	0.1105
Customer perception	1/2	1	1/2	1/3	1/6	0.0654
Supportive Services	1	2	1	1/2	1/5	0.1105
Market conditions	2	3	2	1	1/3	0.1997
Delivery services	5	6	5	3	1	0.5140
Consistency checks	$\lambda_{max} = 5.037, C.R. = 0.008 < 0.1$					

The subordinate indicators of the five first-level indicators were compared in pairs, and the judgment matrix was obtained, as shown in Table 6-10.

Table 6. Judgment matrix based on the core competitiveness of the product

The core competitiveness of products	Product quality	Richness of product variety	Reasonableness of product prices	$w_i$
Product quality	1	1/2	2	0.2973
Richness of product variety	2	1	3	0.5390
The price of the product rationality	1/2	1/3	1	0.1628
Consistency checks	$\lambda_{max} = 3.009, C.R. = 0.009 < 0.1$			

Table 7. Judgment matrix based on customer perception

Customer perception	The perfection of the platform interface	Ease of shopping	Service satisfaction	$w_i$
The perfection of the platform interface	1	1/4	1/3	0.1226
Ease of shopping	4	1	2	0.5571
Service satisfaction	3	1/2	1	0.3202
Consistency checks	$\lambda_{max} = 3.018, C.R. = 0.018 < 0.1$			

Table 8. Judgment matrix based on supporting services

Supportive Services	APP technical support	The ease of return or exchange	Professionalism in after-sales service	$w_i$
APP technical support	1	2	3	0.5390
The ease of return or exchange	1/2	1	2	0.2973
Professionalism in after-sales service	1/3	1/2	1	0.1638
Consistency checks	$\lambda_{max} = 3.009, C.R. = 0.009 < 0.1$			

Table 9. Judgment matrix based on market conditions

Market conditions	Branding	Customer preferences	The degree of promotion of fresh e-commerce	Discount strength	$w_i$
Branding	1	1/3	3	1/4	0.1362
Customer preferences	3	1	5	1/2	0.3093

The degree of promotion of fresh e-commerce	1/3	1/5	1	1/6	0.0626
Discount strength	4	2	6	1	0.4919
Consistency checks	$\lambda_{max} = 4.080, C.R. = 0.030 < 0.1$				

Table 10. Judgment matrix based on delivery service

Delivery services	The punctuality of the delivery person	The service attitude of the delivery staff	Satisfaction with takeaway packaging	Rationality of delivery	$w_i$
The punctuality of the delivery person	1	1/3	3	3	0.2517
The service attitude of the delivery staff	3	1	5	5	0.5550
Satisfaction with takeaway packaging	1/3	1/5	1	1	0.0967
Rationality of delivery	1/3	1/5	1	1	0.0967
Consistency checks	$\lambda_{max} = 4.044, C.R. = 0.016 < 0.1$				

The weights of the indicators at each level relative to the overall target are calculated comprehensively, as shown in Table 11.

Table 11. Weights of indicators at each level based on the overall goal

Level 1 indicators	Based on the total goal weight	Secondary indicators	Based on first-level indicator weights	Based on the total goal weight
The core competitiveness of products	0.1105	Product quality	0.2973	0.0329
		Richness of product variety	0.5390	0.0596
		Reasonableness of product prices	0.1628	0.0180
Customer perception	0.0654	The perfection of the platform interface	0.1226	0.0080
		Ease of shopping	0.5571	0.0364
		Service satisfaction	0.3202	0.0209
Supportive Services	0.1105	APP technical support	0.5390	0.0596
		The ease of return or exchange	0.2973	0.0329

Market conditions	0.1997	Professionalism in after-sales service	0.1638	0.0180
		Branding	0.1362	0.0272
		Customer preferences	0.3093	0.0618
		The degree of promotion of fresh e-commerce	0.0626	0.1250
		Discount strength	0.4919	0.0982
		The punctuality of the delivery person	0.2517	0.1294
Delivery services	0.5140	The service attitude of the delivery staff	0.5550	0.2853
		Satisfaction with takeaway packaging	0.0967	0.0497
		Rationality of delivery	0.0967	0.0497

3.3.2. Fuzzy comprehensive evaluation method

Based on the results of the above reliability and validity analysis, the fuzzy comprehensive evaluation method was used to evaluate the statistical index results of the competitiveness evaluation data of Pupu supermarket, as shown in Table 12 below.

Table 12. Statistical results of the competitiveness evaluation of Pupu supermarket

Evaluation Rating	Very bad	Not good	Average	Good	Very good
The core competitiveness of products	2.06%	4.13%	27.14%	42.77%	23.90%
Customer perception	1.77%	5.31%	28.02%	45.43%	19.47%
Supportive Services	1.47%	5.01%	25.66%	46.02%	21.83%
Market conditions	2.21%	11.06%	23.67%	41.59%	21.46%
Delivery services	1.77%	4.42%	25.66%	44.47%	23.67%
Converted total	1.86%	5.99%	26.03%	44.06%	22.07%

Note: Market conditions are rated as Very Little, Small, Average, Large, and Significant.

First, establish the evaluation factor set of Pupu supermarket's competitiveness:  
 $U = \{\text{Product core competitiveness, customer perception, supportive services, market conditions, distribution services}\}$

Second, create a collection of comments: $V = \{\text{Very bad, not good, average, good, very good}\}$

Thirdly, based on the calculation results of AHP, the weight set of each factor is established, and the weights of the first-level indicators are:  
 $W = \{\text{Product core competitiveness, customer perception, supportive services, market conditions, distribution services}\} = \{0.111, 0.065, 0.111, 0.200, 0.514\}$

Fourth, establish a fuzzy evaluation matrix:



$R_1$ (The core competitiveness of products) = {0.020,0.041,0.271,0.428,0.239}

$R_2$ (Customer perception) = {0.018,0.053,0.280,0.454,0.195}

$R_3$ (Support Services) = {0.015,0.050,0.257,0.460,0.218}

$R_4$ (Market Conditions) = {0.022, 0.111, 0.237, 0.416, 0.215}

$R_5$ (Delivery service) = {0.018,0.044,0.257,0.445,0.237}

Combining the above set of one-factor evaluations and omitting the comments, we can obtain a one-way evaluation matrix, which is the fuzzy relation matrix R:

$$R = \begin{bmatrix} R_1 \\ R_2 \\ R_3 \\ R_4 \\ R_5 \end{bmatrix} = \begin{pmatrix} 0.020 & 0.041 & 0.271 & 0.428 & 0.239 \\ 0.018 & 0.053 & 0.280 & 0.454 & 0.195 \\ 0.015 & 0.050 & 0.257 & 0.460 & 0.218 \\ 0.022 & 0.111 & 0.237 & 0.416 & 0.215 \\ 0.018 & 0.044 & 0.257 & 0.445 & 0.237 \end{pmatrix}$$

The results of the comprehensive objective evaluation are as follows:

$$\begin{aligned} B &= W \times R = (0.111 \quad 0.065 \quad 0.111 \quad 0.200 \quad 0.514) \\ &\quad \times \begin{pmatrix} 0.020 & 0.041 & 0.271 & 0.428 & 0.239 \\ 0.018 & 0.053 & 0.280 & 0.454 & 0.195 \\ 0.015 & 0.050 & 0.257 & 0.460 & 0.218 \\ 0.022 & 0.111 & 0.237 & 0.416 & 0.215 \\ 0.018 & 0.044 & 0.257 & 0.445 & 0.237 \end{pmatrix} \\ &= (0.0187, 0.0584, 0.2563, 0.4400, 0.2282) \end{aligned}$$

## 4. Conclusions and prospects

### 4.1. Conclusions

This paper took the fresh food e-commerce shopping platform Pupu Supermarket as the research platform, and chose Wuhan as the specific research site to analyze consumers' evaluation of its competitiveness. Under the rapid development of the fresh food e-commerce industry and the general trend of digitalization, fresh food e-commerce enterprises are coming one after another [11]. The level of competitiveness of the enterprise becomes crucial, and understanding the core of improving competitiveness helps Pupu Supermarket to clarify its own positioning as well as improve the possibility of expanding development [12].

By constructing the competitiveness evaluation index of Pupu Supermarket, the analysis concludes that the distribution service as well as the market conditions have a greater impact on its competitiveness. Pupu supermarket should strengthen its core strength, seize a larger market share, and expand its target group. Pupu supermarket should focus on its distribution services, improve its service convenience, be product-oriented, and take into account the corporate image, so as to enhance the competitiveness of Pupu supermarket. The conclusions of this paper are also useful for other fresh food e-commerce industries to improve their competitiveness and promote the development of related policies. However, the research sample in this paper is rather limited, which may have some impact on the generalizability of the conclusions, and future research can expand the scope of the paper to obtain more universal conclusions.

#### 4.2. Research limitations and future research

This paper relies on data from a specific platform, Pupu Supermarket, and the Wuhan region, which may make it difficult to comprehensively reflect the situation of the entire fresh food e-commerce industry. The paper on the competitiveness of fresh food e-commerce involves a number of disciplines such as supply chain management, consumer behavior, information technology, etc., which is still insufficient in terms of interdisciplinary integration. The fresh food e-commerce market is in the midst of rapid changes, and this paper fails to fully consider the impact of long-term dynamic changes on competitiveness. Although some studies involve the development mode of foreign fresh food e-commerce, overall, international comparative studies are still insufficient, making it difficult to comprehensively draw on international experience. Future refinements will be made in the above-mentioned areas, which will lead to further research conclusions. To summarize, the research on fresh food e-commerce in terms of competitiveness has achieved certain results, but it still needs to be further deepened and improved to better guide the practical development of fresh food e-commerce.

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