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Grey Relational Evaluation of the Supplier Selection Criteria in Indonesian Hospitality Industry

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Abstract: The study aims to identify and evaluate the key criteria for food supplier selection in the Indonesian hospitality industry. A survey was sent to experts in Indonesia and based on their opinions the supplier selection criteria were evaluated using the Grey Relational Analysis (GRA). The study found that price is the most important supplier selection criteria, followed by food quality, and return-ability of problematic food. The study also reports that the variation in the distinguishing coefficient of the GRA influences the ranking.

Keywords: Suppliers selection criteria; hospitality industry; grey relational analysis

1. Introduction

There are many factors contributing to the success of an industry. One of the factors driving an industry to be successful is its supply chain management practices. Sustainable business practices improve companies' image and win reputation and new customers while ensuring long-term success (Ullah *et al.*, 2021; Han *et al.*, 2011). If an industry has a sustainable supply chain, the goods and services offered to its customers would be well-received by the consumers and can generate positive feedback from the customer. This point is hard to overlook in the hospitality industry because the industry is most valued by the goods and services offered and customers' feedback. Companies in tourism and hospitality industry supply chains cannot thrive without the support of satisfied customers (Chi & Gursoy, 2009). Therefore, hospitality supply chains must be well-managed for the success of the hospitality industry and to create better value for the customers it serves.

The key to sustainable supply chain management, including hospitality supply chain management, is the right selection of suppliers. If an industry can choose its suppliers correctly and provide better goods and services to its customer, it will increase the performance value of the industry and help in materializing aggregate plans more effectively and efficiently. However, the selection of the right suppliers depends on the right criteria for the supplier evaluation. Numerous scholars have discussed essential criteria to be considered in selecting suppliers through different analysis models (see, e.g., Ali, 2019; Önder & Kabadayi, 2015; Chung, 2015), but not many have discussed the priority levels of these criteria in the hospitality industry. Also, most studies focus on evaluating suppliers, while only a few focus on evaluating criteria. Meanwhile, rarely the hospitality industry supplier selection criteria evaluation has been done through the Grey Relational Analysis

(GRA). On top of that, some studies have argued that the variations in the GRA's distinguishing coefficient do not influence the final ranking (see, Sallehuddin *et al.*, 2008; Jiang *et al.*, 2002), while others have argued the opposite (see Mahmoudi *et al.*, 2020). This debate needs to be settled. Thus, the current study attempts to answer the following research questions: (a) What are the key criteria that the Indonesian hospitality industry considers important when selecting suppliers of food?, (b) Which criteria are most important for the industry?, (c) Is the GRA an effective approach to evaluate supplier selection criteria?, and (d) Does the variation in Deng's GRA model influence the prioritization of criteria?

The rest of the paper is structured as follows: Firstly, a broad review of literature is presented that discusses supplier selection, food industry, and criteria, followed by the introduction to the GRA model. Later, research methodology is discussed, followed by a presentation and discussion on the results. Lastly, the study is finalized with a conclusion and recommendations.

2. Literature Review

2.1 Hospitality Supply Chain Management

Supply Chain Management (SCM) can be defined as an approach to manage the flow of supplies from a vendor to the final recipient in a supply chain (Mentzer *et al.*, 2001), and if the supply chain is of the hospitality industry, it is referred to as Hospitality Supply Chain Management. According to Odoom (2012), acquiring strategic management of a supply chain allows firms to provide advanced quality supplies with lower costs. Hence, enhancing a firm's SCM is necessary to compete and have ultimate performances in the growing business environment (Adebayo, 2012).

While many firms in various industries have been improving SCM, with some even building their unique supplier management systems, firms in the hospitality industry also started to enhance the firm performance by investing in their SCM practices (Fantazy *et al.*, 2010). As noted by Chi and Gursoy (2009), the hospitality industry thrives on customer satisfaction. Hence, the Hospitality Supply Chain (HSC), where it involves the supply of goods and services to customers, is mandatory for sustainable management to provide good supplies and gain customers' satisfaction for the industry's success (Xu & Gursoy, 2015).

Xu and Gursoy (2015) ascertained that the first step of establishing sustainable management in HSC should start by selecting sustainable suppliers. Sethu (2007) mentioned several steps to be implemented in hospitality SCM, i.e., identify, evaluate, select, and manage the suppliers. Several studies show that increased customer satisfaction leads to greater customer loyalty (Xu and Gursoy, 2015). Greater customer loyalty leads to the improvement of a firm's financial performance and sustainability (Xu & Gursoy, 2014) because loyal customers are insensitive to the credited price (Jensen & Drozdenko, 2008). Then, improved financial performance helps firm to achieve capital (Biddel *et al.*, 2009). Moreover, Taherdoost and Brand (2019) also stated that suitable supplier selection would reduce purchasing costs, increase profits, shorten product lead time, grow customer satisfaction, and strengthen the competitiveness of firms. These constant impacts will encourage firms in the hospitality industry to advance their SCM for positive results in their financial performance (Xu & Gursoy, 2014). The selection of suitable suppliers that leads to sustainable SCM is the key to achieve success.

2.2 Food Supplier Selection Criteria

Poor quality food can spoil the image of the hospitality industry and can produce dissatisfied customers. Thus, the matter of food supplier selection is of utmost importance for the businesses operating in the hospitality industry. For the last few years, the reported outbreaks of food-borne illnesses have increased public awareness and concern towards food safety (Marucheck, 2016). A single food safety incident can have serious ramifications not only for the company that failed but also for the industry as a whole, with supply chain partners being particularly vulnerable (Marucheck, 2016). Not to mention, food is an essential contributor to physical well-being as well

as a key source of pleasure, anxiety, and stress (Rozin *et al.*, 1999), assuring the safety and quality of food becomes mandatory.

Food safety refers to any issue relating to the hygiene and safety of the food that reaches customers; food is expected to be "safe" and thus devoid of contaminants that could be harmful to one's health (Escanciano & Santos, 2014). Meanwhile, the physical features of a food product, such as its look, texture, flavor, and microbiological elements, are referred to as food quality (Marucheck, 2016), where the quality of food is the significant contribution to its safety.

A way of protection to ensure food quality is the packaging of food. Packaging is prevalent and necessary in today's culture because it protects the products, from processing and manufacturing to handling and storage to the final recipient (Robertson, 2012). Packaging ensures that food is not contacted with any external contaminants or harms, avoids any leakage and most importantly, secure the quality of the food. In addition, proper labeling of nutrition should be included on the packaging as well. Since purchasing managers or responsible parties when selecting suppliers do not have participated in the food-making process, food supply shall be informative. Because misinformation is also frowned upon because it can harm consumers and, in some cases, result in their deaths (Ababio *et al.*, 2012).

Another important point to be noted when ensuring food safety is the food handlers. It is to ensure whether do the suppliers proceed healthy workforce and healthy workplace during the product making process. Maintaining a high degree of personal hygiene and cleanliness is an important approach to avoid food contamination (Mukhopadhyay *et al.*, 2012). Food handlers serve critical responsibilities in the food service system, thus they should keep themselves clean and wear appropriate protective clothing, headgear, and footwear (Qoura & Ali, 2016). Furthermore, the working environment of food handlers shall also be hygienic to free any possible hazards in the food-making process because an unhygienic workplace will cause a potential carrier of any disease (Sneha, 2019).

The way food quality is monitored and guaranteed across the network is critical to chain performance. Aside from being a performance indicator in and of itself, product quality is linked to other food attributes such as integrity and safety (Van *et al.*, 2009). Therefore, quality control and assurance have become increasingly essential in the food business (Wilcock *et al.*, 2004). According to Holleran (1999), while a quality assurance system helps monitor food safety, it also provides a liability defense that will assist in reaching the food safety regulations and standards. The assurance can be proved through certification such as ISO 22000. It outlines the standards for a Food Safety Management System when an organization in the food chain needs to demonstrate its competence to control hazards related to food safety to ensure that the food is safe to be consumed (Escanciano & Santos-Vijande, 2014). Another certified method to be considered is Hazard Analysis Critical Control Point (HACCP), a tool for controlling food hazards and has been widely acknowledged as the best method of assuring food safety (Khandka & Mayes, 1998).

However, while making the purchase decision, consumers might not have proper information about the true quality of a product (Yoo, 2014), causing dissatisfaction with a product to occur and having the disqualified product. Hence, the main reason why a return policy is needed is clearly due to the quality problem of a product (Yoo, 2014).

Lastly, procurement and supply of products at an appropriate price and within the agreed delivery lead time now have a significant impact on market demand (Noori *et al.*, 2017), making price and delivery time are also considered as an important factor in the supplier selection process

The selection of supplier criteria that have met the requirements sought can be specified through the identification stage. Jharkhariaa and Shankarb (2007) stated that the identification stage is a very important stage as this stage is aimed at the elimination of unsuitable suppliers. This research paper aims to sort out a few criteria for supplier selection in the hospitality industry that are most qualified based on the food safety standard. Moreover, this may go along with supplier segmentation on which appropriate suppliers are sectioned based on the sort of service rendered (Rezaei & Ortt, 2012). Figure 1 illustrates multiple criteria for food supplier selection that are compiled through literature review.

Figure 1. The supplier selection criteria for hospitality industry

Figure 1 mentions nine supplier selection criteria: food quality, safe packaging, healthy workforce, healthy workplace, proper labeling of information, timely delivery of food, return-ability of problematic food, price, and certifications from regulatory bodies. Each of these criteria is important for food businesses in the world, in general, and Indonesia, in particular. These criteria will be evaluated in the current study. The complete list of the criteria to be evaluated in the current study with their description and sources is presented in Table 1. The supplier selection framework that considers these criteria is better equipped to evaluate suppliers comprehensively, especially in the hospitality industry like restaurants and hotels where good supplies are a source of satisfied customers.

2.3 Supplier Selection through Grey Relational Analysis

Purchasing departments' main goals are to get the ideal product at the right price, quantity, quality, timing, and source (Sarkis & Talluri, 2002). Hence, selecting a proper supplier is not an easy process as many factors are being considered in the decision-making process. Because supplier selection is dependent on criteria, the definition and selection of criteria play a critical part in the decision-making (Banaeian *et al.*, 2015). Selecting suppliers who best meet the standards based on a set of criteria can improve the intended qualities of purchased goods and services and the performance of supplier evaluation (Lau *et al.*, 2018).

Multi-criteria decision-making is an important stream of research within operations research and has seen widespread application in supplier selection problems. MCDM allows a decision-maker to evaluate multiple options against multiple criteria (Liu *et al.*, 2019). In literature, scholars have used different kinds of tools for supplier selection, e.g., Analytic Hierarchy Process (Deng *et al.*, 2014), Best Worst Method (Rezaei *et al.*, 2016), Ordinal Priority Approach (Mahmoudi *et al.*, 2021a; 2021b), TOPSIS (Kamalakannan *et al.*, 2020), etc. However, when the sample size is small, or the system contains uncertainty, traditional MCDM methods have their limitations, and thus approaches like fuzzy logic and grey system theory become natural choices (Mahmoudi *et al.*, 2021; Javed *et al.*, 2021a; Xie *et al.*, 2021). Table 2 summarizes the literature review where MCDM approaches have been used to evaluate suppliers in the hospitality industry.

Table 1. The supplier selection criteria for hospitality industry

Code	Criteria	Description	Source
C1	Food Quality	Is the food quality provided qualified?	Marucheck (2016); Wilcock *et al.* (2004)
C2	Safe Packaging	Is the food properly packaged?	Robertson (1998)
C3	Healthy Workforce	Is there any health protocols/procedures applied while working?	Mukhopadhyay *et al.* (2012); Qoura and Ali (2016)
C4	Healthy Workplace	Is the workplace hygienic?	Sneha (2019)
C5	Proper Labeling of Information	Are the necessary information about the product such as composition, expiry date, etc., are properly labelled on the food's package?	Ababio *et al.*, (2012)
C6	Timely Delivery of Food	Does the supplier deliver food exactly on time?	Noori *et al.* (2017)
C7	Return-ability of Problematic Food	Is there any return policy for disqualified food?	Yoo (2014)
C8	Price	Is there a budget for price or considering the price offered by the supplier?	Noori *et al.* (2017)
C9	Certifications from Regulatory Bodies	Does the supplier have ISO 22000 certification to certify the safety and quality of their product? Does the supplier have HACCP certification to ensure their food hygiene?	Escanciano and Santos Vijande (2014); Khandka and Mayes (1998)

Grey System Theory (GST) was initiated in the 1980s by Deng Julong, and the concept of the "grey" hereby, stands for the system proportion where it concludes the separation between the white and the black (Deng *et al.*, 1982; Javed *et al.*, 2020b). It can effectively deal with uncertain decision-making problems resulting from human cognition's objective complexity and limitations (Du *et al.*, 2021). The framework of Grey System Theory has been successfully utilized for cases where data contain uncertainty, incompleteness, or insufficiency (Ertugrul *et al.*, 2016; Ikram *et al.*, 2020; Javed *et al.*, 2021c).

Grey Relational Analysis (GRA) is a popular MCDM model and is at the heart of GST. The basic idea of GRA is to conclude the degree of relationship between factors by comparing geometrical patterns of data (Javed *et al.*, 2020b; Dong *et al.*, 2018). GRA has been applied for solving supplier selection problems (Diba & Xie, 2019; Yang & Chen, 2006), temperature-disease transmissibility relationship analysis (Irfan *et al.*, 2021), optimization of engineering processes (Obara *et al.*, 2021), evaluations of barriers to university enrollment (Fahim *et al.*, 2021) and healthcare resource factors (Peng *et al.*, 2021), among others. The implementation of GRA then being applied to Grey Relational Grade (GRG) to estimate the count relation of factors (King & Wen, 2007). The GRA depends on the correlation factors and being estimated between the reference orders and all comparative factors in sequences. To summarize the GRG, the comparability sequence should have the highest grade to be the best choice. GRG is given by,

$$\gamma_{0i} = \gamma(X_0, X_1) = \frac{1}{n}\sum_{k}^{n}\gamma(x_0(k), x_i(k)), \quad (1)$$

where $\gamma(x_0(k), x_i(k))$ is the Grey Relational Coefficient (GRC) given by,

$$\gamma(x_0(k), x_i(k)) = \frac{min_i min_k |x_0(k) - x_i(k)| + \xi\, max_i max_k |x_0(k) - x_i(k)|}{min_k |x_0(k) - x_i(k)| + \xi\, max_i max_k |x_0(k) - x_i(k)|} \quad (2)$$

Here, ξ is the distinguishing coefficient whose value ranges between 0 and 1 though most scholars usually assume its value to be 0.5. However, following Mahmoudi *et al.* (2020), the current study will apply Deng's GRA while performing the sensitivity analysis on different values of ξ so reliable and rigorous results can be obtained.

Table 2. Summary of literature on supplier selection in hospitality industry

Literature	Short description	Method
Hsu *et al.* (2014)	Low carbon supplier selection in the hotel industry of Taiwan	FDM; DANP; VIKOR
Sakhuja *et al.* (2015)	Selection of outsourcing strategies in hotel industry in India	F-AHP; F-TOPSIS
Chung (2015)	Supplier selection in the hospitality industry of Taiwan	AHP
Önder & Kabadayi (2015)	Supplier selection in hospitality industry in Turkey	ANP
Darmaja *et al.* (2018)	Groceries supplier selection at Melia Bali Hotel Indonesia	DSR
Sureeyatanapas *et al.* (2018)	Egg supplier selection in food industry in Thailand.	ROC; TOPSIS
Ali (2019)	Vendor performance assessment in hospitality industry in Yogyakarta, Indonesia	F-AHP

F-AHP: Fuzzy Analytical Hierarchy Process; AHP: Analytical Hierarchy Process; ANP: Analytic Network Process; TOPSIS: The Technique for Order Preference by Similarity to Ideal Solution; ROC: Rank Order Centroid; DSR: Descriptive Statistical Research; F-TOPSIS: Fuzzy TOPSIS; DANP: DEMATEL-based Analytic Network Process; VIKOR: VlseKriterijumska Optimizacija I Kompromisno Resenje; FDM: Fuzzy Delphi Method

Table 3. Demographic information of the respondents

Characteristics	Demographic Characteristic	Number	%
Industry	Bakery	1	5.9
	Cafe	2	11.8
	Event Management	1	5.9
	Hotel	7	41.1
	Restaurant	4	23.5
	Tourism and Travel	2	11.8
Job Position	Entry level job	13	76.5
	Middle level job	3	17.6
	Upper level job	1	5.9
Work Experience	1 - 3 years	15	88.2
	4 - 6 years	1	5.9
	More than 6 years	1	5.9
Age	Less than 25	14	82.4
	25 to 34	3	17.6
Gender	Male	7	41.2
	Female	10	58.8

3. Research Methodology

Data were gathered through an online survey created on Google Form. It was sent to potential respondents in Indonesia, and 17 experts filled it properly on a 9-point Likert scale, where 9 showed most important and 1 showed least important. In the current study, A represents respondent and C represents criterion. Table 3 shows the demographic information of the respondents. Most of the respondents were female employees with at least three years of experience working in the hotel

Table 4. The original data

	A 1	**A 2**	**A 3**	**A 4**	**A 5**	**A 6**	**A 7**	**A 8**	**A 9**	**A 10**	**A 11**	**A 12**	**A 13**	**A 14**	**A 15**	**A 16**	**A 17**
C 1	4	5	8	1	6	9	9	9	9	6	9	7	1	1	7	9	2
C 2	2	5	8	1	7	4	9	9	9	7	9	7	3	2	7	6	3
C 3	2	6	9	3	7	8	9	9	9	7	9	7	5	1	8	8	1
C 4	1	6	9	3	7	8	9	9	9	7	8	7	5	1	8	8	1
C 5	5	6	7	3	8	6	8	8	8	8	8	7	5	3	8	6	3
C 6	4	4	9	5	7	7	9	9	9	7	9	7	2	1	7	9	1
C 7	5	4	9	1	7	5	8	8	8	7	9	7	2	1	8	7	2
C 8	3	1	6	1	6	4	8	8	8	6	7	8	1	3	8	9	2
C 9	4	6	8	4	8	7	9	9	9	8	9	7	5	2	8	4	4

Table 5. Grey relational coefficients at ξ=0.5.

	A1	**A2**	**A3**	**A4**	**A5**	**A6**	**A7**	**A8**	**A9**	**A 10**	**A 11**	**A 12**	**A 13**	**A 14**	**A 15**	**A 16**	**A 17**
C 1	0.57	0.50	0.36	1.00	0.44	0.33	0.33	0.33	0.33	0.44	0.33	0.40	1.00	1.00	0.40	0.33	0.80
C 2	0.80	0.50	0.36	1.00	0.40	0.57	0.33	0.33	0.33	0.40	0.33	0.40	0.67	0.80	0.40	0.44	0.67
C 3	0.80	0.44	0.33	0.67	0.40	0.36	0.33	0.33	0.33	0.40	0.33	0.40	0.50	1.00	0.36	0.36	1.00
C 4	1.00	0.44	0.33	0.67	0.40	0.36	0.33	0.33	0.33	0.40	0.36	0.40	0.50	1.00	0.36	0.36	1.00
C 5	0.50	0.44	0.40	0.67	0.36	0.44	0.36	0.36	0.36	0.36	0.36	0.40	0.50	0.67	0.36	0.33	0.67
C 6	0.57	0.57	0.33	0.50	0.40	0.40	0.33	0.33	0.33	0.40	0.33	0.40	0.80	1.00	0.40	0.44	1.00
C 7	0.50	0.57	0.33	1.00	0.40	0.50	0.36	0.36	0.36	0.40	0.33	0.40	0.80	1.00	0.36	0.40	0.80
C 8	0.67	1.00	0.44	1.00	0.44	0.57	0.36	0.36	0.36	0.44	0.40	0.36	1.00	0.67	0.36	0.33	0.80
C 9	0.57	0.44	0.36	0.57	0.36	0.40	0.33	0.33	0.33	0.36	0.33	0.40	0.50	0.80	0.36	0.57	0.57

industry. The nine selection criteria reported in Table 1 were considered for supplier evaluation. The equally weighted Grey Relational Analysis (GRA) will be applied to prioritize the nine criteria against the responses of the seventeen respondents with MS Excel's aid. The collected data is shown in Table 4.

4. Results and discussion

The study applied Deng's GRA model to the data collected from 17 respondents. Table 5 presents the Grey Relational Coefficient values. The rank defines the positions of each criterion that closely stand the food standards based on experts surveyed. Table 6 will show us Grey Relational Grades at different values of ξ (0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9). This sensitivity analysis helps us get an overall picture of the problem. It also confirmed the thesis put forward by Mahmoudi *et al.* (2020), i.e., the variation in ξ changes ranks. In Table 6, the ranks are shown within

Table 6. Grey Relational Grades and ranks at different values of ξ

	0.1	**0.2**	**0.3**	**0.4**	**0.5**	**0.6**	**0.7**	**0.8**	**0.9**
	GRG [Rank]	**GRG [Rank]**	**GRG [Rank]**	**GRG [Rank]**	**GRG [Rank]**	**GRG [Rank]**	**GRG [Rank]**	**GRG [Rank]**	**GRG [Rank]**
C1	0.293 [2]	0.373 [2]	0.434 [2]	0.484 [2]	0.525 [2]	0.56 [3]	0.589 [3]	0.615 [3]	0.638 [3]
C2	0.230 [7]	0.335 [5]	0.410 [5]	0.468 [4]	0.514 [4]	0.553 [4]	0.586 [4]	0.614 [4]	0.638 [4]
C3	0.244 [6]	0.330 [7]	0.396 [7]	0.449 [7]	0.492 [7]	0.529 [7]	0.561 [7]	0.589 [7]	0.613 [7]
C4	0.277 [3]	0.354 [4]	0.414 [4]	0.464 [5]	0.506 [5]	0.541 [5]	0.572 [5]	0.599 [5]	0.622 [5]
C5	0.150 [9]	0.256 [9]	0.336 [8]	0.400 [8]	0.452 [8]	0.495 [8]	0.532 [8]	0.563 [8]	0.591 [8]
C6	0.245 [5]	0.332 [6]	0.399 [6]	0.452 [6]	0.497 [6]	0.534 [6]	0.566 [6]	0.593 [6]	0.618 [6]
C7	0.264 [4]	0.357 [3]	0.425 [3]	0.479 [3]	0.523 [3]	0.560 [2]	0.591 [3]	0.618 [2]	0.641 [2]
C8	0.315 [1]	0.405 [1]	0.471 [1]	0.522 [1]	0.564 [1]	0.599 [1]	0.628 [1]	0.653 [1]	0.675 [1]
C9	0.153 [8]	0.257 [8]	0.335 [9]	0.397 [9]	0.448 [9]	0.491 [9]	0.527 [9]	0.558 [9]	0.585 [9]

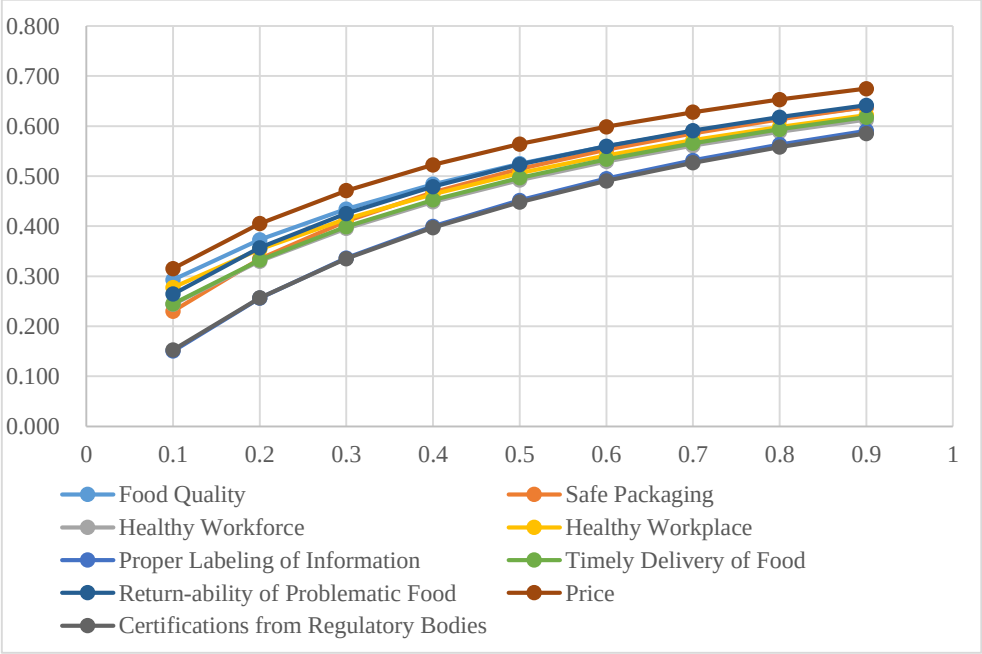

Figure 2. Grey Relational Grades at different values of the distinguishing coefficient

Figure 3. Ranks at different values of the distinguishing coefficient

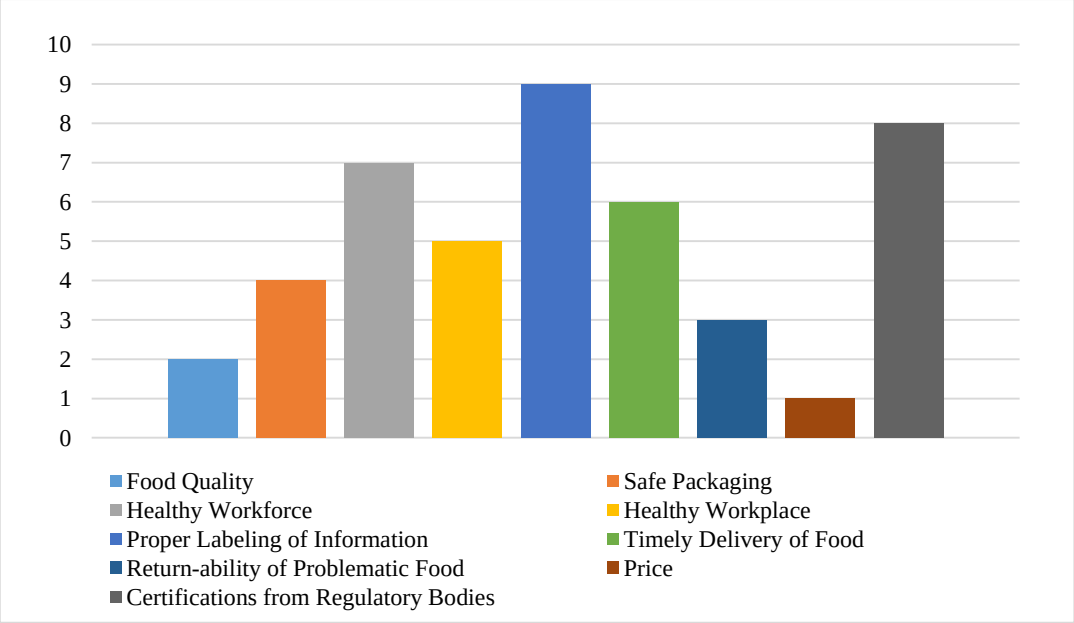

Figure 4. Ranking of the hospitality sector supplier selection criteria with GRA ($\xi = 0.5$)

square brackets. Grey Relational Grades and ranks at different values of Distinguish Coefficient (DC) are shown in Figures 2 and 3, respectively.

Furthermore, even though different values of DC have been applied, the calculation results show that one of the best criteria, namely Price, always occupies the top rank, while the distinguishing coefficient range defines the rank of other criteria. The ranking produced through Deng's GRA (at $\xi = 0.5$) is shown in Figure 4.

In the end, as the result of the ξ (0.5) based on the rank and valued by experts, Price occupies the first rank as the most important criteria as rated to supplier selection and followed by related criteria in sequences, i.e., Food Quality, Return-ability of Problematic Food, Safe Packaging, Healthy Workplace, Timely Delivery of Food, Healthy Workforce, Certifications from Regulatory Bodies, and Proper Labeling of Information.

5. Conclusion

Hospitality is a customer-oriented service industry where it mainly thrives by customer's satisfaction. Hence one shall be able to provide good service to run the business. The Hospitality Industry has an orientation where its supply chain management is important for the success of one industry. If one's supply chain is well-managed, goods and services will be well provided, increasing customer satisfaction, which improves performance's value. The results can contribute to improving the well-being of one's industry, specifically for the hospitality industry. Thus, in arranging to set up a well-managed supply chain, selecting the right supplier is the critical first step. The right supplier helps adds value to the goods and services demanded by the customer, thus paving the way for better outcomes while increasing the industry's surplus, where apparently, these procedures work as a cycle. Consequently, satisfied customers are produced through satisfying supplies.

Nine criteria based on health, safety, and food standards identified through several literature studies have been discussed to select the right supplier in the hospitality industry. Later, these criteria have been prioritized by GRA in different scenarios built through the variation in the distinguishing coefficient. Also, the study confirmed the thesis of Mahmoudi *et al.* (2020) by arguing that the variation in the distinguishing coefficient does indeed influences ranks.

The results revealed Price to be the most important criteria that experts should consider in the process of selecting supplier as it consecutively ranked first at different distinguish coefficient values calculated. To be precise ($\xi = 0.5$), Price took first place followed by the rest of the criteria, i.e., Food Quality, Return-ability of Problematic Food, Safe Packaging, Healthy Workplace, Timely Delivery of Food, Healthy Workforce, Certifications from Regulatory Bodies, and Proper Labeling of Information. Hence, in selecting a supplier in the hospitality industry, experts can consider the proposed criteria based on health, safety, and food standards that have been ranked out. In the future, these criteria can be used to evaluate suppliers in the hospitality industry.

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