

Empirical investigation of trust antecedents and consequences in decentralized supply chain: The case of cosmetics market in Iran

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ABSTRACT

This study develops an empirical investigation of trust antecedents and consequences in creating a collaborative business relationship between distribution companies and retailers in the cosmetics market. A conceptual framework based on trust antecedents as inputs and trust consequences as outputs is designed for both parties. In order to evaluate the performance and effectiveness of each considered trust factor for each party, a fuzzy data envelopment analysis (FDEA) based approach is proposed. In order to demonstrate the applicability of the proposed model, a real-life case study is considered. The required data are collected using interview and questionnaires, and the reliability of the collected data is examined using the Cronbach's alpha. The obtained results indicate that there is no significant difference between both parties' tendency towards building a collaborative business relationship based on trust. The results also indicate that information sharing is not an effective trust antecedent for both parties. The "product quality" and "product price" are the most effective trust antecedents for retailers, while the "retailer's financial conflicts records" along with "length of partnership" are the most effective trust antecedents for distribution companies. Finally, the most effective trust consequences for distribution companies and retailers are "information sharing" and "brand advertising", respectively.

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1. Introduction

The current aggressive competition in the market has forced companies to extend their business relationships and markets in order to survive (Kotabe & Kothari, 2016). Creating collaborative relationships with business partners is the key to stay in business and make money nowadays (Prajogo, 2016). Business relationships among partners are created based on reciprocal expectations, similar to social relationships. The most significant known deliverables that each supply chain player can offer in a business relationship are materials, money, and information. Accordingly, there are three important flows among supply chain players, including materials, financial, and information flows (Arani & Torabi, 2018; Stadler, 2015). Each supply chain player expects its partners to deliver the deliverables as they have agreed to. In an ideal world nothing would disrupt partners from fulfilling their deliverables, however, the business world is full of uncertainties such as players' opportunistic

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behaviors. To this end, confidence in receiving the deliverables as they have agreed to is of great significance (Melnyk et al., 2009; Yazdanparast et al., 2018). This macro ergonomic factor is called trust (Chen & Paulraj, 2004). Various researchers and practitioners have studied trust in the past decades, and various definitions are presented. According to Moorman et al. (1992), trust is defined as a willingness to rely on an exchange partner in whom one has confidence. Trust is the key contributor to a strategic alliance success. Does any business relationship require trust? The answer is no. Trust is a necessary condition for commitment and commitment only matters if tomorrow matters. Therefore, trust highly matters to collaborative relationships in decentralized supply chains. Although a huge amount of studies addressed supply chain flows and related uncertainties and disruptions, relatively few papers have dealt with trust antecedents and consequences among supply chain players. It is been indicated that as environmental uncertainty grows, the effects of trust are more highlighted in business relationships (Wang et al., 2011). As trust increases among partners, the perception of risk associated with opportunistic behavior decreases (Lui et al., 2009). According to the literature, the lack of trust between partners is one of the most important issues leading to unsuccessful relationships. When trust decreases in a relationship, both parties scrutinize and verify each trade and transaction, emphasize on more detailed contracts and confidential agreements. Finally, lack of trust results in more transaction costs and time which finally reduces the agility and responsiveness of each player along with the whole chain (Chen et al., 2011). Trust affects the supply chain performance from various perspectives. Kwon and Suh (2005) indicated that trust leads to relationship commitment in supply chains. Trust also impacts the cooperation among players in the supply chain significantly (Yeung et al., 2009; Zhao et al., 2008; Zhao et al., 2011). It is important to note that earning trust is costly, parties have to invest money and time, and expose themselves to vulnerability to earn their partners' trust. Therefore, there is a more important step after building trust, and that is keeping the trust. As business and social experts say, trust is hard to gain, but easy to lose. To this end, identifying the trust antecedents for supply chain players in a decentralized network is of great importance to build and keep trust (Urban et al., 2000).

There are various trust enablers in business relationships which are also known in the literature as trust antecedents. According to the Mayer et al. (1995), the trust antecedents can be classified into three main categories, including the general characteristics of the trustee, the trustor's propensity to trust others, and situational factors. The general enabler of trust is trustor's satisfaction with the trustee's performance in the relationship. Trust also have some consequences in the business behaviors of parties. For example, when a supplier trusts a retailer, delayed payments are allowed. This kind of behaviors which occur only when a partner trust another are called trust consequences. Information sharing is one of the most known and significant consequences of trust in supply chains. Parties share information which they think would help their trusted partners in the supply chain. Information sharing among supply chain players benefit the chain from various perspectives.

Previous studies have investigated the trust from various perspectives. Ozpolat et al. (2018) investigated the relationship between the length of a vendor-managed inventory (VMI) and trust among manufacturers and distributors in a supply chain. The impacts of trust and managerial ties on information sharing in supply chains are evaluated by Wang et al. (2014). Fawcett et al. (2012) investigated the relationship between trust and collaborative innovation capability in the supply chain. Cai et al. (2013) investigated the effects of trust and power on knowledge sharing in collaborative supply chains. Vlachos and Bourlakis (2006) indicated that the perceived trust of each player in the supply chain is dependent on its own perceived affecting factors which are not necessarily similar for all players. Laeequddin et al. (2010) proposed a conceptual framework for the evaluation of trust from risk perspectives. Chen et al. (2011) investigated the relationship between trust and information sharing, information quality, and information availability in a supply chain context. Han and Dong (2015) developed a two-stage coordination model by considering the trust between supplier and retailer. Beer et al. (2018) proposed a game theory-based approach to reflect supplier trustworthiness to potential buyers. Fawcett et al. (2017) presented an empirically grounded approach to investigate trust-building process between supplier and buyer in the supply chain context. Wang et al. (2011) evaluated the

performance of trust and contract on innovativeness in the supply chain under uncertain environment. Capaldo and Giannoccaro (2015b) investigated the impacts of interdependence structure on network-level trust in the context of the supply chain. Zhang and Huo (2013) evaluated the impact of joint dependence and trust on supply chain integration and financial performance. Panayides and Lun (2009) demonstrated that trust has positive impacts on innovativeness and supply chain performance. Sharfman et al. (2009) evaluated the role of trust in creating a cooperative environment in supply chain management (SCM). Handfield and Bechtel (2002) indicated that trust among supply chain players has positive effects on supply chain responsiveness. Capaldo and Giannoccaro (2015a) investigated the effect of trust and interdependency degree on supply chain performance. Moore (1998) investigated the role of trust and commitment in logistics alliances by focusing on buyer perspective. Tejpal et al. (2013) reviewed and classified the concept of trust in the context of the supply chain. Laeequddin et al. (2012) presented a conceptual framework for building trust among supply chain players.

According to the Glaeser et al. (2000), many researchers and practitioners in different fields believe that social capitals such as trust have a significant impact on economic or political decisions and performance. Although trust is extremely effective in supply chain relationships, collaboration, and cooperation, it is hard to measure. The researchers also believe that managers do not understand the nature of trust, neither the process of building it and there is a knowledge gap (Fawcett et al., 2012). The complexity of trust in the real-world business relationships seems to be beyond what theories say. For example, Ebrahim-Khanjari et al. (2012) indicated that although manufacturers' representatives give false information about demand forecasts to the retailers to maximize their own profits by selling more, the retailers tend to trust them in the long run. Therefore, it seems generalized trust evaluation models based on empirical investigations is the best way to link the concept of trust with dynamics of trust in the real-world business relationships and fill the knowledge gap. According to Sahay (2003), in order to understand the role of trust in business relationships, some significant questions should be answered; (i) What leads to a trusting behavior in a business relationship?, (ii) What is the effect of trust on the behavior of each player?. The answer to the first question is trust antecedents, while the answer to the second question is trust consequences. These factors should cover all aspects of each player's major expectations and business related behaviors in a business relationship in order to build and keep trust. To this end, the objective of this study is to investigate the trust antecedents and consequences among distributors and retailers in the cosmetics industry in Iran. First, using a comprehensive investigation among executive and sales managers of the cosmetics distribution companies and retailers the trust antecedents and consequences for both distributors and retailers are identified. Then, the required data for trust assessment are collected using standard questionnaires based on the developed conceptual model. Finally, the weight of each trust antecedent and consequence from both distributors and retailers' perspective are calculated. The obtained managerial insights help practitioners in the cosmetics industry to improve their business relationships especially in Iran where the economy is unstable and trust plays an important role in business relationships and successful business alliances. The proposed conceptual model and obtained results also contribute to the existing literature in performance evaluation of trust and better understanding using a ground-based empirical investigation. To the best of our knowledge, this is the first study that investigates the trust between distributors and retailers.

The rest of this paper is organized as follows. Section 2 presents the problem description. Section 3 is dedicated to the proposed conceptual model of this study which is comprised of trust antecedents and consequences from both distributors and retailers' perspective. Section 4 proposes an empirical investigation of trust in cosmetics supply chain in Iran. The obtained results and discussion are presented in Section 5. Lastly, Section 6 concludes the paper and proposes some directions for future research.

2. Problem description

2.1. Cosmetics market in Iran

The Persian culture emphasizes on fashion, art, aesthetics, and design more than any other culture in the region. Iran is one of the biggest cosmetics markets in the world. Women above 15 years old are the potential customers of this market. A vast majority of people below 40 has created a 4 billion dollars' cosmetics market in Iran which is an attractive destination for international cosmetics companies' products around the world (Hanzaee & Andervazh, 2012). The cosmetics supply chain in Iran is completely decentralized. Distribution centers are located in Iran, while manufacturers and suppliers are located in other countries. Due to the economic sanctions on Iran in the past decades and political issues, cosmetics international brands do not hold any representatives in Iran. Therefore, national distribution companies are importing cosmetics from international brands representatives mainly located in Dubai, Turkey, and France. Currently, there are 93 legal cosmetics distribution companies mainly located in Tehran which import various international cosmetics brands. After importing the cosmetics, the distribution companies supply the demands of retailers in Tehran and send the rest to the retailers in other major cities of Iran. Some of this distribution companies are working exclusively with one international brand, while others import cosmetics from multiple brands. Currently, there are more than two hundred cosmetics brands in Iran which are mainly produced in Europe and China. The multiplicity of brands especially targeting middle and poor classes has resulted in an aggressive competitive market. Besides the competition for market share, another problem in the cosmetics market in Iran is fake cosmetics. Allergic reaction and skin breakouts are side effects of fake cosmetics due to the presence of toxic materials such as mercury. It should be noted that it is not easy to spot differences between fake and real cosmetics at the first look, however, the customer will finally find out about the low quality of the product. The fake cosmetics can extensively damage brand and retailers' reputation. Besides the quality of the product, there are various other actions that can damage each partner's reputation and financial performance. For example, aggressive retail discounts can damage brand reputation which is a financial damage to the manufacturer, main supplier and national distributor. To this end, a collaborative business relationship between distributors and retailers plays an important role in their financial performance. Trust is the key to a collaborative relationship which results in a successful alliance and prosperity for both parties.

2.2. Trust antecedents and consequences

Trust between cosmetics distribution companies and retailers can benefit all the supply chain players. The collaborative relationship which is the result of trust and commitment can improve the financial performance of players in the context of the decentralized supply chain.

Distributors sell cosmetics to the retailers in Tehran and to the local distributors in other cities. The scope of this study only considers cosmetics retailers in Tehran. The objective of this study is first, determination of trust antecedents from both distributors and retailers' perspective. Furthermore, the trust consequences from both distributors and retailers' perspective are determined using ground empirical investigation. Finally, the weight and impact of each trust antecedent and consequence in the cosmetics market is calculated.

3. Conceptual model

In order to build and keep the successful business relationship, we should build and keep trust. Since trust is a multi-dimensional concept, there are various antecedents on it which should all be considered in a comprehensive trust building model. According to Mayer et al. (1995), trust antecedents can be classified into three main categories, including the general characteristics of the trustee, the trustor's propensity to trust others, and situational factors. The proposed conceptual model for the determination

of trust antecedents in this study is based on the stated categories. In this regard, 78 executive and sales managers, and business development experts of five cosmetics distribution companies located in Tehran are interviewed and asked for their trust antecedents in retailers. The demographic features of distribution companies' participants in this empirical investigation are presented in Fig. 1. They are also asked about their trust consequences and privileges for trusted retailers. After careful examination of gathered data, the distributors' trust antecedents and consequences are determined and presented in Table 2.

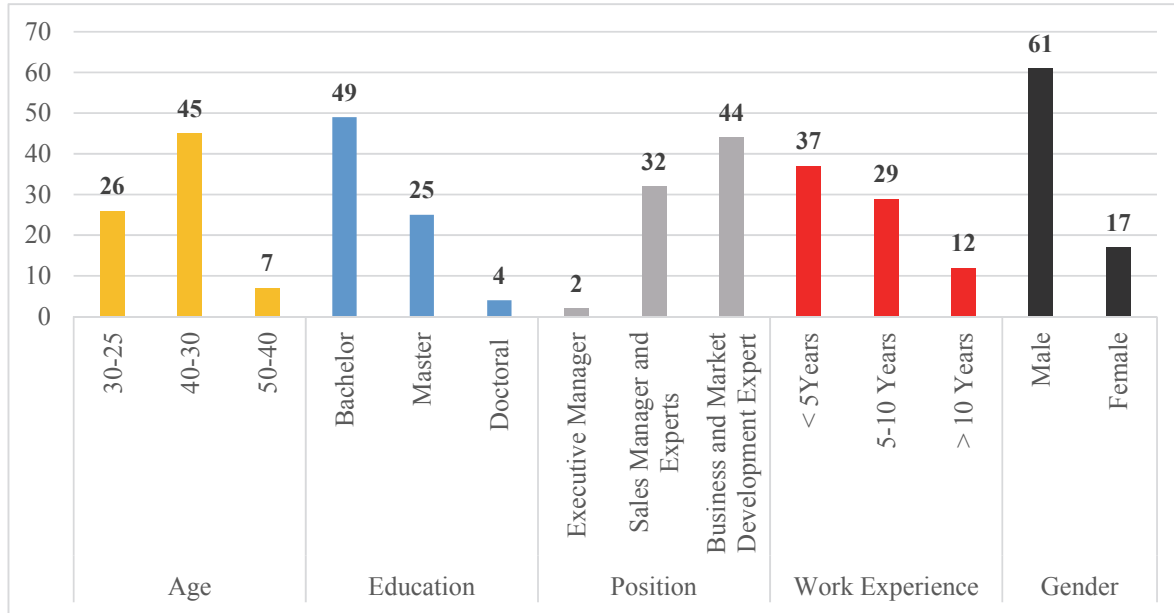


Fig. 1. The demographic features of distribution companies' participants

Table 1

Trust antecedents and consequences of cosmetics distribution companies

Category	Indicators	Distributors' Stand Point
Trust Antecedents	Exclusive cooperation	Does this retailer exclusively present our products or he is presenting other brands too?
	Information sharing	Does this retailer share useful and reliable information?
	Being a regular customer	Does this retailer make irregular orders or is he a regular customer?
	Financial dependability	Does this retailer make on-time payments or is he late in paying us?
	Retailer's financial conflicts records	Do we have any history of financial conflict with this retailer?
	Retailer's consumer complaints records	Have we received any consumer complaints regarding this retailer? (Since our contact information is on all of our products, customers can contact us any time)
	Retailer's financial status	How is the financial status of this retailer? Which part of the city is he operating? How connected is he?
	Length of partnership	How long do we have a business relationship with this retailer?
Trust Consequences	Permissible delay in payments	We offer permissible delay in payments to our trusted retailers.
	Granting exclusive products	Sometimes we grant our exclusive or new products only to our trusted retailers in each region of the city.
	Special discounts and allowances	We offer special discounts and allowances to our trusted retailers.
	Advertising for the trusted retailers	There are usually customers who try to buy products directly from us, however, we refer them to the available retailers in the city. In this reference, our trusted retailers always come first. Also, we can advertise our trusted retailers' address and contact information on our website.
	Information Sharing	We provide useful information for our trusted retailers.

In order to identify trust antecedents and consequences of retailers, 65 cosmetics retailers are interviewed and asked. The demographic features of participant retailers are presented in Fig. 2. After careful examination of gathered data, the retailers' trust antecedents and consequences are determined and presented in Table 3.



Fig. 2. The demographic features of participant retailers

Table 2
Trust antecedents and consequences of cosmetics retailers

Category	Indicators	Retailers' Stand Point
Trust Antecedents	Information sharing	Does this distributor share useful and reliable information?
	Brand reputation and advertising	Does this distributor provide brand reputable and well-known products? (There are various distributors who sell Chinese low-quality products in the market)
	Product price	Does this distributor provide products with a fair price?
	Distributor reputation	Does this distributor have a good reputation in the cosmetics market? Their previous partners (retailers) are satisfied with their performance?
	Product quality	Are our customers satisfied with the product provided by this distributor? Or we are receiving many complaints regarding products quality.
	Product delivery	Does this retailer deliver our orders on time?
	Length of partnership	How long do we have a business relationship with this distributors?
Trust Consequences	Brand advertising	We advertise the brand of our trusted distributors in any way we can (such as banners, stands and etc.)
	Increase in order volume	We increase our order volume when we trust the distributor. This can minimize our ordering costs and distributors' delivering costs.
	Making payments on time	We try our best to make our trusted distributors' payments on time.
	Information sharing	We share any information we get directly from the market and customers with our trusted distributors.

The proposed conceptual model is able to cover all aspects of trust from both distributors and retailers' perspective. The identified trust antecedents form the trust of distributor-retailer business relationship, while trust consequences determine the business behaviors which are the results of the formed trust.

4. Methodology

Performance evaluation of the proposed trust conceptual model is of great importance. As discussed in Section 1, previous studies have indicated that various combination of trust antecedents can form trust due to its multi-dimensionality. Ebrahim-Khanjari et al. (2012) indicated that although distributors' agents give false information to the retailers, they tend to trust agents in a long run. In other words, although the information sharing which is one of the important antecedents of trust is violated, other

trust antecedents have formed a trust. Therefore, determining the performance and weight of each indicator in the proposed trust model is of great importance. This study proposes a fuzzy data envelopment analysis (FDEA) based methodology for performance evaluation of the proposed trust model. Since trust is a subjective concept, fuzzy logic is used to deal with the available uncertainty. The proposed approach calculates a trust efficiency score by considering the trust antecedents as input variables and trust consequences as outputs. The calculated efficiency score determines the level of trust for each decision-making unit (DMU). The proposed FDEA based approach is used for distributors and retailers, separately. The distribution companies' participants and retailers' participants are the DMUs of each trust model, respectively. Fig. 3 demonstrates the schematic view of the proposed approach.

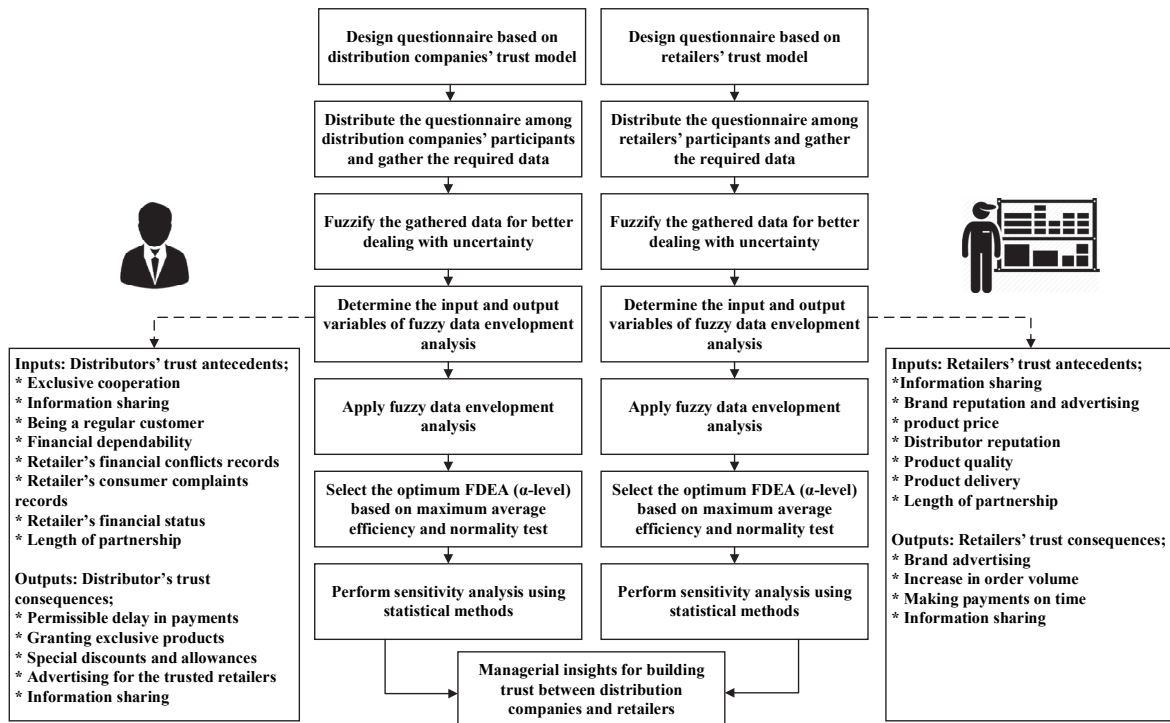


Fig. 3. The schematic view of the proposed methodology

4.1. Questionnaire design

In order to empirically test the proposed trust model for both distributors and retailers, a field questionnaire is developed. Some of the items of the questionnaires for measuring the proposed indicators are developed based on the conducted interviews, while others are derived from the past studies such as Chen et al. (2011), Vlachos and Bourlakis (2006), Wang et al. (2014), and Panayides and Lun (2009). In order to collect the required data from both distribution companies and retailers' participants, two questionnaires based on the identified trust antecedents and consequences for each party are distributed among related participants. In order to answer the items of the questionnaires, participants have marked an evaluation ruler which ranges from 1 (Completely disagree) to 10 (Completely agree). The developed items for questionnaires are presented in Appendix A.

4.2. Fuzzy data envelopment analysis (FDEA)

Data envelopment analysis (DEA) is a non-parametric method for evaluating the efficiency of DMUs based on multiple inputs and output variables. Although the primary use of DEA is investigating the productivity and efficiency of DMUs, and finally ranking them, it is a popular tool for investigating the relationship between multiple inputs and output variables in conceptual systems where the relationships among variables are complex and vague (Azadeh et al., 2017a). In other words, DEA usually evaluates

the performance of a system by considering multiple inputs and output variables, however, in order to evaluate the role of input and output variables, it is possible to reverse this process. In this regard, a set of experts from the system who are aware of the system processes, express their knowledge about the role of the input and output variables which form the overall performance of the system. Therefore, the obtained efficiency score for each expert determines the overall performance of the system based on the related input and output variables. The obtained set of efficiency scores from all participated experts depict the efficiency map of the system which demonstrates the current status of the system. The schematic view of the stated approach is presented in Fig. 4.

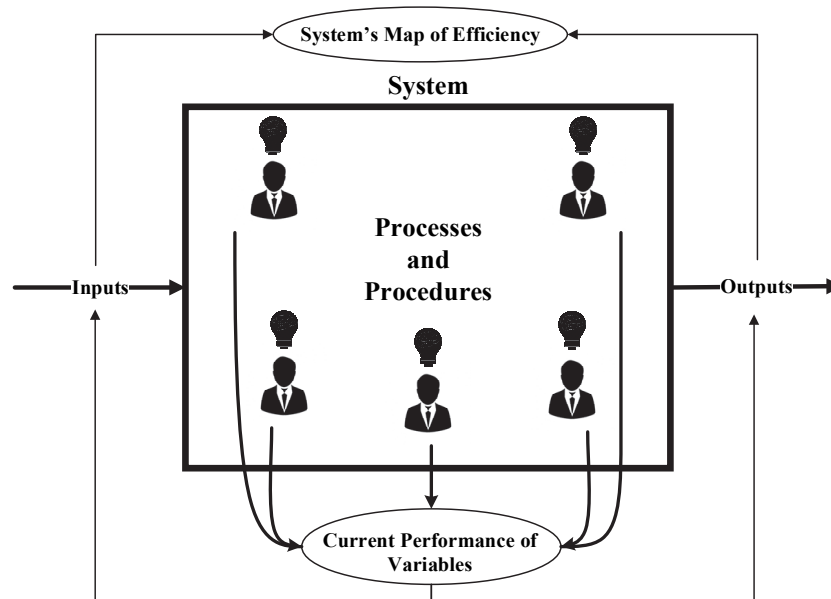


Fig. 4. Performance evaluation of system's variables using DEA

In order to evaluate the performance of indicators in a conceptual model using DEA, first, the efficiency scores of the DMUs considering all input and output variables are calculated. The obtained efficiency scores depict the efficiency map of the considered system. Then, each variable is eliminated from the model once, and the efficiency scores are recalculated. The non-existence of the eliminated variable causes changes in the obtained efficiency scores and efficiency map of the system. Comparing the obtained efficiency scores before and after the elimination of each variable from the model determines the performance of the eliminated variable. The most important thing to set before efficiency calculation using DEA is data preparation. Since efficiency can simply be defined as the ratio of output variables to inputs, the output variables are the larger-the-better type (LTB), while inputs are smaller-the-better (STB) type. In the implementation of DEA based models for performance evaluation or simply ranking DMUs, it is extremely important to fix the considered variables in the model based on this process. In this study, trust antecedents are considered as input variables, while trust consequences are outputs of each trust model (distributor's trust model and retailer's trust model). Since the nature of all considered variables is LTB, inputs should be transformed to STB before efficiency calculation. Therefore, Eq. (1) is used for transforming the input variables into STB type and scaling between 0 to 1 (called standardization), while Equation (2) only standardize the values of output variables (Azadeh et al., 2017b; Rabbani et al.).

$$x_{ji} = \frac{\text{Max}(x'_{ji}) - x'_{ji}}{\text{Max}(x'_{ji}) - \text{Min}(x'_{ji})} ; \forall i = 1, 2, \dots, I \quad (1)$$

$$y_{ri} = \frac{y'_{ri} - \text{Min}(y'_{ri})}{\text{Max}(y'_{ri}) - \text{Min}(y'_{ri})} ; \forall i = 1, 2, \dots, I \quad (2)$$

where x'_{ji} is the value of input (trust antecedent) j from DMU i and x_{ji} is the standardized value of the transformed to STB type for input j from DMU i . Also, y'_{ri} is the value of output r from DMU i , while y_{ri} represents the standardized value of output r from DMU i . The traditional DEA models were applicable for efficiency analysis of deterministic input and output variables, while in most cases data sets are not deterministic. Considering the vague and subjective nature of trust and related collected data, the fuzzy programming can be an appropriate choice. This study employs a fuzzy logic based DEA model proposed by Azadeh and Alem (2010). The utilized FDEA model for R output variables ($r = 1, 2, \dots, R$), J input variables ($j = 1, 2, \dots, J$), and I DMUs ($i = 1, 2, \dots, I$) is presented in Model (3).

$$\begin{aligned} \text{Max } \theta &= \sum_{r=1}^R u_r \widetilde{y}_{ri} \\ \sum_{j=1}^J v_j \widetilde{x}_{ji} &= 1 \\ \sum_{r=1}^R u_r \widetilde{y}_{ri} - \sum_{j=1}^J v_j \widetilde{x}_{ji} &\leq 0 \end{aligned} \quad (3)$$

$$v_j, u_r \geq 0 ; \forall j = 1, 2, \dots, J; r = 1, 2, \dots, R$$

where x_{ji} represents the standardized value of input variable j from DMU i and y_{ri} is the standardized value of output variable r from DMU i . Also, \widetilde{x}_{ji} and \widetilde{y}_{ri} are the fuzzy variables. Although various types of fuzzy membership functions are introduced in the literature, triangular fuzzy functions are the most efficient ones due to the simplicity and accuracy. In order to transform the model (2) into the triangular fuzzified model, the α -cut method proposed by Chang and Lee (2012) is used. Lastly, the transformed α -cut based FDEA model is presented in Model (4).

$$\begin{aligned} \widetilde{x}_{ji} &= (x_{ji}^l, x_{ji}^m, x_{ji}^u), \widetilde{y}_{ri} = (y_{ri}^l, y_{ri}^m, y_{ri}^u) \\ \text{Max } \omega &= \sum_{r=1}^R u_r (\alpha y_{ri}^m + (1 - \alpha)y_{ri}^l, \alpha y_{ri}^m + (1 - \alpha)y_{ri}^u) \\ \sum_{j=1}^J v_j (\alpha x_{ji}^m + (1 - \alpha)x_{ji}^l, \alpha x_{ji}^m + (1 - \alpha)x_{ji}^u) &= 1 \\ \sum_{r=1}^R u_r (\alpha y_{ri}^m + (1 - \alpha)y_{ri}^l, \alpha y_{ri}^m + (1 - \alpha)y_{ri}^u) - \sum_{j=1}^J v_j (\alpha x_{ji}^m + (1 - \alpha)x_{ji}^l, \alpha x_{ji}^m + (1 - \alpha)x_{ji}^u) &\leq 0 \\ v_j, u_r &\geq 0 ; \forall j = 1, 2, \dots, J; r = 1, 2, \dots, R \end{aligned} \quad (4)$$

where u_r represents the weight of output variables, while v_j is the weight of inputs. The optimum α -cut is selected based on the highest average efficiency scores from the set of 0.1, 0.25, 0.5, 0.75, and 0.9.

5. Case study

As mentioned before, trust plays an important role in collaborative business relationships among supply chain players particularly in a decentralized structure where each player tends to focus on its own profits. Since each market and business has its own characteristics and motivational factors for trust, it seems an effective and applicable trust model should arise from a case study. Cosmetics market is an extremely competitive market in Iran which worth more than 4 billion dollars. Currently, the cosmetics market is suffering from severe distrust and uncertainty due to the presence of low-quality fake cosmetics. To this end, this paper proposes a trust model based on the empirical investigation for cosmetics market in Iran. The considered players in the mentioned decentralized supply chain are distribution companies and retailers.

5.1. Data gathering

As mentioned before, the required data in this study are collected using developed questionnaires presented in Appendix A. The collected raw data from distribution companies and retailers' participants are presented in Appendix B. The demographic features of each DMU for distribution companies and retailers' trust models are presented in Appendix C, respectively.

5.2. Reliability of questionnaires

The reliability of the questionnaires' data is evaluated by the Cronbach's alpha test (Santos, 1999). The total Cronbach's alpha for distributors and retailers' trust model are equal to 0.781 and 0.823, respectively. Cronbach's alpha value for each trust factor (trust antecedents and consequences) is also calculated and presented in Table 3.

Table 3
The values of Cronbach' alpha for the collected data

Distribution companies' trust model		Retailers' trust model	
Trust factor	Cronbach' alpha	Trust factor	Cronbach' alpha
Exclusive cooperation	0.712	Information sharing (as a trust antecedent)	0.741
Information sharing (as a trust antecedent)	0.684	Brand reputation and advertising	0.732
Being a regular customer	0.753	Product price	0.705
Financial dependability	0.801	Distributor reputation	0.785
Retailer's financial conflicts records	0.744	Product quality	0.762
Retailer's consumer complaints records	0.712	Product delivery	0.744
Retailer's financial status	0.715	Length of partnership	0.783
Length of partnership	0.694	Brand advertising	0.731
Permissible delay in payments	0.736	Increase in order volume	0.729
Granting exclusive products	0.853	Making payments on time	0.737
Special discounts and allowances	0.799	Information sharing (as a trust consequence)	0.801
Advertising for the trusted retailers	0.712	-	-
Information sharing (as a trust consequence)	0.766	-	-

6. Computational results

6.1. Data preparation

In order to deal with the uncertainty and variability of the collected deterministic data, this study implements a triangular fuzzification approach. Although various types of fuzzy membership functions are introduced in the literature, triangular fuzzy functions are the most efficient ones due to the simplicity and accuracy. Fuzzification of the collected data is performed based on Equations (5-10).

$$\widetilde{x}_{ji} = (x_{ji}^l, x_{ji}^m, x_{ji}^u), \widetilde{y}_{ri} = (y_{ri}^l, y_{ri}^m, y_{ri}^u)$$

$$x_{ji}^l = \text{Min}(x_{ji}) \quad ; \forall i = 1, 2, \dots, I \tag{5}$$

$$x_{ji}^m = x_{ji} \quad ; \forall i = 1, 2, \dots, I \tag{6}$$

$$x_{ji}^u = \text{Max}(x_{ji}) \quad ; \forall i = 1, 2, \dots, I \tag{7}$$

$$y_{ri}^l = \text{Min}(y_{ri}) \quad ; \forall i = 1, 2, \dots, I \tag{8}$$

$$y_{ri}^m = y_{ri} \quad ; \forall i = 1, 2, \dots, I \tag{9}$$

$$y_{ri}^u = \text{Max}(y_{ri}^u) \quad ; \forall i = 1, 2, \dots, I \tag{10}$$

where x_{ji}^u is the maximum value of input j for all DMUs ($i = 1, 2, \dots, I$), while x_{ji}^l is the minimum value of input j for all DMUs ($i = 1, 2, \dots, I$). Also, y_{ri}^u is the maximum value of output r for all DMUs ($i = 1, 2, \dots, I$), while y_{ri}^l is the minimum value of output r for all DMUs ($i = 1, 2, \dots, I$).

6.2. Determination of preferred α -cuts

As mentioned before, the optimum α -cut for the FDEA model is determined based on the highest average efficiency of DMUs and normality of the obtained results (Azadeh et al., 2017a). Therefore, the efficiency scores of both trust models (distribution companies and retailers) are calculated with candidate α -cuts, including 0.1, 0.25, 0.5, 0.75, and 0.9. All FDEA calculations in this study are performed using AutoAssess package (Azadeh et al., 2013). According to the obtained results presented in Table 4, the optimum α -cut for distributors and retailers' trust models is 0.1. Figure 5 demonstrates the results of the normality test for obtained efficiency scores of each trust model. It is notable that the Anderson-Darling Normality test is used in this study. As a result of that, the next steps of the performance evaluation of trust models are implemented based on the obtained optimum FDEA α -cuts for each trust model.

Table 4
The obtained results of all considered FDEA models

Model	FDEA ($\alpha=0.1$)	FDEA ($\alpha=0.25$)	FDEA ($\alpha=0.5$)	FDEA ($\alpha=0.75$)	FDEA ($\alpha=0.9$)
Distribution Companies' trust model	Mean efficiency: 0.8775	Mean efficiency: 0.8701	Mean efficiency: 0.8038	Mean efficiency: 0.7854	Mean efficiency: 0.7599
	P-value of normality test: 0.202	P-value of normality test: 0.164	P-value of normality test: 0.105	P-value of normality test: 0.049	P-value of normality test: 0.085
Retailers' trust model	Mean efficiency: 0.8633	Mean efficiency: 0.8524	Mean efficiency: 0.8503	Mean efficiency: 0.8250	Mean efficiency: 0.8131
	P-value of normality test: 0.217	P-value of normality test: 0.145	P-value of normality test: 0.057	P-value of normality test: 0.067	P-value of normality test: 0.093

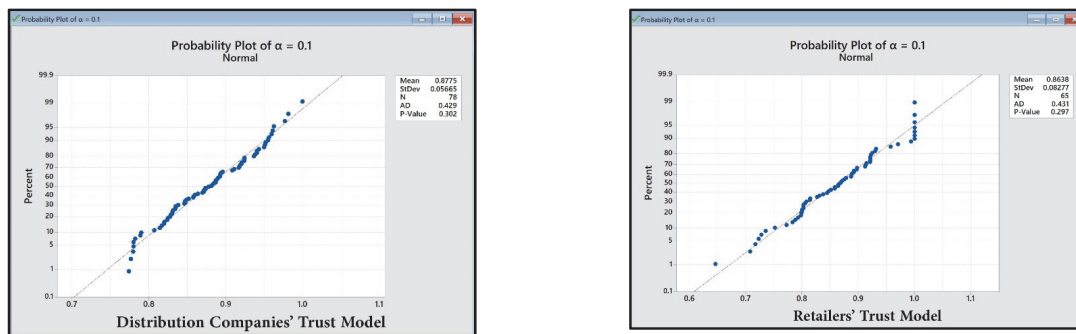


Fig. 5. The results of the normality test for selected optimum FDEA α -cuts

The obtained efficiency scores for both introduced trust models using the selected optimum FDEA models are presented in Table 5.

Table 5

The obtained efficiency scores for both trust models

DMU	Distribution Companies' Trust	DMU	Distribution Companies' Trust	DMU	Distribution Companies' Trust	DMU	Retailers' Trust
1	0.8242	37	0.9208	73	0.8277	30	0.8672
2	0.8584	38	0.9512	74	0.9381	31	0.8924
3	0.9169	39	0.8518	75	1.0000	32	0.8584
4	0.8842	40	0.9245	76	0.7800	33	0.8700
5	0.7823	41	0.8385	77	0.8893	34	1.0000
6	0.8348	42	0.7765	78	0.8317	35	0.8005
7	0.9405	43	0.8204	DMU	Retailers' Trust	36	0.8783
8	0.9598	44	0.9566	1	0.8872	37	0.9939
9	0.9367	45	0.7892	2	1.0000	38	0.8311
10	0.8930	46	0.8310	3	0.8923	39	1.0000
11	0.8169	47	0.7796	4	0.8149	40	0.7230
12	0.8736	48	0.9630	5	0.8647	41	0.8028
13	0.8249	49	0.9772	6	1.0000	42	0.7998
14	0.7800	50	0.8941	7	0.8380	43	0.7174
15	0.8601	51	0.8700	8	1.0000	44	0.9137
16	0.9241	52	0.8876	9	0.9250	45	0.8649
17	0.9245	53	0.8461	10	1.0000	46	0.8758
18	0.9407	54	0.9087	11	0.8445	47	0.7983
19	0.8306	55	0.8868	12	0.8719	48	0.7521
20	0.8901	56	0.8777	13	0.7881	49	0.8027
21	0.8641	57	0.9519	14	0.8032	50	0.8080
22	0.8474	58	0.9114	15	0.8056	51	0.9145
23	0.8286	59	0.7742	16	0.7988	52	0.7730
24	0.8924	60	0.9190	17	0.8270	53	0.6465
25	0.9615	61	0.8717	18	0.7080	54	0.9214
26	0.8069	62	0.8144	19	0.8971	55	0.8919
27	0.7902	63	0.9207	20	1.0000	56	0.7356
28	0.8198	64	0.8827	21	0.8891	57	0.7835
29	0.9819	65	0.8350	22	1.0000	58	0.8672
30	0.9499	66	0.9555	23	0.9133	59	0.7932
31	0.9432	67	0.8475	24	0.7278	60	0.8983
32	0.8869	68	0.8490	25	0.9302	61	0.8142
33	0.8718	69	0.8814	26	1.0000	62	0.8475
34	0.8931	70	0.9180	27	0.8587	63	0.9314
35	0.8579	71	0.8965	28	0.8976	64	0.8513
36	0.8738	72	0.8344	29	0.8878	65	0.9217

6.3. Results discussion

The obtained efficiency scores for all distribution companies and retailers' decision-making units are calculated using the selected FDEA models and presented in Table 5. In order to evaluate the tendency of both parties toward forming a collaborative business relationship based on trust, 2 sample t-test is used to compare the mean efficiency of both trust models. The obtained results indicate that both parties are after building a collaborative business relationship based on trust and there is no significant difference (Table 6).

Table 6

The result of 2 sample t-test between the mean efficiency of both parties for trust tendency

Model	Number of DMUs	Mean efficiency	2 Sample t-test p-value	2 Sample t-test t-value	Confidence level	DF
Distribution companies' trust model	78	0.8775	0.245	1.17	95%	109
Retailers' trust model	65	0.8633				

Evaluating the efficiency results of distribution companies' trust model indicates that the age of distribution companies' experts doesn't affect their tendency toward trust. Although there is not a significant difference between the mean of trust efficiencies for experts' educations in 95% confidence level, as the education of distribution companies' experts increases their tendency toward building a collaborative business relationship based on trust with retailers slightly decreases (Table 7).

Table 7

The impact of education on the development of trust in the distribution companies' model

Education	Mean efficiency	One-way ANOVA F-value	One-way ANOVA p-value
Bachelor	0.8872	2.69	0.074
Master	0.8659		
Ph.D.	0.8313		

The obtained results indicate no significant difference between experts' position, job experience and gender on forming trust in distribution companies. Evaluating the efficiency results of retailers' trust model indicates that as the age of retailers grow, their tendency toward building a collaborative business relationship based on trust decreases. The results also indicate that there is a significant difference between the mean efficiencies of retailers based on gender. In this regard, female retailers demonstrate more tendency toward building a collaborative business relationship based on trust. The results indicate that retailers' tendency grows as their job experience grows, however after ten years of job experience their mean trust efficiency drops (Table 8).

Table 8

The impact of job experience on the development of trust in retailers' model

Job Experience	Mean efficiency	One-way ANOVA F-value	One-way ANOVA p-value
<5 Years	0.8676	3.78	0.028
5-10 Years	0.9024		
> 10 Years	0.8340		

6.4. Sensitivity analysis

In order to calculate the performance weight of each trust factor, it is eliminated from the selected FDEA model and efficiency scores are recalculated. The observed changes in the efficiency map of the trust model are used to estimate the performance weight of eliminated factor. Table 9 demonstrates the obtained results for each trust model.

Table 9

The estimated performance weight of each trust factor

Model	Trust factors	Mean efficiency	Efficiency difference	Effect	Normalized weight
Distribution companies' trust model	Full factor	0.8755	-	-	-
	Exclusive cooperation	0.9378	-0.0623	Non-effective	0
	Information sharing (as a trust antecedent)	0.9103	-0.0348	Non-effective	0
	Being a regular customer	0.8642	0.0113	Effective	0.1757
	Financial dependability	0.8319	0.0436	Effective	0.6781
	Retailer's financial conflicts records	0.8112	0.0643	Effective	1.0000
	Retailer's consumer complaints records	0.9545	-0.0790	Non-effective	0
	Retailer's financial status	0.8990	-0.0235	Non-effective	0
	Length of partnership	0.8286	0.0469	Effective	0.7294
	Permissible delay in payments	0.9403	-0.0648	Non-effective	0
	Granting exclusive products	0.8641	0.0114	Effective	0.1773
	Special discounts and allowances	0.8883	-0.0128	Non-effective	0
	Advertising for the trusted retailers	0.8569	0.0186	Effective	0.2893
	Information sharing (as a trust consequence)	0.8428	0.0327	Effective	0.5086
Retailers' trust model	Full factor	0.8633	-	-	-
	Information sharing (as a trust antecedent)	0.9133	-0.0500	Non-effective	-
	Brand reputation and advertising	0.8740	-0.0107	Non-effective	-
	Product price	0.8413	0.0220	Effective	0.4382
	Distributor reputation	0.8512	0.0121	Effective	0.2410
	Product quality	0.8131	0.0502	Effective	1.0000
	Product delivery	0.8914	-0.0281	Non-effective	-
	Length of partnership	0.8695	-0.0062	Non-effective	-
	Brand advertising	0.8251	0.0382	Effective	0.7610
	Increase in order volume	0.8559	0.0074	Effective	0.1474
	Making payments on time	0.9054	-0.0421	Non-effective	-
Information sharing (as a trust consequence)	0.8695	-0.0062	Non-effective	-	

The sensitivity analysis results indicate that in distribution companies' trust model, trust antecedents including exclusive cooperation, information sharing, retailers' consumer complaints records, and retailers' financial status are non-effective in forming an efficient trust. However, retailers' financial conflicts records, length of partnership, financial dependability, and being a regular customer are most effective trust antecedents, respectively. Regarding the distribution companies' trust consequences in retailers, the obtained results indicate that permissible delay in payments and special discounts and allowances are non-effective, while information sharing, advertising for the trusted retailers, and granting exclusive products are the most effective and desirable trust consequences. The sensitivity analysis results for retailers' trust model indicate that trust antecedents including information sharing, brand reputation and advertising, product delivery, and length of the partnership are non-effective in forming trust, however product quality, product price, and distributor reputation are the most effective trust antecedents for retailers. Regarding the retailers' trust consequences in distribution companies, the obtained results indicate that brand advertising and increase in order volume are most effective and desirable trust consequences while making payments on time and information sharing are non-effective.

7. Conclusion

Trust plays an important role in building collaborative business relationships between players particularly in decentralized supply chain structures. To this end, identification and evaluation of effective factors in building trust and its consequences in partnership is of great importance. Although the concept of trust is very applicable to creating successful business alliances, further efforts are needed to fill the knowledge gap. In this regard, this study proposed an empirical investigation of trust antecedents and consequences in the business relationship of distribution companies and retailers in the cosmetics market in Iran. Then, a performance evaluation algorithm based on the FDEA is proposed to evaluate the weights of considered trust factors. It should be noted that the validity and reliability of the obtained results are affected by the small sample size of the distribution companies' experts (78) and retailers' participants (65). In order to verify the obtained results and get the better view of national culture, future research on trust evaluation in cosmetics market is desirable. The obtained results of this study indicated that information sharing is a non-effective trust antecedent, while it's an important trust consequence for both cosmetics players in the market. While information sharing is the main trust consequence of distribution companies, brand advertising is the most effective trust consequence for retailers. This study also investigated the role of both parties' demographic features on building a collaborative business relationship.

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Appendix A

Table A1

The developed questionnaire for performance evaluation of distributors' trust in retailers

Factor	Question
Exclusive cooperation	e.g. How important is retailer's exclusive cooperation with you? e.g. To find out that our retailers are also presenting another brands and working with other distribution companies affect our trust in them.
Information sharing	e.g. We expect our trusted retailers to provide us useful and reliable information. e.g. If our trusted retailers acquire any information that may be important to us, they should share it with us.
Being a regular customer	e.g. We don't tend to trust retailers with irregular orders. e.g. One of the main prerequisites to earn our trust is to be our regular customer.
Financial dependability	e.g. On-time payments are crucial for building trust in our business. e.g. Although we work even with retailers who are late in paying us, we don't tend to trust them.
Retailer's financial conflicts records	e.g. Our trusted retailers do not have any history of financial conflicts with us. e.g. Previous financial conflicts prevent building a collaborative business relationship.
Retailer's financial status	e.g. Retailer's financial status is a very important factor in his trustworthiness. e.g. We tend to trust retailers with high financial liability.
Length of partnership	e.g. We tend to trust our retailers in a long run. e.g. The length of business relationship is very important in retailer's trustworthiness evaluation.
Permissible delay in payments	e.g. We provide permissible delay in payments for our trusted retailers. e.g. Permissible delay in payments are only available for our trusted retailers.
Granting exclusive products	e.g. In selecting retailers for granting exclusive products, trustworthiness is a key factor. e.g. Only our trusted retailers are granted exclusive products.
Special discounts and allowances	e.g. In granting special discounts and allowances, our trusted retailers come first. e.g. Only our trusted retailers are granted special discounts and allowances.
Advertising for the trusted retailers	e.g. We tend to advertise only for our trusted retailers. e.g. When it comes to advertising products, our trusted retailers are also considered.
Information sharing	e.g. We share useful information only with our trusted retailers. e.g. When it comes to information sharing with partners, our trusted retailers come first.

Table A2

The developed questionnaire for performance evaluation of retailers' trust in local suppliers

Factor	Question
Information sharing	e.g. Our trusted distributors should provide us useful and reliable information. e.g. We don't tend to trust distributors who don't share information with us.
Brand reputation and advertising	e.g. Brand reputation and advertising in the market significantly affect our trust in distribution companies who present those brands. e.g. When don't tend to trust distribution companies who don't present reputable brands.
Product price	e.g. We tend to trust distribution companies who provide us fair and competitive prices. e.g. Our trusted distributors always provide us products with competitive and fair prices compare to the available products in the market.
Distributor reputation	e.g. The distribution company's reputation in the market plays an important role in its trustworthiness. e.g. We don't tend to trust distribution companies who has not a reputation of being fair and honest.
Product quality	e.g. Our trusted distribution companies provide us high-quality products as promised. e.g. Delivering product quality as promised determines the trustworthiness of distribution companies.
Length of partnership	e.g. We don't tend to trust new distribution companies. Our trust is formed in the long run. e.g. The length of business relationship significantly affects the trustworthiness of cosmetics distribution companies.
Brand advertising	e.g. We usually advertise for out trusted distribution companies in the market. e.g. We support our trusted distribution companies by advertising their products in the market and recommending them to the other retailers.
Increase in order volume	e.g. We increase our order volume when we trust a distribution company. e.g. Trust in distribution companies significantly affects our orders' volume.
Making payments on time	e.g. We try our best to make payments on time for our trusted distribution companies. e.g. When it comes to making payments on time, our trusted distribution companies come first.
Information sharing	e.g. We share useful information only with our trusted distribution companies. e.g. When it comes to information sharing with partners, our trusted distribution companies come first.

Appendix B

The collected raw data

Table B1

The average values of each trust factor for distribution companies (average of two items for each factor in the questionnaire)

DMU	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13
1	5.5	5	8.5	9	7.5	6	7	6.5	5.5	7	7	5.5	7
2	6	5.5	6	8.5	9.5	5.5	5.5	4.5	4.5	8	5.5	4.5	8.5
3	6.5	4.5	4.5	9	8	3.5	8.5	5.5	5	5.5	7.5	6.5	10
4	5.5	6.5	6	10	7.5	5.5	5.5	4	3.5	7	8.5	5.5	7.5
5	7	4.5	7.5	8.5	10	4.5	6.5	6.5	3.5	8	6	6	6.5
6	4	4.5	6.5	8	9.5	5.5	5.5	7.5	5.5	7	4.5	3.5	9
7	6	6.5	6	8.5	8.5	3	3.5	3.5	6	7.5	6	4.5	7
8	5	5	6.5	7.5	6	3.5	5	5	4.5	6	4.5	6.5	8
9	6.5	5.5	5	7.5	7.5	1.5	7.5	4.5	5	7.5	4.5	6.5	6.5
10	5	4.5	6	7.5	7.5	4	8	4.5	3.5	8.5	3.5	5.5	7.5
11	6.5	4.5	7	9	9	2.5	7	6.5	3.5	7	6.5	7	5.5
12	5.5	3.5	5.5	7.5	7.5	5	8.5	5.5	3.5	5.5	5.5	6	8
13	4	5	7.5	7.5	9.5	3.5	4.5	6.5	1.5	6	7	5	6.5
14	6.5	5.5	6	9	9	2.5	6.5	5	1.5	6.5	4.5	6	5.5
15	5	5	5	8	10	3	7.5	6.5	4	5.5	6.5	6.5	8.5

DMU	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13
16	5.5	3.5	7	5.5	8.5	4.5	8	6	5.5	7.5	5.5	6.5	7.5
17	6.5	5.5	6	7.5	7	3	4.5	4.5	5	6	5	4	7.5
18	5	5.5	6.5	7.5	9.5	2.5	4.5	7	7.5	8	6.5	6	6.5
19	4.5	5.5	8.5	9	9	4	4.5	6.5	4.5	7.5	4	8	6.5
20	6.5	5	7	7	8	1.5	5.5	8	5.5	7	3	6.5	8.5
21	4.5	4.5	7.5	7.5	9.5	2.5	6	8	3.5	7.5	7.5	6.5	6.5
22	4	6	6	9.5	8	4	6	7.5	3.5	7	6.5	5.5	8
23	5.5	5	7	7.5	8.5	5	7	6.5	3.5	6	5	6	9
24	5.5	5.5	5.5	7	9	6	6	8.5	5	7	6	7.5	10
25	6.5	4.5	5.5	6.5	7.5	3	7	7.5	6.5	8.5	5	6	8.5
26	5.5	6.5	8	7.5	8	2	7.5	6.5	3.5	4.5	6.5	6	6.5
27	2.5	4.5	6.5	8.5	8.5	2.5	7	9.5	3.5	4.5	4	5.5	7.5
28	4	3	9.5	7	10	4.5	6.5	8.5	2.5	8.5	6.5	7	7.5
29	3.5	3	5	7.5	8.5	3.5	4	10	6	6.5	7	7	8.5
30	3	3.5	5	8.5	8	2	5.5	9.5	5	7	7.5	7.5	5.5
31	4.5	5	4.5	9.5	7.5	1.5	5.5	8.5	7	5.5	6.5	7	7
32	4.5	2.5	6	8.5	9	3.5	3.5	7	2.5	5.5	4	6.5	9.5
33	4	1.5	9	10	6.5	5.5	3	8	5.5	6.5	4	5.5	7.5
34	2	4.5	7.5	9.5	8.5	1.5	5.5	10	5.5	8.5	7.5	5.5	6.5
35	2.5	5.5	5.5	9.5	8	4.5	6	8.5	4.5	6.5	4.5	7.5	7.5
36	2.5	6	7.5	6.5	7.5	4	5.5	8	2.5	8	3.5	6.5	7.5
37	4.5	4	4.5	9.5	7	2.5	5.5	8.5	3.5	6.5	6	5.5	9.5
38	3	2.5	5.5	7.5	7.5	2	5.5	9	4	5.5	7.5	6.5	6
39	4	3.5	6.5	9	7	4.5	5.5	9.5	4	5.5	5.5	5.5	8.5
40	3.5	3.5	8.5	7.5	7.5	4	4	9	4.5	6	4.5	9	9.5
41	3	5.5	9.5	7.5	9	4.5	6.5	8.5	6	6	7	6.5	8
42	5.5	5	9	7.5	9.5	2.5	5.5	9	3.5	6	4.5	5.5	9
43	4.5	4	9.5	8.5	6.5	5.5	6.5	9	3.5	5.5	7.5	9	5.5
44	4	3.5	5	9.5	7.5	1.5	5	8.5	5.5	8.5	5.5	6.5	6.5
45	6	3	7.5	7.5	9	4	6.5	9	2	5.5	5.5	7	8
46	2.5	2	7.5	10	7.5	3.5	6	8.5	3	5	4.5	6	8.5
47	4.5	4.5	8.5	8.5	10	2	4	8.5	1.5	7.5	4.5	7.5	5.5
48	3.5	3.5	6	8.5	6.5	4.5	4.5	9.5	4.5	8	5.5	8.5	8
49	4	1.5	4.5	8	8.5	2	5.5	9	5	5.5	7	9	6.5
50	4.5	3	4.5	8.5	8	2.5	6	10	4.5	5.5	5.5	7.5	7
51	3.5	4.5	5	6.5	9.5	4.5	5.5	8.5	2.5	6.5	4	9	6.5
52	5.5	5	5	7.5	10	1.5	6.5	9	4	7.5	6	6.5	9.5
53	4.5	4.5	8.5	9	9.5	1.5	6.5	10.5	5.5	8.5	6.5	8.5	6.5
54	4.5	2.5	8.5	7	9	5.5	3.5	9	5.5	7.5	4.5	7.5	9.5
55	4	6	5.5	9.5	7.5	3.5	4.5	10	5	5.5	7.5	6.5	8.5
56	4	4	5.5	6.5	10	5.5	5.5	8.5	5.5	6	5	8.5	6
57	3	5.5	5	7.5	8	1.5	3.5	8.5	3.5	5	4.5	7.5	9.5
58	4.5	6.5	5.5	9.5	8.5	3	3	7	3.5	8	4.5	8.5	8
59	4.5	5	9	9.5	8	1.5	5.5	8.5	3	5	3.5	8.5	6.5
60	5.5	3.5	5.5	6.5	9.5	1.5	6	9.5	3.5	6.5	7.5	7	8.5
61	4	6	8	7	8.5	2.5	5	9	3	8.5	5	9.5	5.5
62	4	6	6	8.5	9.5	4	5.5	7.5	2	7.5	5	6.5	7.5
63	2.5	1.5	7.5	9.5	9	3.5	5.5	8.5	3.5	8	6	8.5	9.5
64	3	5.5	7.5	7.5	9	2	6.5	9	3.5	6.5	6.5	7.5	9.5
65	4.5	3	9.5	7	7.5	1.5	5.5	9.5	4	5	4	6.5	7
66	3.5	6.5	6	7.5	7.5	3	4.5	8.5	5.5	6.5	7	6	9
67	4.5	5.5	6	9.5	7.5	3.5	4.5	8.5	3	5.5	5.5	6.5	8.5
68	5.5	6.5	4.5	7.5	9	4	6.5	8.5	4	6.5	7	7.5	5.5
69	1.5	6	6.5	9	6.5	3.5	4	9.5	5	5.5	6	5.5	5.5
70	2.5	4.5	7.5	6.5	8.5	2	6.5	7.5	5	4.5	6	6.5	8.5
71	4.5	3.5	7	7.5	9	1.5	5	8.5	4	7	5	7	7.5
72	6.5	1.5	8	8	7.5	3	5.5	9.5	2.5	6.5	5.5	7	6.5
73	5	6	7.5	8	8.5	4	5	8.5	4.5	4.5	5.5	7.5	8.5
74	1.5	4.5	5.5	7.5	9.5	2.5	5.5	9.5	5.5	7	5.5	7.5	8
75	2.5	2	5	7.5	9.5	3	6	8.5	4	7	7.5	9	9.5
76	4.5	5	8.5	8.5	8.5	5	4.5	9.5	4.5	4.5	6	6.5	7
77	1.5	4.5	7.5	8	8.5	3.5	4.5	9	4	6.5	5.5	7.5	7
78	2	6.5	6.5	9.5	10	1.5	5.5	8.5	3.5	6	5.5	7.5	8

Note; F1: Exclusive cooperation, F2: Information sharing (as a trust antecedent), F3: Being a regular customer, F4: Financial dependability, F5: Retailer's financial conflicts records, F6: Retailer's consumer complaints records, F7: Retailer's financial status, F8: Length of partnership, F9: Permissible delay in payments, F10: Granting exclusive products, F11: Special discounts and allowances, F12: Advertising for the trusted retailers, and F13: Information Sharing (as a trust consequence).

Table B2

The average values of retailers' each trust factor (average of two items for each factor in the questionnaire)

DMU	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11
1	4.5	9.5	6.5	6.5	10	6.5	6	8.5	9	5.5	7
2	5.5	7.5	8.5	7.5	9	8.5	7.5	9.5	6.5	4.5	9
3	4.5	5	7	9.5	9	7.5	9.5	8.5	6.5	6.5	8.5
4	5	6.5	8.5	8	9.5	6.5	7.5	9	9.5	4	5.5
5	3.5	9	8.5	7.5	10	8.5	7.5	9	8.5	6.5	5.5
6	4.5	6	7	7.5	8.5	5	5.5	10	9.5	7	7.5
7	4.5	5.5	9.5	6.5	9.5	5	5.5	9.5	5.5	4	6.5
8	6	4.5	8.5	6.5	9	4.5	4.5	8.5	10	5.5	9
9	4.5	6	9.5	5.5	9.5	5.5	6	10	6.5	4	9.5
10	5	8.5	9.5	8	8.5	7.5	5.5	10	9.5	6.5	6.5
11	4.5	7.5	8	9	9	6.5	7.5	9	9.5	7.5	6.5
12	4	9	9.5	9.5	10	7.5	7.5	8	9.5	3.5	7.5
13	3.5	6.5	8.5	7.5	10	6.5	7.5	8.5	6.5	5.5	6.5
14	5	7	8.5	8.5	9.5	4.5	6.5	7.5	5.5	4	5.5
15	5.5	8.5	8.5	9.5	10	6.5	7	8	9.5	6	9.5
16	4	9	7.5	8	9.5	7.5	6.5	8.5	9.5	3.5	6
17	4.5	7	9	6.5	8.5	5.5	9.5	9.5	8.5	6.5	8.5
18	4	6.5	6.5	7	9	7	9	7.5	6	7	9

DMU	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11
19	4	8.5	10	8.5	10	5	5.5	8	8	6.5	5
20	7	7	8.5	9.5	9.5	3.5	7	8.5	9.5	8	4.5
21	3	8.5	8	8.5	9.5	6	5.5	8.5	5.5	7.5	8
22	3.5	5	7.5	7.5	9.5	5.5	9.5	8	9.5	6.5	9
23	2.5	4.5	8.5	7.5	10	5.5	7	9.5	7	6.5	5.5
24	2.5	8	7.5	8	9.5	7.5	8.5	8	6.5	6	7
25	4.5	7.5	7.5	7	9	4.5	8.5	7.5	6.5	7.5	8.5
26	2.5	9	8.5	6	9.5	7	7	10	9.5	6.5	4.5
27	5.5	6.5	8.5	6	9	8.5	8.5	8.5	8.5	7.5	6
28	4.5	6.5	8.5	10	10	6.5	8.5	8.5	7	7.5	6.5
29	5.5	9	6.5	5.5	10	5.5	7.5	8.5	8	7.5	7.5
30	4.5	9	9.5	10	10	5	8.5	10	10	5	5
31	4	5.5	7.5	7.5	9.5	8.5	9.5	8.5	8.5	8	7
32	4.5	6.5	8	5.5	10	6.5	9.5	9.5	7	7.5	6.5
33	4	9	7.5	7	9	5.5	7.5	8.5	10	8.5	7
34	4.5	6	9.5	6.5	8.5	5	5	10	5.5	7	7.5
35	5.5	8.5	8.5	7.5	9	6.5	9.5	9.5	9	7	8.5
36	6	6.5	8.5	7.5	10	5.5	7.5	7.5	9	7.5	8.5
37	6.5	7.5	8.5	8.5	9	4	4.5	10	8.5	4.5	8.5
38	5.5	9.5	8.5	5.5	9.5	4.5	6.5	9	7.5	8	7.5
39	2.5	6	9.5	6	9.5	6.5	5.5	8.5	8.5	6.5	9.5
40	6.5	5	9	9	9.5	4.5	6	9.5	5.5	5	6.5
41	6	8.5	7	9.5	9	6.5	8.5	9.5	6	4.5	8.5
42	4.5	8.5	7	8.5	9	5	10	8.5	7.5	4.5	8.5
43	3	8.5	8	8.5	10	8	9.5	10	5.5	6.5	6.5
44	5	8.5	6.5	6.5	8.5	6.5	7.5	8.5	5.5	7.5	9.5
45	5.5	6	7.5	10	9.5	3.5	9	9	10	4.5	4.5
46	2.5	8	9.5	7.5	9.5	4.5	6	9.5	8	4.5	8
47	3.5	4.5	9.5	7.5	10	4	10	9.5	5.5	4.5	7
48	5.5	9.5	9.5	8.5	10	3.5	8.5	10	6	8.5	4.5
49	5.5	9	7.5	6	10	7	8.5	8.5	7.5	7.5	7.5
50	5.5	7.5	10	9.5	9	6.5	8.5	8	9.5	6.5	5.5
51	3	8	7.5	10	8.5	7.5	7	9.5	8.5	6.5	8
52	5	5	9.5	7	9	5.5	6.5	7.5	8	4	8.5
53	3	5	8.5	6.5	9.5	6	10	8.5	9	5.5	7.5
54	3.5	5.5	9.5	7.5	10	4.5	7.5	9	9.5	7	9
55	3	6.5	8.5	10	9.5	8.5	6.5	9.5	5.5	8	6.5
56	3	9.5	7.5	5.5	9	8.5	9.5	10	6.5	6.5	5.5
57	5.5	8.5	6.5	6.5	9.5	7	10	8	10	5	8
58	5.5	8.5	6.5	6.5	9.5	6.5	8.5	10	8.5	4	8.5
59	3.5	5	9	6	9.5	8.5	8.5	8	7	4.5	5.5
60	5	4.5	7	5.5	8.5	6.5	9.5	7.5	7.5	7.5	8
61	5.5	4.5	8.5	6.5	10	5.5	9.5	9.5	7.5	4.5	9.5
62	5	8.5	9	9.5	9.5	7	9	10	8.5	8	8.5
63	2.5	6	10	9.5	9.5	4	5.5	8.5	10	7	9.5
64	5.5	9.5	8.5	9	9	4.5	6.5	9.5	7.5	6.5	7.5
65	1.5	5	9.5	5.5	10	7.5	8.5	8.5	7.5	5	7

Note; R1: Information sharing (as a trust antecedent), R2: Brand reputation and advertising, R3: Product price, R4: Distributor reputation, R5: Product quality, R6: Product delivery, R7: Length of partnership, R8: Brand advertising, R9: Increase in order volume, R10: Making payments on time, R11: Information sharing (as a trust consequence).

Appendix C. The demographic features of participants

Table C1
The demographic features of distribution companies' experts

DMU	Gender	Work Experience	Position	Education	Age
1	Female	< 5 Years	Business and Market Development Expert	Bachelor	
2	Male	< 5 Years	Business and Market Development Expert	Master	
3	Male	< 5 Years	Business and Market Development Expert	Bachelor	
4	Male	< 5 Years	Business and Market Development Expert	Bachelor	
5	Male	< 5 Years	Business and Market Development Expert	Bachelor	
6	Female	< 5 Years	Business and Market Development Expert	Master	
7	Male	< 5 Years	Business and Market Development Expert	Bachelor	
8	Male	< 5 Years	Business and Market Development Expert	Master	
9	Male	< 5 Years	Business and Market Development Expert	Master	25-30
10	Male	< 5 Years	Business and Market Development Expert	Bachelor	
11	Female	< 5 Years	Sales Manager	Master	
12	Male	< 5 Years	Business and Market Development Expert	Master	
13	Male	< 5 Years	Business and Market Development Expert	Bachelor	
14	Male	< 5 Years	Business and Market Development Expert	Master	
15	Male	< 5 Years	Business and Market Development Expert	Master	
16	Male	< 5 Years	Business and Market Development Expert	Bachelor	
17	Female	< 5 Years	Sales Manager	Master	

DMU	Gender	Work Experience	Position	Education	Age
18	Male	< 5 Years	Business and Market Development Expert	Bachelor	
19	Female	< 5 Years	Sales Manager	Bachelor	
20	Male	< 5 Years	Business and Market Development Expert	Bachelor	
21	Male	< 5 Years	Business and Market Development Expert	Bachelor	
22	Male	< 5 Years	Business and Market Development Expert	Bachelor	
23	Male	< 5 Years	Business and Market Development Expert	Bachelor	
24	Female	< 5 Years	Sales Manager	Master	
25	Male	< 5 Years	Business and Market Development Expert	Bachelor	
26	Female	< 5 Years	Sales Manager	PhD	
27	Male	< 5 Years	Business and Market Development Expert	Master	
28	Male	5-10 Years	Business and Market Development Expert	Bachelor	
29	Female	< 5 Years	Sales Manager	Bachelor	
30	Male	5-10 Years	Sales Manager	Bachelor	
31	Female	5-10 Years	Sales Manager	Master	
32	Male	5-10 Years	Business and Market Development Expert	Bachelor	
33	Male	< 5 Years	Sales Manager	Master	
34	Male	5-10 Years	Sales Manager	Bachelor	
35	Male	< 5 Years	Business and Market Development Expert	Bachelor	
36	Male	5-10 Years	Sales Manager	Master	
37	Male	> 10 Years	Business and Market Development Expert	Bachelor	
38	Male	< 5 Years	Sales Manager	Bachelor	
39	Male	5-10 Years	Business and Market Development Expert	Bachelor	
40	Male	> 10 Years	Sales Manager	Bachelor	
41	Male	5-10 Years	Sales Manager	Master	
42	Male	> 10 Years	Sales Manager	Bachelor	
43	Male	< 5 Years	Business and Market Development Expert	PhD	
44	Female	5-10 Years	Business and Market Development Expert	Bachelor	
45	Male	5-10 Years	Sales Manager	PhD	
46	Male	< 5 Years	Business and Market Development Expert	Bachelor	
47	Female	5-10 Years	Business and Market Development Expert	Bachelor	
48	Male	> 10 Years	Sales Manager	Bachelor	
49	Female	5-10 Years	Sales Manager	Bachelor	30-40
50	Male	> 10 Years	Business and Market Development Expert	Master	
51	Male	< 5 Years	Business and Market Development Expert	Bachelor	
52	Female	5-10 Years	Sales Manager	Master	
53	Male	5-10 Years	Business and Market Development Expert	Bachelor	
54	Male	< 5 Years	Business and Market Development Expert	PhD	
55	Male	> 10 Years	Sales Manager	Bachelor	
56	Male	< 5 Years	Sales Manager	Master	
57	Male	5-10 Years	Business and Market Development Expert	Bachelor	
58	Female	> 10 Years	Sales Manager	Bachelor	
59	Male	5-10 Years	Business and Market Development Expert	Bachelor	
60	Male	< 5 Years	Sales Manager	Bachelor	
61	Male	5-10 Years	Sales Manager	Master	
62	Male	5-10 Years	Business and Market Development Expert	Bachelor	
63	Female	> 10 Years	Business and Market Development Expert	Bachelor	
64	Male	5-10 Years	Business and Market Development Expert	Bachelor	
65	Male	5-10 Years	Business and Market Development Expert	Master	
66	Male	5-10 Years	Business and Market Development Expert	Bachelor	
67	Male	5-10 Years	Sales Manager	Bachelor	
68	Male	5-10 Years	Business and Market Development Expert	Master	
69	Male	5-10 Years	Sales Manager	Bachelor	
70	Male	> 10 Years	Sales Manager	Bachelor	
71	Male	5-10 Years	Business and Market Development Expert	Bachelor	
72	Male	5-10 Years	Sales Manager	Bachelor	
73	Female	5-10 Years	Sales Manager	Master	
74	Male	> 10 Years	Executive Manager	Master	
75	Female	5-10 Years	Sales Manager	Bachelor	40-50
76	Male	> 10 Years	Executive Manager	Master	
77	Male	5-10 Years	Sales Manager	Bachelor	
78	Male	> 10 Years	Sales Manager	Master	

Table C2
The demographic features of retailers' participants

DMU	Gender	Work Experience	Age	DMU	Gender	Work Experience	Age
1	Female	< 5 Years	25-30	34	Female	> 10 Years	30-45
2	Male	< 5 Years		35	Female	< 5 Years	
3	Female	< 5 Years		36	Male	5-10 Years	
4	Female	< 5 Years		37	Male	> 10 Years	

DMU	Gender	Work Experience	Age	DMU	Gender	Work Experience	Age
5	Female	5-10 Years		38	Female	< 5 Years	
6	Female	< 5 Years		39	Female	5-10 Years	
7	Female	< 5 Years		40	Male	< 5 Years	
8	Female	< 5 Years		41	Female	< 5 Years	
9	Female	5-10 Years		42	Male	> 10 Years	
10	Male	5-10 Years		43	Male	> 10 Years	
11	Male	< 5 Years		44	Male	5-10 Years	
12	Female	> 10 Years		45	Male	> 10 Years	
13	Female	5-10 Years		46	Male	> 10 Years	
14	Male	< 5 Years		47	Male	> 10 Years	
15	Female	< 5 Years		48	Male	> 10 Years	
16	Male	> 10 Years		49	Male	> 10 Years	
17	Female	< 5 Years		50	Male	> 10 Years	
18	Male	> 10 Years		51	Female	5-10 Years	
19	Female	5-10 Years		52	Male	> 10 Years	
20	Female	5-10 Years		53	Male	> 10 Years	
21	Male	< 5 Years		54	Male	> 10 Years	
22	Female	5-10 Years	30-45	55	Male	> 10 Years	45-65
23	Female	< 5 Years		56	Male	> 10 Years	
24	Male	5-10 Years		57	Male	5-10 Years	
25	Female	5-10 Years		58	Male	> 10 Years	
26	Female	5-10 Years		59	Male	> 10 Years	
27	Female	5-10 Years		60	Male	> 10 Years	
28	Female	< 5 Years		61	Male	> 10 Years	
29	Male	< 5 Years		62	Male	> 10 Years	
30	Male	< 5 Years		63	Male	> 10 Years	
31	Female	< 5 Years		64	Male	> 10 Years	
32	Male	5-10 Years		65	Male	> 10 Years	
33	Male	< 5 Years		-	-	-	-