

Key factors in forming an e-marketplace: An empirical analysis

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Abstract

Currently, the major marketing channel for flower suppliers and retailers in Taiwan is the flower wholesale market. However, when the retailers make purchases in the wholesale market, the dominant suppliers offer poor service, and the retailers find it inconvenient to collect information on the price of flowers. Our study shows that the E-Commerce mechanism of the e-marketplace can improve trading efficiency and lower the cost of collecting information as well as the purchase price. According to our analysis, the e-marketplace can use “a combination of pictures, literal description, and regulated classification” to introduce the quality of flower products. By Fuzzy Delphi, the key factors which affect the operation modes between the retailer and the e-marketplace are “cooperation on urgent orders”, “accuracy of order processing”, and “order processing efficiency”. Then, based on the three key factors, we use Fuzzy Multiple Criteria Decision Making to find what operation modes the e-marketplace should take to cooperate with the retailer. Retailers find the three operation modes “actively placing orders”, “jointly negotiating prices”, and “free bidding” equally compatible, so we suggest that the e-marketplace should provide these modes at the same time for retailer use and later the retailers can adjust the modes according to their business performance. © 2005 Elsevier B.V. All rights reserved.

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1. Introduction

Internet has quietly linked global markets, but it is unlikely to alter the trading mode and preference in each market in the short term; thus, to operate e-commerce in a certain market, what we first need to know is the trading mode and preference in that market. E-marketplace is a form of e-commerce, supplier and the retailer deal through the e-commerce mechanism. However, they do not necessarily deal through the trading mechanism provided by the e-marketplace. This paper argues that the e-marketplace for the floral industry in Taiwan aims to meet the demand of both supplier and retailer. The technology for providing an e-marketplace is readily present. This study unfolds the criteria for joining an e-marketplace and proposes a conceptual framework to study the key factors in

forming an e-marketplace. The study subject is the floral industry in Taiwan.

Currently, the major marketing channel for flower suppliers and retailers is the wholesale market, where the wholesaler bids for the supplier's flowers and then sell them downstream to the retailer (Fig. 1). Although there are hundreds of flower retail websites on Internet and in recent years e-commerce has been used extensively, most retailers still make purchases in the traditional wholesale market. However, when the retailers make purchases in the wholesale market, the wholesalers offer poor service; besides, it is inconvenient for buyers to collect information on the prices of flowers. An e-marketplace is able to solve the problem by providing retailers a new marketing channel and offering timely information on website about the production-marketing of flowers so as to reduce the cost of collecting information as well as the purchase price, and to improve trading efficiency.

The paper suggests key factors in forming an e-marketplace for the floral industry in Taiwan, investigates by

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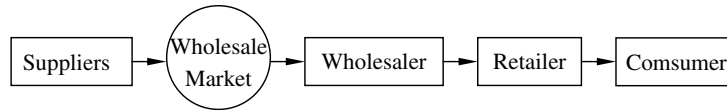


Fig. 1. Flow in the floral industry in Taiwan.

questionnaire the attitudes and interests of both supplier and retailer in selling or purchasing flowers through e-commerce, and analyzes the possible cooperation modes among supplier, retailer, and e-marketplace. The scope of the paper is to explore the possibility of an e-marketplace for the floral industry in Taiwan. The objective is to find the key factors in forming an e-marketplace for the floral industry in Taiwan. The main contribution of this paper is to highlight the key factors in forming an e-marketplace for the floral industry in Taiwan.

2. Literature review

Ratchford et al. [12] discussed a model of demand for Internet and other information sources on the premise that Internet is the most efficient source of providing functions and prices; however, his empirical subject was the automobile, while agricultural products like flowers do not have clear functions, which thus require other substitutes like quality check or standard classification.

O’Keefe and Loebbecke [11] suggested that researchers should not blindly suppose that the virtual world is of interest in its own right because most of the time people live in the physical world and have already developed a mature approach to integrate the experiences they have had in both real and virtual worlds. Thus, when we analyze the business mode in the virtual world like the electronic marketplace, we should take into account the business mode in the real world.

Steinfeld et al. [15] explained how organizations in the Netherlands combine the operation of the real and the virtual by proposing four points: cost savings, improved differentiation, enhanced trust, and market extension. O’Keefe and Loebbecke [11] thought that these four points could apply to other related studies on the combination of e-commerce and activities in the real world. Our study discusses the key factors which influence the formation of the e-marketplaces in four aspects: logistics flow (cost savings), business flow (market extension), cash flow, and information flow.

Using Extended Web Assessment Method (EWAM), Schubert [13] discovered that, from the consumer’s point of view on consumer goods and on e-commerce service of Internet banks, most websites fail to satisfy consumer expectations; on the other hand, those websites with high-quality service are not necessarily successful in their business. Schubert thought that the soundness of the Business Model and the assessment of the Website should be discussed separately. Our study analyzes the flower e-marketplace based on the soundness of the Business Model and

find the key factors in forming the flower e-marketplace based on the expectations of both supplier and retailer.

Luo and Seyedian [10] quoted the viewpoint of Kenny and Marshall [8] that contextual marketing refers to the extent to which e-businesses use the ubiquitous Internet to provide customers with relevant information in the right context and in real-time, and that contextual marketing is important because users are already overloaded with information. What they need most is relevant information provided in real time at the point of need. Our study confirms this viewpoint, that is, an e-marketplace has to provide the proper business modes for both supplier and retailer.

Chen [2] in her essay “Study on the Evaluation Procedure of Selecting Airport Location” used Fuzzy Delphi and Fuzzy Layer Analysis as evaluation tools. By questionnaire, and taking the professionals familiar with transportation and delivery and the staff in Taipei Agricultural Marketing Company as research subjects, Cheng [4,5] used Fuzzy Multiple Criteria Decision Making to evaluate the delivery modes between the company and its 18 affiliated supermarkets; the result show that “commission delivery” is the most feasible delivery mode.

Kano analysis is proposed by the Japanese Kano [6], which was initially used to systematically deal with the demand from customer and then transfer the demand onto the improvement of products so as to improve the competitiveness of enterprises. Kano considered that the major customer demands are: must have, linear satisfier, and delighted.

In respect of flower consumption behavior, Lee and Cheng [3] in their study “The Business Environment Analysis and the Sales Channel Strategy Making of the Flower Stores (Part 2)” analyzed the current general environment confronted by flower stores, their roles in the marketing channels, and the right strategies they should take; they made strategic analysis and suggested that the flower stores should put more emphasis on their business management strategy and well employ their unique advantages and reduce threats so as to fight against external market impacts.

Lee [9] in his study of “New Sales Channel for Flowers – Application of Internet”, by questionnaire and the application of independent checking and Logit’s mode, analyzed the background of the interviewees, discussed the relationship between the interviewees’ background and their purchase behavior, as well as finding out the feasible separated markets for bouquet promotion. The result shows that the feasible separated markets is composed of consumers “who have computers with Internet access” and “whose education level is above college or graduate school (inclusive)”.

3. Methodology

Besides using descriptive statistical method, this study employs Fuzzy Delphi to extract the key factors which affect the willingness of flower supplier and retailer to join the e-marketplace, and further uses Fuzzy Multiple Criteria Decision Making [14] to choose the more feasible cooperation modes from all the possible cooperation modes. Our study also uses Kano analysis to analyze the supplier’s attitudes towards the operation mode of the e-marketplace. The following is an introduction of the three methods.

3.1. Fuzzy Delphi

Based on Kauffman and Gupta [7], Fuzzy Delphi is a variation of the Delphi method using triangular fuzzy numbers in which communication with experts is the same, but the estimation procedure is different. Some important remarks about this method can be found in Kauffman and Gupta [7]. Here, the function of this method is to list several factors in order according to their importance, which is shown in the form of a geometric mean. The equation of the geometric mean is shown as:

$$X_i = \sqrt[m]{a_{1i} \times a_{2i} \times a_{3i} \times \dots \times a_{mi}}, \quad (1)$$

where X_i is the score of question i , m is the number of respondents, a_{ji} is the score of respondent j to question i .

3.2. Fuzzy Multiple Criteria Decision Making

This method evaluates the feasibility of each item; the higher the calculated figure, the more feasible is the item. This paper adopts the method to evaluate all possible cooperation modes for the flower supplier who would like to participate in the flower e-marketplace, then to find out the more feasible cooperation modes. The steps are as follows:

Step 1: Decide Factor Set

Factor Set $U = \{u_i, i = 1, 2, \dots, n\}$, u_i is the key factor i

Step 2: Find the weight of each factor in Factor Set

$W = \{w_i, i = 1, 2, \dots, n\}$, w_i is the relative weight of the key factor (u_i) The weight of each factor is shown by the triangle fuzzy figure, as Eq. (2) shows:

$$w_i = \{w_{iL}, w_{iA}, w_{iH}\}, \quad i = 1, 2, \dots, n, \quad (2)$$

where w_{iL} is the lowest of all the scores in question (i), w_{iA} is the geometric mean of all the scores in question (i), w_{iH} is the highest of all the scores in question (i).

Step 3: Find the value of each item to each factor, which is shown by r_{jk} , representing that the performance score of the factor j in the item k ; the higher the score, the better the factor j performs in the item k . r_{jk} is also shown by the triangle fuzzy figure, as Eq. (3) shows:

$$r_{jk} = \{r_{jKL}, r_{jKA}, r_{jKH}\}, \quad j = 1, 2, \dots, v, \quad k = 1, 2, \dots, p, \quad (3)$$

where r_{jk} is the performance score, r_{jKL} is the lowest of the geometric means of the score of the factor j in the item k , r_{jKA} is the geometric mean of the score of the factor j in the item k , r_{jKH} is the highest of the geometric means of the score of the factor j in the item k .

The fuzzy evaluation matrix R_k of all factors in the item k , as Eq. (4) shows:

$$R_k = \left\{ \begin{matrix} r_{1k} \\ r_{2k} \\ \vdots \\ r_{vk} \end{matrix} \right\} = \left\{ \begin{matrix} r_{1kL} & r_{1kA} & r_{1kH} \\ r_{2kL} & r_{2kA} & r_{2kH} \\ \vdots & \vdots & \vdots \\ r_{vkL} & r_{vKA} & r_{vKH} \end{matrix} \right\}. \quad (4)$$

After calculation, we get the triangle fuzzy figure of the item k , which has to be positively naturalized before comparison. The process of positive naturalization is in Step 4:

Step 4: Fuzzy Compound Calculation

$$\begin{aligned} B_k &= W \cdot R_k \\ &= \{w_1, w_2, w_3, \dots, w_n\} \cdot \left(\begin{matrix} r_{1kL} & r_{1kA} & r_{1kH} \\ r_{2kL} & r_{2kA} & r_{2kH} \\ \vdots & \vdots & \vdots \end{matrix} \right) \\ &= [(w_{1L}, w_{1A}, w_{1H}), (w_{2L}, w_{2A}, w_{2H}), \dots, (w_{3L}, w_{3A}, w_{3H})] \\ &\quad \cdot \left(\begin{matrix} r_{1kL} & r_{1kA} & r_{1kH} \\ r_{2kL} & r_{2kA} & r_{2kH} \\ \vdots & \vdots & \vdots \end{matrix} \right) = [b_{kL}, b_{kA}, b_{kH}] \end{aligned} \quad (5)$$

where B_k is the compatibility of the item k , also shown in the fuzzy triangle figure $[b_{kL}, b_{kA}, b_{kH}]$

Step 5: De-fuzz and Sort

After fuzzy calculation, we get a set of figures representing the triangle fuzzy function, and we use the simple triangle centering method to calculate the compatibility of each factor.

3.3. Kano analysis

Zhang and von Dran [16] used Kano’s model of quality to analyze the customer’s quality expectation of the websites of special form (CNN.com) and discovered that Kano’s model of quality could be extensively applied to many areas or many types of websites; through long-term study they discovered that customer expectation on quality changes with time, so it fails to use the same single quality checking table to evaluate quality expectation. Kano’s model can be employed to identify quality expectations and time transition of quality factors; customers in the same web areas do not consider all quality factors equally important; the quality factors in different web areas have different importance, but certain factors exhibit great importance in all web areas.

This method classifies customer demand threefold: must have, linear satisfier, and delighted. “Must have” means

Table 1
Kano's transformation of customer demand

Positive description	Negative description				
	I like it very much	Must have	I remain neutral	It's so-so	I dislike it
I like it very much	There is some problem	Delighted	Delighted	Delighted	The more, the better
Must have	The contrary	No difference	No difference	No difference	Must have
I remain neutral	The contrary	No difference	No difference	No difference	Must have
It's so-so	The contrary	No difference	No difference	No difference	Must have
I dislike it	The contrary	The contrary	The contrary	The contrary	There is some problem

the property or function customers consider the product must certainly have or they cannot accept the product. Kano analysis inquires customer demand by questionnaire with two questions as a set, including both a positive and a negative question. For example:

Positive: What is your opinion if Service A is included?

Negative: What is your opinion if Service A is not included?

With respect to the questions, the interviewee has five choices: (1) I like it very much, (2) It must be included, (3) I remain neutral, (4) It's so-so, and (5) I dislike it. The results are transformed and shown in Table 1; the transformed results include "must have", "the more, the better", "delighted", "there is some problem", "the contrary", and "no difference".

Suppose the interviewee thought Service A must be included (Choice 2) and disliked no Service A (Choice 5). After the transformation in Table 1, we know that Service A belongs to the function "must have".

In Table 1, "no difference" means that customer remains neutral and is not affected by the property of the product. "The contrary" means that the interviewee dislikes or does not need the property of the product. "There is some problem" means that the interviewee chooses both "I like it very much" and "I dislike it" in answering both the positive and the negative question. "The contrary and "There is some problem" indicate that the customer shows contradiction in answering the questions, but these situations more or less appear in common questionnaire investigations. After we have interviewed a certain number of customers, we tally the number of times in each grid of Table 1 and relate it in terms of percentage, to show the viewpoint of the customers.

4. Empirical results

4.1. Suppliers

In respect of flower production, according to the Profile of Agricultural Suppliers in Taiwan [1], in June 1996, there were 486 groups of flower suppliers in Taiwan, mostly from the central countries of Nantou, Changhua, and Taichung. Currently the major sales channels for suppliers are the four wholesale markets in Taipei, Taichung, Changhua, and Tainan. There are two questionnaires with two parts

therein both for the supplier and the retailer, respectively. The first part of the questionnaire deals with the supplier's related sales background, including gender, age, level of education, and his/her major sales channel; the second part is about the related B2B (Business to Business) trading information of the supplier, including his/her willingness in selling flowers in the e-marketplace, and his/her preferred cooperation mode with the e-marketplace. The Delphi processes were conducted from June 28, 2002 to July 7, 2002, and the 150 interviewees (all of them were experts in this industry) are chosen by random sampling from suppliers in the central countries listed in the Profile of Agricultural Suppliers in Taiwan. 135 questionnaires were retrieved, with a high effective retrieve rate of 90%. There were five iterations in the whole Delphi processes to get the final results. On the last iteration, our researchers conduct personal interviews and the issue is very attractive to interviewees; besides, the questions has little to do with the business confidentiality of the interviewees, so most of them feel free to answer the questions.

Table 2 shows most interviewees are male (88.9%), over 40 years old (37.8%), with senior high level of education (40.7%), with an average of 9.29 years on flower production and their planting areas are mostly in Nantou (43%). Flower suppliers with the above characteristics are the principal research subjects of our study.

Table 3 shows the current sales modes of the interviewees. The wholesale market is the principal sales channel (54.3%), and cut flowers (75.8%) are a major production.

Table 2
Background of interviewees: suppliers

Characteristics of interviewees	Statistics	
Gender	Male (88.9%), female (11.1%)	
Seniority on flower production	9.29 years on average	
Age	50 and over (20%)	35–39 (14.8%)
	40–44 (17.8%)	45–49 (14.8%)
	25–29 (14.8%)	20–24 (3%)
	30–34 (14.8%)	
Level of education	Senior high (40.7%)	Vocational school (11.1%)
	Junior high (25.2%)	College (3.7%)
	Elementary school (19.3%)	
Planting area	Nantou (43%), Changhua (22.2%), Taichung (34.8%)	

Table 3
Current sales modes of the interviewees

Item	Statistics	
Major sales channels and ratio of sales volume to total sales volume	54.3% to wholesale markets 22.6% to collecting centers 10.2% to exporters	7.9% to retailers 3.4% to flower stores 1.6% to other channels
Major types of flowers they supply	Cut flowers 75.8%, Potted flowers 15.8%, Others 8.4%	
Dealing with contract production	No (94.1%), Yes (5.9%)	
Usual goods-delivering period	Within 7 days (50%) 2 months and over (25%) 7 days to 1 month (12.5%) 1 to 2 months (12.5%)	
Attitude of the flower suppliers who do not deal with contract production towards selling flowers through Internet to flower stores	Yes (83%), No (17%)	
Price-deciding reference of flower suppliers who do not deal with contract production	Wholesale price of the day (40.2%) Wholesale price of three days ago (26.8%) Wholesale price of the day before (16.1%) Wholesale price of one week ago (11.6%) Others (5.4%)	
Why flower suppliers who do not deal with contract production are not willing to sell products through Internet to flower stores	On-line demand is deficient (5.39 points) Sales procedures online are complicated (5 points) Price-deciding methods are complicated (4.04 points)	Classification-packaging standard is complicated (3.39 points) Production scale is small (3.26 points) They show little interest (2.83 points)

Note. 7-point scale – 7 the highest, 1 the lowest.

94.1% of the interviewees do not deal with contract production and the usual goods-delivering period is within 7 days (50%). Most suppliers who do not deal with contract production show great willingness to sell flowers through Internet (83%). Suppliers who do not deal with contraction product but are willing to sell flowers through Internet tend to take the wholesale price of the day as reference (40.2%) before they decide on the price of their flowers. The interviewees who do not deal with contract production and are not willing to sell flowers through Internet to flower stores think that “on-line demand is deficient” (5.39 points), and “the sales procedures online are complicated” (5 points). We suggest that the e-marketplace should simplify the online sales procedure as much as possible, but we have not recommended any specific standard online-sales procedure to respondents.

While suppliers cooperate with the e-marketplace, the activities are categorized into four parts: logistics flow, cash flow, business flow, and information flow. There are 23 factors altogether, and the interviewees are asked to rate the importance of each of the factors based on a 10-point scale, 10 being the most important and 1 the least important. We use Fuzzy Delphi to calculate the geometric mean of each factor, and the results are shown in Table 4.

Fig. 2 shows the scores of all the factors in linear illustration. Based on the experience principle of “choosing no more than 7 successful key factors in a study”, we classify the factors into 5 groups. The geometric mean of the first group is the highest, indicating that it is most representative of the interviewees’ opinions, hence the most feasible website key factors. From this we extract, in descending order, the four

key factors which affect the cooperation modes between the supplier and the e-marketplace, namely “accuracy of order processing”, “trading credit investigation”, “quality check”, and “production project”. “Order processing correctness” is under Business Flow, “trading credit investigation” under Cash Flow, and “quality check” and “production project” under Logistics Flow. There are no factors attributed to Information Flow, possibly because the suppliers seldom use related production information to make production planning, and they are not quite familiar with the application of production-marketing information.

According to the analysis, we suggest that the e-marketplace should strengthen flower quality check to ensure flower quality stability, and take into account production-marketing information while planning production projects, cooperating with the suppliers on planned production. Besides, the e-marketplace should check the trading credit of both sides to prevent bad debts, and improve the accuracy and efficiency of order processing so as to upgrade customer service.

Presently, the major production-marketing modes for suppliers are “spot selling” and “contract production”. We also include “free bidding” which is now popular in Internet. The contents of the three modes are as follows:

1. Spot selling: As soon as the retailers join the e-marketplace and place orders online, the suppliers sell their flowers based on the orders.
2. Contract production: After confirming the total volume of orders and the transaction day, the e-marketplace arranges the delivery date with the suppliers by contract.

Table 4
Factors affecting the operation modes between the supplier and the e-marketplace

Category	Serial number	Factor	Average
Logistics flow	1	Quality check	8.81
	2	Production project	8.52
	3	Flower-packing and staff training	7.58
	4	Efficiency of car dispatch	7.15
	5	Freight charge	7.04
	6	Form and amount of compensation	7.04
	7	Urgent order processing	6.46
	8	Quantity and capacity of cars	6.36
Cash flow	9	Trading credit investigation	8.81
	10	Whether capital is sufficient or not	7.65
	11	Trading price and trading volume	7.31
	12	Processing fee	6.19
Information flow	13	Provision and compilation of production-marketing information	8.25
	14	Volume and stability of demand	8.14
	15	Efficiency of deciding on trading price	7.53
	16	Establishing trading mechanism	7.42
	17	Price prediction	6.68
Business flow	18	Accuracy of order processing	8.91
	19	Order processing efficiency	8.19
	20	Dealing with damaged flowers	8.08
	21	Processing of customer complaint	7.58
	22	Goods tracking	6.99
	23	Frequency and degree of contact with buyers	6.6

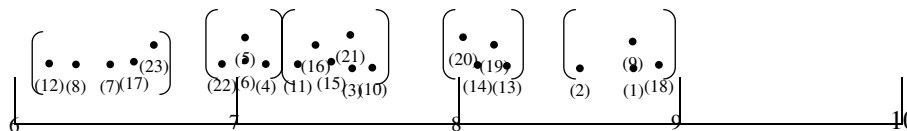


Fig. 2. Linear illustration of scores of all factors.

3. Free bidding: Suppliers provide information about their products including literal description or pictures, which are then put on the e-marketplace for retailers to bid.

We employ Fuzzy Multiple Criteria Decision Making to evaluate the compatibility of the three cooperation modes. Table 5 lists the results. The evaluation shows that “contract production” is the most acceptable mode to suppliers, “free bidding” the second, and “spot selling” the last. The compatibility of “contract production” is very close to that of “free bidding”, both higher than that of “spot selling”.

Next, we analyze the suppliers’ attitude towards 13 operation modes with Kano analysis. Table 6 shows the results.

In Kano analysis, the questions are addressed positively and negatively to each operation mode, giving a total of 26 questions. The following is an illustration:

Table 5
Compatibility of the operation modes of the e-marketplaces

Operation mode	Compatibility
Contract production	1.21058
Free bidding	1.20870
Spot selling	1.18955

Positive question: What is your opinion when the operation mode is “integrating all orders and then purchasing flowers from suppliers”?

Negative question: What is your opinion when the operation mode is “not integrating all orders and then purchasing flowers from suppliers”?

There are five options: (1) I like it very much, (2) Must have, (3) I remain neutral, (4) It’s so-so, and (5) I dislike it. We arrange the opinions of the interviewees (Table 7). With reference to Table 1, the results show that 32 interviewees are for “must have”, 31 for “the more, the better”, 22 for “delighted”, 44 for “no difference”, 4 for “there is some problem”, and 2 for “the contrary”. Thus, for this operation mode, the principal attitude of the interviewees is “no difference”, followed by “must have”, “the more, the better”, “delighted”, “there is some problem”, and “the contrary”, respectively.

Table 6 shows the attitude of the interviewees towards the 13 operation modes. As “there is some problem” and “the contrary” appear sparingly, and both are negative, we put them under one heading. We tally the number of times of all the options and compute the percentage. For example, in the operation mode “integrating all orders

Table 6
Attitude of interviewees towards the operation modes of the e-marketplaces

Operation mode	Description					Conclusion
	Must have	The more, the better	Delighted	No difference	There is some problem/ The contrary	
Integrating all orders and then purchasing flowers from suppliers	32 (24%)	31 (23%)	22 (16%)	44 (33%)	6 (4%)	No difference, Must have, The more, the better
Suppliers get better pricing based on their sales volume online	9 (7%)	15 (11%)	17 (13%)	78 (58%)	16 (12%)	No difference
Setting up an arbitration mechanism to deal with quality check, damaged goods, and compensation	33 (24%)	24 (18%)	11 (8%)	59 (44%)	8 (6%)	No difference, Must have
Suppliers become members, provide only registered members of suppliers can sell their products online	24 (18%)	11 (8%)	13 (10%)	75 (56%)	12 (9%)	No difference
Suppliers choose orders they prefer online	46 (34%)	18 (13%)	16 (12%)	42 (31%)	13 (10%)	No difference, Must have
Suppliers have to be shareholders of the e-marketplace or pay a fee to become members.	12 (9%)	8 (6%)	6 (4%)	88 (65%)	21 (16%)	No difference
Flowers are grown locally and/or imported	5 (4%)	5 (4%)	4 (3%)	66 (49%)	55 (41%)	No difference, There is some problem, The contrary
Professional transportation companies are in charge of transportation and delivery	25 (19%)	22 (16%)	10 (7%)	67 (50%)	11 (8%)	No difference
A professional computer company is in charge of the website and maintenance.	31 (23%)	32 (24%)	10 (7%)	57 (42%)	5 (4%)	No difference, Must have, The more, the better
Ranking of trading volume and sales volume by suppliers and buyers are posted on the e-marketplace	15 (11%)	10 (7%)	20 (15%)	68 (50%)	22 (16%)	No difference
On-line trading is only for flowers of large trading volume	15 (11%)	4 (3%)	11 (8%)	77 (57%)	28 (21%)	No difference
On-line trading is open to all breeds of flowers	20 (15%)	22 (16%)	17 (13%)	67 (50%)	9 (7%)	No difference
Providing members with compiled production-marketing information (price in all wholesale markets, yield in place of production, and related activities)	28 (21%)	41 (30%)	17 (13%)	46 (34%)	3 (2%)	No difference, The more, the better

Table 7
Attitude of interviewees towards the operation mode “integrating all orders and then purchasing flowers from suppliers”

Positive	Negative				
	I like it very much	Must have	I remain neutral	It's so-so	I dislike it
I like it very much	2	0	15	7	31
Must have	0	0	7	2	13
I remain neutral	1	0	12	5	7
It's so-so	0	0	13	5	12
I dislike it	0	0	1	0	2

Note. The scores in the table represent “the number of times”.

and then purchasing flowers from suppliers”, 33% of the interviewees find “no difference”, 24% “must have”, and 23% “the more, the better”. Therefore, this operation mode favors “no difference”, “must have” and “the more, the better”.

The “Conclusion” column shows that the four principal attitudes of the interviewees towards each operation mode

are “no difference”, “must have”, “the more, the better”, and “there is some problem”. “No difference” appearing most frequently probably because the interviewees are not quite familiar with the current operation modes of the e-marketplace. “There is some problem” and “the contrary” appears only in the operation mode “flowers are grown locally and/or imported”. To get the real picture, we compile the statistics of the two options separately, and find that 49 interviewees (36%) have chosen “the contrary” on this item and 6 (5%) for “there is some problem”. In other words, 36% of the interviewees consider the operation mode unnecessary; thus, the suppliers favor flowers grown locally.

Interviewees favor “must have” towards four operation modes, viz, “integrating all orders and then purchasing flowers from suppliers”, “setting up an arbitration mechanism to deal with quality check, damage goods, and compensation”, “suppliers choose orders they prefer online”, and “a professional computer company is in charge of the website and maintenance”.

Interviewees favor “the more, the better” towards three operation modes, viz, “integrating all orders and then purchasing flowers from suppliers”, “a professional computer company is in charge of the website and maintenance”, and “providing members with compiled production-marketing information (price in all wholesale markets, yield in place of production, and related activities)”.

Interviewees favor both “must have” and “the more, the better” towards two operation modes, viz, “integrating all orders and then purchasing flowers from suppliers”, and “a professional computer company is in charge of the website and maintenance”.

From the analysis we notice that, the e-marketplace has to employ Internet marketing to increase and integrate orders and then purchase flowers from suppliers. A professional computer company should be in charge of the website and maintenance. The e-marketplace has to set up a clear and fair arbitration mechanism to deal with quality check, damage goods, and compensation. To attract suppliers to browse the website, the e-marketplace should allow suppliers to choose orders they prefer online and offer as much production-marketing information as possible.

4.2. Retailers

The first part of the questionnaire deals with the retailer’s background, including gender, age, level of education, frequency of Internet usage and service area (location of flower stores). The interview was conducted from June 28, 2002 to July 7, 2002, and the 200 interviewees were chosen by random sampling from retailers (flower stores) in areas north of Hsinchu county listed in Flower Retailers in Taiwan in 1996. 199 questionnaires were retrieved, with a high effective retrieve rate of 99.5%. Our researchers conducted personal interviews and the issue was very attractive to interviewees; besides, the questions had little to do with the business confidentiality of the interviewees, so most of them felt free to answer the questions.

Table 8 shows most interviewees are female (67.3%), under 35 years old (66.3%), with senior high and above

in education level (90.5%), do not often use Internet to look up information (40%), and have their flower stores mainly in Taipei county/city (73.4%). Flower retailers with the above characteristics are the principal research subjects of our study.

Table 9 shows the purchase modes and the major business items of the flower stores being interviewed. The major purchase channels include the wholesale market, brokers, importers, flower suppliers, and others; and the wholesale market is the most popular (73%).

The standard for purchase includes, “stable flower quality”, “goodwill of the seller”, “prices of flowers”, “sufficient breeds of flowers”, “purchase volume”, and “transportation”. The retailers put much emphasis on quality (6.46 points), so flower brokers and wholesalers should actively and continuously provide flowers of high quality to establish goodwill and to attract flower stores to buy their products.

Table 9
Purchase modes and major business items of the flower stores

Item	Statistics
Purchase channels & ratio of purchase volume to total purchase volume	73% from wholesale markets 13% from brokers 7% from importers 5% from flower suppliers 2% from other purchase channels
Standard for purchase	Stable flower quality (6.46 points) Goodwill of the seller (6.01 points) Price of flowers (5.99 points) Sufficient breeds of flowers (5.77 points) Purchase volume(5.58 points) Transportation (5.37 points) <i>Note.</i> 7-point scale – 7 the highest, 1 the lowest
Business items of the flower store	Selling flower (97%) Designing bouquets (90%) Decorating meeting venues (72%) Landscaping (57%) Giving classes on flower arrangement (23%) Selling on-line (13%) Others (5%)

Table 8
Background of interviewees: retailers

Characteristics of interviewees	Statistics
Gender	Female (67.3%), male (32.7%)
Age	25–29 (27.6%) 30–34 (27.1%) 40–44 (15.6%) 20–24 (11.6%) 35–39 (10.6%) 45–49 (5.5%) 50 and over (2%)
Level of education	Senior high (42.7%) Vocational school (32.7%) College (12.6%) Junior high (7%) Graduate school (2.5%) Elementary school (2.5%)
Frequency of internet usage	Not often (40%) Never (26.3%) 2–3 times a week (12.5%) Once a week (10.6%) Almost every day (5%) Once a month (5%) Once half a month (0.6%)
Service area (Location of flower stores)	Taipei city (54.3%), Taipei county (19.1%), Taoyuan county (11.1%), Hsinchu city (9.5%), Taoyuan city (6%)

As for business items, “selling flowers” (97%), “designing bouquets” (90%), and “decorating meeting venues” (72.7%) rate high.

Table 10 shows that the major breeds sold by the retailers are daisies, roses, and orchids. Table 11 shows the sales and the delivery modes of the flower stores. The average number of self-owned trucks is 1.38, and flower stores with trucks are able to purchase and deliver goods using their own trucks. When the delivery volume is very large, they entrust the transportation companies to do the service. 55.95% of the flower stores have delivery service, 81.56% of which are delivered by self-owned trucks and 14.46% are entrusted to other transportation companies. The sales are mainly cut flowers (59.85%), and the delivery period is mostly on the same day (43.7%) and/or 2–3 days (43.7%). 19.6% of the flowers are sold through e-commerce, 50% of which are interested in using Internet to sell their products, and 7.5% greatly interested. The interviewees not using e-commerce to sell their flowers claim that “on-line promotion doesn’t work well” (5.29 points) and “no need to promote online” (4.75 points).

Table 12 shows the feasibility and reasons for selling flowers online. All the factors affecting the feasibility of selling flowers successfully online have high scores, viz. “quality stability” (6.32 points), “quality recognition” (6.14), “freshness” (6.09), “classification-packing standard” (5.94), “transporting and delivering” (5.79), “unit price” (5.68), and “demand” (5.46), showing that they are all important for successful business performance. Cut flowers scoring over 5 points include bouquet (5.72), lily (5.50), rose (5.42), carnation (5.16), and million stars (5.05). Pot flowers scoring over 5 points include compound pot flowers (5.72), lucky bamboo (5.68), pachimacarpus (5.53) and phalaenopsis (5.42).

The questionnaire lists four possible introductions of flower products in the e-marketplace, viz. “literal description”, “picture illustration”, “regulated classification”, and “a combination of pictures, literal description, and regulated classification”. “Spot check” is also listed in order to compare the interviewees’ attitude between direct spot check and online literal and pictorial description. Table 13 shows that “a combination of pictures, literal description, and regulated classification” (5.97), and “spot check” (5.81), score highest, showing that the retailers will accept pictures, literal description, and regulated classification even though they do not see the real objects.

With regard to the expectations towards the contents of the e-marketplaces, items scoring over 5 points include “price in all flower markets” (5.79), “yield in all places of production” (5.3), “collecting trading details of flower

Table 11
Sales and delivery modes of flower stores

Item	Statistics
Number of self-owned truck	1.38 on average
Delivery ratio	Ratio of flowers delivered to total sales volume, 55.95%
Delivery mode	Ratio of flowers delivered by self-owned trucks to total volume delivered, 81.56% Ratio of flowers delivered by entrusted vehicles to total volume delivered, 14.46%
Sales	Ratio of cut flower sales to total sales, 59.85% Ratio of pot flower sales to total sales, 25.74% Ratio of accessory sales to total sales, 10.09% Ratio of other sales to total sales, 4.32%
Delivery period	On the same day (43.7%) 2–3 days (43.7%) 4–6 days (10.1%) 7 days–4 weeks (2%) Over one month (0.5%)
Trading through e-commerce	Yes (19.6%), No (80.4%)
Interest in trading through e-commerce	Yes (50%), No (42.5%), Yes, greatly interested (7.5%)
Reasons for not using e-commerce	On-line promotion does not work well (5.29 points) No need to promote online (5.29 points) Business scale is not large (4.75 points) Unfamiliar with computer (4.66 points)

Note. 7-point scale – 7 the highest, 1 the lowest.

stores” (5.11), and “information about flower suppliers” (5.09).

To realize the interviewees’ ideal delivery modes, we investigate their ideal delivery time and their evaluation of the transportation companies, and the results are shown in Table 14. The ideal delivery times are 08:00–11:59 (46.7%), and 04:00–7:59 (37.7%), showing that the retailers prefer to receive the flowers they order before the business hours so they have enough time to arrange or pack the flowers. In choosing transportation companies, they pay great attention to service factors, including the quality of service (6.66), cooperation on urgent orders (6.62), punctual delivery (6.58), and efficient delivery (6.52). In fact, all 8 factors score over 5 points, and they should all be taken into consideration.

There are 20 factors which possibly affect the cooperation modes between the e-marketplace and the flower store, and they are categorized into four parts: logistics flow, business flow, cash flow, and information flow. The inter-

Table 10
Major breeds of flowers purchased and their purchase rate

	Daisy	Rose	Orchid	Lily	Tulip	Other breeds
Average purchase rate (%)	38.6	36.9	33.2	32.2	28.6	29.3

Note. Average purchase rate = purchase volume of a particular breed ÷ total purchase volume.

Table 12
Feasibility and reasons for selling flowers online

Item	Statistics	
Factors affecting the feasibility of selling flowers online	Quality stability (6.32) Quality recognition (6.14) Freshness (6.09) Classification-packing standard (5.94)	Transporting and delivering (5.79) Unit price (5.68) Demand (5.46)
Feasibility of selling cut flowers online	Bouquet (5.72) Lily (5.50) Rose (5.42) Carnation (5.16) Million Stars (5.05)	African Daisy (4.70) Gladiolus (3.90) Chrysanthemum (3.50) Other breeds (0.47)
Feasibility of selling pot flowers online	Compound pot flowers (5.72) Lucky Bamboo (5.68) Pachira macrocarpa (5.53) Phalaenopsis (5.42) Codiaeum (4.93)	Begon × Semperflorens-cultorum (4.74) Impatiens balsamina (4.61) Duranta repens (4.58) Others (0.42)

Note. 7-point scale – 7 the highest, 1 the lowest.

Table 13
Expectations of Interviewees towards the E-marketplace

Item	Statistics
Ideal introductions of flower products	A combination of pictures, literal description, and regulated classification (5.97) Spot check (5.81) Pictures (5.67) Literal description (5.48) Regulated classification (5.47)
Expectations towards the contents of the e-marketplace	Price in all flower markets (5.79) Yield in all places of production places (5.30) Collecting trading details of flower stores (5.11) Information about flower suppliers (5.09) Related flower activities (4.75) Related measures from the agricultural authority (4.38)

Note. 7-point scale – 7 the highest, 1 the lowest.

Table 14
Ideal delivery modes for interviewees

Item	Statistics	
Receiving period	08:00–11:59 (46.7%) 04:00–7:59 (37.7%) 12:00–15:59 (9.5%)	0:00–3:59 (4%) 20:00–23:59 (1.5%) 16:00–19:59 (0.5%)
Factors in choosing transportation companies	Quality of service (6.66) Cooperation on urgent orders (6.62) Punctual delivery (6.58) Efficient delivery (6.52)	Attitude towards customer complaint (6.24) Freight charge (6.22) Packing (5.8) Number of self-owned trucks (5.48)

Note. 7-point scale – 7 the highest, 1 the lowest.

viewees are asked to rate on a 10-point scale, 10 being the most important and 1 the least important. We use Fuzzy Delphi to calculate the geometric mean of each factor and the results are shown in Table 15.

Fig. 3 shows the scores of all the factors in linear illustration and we classify them into 5 groups. The three key factors which affect the cooperation modes between the retailer and the e-marketplace are “cooperation on urgent order”, “accuracy of order processing”, and “order processing efficiency”. We suggest that the e-marketplace should put more emphasis on how to correctly and speedily process orders from the retailers and cooperate on the urgent orders by immediately dispatching cars for delivery.

To analyze the feasible operation modes that the e-marketplace should use to cooperate with the flower stores, we list three operation modes for evaluation: 1. Actively placing orders: After becoming members of the e-marketplace, the retailers can search all production-marketing information on the e-marketplace, and then relate to the supplier’s type, class, volume, trading time and place, and the ideal price of the flower products. The supplier who is interested in this order can directly contact the retailer directly and negotiate on the price. 2. Jointly negotiating prices: The e-marketplace first relates the class, trading time, and volume of the flower products to all members so they are able to register the class, trading time, volume and place for collection; the bigger the order, the more the discount. 3. Free bidding: Suppliers offer retailers on the e-marketplace the class and the lowest bidding price of their products. Within a stipulated period of time, members place bids on the products.

We employ Fuzzy Multiple Criteria Decision Making to evaluate the compatibility of the three operation modes. Table 16 shows the results: the scores of are very close, indicating that the flower retailers find them all equally compatible, probably because currently there is still no e-marketplace formed based on the expectations of the retailers, and the retailers are not familiar with the modes. We suggest that the e-marketplace can employ the three modes at the same time to cooperate with the retailers and evaluate the feasibility of each of the modes in the process.

Table 15
Factors affecting the cooperation modes between the e-marketplace and the flower store

Category	Serial number	Factor	Average
Logistics flow	1	Cooperation on urgent orders	9.2
	2	Sufficient supply	8.84
	3	Good stock management	8.77
	4	Diverse breeds	8.72
	5	Quality check	8.69
	6	Efficiency of car dispatch	8.48
	7	Form and amount of compensation	8.33
	8	Freight charge	8.3
	9	Quantity and capacity of cars	7.45
	10	Flower-packing and staff training	6.15
Cash flow	11	Trading credit investigation	8.76
	12	Whether capital is sufficient	8.37
	13	Processing fee	8.07
Information flow	14	Provision and compilation of establishing trading mechanism	8.23
	15	Production-marketing information	8.12
	16	Trading price prediction	8.12
	17	Efficiency of deciding on trading price	8.03
Business flow	18	Accuracy of order processing	9.46
	19	Order processing efficiency	9.06
	20	Goods tracking	8.63

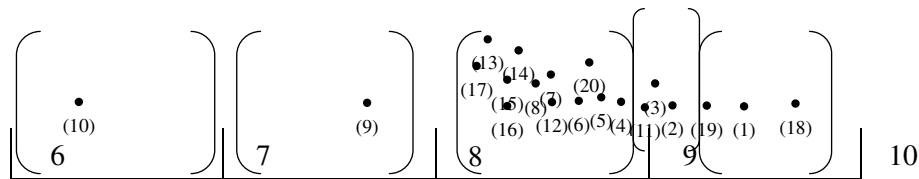


Fig. 3. Linear illustration of scores of all factors.

Table 16
Compatibility of the operation modes of the e-marketplace

Operation mode	Compatibility
Actively placing orders	0.92089
Jointly negotiating prices	0.92086
Free bidding	0.92084

5. Conclusions

The scope of the paper is to explore the possibility of an e-marketplace for the floral industry in Taiwan, and we suggest key factors in forming an e-marketplace for the floral industry in Taiwan by analyzing the possible cooperation modes among the supplier, the retailer and the e-marketplace. This study proposes a conceptual framework to analyze the key factors affecting the formation of an e-marketplace, and also employs Fuzzy Delphi, Fuzzy Multiple Criteria Decision Making, and Kano Analysis to conduct an empirical research on the floral industry in Taiwan. The results also show this conceptual framework can be used to analyze the key factors in forming an e-marketplace with products that are difficult to standardize.

Currently, the major marketing channel for flower suppliers and retailers in Taiwan is the flower wholesale mar-

ket. However, when the retailers make purchases in the wholesale market, the dominant suppliers offer poor service, and the retailers find it inconvenient to collect information on the price of flowers. Our study shows that the e-commerce mechanism of the e-marketplace can improve trading efficiency and lower the cost of collecting information as well as the purchase price. According to our analysis, the e-marketplace can use “a combination of pictures, literal description, and regulated classification” to introduce the quality of flower products. By Fuzzy Delphi, the key factors which affect the operation modes between the retailer and the e-marketplace are “cooperation on urgent orders”, “accuracy of order processing”, and “order processing efficiency”. Then, based on the three key factors we use Fuzzy Multiple Criteria Decision Making to find what operation modes the e-marketplace should take to cooperate with the retailer. Retailers find the three operation modes “actively placing orders”, “jointly negotiating prices”, and “free bidding” equally compatible, so we suggest that the e-marketplace should provide these modes at the same time for retailer use and later the retailers can adjust the modes according to their business performance.

Besides, by Fuzzy Delphi, the key factors affecting the cooperation modes between the supplier and the e-marketplace are “quality check”, “production project”, “trading

credit investigation”, and “accuracy of order processing”. We then employ Fuzzy Multiple Criteria Decision Making to evaluate the operation modes that the e-marketplace should take to cooperate with the supplier. “Contract production” and “free bidding” are the preferred operation modes. Using Kano analysis, we realize the supplier’s attitude towards all the preferred operation modes. To attract more suppliers to join and trade on their websites, the e-marketplace should upgrade on-line promotion. In addition, the e-marketplace should integrate all orders and then purchase flowers from suppliers, and set up a clear and fair arbitration mechanism to deal with quality check, damaging goods, and compensation; and, in order to attract suppliers to surf their websites, the e-marketplace should allow them to place orders online and offer as much production-marketing information as possible.

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