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Developing retailer selection factors for collaborative planning, forecasting and replenishment

Farhad Panaihfar and Cathal Heavey
*Department of Design and Manufacturing Technology,
Enterprise Research Centre, University of Limerick, Limerick, Ireland, and*
P.J. Byrne
Dublin City University Business School, Dublin City University, Dublin, Ireland

Abstract

Purpose – Selecting an appropriate partner is a vital and strategic decision-making process in any supply chain collaboration initiative. The purpose of this paper is to introduce and explore the key factors considered by manufacturers in the selection of an appropriate retailer(s) for collaboration and collaborative planning, forecasting and replenishment (CPFR) implementation and the relationships between these factors.

Design/methodology/approach – A comprehensive literature review and experts' views are applied to identify the main retailer selection and evaluation factors for CPFR implementation. A fuzzy decision-making trial and evaluation laboratory approach is then used to rank and analysis the interaction among identified factors. The findings are finally evaluated using a case study from a high-tech industry.

Findings – The most important partner selection factors comprising of five dimensions and 24 factors are introduced. Of the identified criteria, three factors: manufacturer's familiarity with the retailer, workforce skills and training and customer service orientation and capability have been identified as critical when selecting retailers for CPFR implementation. The technological capabilities dimensions are identified as the only net cause dimension which affects all other dimensions and its importance and role in simplifying and enhancing the speed and flexibility of CPFR implementation.

Practical implications – The paper identifies practical retailer selection factors for CPFR implementation and the causal relationships between factors. Developed retailer selection dimensions and criteria will assist manufacturers and retailers in understanding the role these factors play in CPFR implementation. This will also assist in appropriate retailer(s) selection by manufacturers.

Originality/value – This paper contributes to the literature on CPFR and tackles the important issue of selecting appropriate partners by developing retailer selection dimensions and criteria in CPFR implementation.

Keywords Partnership, Fuzzy DEMATEL, CPFR implementation, Retailer selection factor

Paper type Research paper

1. Introduction

Collaboration and collaborative planning, forecasting and replenishment (CPFR) in the context of supply chains have been well discussed in previous research (Holmström *et al.*, 2002; Sahay, 2003; Daugherty *et al.*, 2006; VICS, 2013; Byrne and Heavey, 2006; Thomé and Hollmann, 2014; Panahifar *et al.*, 2014, 2015a). It is well recognised that collaboration between supply chain members can facilitate enhanced strategic and operational focus, thus allowing individual organisations to better exploit their core competencies (Daugherty *et al.*, 2006). Sahay (2003) identified three major types of collaborative relationships: manufacturing/supplier collaboration; manufacturing/customer (i.e. retailers) collaboration

and collaboration with third and fourth party logistics providers, with the manufacturer-retailer collaboration identified as the most significant. Sahay (2003, p. 77) argued that "the main focus in this collaboration is developing an understanding of demand at the point of consumption, followed by the creation of a mutually agreed replenishment plan". CPFR has also been acknowledged as one of the most important collaborative initiatives in business to business commerce potentially leading to radically reduced inventories and expenses while simultaneously improving customer service (VICS, 2013). Although promising results have been presented in relation to CPFR applications, significant implementation challenges still exist, which has led to slower than expected uptake rates (Panahifar *et al.*, 2015a).

A review of the importance of partner selection in successful collaboration practices suggests that there is a strong correlation between the selection of the most suited partner(s) and the main barriers to a successful collaborative approach, including: lack of trust – Min *et al.* (2005); lack of compatibility of partners' abilities – Panahifar *et al.* (2014); cultural conflicts – Kelly *et al.* (2002). In general, improper partner selection is recognised as one the main reasons for below standard performance in trading partnerships (Ireland *et al.*, 2002). Whilst it is recognised that selection of appropriate partners is a critical, complex and time consuming task in CPFR (Sheffi, 2002; Fu *et al.*, 2010), it has been under represented in the academic literature to date with only a small number of papers covering the topic (Chung and Leung, 2005; Panahifar *et al.*, 2014). This has led to a gap in the knowledge base relating to the identification and selection of appropriate implementation partners so as to maximise the likelihood of CPFR success. This study explicitly addresses this gap through retailer selection factor analysis for CPFR, including factor identification, ranking and interaction identification using a hybrid approach including expert opinion. A review of previous literature shows that while there are many partner selection factors affecting collaboration, from a practice-based perspective more efforts should be made to include expert opinion in the evaluation and distillation of such factors. In this study, this process uses a detailed literature review to identify the most significant factors which positively affect a manufacturer's ability to collaborate with retailers. In order to build on this and to capture practice-based omissions from the literature, expert views were then used to assess the identified factors and to alter and adapt as appropriate based on their practice expertise.

Traditionally, multi-criteria decision making (MCDM) methods have been widely used in partner selection, (Huang and Keskar, 2007). In this study a hybrid version of one such technique is used to evaluate the relevant partner selection factors, the decision-making trial and evaluation laboratory (DEMATEL) method. The DEMATEL model has been successfully applied in many fields and areas, such as outsourcing, project management and marketing including the use of fuzzy DEMATEL in partner selection and evaluation studies (Chang *et al.*, 2011; Liou, 2012).

The remainder of this study is organised as follows. Section 2 presents the methodology by which this study was completed, expanding on factor selection and refinement through literature review and expert opinion, followed by fuzzy DEMATEL evaluation and concluding with a case validation. Following this, Section 3 presents results for each of the methodological steps and discusses the industrial validation of the results in the high-tech industry case organisation. Sections 4 and 5, respectively discusses the results followed by concluding remarks identifying their theoretical and practical implications.

2. Methodology

High-tech industries such as semiconductor, computer and peripheral equipment, telecommunications, pharmaceutical and medical devices are characterised by rapid change, intense competition and a highly uncertain environment (Huang and Lin, 2006). These characteristics lead to severe difficulties in relation to demand forecasting for high-tech products even in what can be regarded as stable economies (Wu *et al.*, 2005), leading to organisational underperformance. In such instances, high levels of collaboration between supply chain partners (e.g. CPFR) have been proposed as a possible method for addressing this issue (Washida, 2005; Yuan *et al.*, 2010). In recognition of the value of CPFR in this domain, Panahifar *et al.* (2015b) found that of the presented literature on the topic, the high-tech industry was most frequently represented. Based on the relevance and importance of CPFR in this field this study focuses its analytical lens on the high-tech industry and the role of retailer selection factors in CPFR implementation.

This study focuses significantly on expert opinion and perception and the presented methodology supports this. In particular the study includes four supporting techniques: literature review, structural interviews, survey using fuzzy techniques and case study. The general methodology and fuzzy DEMATEL workflow is outlined in Figure 1. The labelling of Figure 1 represents the sections under which each component of the methodology is discussed (e.g. Sections 2.1, 2.2 and 2.3). In the process of selecting and refining retailer selection factors, the study initially utilises a literature review to develop the CPFR retailer selection factor base which is then refined using expert opinion. Following the refinement of the retailer selection factors, a fuzzy DEMATEL approach is used to identify and assess the main dimensions and criteria for CPFR retailer selection. The model and its findings were then subjected to an industrial case evaluation in a high-tech organisation. The fuzzy DEMATEL steps used in this study are extended from (Panahifar *et al.*, 2015c) and have been derived and updated based on approaches presented by Lin and Wu (2008) and Chang *et al.* (2011). The following sections present the main steps of the methodology, beginning with retailer selection factor identification and refinement.

2.1 Retailer selection factor identification and refinement

To identify an initial list of retailer selection factors a detailed literature review was completed focusing specifically on concepts relating to CPFR and collaboration partner selection, in order to identify factors which have been identified as important partner selection factors for CPFR implementation, and affect a partner's ability for collaboration and information sharing with others. The keywords "CPFR", "collaboration" and "partner selection" in article titles were used to search the scholarly databases of ISI Web of Science®, Taylor & Francis, Google Scholar™ and Emerald from the year 1998 (when CPFR was first academically documented) up to 2014. This search resulted in the collection of 95 scholarly articles (Panahifar *et al.*, 2015b). These 95 articles were then critically evaluated to identify relevant partner selection factors for collaboration in general and particularly with respect to CPFR implementation. This process involved two separate analytical runs for factor analysis. In the first run, based on the key criterion of partner selection, papers were identified and classified. In the second run, a more detailed analysis was conducted, which involved a comprehensively assessment for each of the selected papers for the purpose of data relevant extraction (e.g. selection factors and dimensions).
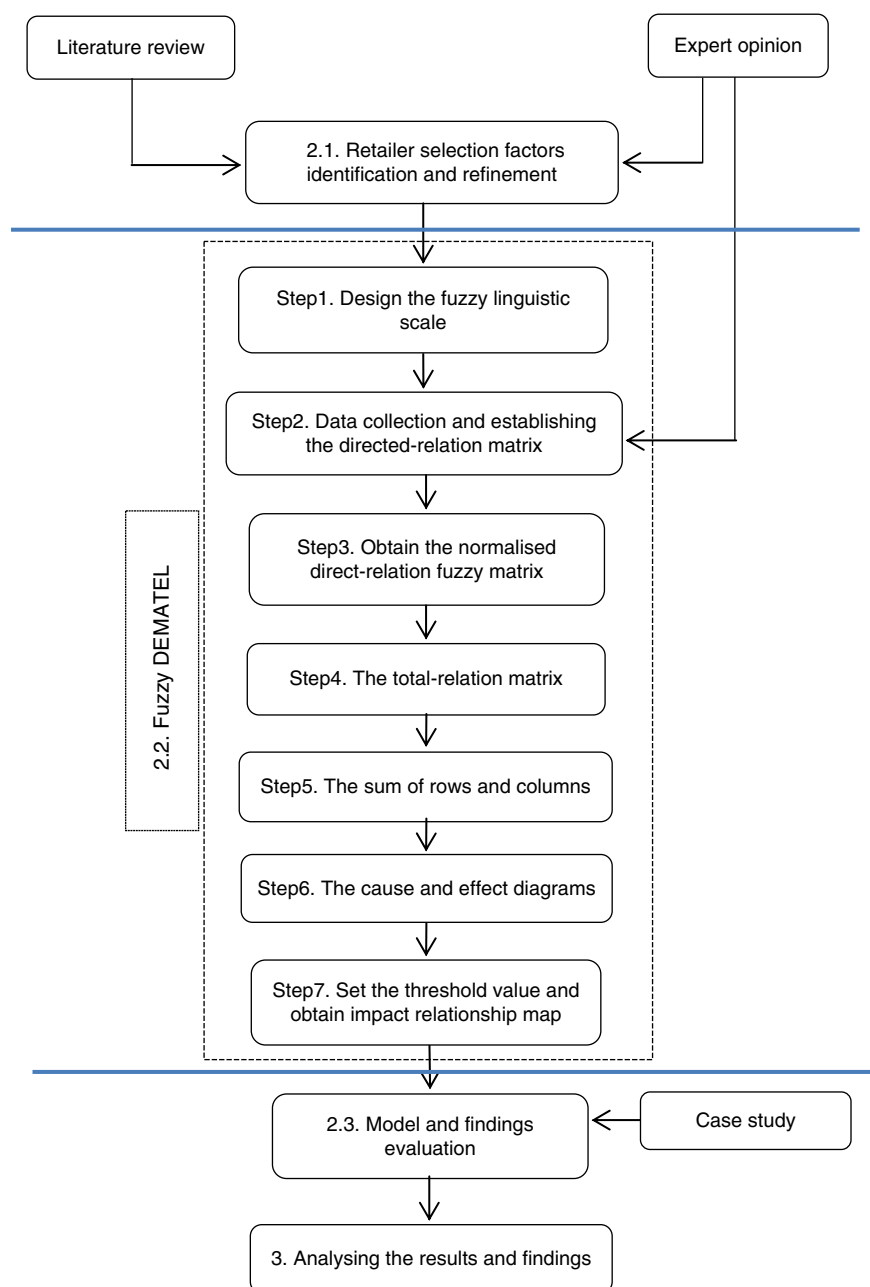
Figure 1.
Research
methodology

Following the extraction of selection factors and dimensions from the literature, expert
opinion was engaged to refine the list through the identification of additional factors
not captured in existing literature and to eliminate or combine non-relevant or similar
factors. This step is critical in ensuring the input factors being presented to the fuzzy

DEMATEL model are relevant (for practice) with the removal of non-relevant factors preventing model bias. For this, three experts were brought together to form a working group. Each of these experts were chosen due to their role as supply chain directors, their involvement in CPFR implementation projects and their relevant backgrounds in the high-tech sector. To complete this task, this expert group were specifically tasked with the following sub-steps:

- Literature review factor analysis: the purpose was to review the general objectives and findings of the literature study. In this phase, detailed definitions for each of the identified factors from the literature were presented to the experts group to ensure a definitive common understanding of the factors presented.

- Factor addition: using the list of factors identified in the literature with accompanying definitions, the expert group was tasked with the identification and inclusion of any factors not represented on the list based on their practical experience.

- Factor elimination: the expert group were then tasked with making any necessary adjustments to the list of factors by eliminating or integrating similar dimensions and criteria. In this step they were also tasked with term refinement where necessary.

- Factor grouping: finally the expert group was tasked with discussing factor grouping based on proposed literature dimensions and to suggest new dimensions if appropriate.

To complete these steps the nominal group technique (NGT) was used to generate a consensus position in the selection of the most important factors related to the CPFR implementation process. The NGT is a powerful learning and development tool developed by Delbecq *et al.* (1975) to facilitate effective group decision-making. The purpose of the NGT technique is to generate information in response to an issue that can then be prioritised by a group of experts (Potter *et al.*, 2004). To facilitate this process, the NGT session was opened with a trigger question "what are the important retailer selection factors for adopting CPFR in high-tech industries"? The NGT session then followed with the generation of individual ideas; exchanging lists of factors; collective identification of headings for factor categorisation; and editing until group consensus was reached.

Following the consolidation of the list of factors and engagement in the NGT session, the next step involved the development of a questionnaire, including all factors selected from the previous step, for the purpose of identifying the influence one factor on the list has through a series of pairwise comparisons over the others using a five-point scale from "no influence" to "very high influence". The questionnaire was pretested by two CPFR experts. The pre-test was conducted via e-mail and its objective was to ensure the ambiguity, clarity and appropriateness of the items used to operationalise each of the factors. Based on the feedback received from these two experts, the questionnaire was modified to enhance clarity and appropriateness of the measures purporting.

This questionnaire was then distributed to a group of experts with extensive knowledge and experience of CPFR implementation for the purpose of identifying the most significant and dominant retailer selection factors using the fuzzy DEMATEL model. Of those contacted, 12 CPFR experts agreed to partake in the study having been approached prior to completing the study to ascertain their willingness to attend due to the time consuming nature of the task. Each of these 12 experts are either industrial practitioners with an average of 16 years of experiences in international high-tech industries or academic scholars with research concentrations

in the supply chain management domain. Summary details on each of the experts are presented in Table I. The pretested questionnaires were e-mailed to each of the expert participants and once completed, e-mailed back to the investigators. In order to capture more effective and significant factors from retailer selection situations, expert participants were encouraged to recall their most recent CPFR implementation with their trading partners.

2.2 Fuzzy DEMATEL
In this study fuzzy DEMATEL (see Figure 1) has been used as an MCDM technique for the purpose of taking an input list of retailer selection factors and translating these into a framework which clearly presents the interrelationships between these factors. In this study the mathematical workings of each of the seven sub-steps are outlined in this section with summarised results from each step presented in Section 3. The end product of the fuzzy DEMATEL process is a visual representation that one can use to represent a structural model which shows the relationship between the causes and effects of criteria:

- Step 1: design the fuzzy linguistic scale

  To deal with the ambiguities of human assessments, fuzzy linguistic scales are used which expresses different degrees of "influence" and their corresponding positive triangular fuzzy numbers:

- Step 2: data collection and establishing the directed-relation matrix

  This study surveys experts with extensive knowledge and experiences of CPFR implementation in high-tech industries using questionnaires. To measure the relationship between criteria $C = \{C_i \mid i = 1, 2, ..., n\}$, a decision group of p experts was asked to make sets of pairwise comparisons in terms of linguistic terms. This helps to transform triangular fuzzy numbers into the initial direct-relation

Experts	High-tech sector	Academia/ industry	Background/current position	Years of experiences
E1	Computer and digital equipment	I	Senior executive of supply chain global programmes	27
E2		A&I	R&D manager (new production technologies)	22
E3		I	Director of supply chain business intelligence	19
E4		I	Quality manager	10
E5		A&I	Supply chain lecturer and researcher	10
E6	Automotive	I	Sales department	12
E7		I	Production planning and operations	7
E8		I	Cost-engineering	10
E9		A&I	Supply chain lecturer and researcher	11
E10	Medical devices	I	Quality manager	27
E11	Semiconductors	I	Senior director of operations	23
E12	Mobile phone and communications equipment	I	Operations engineer	16

Table I.
Expert participants

matrix. Hence, p fuzzy matrices $\tilde{Z}^1, \tilde{Z}^2, ..., \tilde{Z}^p$ each corresponding to an expert and with triangular fuzzy numbers as its elements, are obtained. In this step, the average value of initial direct-relation matrices is obtained from the total amount of all initial direct-relation matrices divided by 12 (the number of respondents). Fuzzy matrix $\tilde{Z}$ is called the initial direct-relation fuzzy matrix where:

$$\tilde{Z} = \begin{matrix} C_1 \\ C_2 \\ \vdots \\ C_n \end{matrix} \begin{pmatrix} 0 & \tilde{Z}_{12} \cdots & \tilde{Z}_{1n} \\ \tilde{Z}_{21} & 0 \cdots & \tilde{Z}_{2n} \\ \vdots & \vdots & \vdots \\ \tilde{Z}_{n1} & \tilde{Z}_{n2} & 0 \end{pmatrix};$$ (1)

and $\tilde{Z}_{ij} = (l_{ij}, m_{ij}, r_{ij})$ are triangular fuzzy numbers. Where the following formulas are applicable to fuzzy numbers:

$$k.\tilde{Z} = (kl, km, kr)$$ (2)

$$\tilde{Z}_1 \oplus \tilde{Z}_2 = (l_1 + l_2, m_1 + m_2, r_1 + r_2)$$ (3)

$$\tilde{Z} = \frac{\left(\tilde{Z}^1 + \tilde{Z}^2 + ... + \tilde{Z}^P\right)}{P}$$ (4)

- Step 3: obtain the normalised direct-relation fuzzy matrix
  On the basis of the direct-relation matrix, the following equation, as a normalisation formula is used to transform the criteria scales into comparable scales:

$$\tilde{a}_{ij} = \sum_{j=1}^{n} \tilde{z}_{ij} = \left(\sum_{j=1}^{n} l_i, \sum_{j=1}^{n} m_i, \sum_{j=1}^{n} r_i\right) \quad \text{and} \quad u = \max_{1 \leqslant i \leqslant n} \left(\sum_{i=1}^{n} r_{ij}\right)$$ (5)

The normalised initial direction-relation fuzzy matrix is:

$$\tilde{X} = \begin{pmatrix} \tilde{x}_{11} & \tilde{x}_{12} \cdots & \tilde{x}_{1n} \\ \tilde{x}_{21} & \tilde{x}_{22} & \tilde{x}_{2n} \\ \vdots & \vdots & \vdots \\ \tilde{x}_{m1} & \tilde{x}_{m2} \cdots & \tilde{x}_{mn} \end{pmatrix} \quad where \quad \tilde{x}_{ij} = \frac{\tilde{z}_{ij}}{u} = \left(\frac{l_{ij}}{u}, \frac{m_{ij}}{u}, \frac{r_{ij}}{u}\right)$$ (6)

- Step 4: the total-relation matrix
  Once the normalised direct-relation matrix is obtained, the total-relation matrix can be acquired by using formula (8). The objective of this step is to get the overall causal relationships by computing the total-relation fuzzy matrix. To calculate the total-relation matrix $\left(\tilde{T}\right)$ we assume $\lim_{k \to \infty} \tilde{x}^k = 0$.

To calculate $\tilde{x}^k$ we use the following equation in order to multiple two fuzzy numbers:

$$\tilde{N}_1 \otimes \tilde{N}_2 \cong (l_1 \cdot l_2, m_1 \cdot m_2, r_1 \cdot r_2)$$ (7)

$$\tilde{X}_{ij} = \left(l'_{ij}, m'_{ij}, r'_{ij}\right); \quad X_l = \begin{pmatrix} 0 & l'_{12} \cdots & l'_{1n} \\ l'_{21} & 0 \cdots & l'_{2n} \\ \vdots & \vdots & \vdots \\ l'_{n1} & l'_{n2} \cdots & 0 \end{pmatrix};$$

$$X_m = \begin{pmatrix} 0 & m'_{12} \cdots & m'_{1n} \\ m'_{21} & 0 \cdots & m'_{23} \\ \vdots & \vdots & \vdots \\ m'_{n1} & m'_{n2} \cdots & 0 \end{pmatrix}; \quad X_r = \begin{pmatrix} 0 & r'_{12} \cdots & r'_{1n} \\ r'_{21} & 0 \cdots & r'_{2n} \\ \vdots & \vdots & \vdots \\ r'_{n1} & r'_{n2} \cdots & 0 \end{pmatrix}$$

Then the total-relation matrix is defined by the following equation as outlined here. The I is denoted as the identity matrix:

$$\tilde{T} = \tilde{X}^1 + \tilde{X}^2 + \cdots + \tilde{X}^k = \tilde{X}(I - \tilde{X})^{-1} \tag{8}$$

$$\tilde{T} = \lim_{k \to \infty} \left(\tilde{X} + \tilde{X}^2 + \cdots + \tilde{X}^k \right) \quad \text{then}: \quad \tilde{t}_{ij} = \left(l''_{ij}, m''_{ij}, r''_{ij} \right) \quad \text{and}$$

$$\tilde{T} = \begin{pmatrix} \tilde{t}_{11} & \tilde{t}_{12} \cdots & \tilde{t}_{1n} \\ \tilde{t}_{21} & \tilde{t}_{22} \cdots & \tilde{t}_{2n} \\ \vdots & \vdots & \vdots \\ \tilde{t}_{31} & \tilde{t}_{n2} \cdots & \tilde{t}_{nn} \end{pmatrix}$$

According to the assumption in step 4 we have: $\lim_{k \to \infty} \tilde{X}^k = [0]_{n \times n}$ and:

$$\left[l''_{ij} \right] = X_l \times (I - X_l); \tag{9}$$

$$\left[m''_{ij} \right] = X_m \times (I - X_m)^{-1}; \tag{10}$$

$$\left[r''_{ij} \right] = X_r \times (I - X_r)^{-1} \tag{11}$$

- Step 5: obtain the sum of rows and columns
    We now calculate the relevant amounts of $\tilde{D}_i + \tilde{R}_i$ and $\tilde{D}_i - \tilde{R}_i$ whereas $\tilde{D}_i$ is the row sum and $\tilde{R}_i$ is the sum of columns in $(\tilde{T})$:

$$\tilde{T} = [\tilde{t}_{ij}], i, j \in \{1, 2, \cdots, n\} \; \tilde{D}_i = \left(\tilde{d}_i \right)_{n \times 1} = \left[\sum_{j=1}^{n} \tilde{t}_{ij} \right]_{n \times 1} \quad \text{and}$$

$$\tilde{R}_i = \left(\tilde{r}_j \right)_{1 \times n} = \left[\sum_{i=1}^{n} \tilde{t}_{ij} \right]_{1 \times n} \tag{12}$$

The defuzzification procedure considers the spread, height and shape of a triangular fuzzy number as important characteristics of the fuzzy number (Chang *et al.*, 2011). The objective of defuzzification is to convert the output fuzzy variable to a crisp value. In other words, it is used to determine an exact value as the representative of the fuzzy number. To defuzzify the fuzzy weights in order to compare the alternatives in a non-fuzzy ranking method, the centre of area (COA) is applied in this study using the following equation:

$$BNP = l + \frac{(r-l)+(m-l)}{3} \tag{13}$$

The values of $(\tilde{D}_i + \tilde{R}_i)^{def}$ and $(\tilde{D}_i - \tilde{R}_i)^{def}$ are calculated using Equation (13).

- Step 6: the cause and effect diagram

  The fuzzy DEMATEL method converts the relationship between cause and effect factors into an intelligible structural model of the system. This structural model can propose the most important criteria which affects other criteria. In this step, a causal and effect graph is completed by mapping the data set of (D+R, D−R). The importance of each criteria "Prominence" is obtained by adding D to R which forms the horizontal axis. Similarly, the vertical axis (D−R), "Relation" is obtained by subtracting R from D, which if found positive, the group criteria is denoted a cause group, or, if the (D−R) is negative, the criteria is denoted an effect group.

- Step 7: set the threshold value and obtain impact relationship map

  Setting a threshold value, *n*, to filter the obvious effects denoted by the factors is necessary in order to better explain the interrelationship among the factors and to help visualise the complex relationships between the criteria. To reduce the complexity of the impact relations map (IRM), a threshold value for the influence level will be set. Only the elements, whose influence level is higher than the threshold value, can be chosen and converted into the IRM (Liou and Chuang, 2010).

2.3 Model and findings evaluation

The fuzzy DEMATEL model presents a framework for understanding the relationships between the identified retailer selection factors. This step in the process was developed to evaluate the model. To complete the evaluation exercise, the results were assessed using a case organisation with the evaluation process following five sub-steps:

(1) case company selection;

(2) evaluation of current partner selection method for collaboration and information sharing;

(3) presentation of the main dimensions and factors identified;

(4) discussion on the practical and managerial implications of the model; and

(5) discussion on perceived completeness of partner selection model.

The organisation chosen to evaluate the research findings is operating in the medical device industry and the group presented for validation included four divisional managers and one collaboration expert from the following departments: supply chain management; production management; quality management and process engineering.

The meeting with the case organisation lasted 120 min and focused on understanding and capturing partner selection factors for the purpose of collaboration and information sharing, the results of which are presented in Section 3.

3. Results

3.1 Retailer selection factor identification and refinement

Using the methodology described in Section 2.1, which included a comprehensive literature review and expert group input, 24 retailer selection factors were identified for CPFR partnering and their subsequent categorisation into five distinct dimensions (Table II). In order to create the initial set of factors for expert evaluation, the 95 scholarly articles identified were evaluated and categorised based on their relevance in terms of CPFR partner selection or partner selection more generally. Of the papers analysed, only five factors (C_2 – high internal alignment; C_5 – workforce skills and training; C_{17} – retailers' initiative to build trust; C_{22} – information security system and C_{23} – strong IT infrastructure) were found to have been previously identified and studied in the CPFR partnering domain (ECR Europe, 2001; Lin et al., 2004; Chung and Leung, 2005; Lin and Chen, 2008; Fu et al., 2010). The additional 20 factors were found to have a relevance based on partner selection in collaboration and information sharing initiatives but were not directly attributable to CPFR studies. In total the literature review identified 25 factors for presentation to the expert group.

Upon completion of the literature-based factor identification a compilation of relevant definitions for each of the factors was developed. These definitions, including relevant reference sources were developed to ensure a common understanding was being presented and used by each member of the expert group (experts E1, E2 and E11 in Table I). Factor refinement was conducted using the NGT session. Using this approach the expert group were first asked to review the 25 presented factors and based on their significant experience to identify and put forward any factors which they believed should be added. Based on this procedure the expert group agreed upon the addition of three additional factors (C_{14} – footfall, C_{20} – inventory management and C_{24} – technology compatibility), bringing the list to 28. Following factor addition the

Organisational and financial strengths	D_1	*Relationship strength*		D_3
Management abilities and skills	C_1	Retailers' commitment to agreed order		C_{15}
High internal alignment	C_2	Willingness to share information		C_{16}
Flexible organisation	C_3	Retailers' initiative to build trust		C_{17}
Organisational size	C_4	Enthusiasm to collaboration		C_{18}
Workforce skills and training	C_5	Manufacturer's familiarity with the retailer		C_{19}
Financial strength	C_6			
Physical facilities	C_7	*Logistics capabilities*		D_4
Reputation	C_8	Inventory management		C_{20}
		On-time deliveries		C_{21}
Marketing abilities	D_2			
Sales strength	C_9	*Technological capabilities*		D_5
Market coverage	C_{10}	Information security system		C_{22}
Familiarity with the product(s)	C_{11}	Strong IT infrastructure		C_{23}
Customer service orientation and capability	C_{12}	Technology compatibility		C_{24}
Product compatibility	C_{13}			
Footfall	C_{14}			

Table II.
Retailer selection dimensions (D_i) and related criteria (C_j)

expert group were then tasked with factor elimination due to a perceived lack of relevance or factor consolidation in terms of perceived factor overlap. Based on this analysis the expert group proposed adaptations to the list leading to a final factor list of 24. The four factors which were removed or integrated with other factors in this step included retailers' on-shelf availability, ability to raise additional funding, relationship quality and company experiences.

To better categorise the final 24 factors a number of consolidating dimensions have been developed. In total, five dimensions have been derived, three of which have been previously used in the distributor selection domain: organisational and financial strengths (Cavusgil *et al.*, 1995); marketing abilities and logistics capabilities (Lin and Chen, 2008). Based on discussions with the expert group two further categorisation dimensions were added: relationship strength and technological capabilities. Finally, the 24 criteria were grouped into the five major dimensions as illustrated in Table II.

3.2 Fuzzy DEMATEL

- Steps 1 and 2: design the fuzzy linguistic scale and data collection and establishing the directed-relation matrix

   The first two steps in the fuzzy DEMATEL process (see Figure 1) involve the setting of the linguistic scale for data collection and the collection of this data in the form of a relational matrix. A five-point fuzzy linguistic scale was used in this study as is presented in Table III. Each of the 12 experts introduced in Table I were then presented with this linguistic scale and a blank direct-relation matrix pre populated with the 24 factors presented in Table II. Based on this information each of the 12 experts were asked to fill in the matrix based on their own perception of the interdependences (i.e. influence) between the factors with respect to CPFR implementation projects. A sample of one completed matrix is presented in Table AI. Each completed direct-relation matrix was then translated into a fuzzy matrix $\tilde{Z}$ using Equation (4). A sample of one completed fuzzy matrix is presented in Table AII.

- Step 3 and 4: obtain the normalised direct-relation fuzzy matrix and the total-relation matrix

   The next two steps are functional in nature and are part of the fuzzy DEMATEL translation process. In step 3, the normalised direct-relation matrix (Table AIII) is developed using Equation (6) and the initial direct-relation matrix (Table AI). To produce the total-relation matrix, three matrices are constructed which are labelled X_l, X_m and X_r. The values of X_l, X_m and X_r (Table AIV) are

Linguistic scale	Linguistic values	Influence score
No influence (No)	(0, 0, 0.25)	0
Very low influence (VL)	(0, 0.25, 0.50)	1
Low influence (L)	(0.25, 0.50, 0.75)	2
High influence (H)	(0.50, 0.75, 1.00)	3
Very high influence (VH)	(0.75, 1.00, 1.00)	4

Table III.
The correspondence of linguistic scale and linguistic values

calculated using the normalised initial direct-relation matrix. The values of $\left[l''_{ij}\right]$, $\left[m''_{ij}\right]$ and $\left[r''_{ij}\right]$ will be then calculated with the help of Equations (9)-(11), respectively (see Table AV). The total-relation matrix is presented in Table AVI.

- Step 5: the sum of rows and columns

The problem under consideration in this research is to determine the level of interdependences of factors and determine their significance and their relative weight in the retailer selection for CPFR implementation. To do so, the rank of significance (ROS) and rank of impact (ROI) are calculated for each factor using $\tilde{R}_i, \tilde{D}_i$, $\tilde{D}_i + \tilde{R}_i$ and $\tilde{D}_i - \tilde{R}_i$ (Table IV) to visually simply show the position of each factor in the structural model. To complete the criteria analysis in Table IV, all calculated $\tilde{D}_i + \tilde{R}_i$ and $\tilde{D}_i - \tilde{R}_i$ are defuzified using a COA defuzification method (Equation (13)). The resultant values of $(\tilde{D}_i + \tilde{R}_i)^{def}$ then shows the importance of each factor and $(\tilde{D}_i - \tilde{R}_i)^{def}$ assigns each factor into cause and effect groups. Table IV also presents each of the five dimensions significance and impact, which is representative of the collective criteria in the grouping.

In Table IV, the values of $(\tilde{D}_i + \tilde{R}_i)^{def}$ show how significant or important each criterion is and the values of $(\tilde{D}_i - \tilde{R}_i)^{def}$ divide the criteria into cause and effect groups. If the value of $(\tilde{D}_i - \tilde{R}_i)^{def}$ is positive, the criteria belongs to the cause group and if its value is negative, the criteria is a member of the effect group.

Dimension	Criteria	$(\tilde{D}_i+\tilde{R}_i)^{def}$	$(\tilde{D}_i-\tilde{R}_i)^{def}$	Rank of significance	Rank of impact	Cause/ effect	High critical	DS	DI
D_1	C_1	6.067	0.253	2	4	Cause	✔	41.536	−0.207
	C_2	5.290	−0.221	11	22	Effect			
	C_3	5.412	0.017	9	9	Cause			
	C_4	4.307	−0.070	23	13	Effect			
	C_5	5.724	0.311	3	2	Cause	✔		
	C_6	5.257	−0.103	13	18	Effect			
	C_7	3.793	−0.388	24	24	Effect			
	C_8	5.686	−0.006	5	12	Effect			
D_2	C_9	5.720	−0.091	4	15	Effect		32.096	−0.019
	C_{10}	5.507	−0.094	6	16	Effect			
	C_{11}	5.175	−0.146	15	19	Effect			
	C_{12}	6.130	0.242	1	5	Cause	✔		
	C_{13}	4.814	0.171	20	6	Cause			
	C_{14}	4.750	−0.101	21	17	Effect			
D_3	C_{15}	5.251	−0.250	14	23	Effect		26.41	−0.044
	C_{16}	5.500	0.087	7	8	Cause			
	C_{17}	5.274	−0.151	12	20	Effect			
	C_{18}	5.327	−0.072	10	14	Effect			
	C_{19}	5.058	0.342	17	1	Cause			
D_4	C_{20}	5.124	−0.183	16	21	Effect		10.57	−0.054
	C_{21}	5.446	0.129	8	7	Cause			
D_5	C_{22}	4.974	0.292	18	3	Cause		14.44	0.322
	C_{23}	4.925	0.017	19	9	Cause			
	C_{24}	4.541	0.013	22	11	Cause			

Notes: DS, dimension significance; DI, dimension impact

Table IV.
Rank of significance
and impact

The ROS is determined by using the values of $(\tilde{D}_i + \tilde{R}_i)^{def}$. From a perusal of these results, it can be seen that C_{12} (customer service orientation and capability) is ranked as having most significant with a value of 6.130, followed in second by C_1 (management abilities and skills) with a value of 6.067, and in third by C_5 (workforce skills and training) with a value of 5.724. In contrast to the significance for each factor, C_7 (physical facilities) and C_{15} (retailers' commitment to agreed order) are net receivers based on the $(\tilde{D}_i - \tilde{R}_i)^{def}$ values and the ROI and will be affected by the other factors. As C_1 (management abilities and skills) has the second highest ROS, and is classified in the cause group with a relatively large value of 0.253 (ROI rank – 4th), it is a critical factor for the objective of retailer selection. This indicates that for the purpose of supporting collaborative planning initiatives, such as CPFR, management abilities and skills of the retailers have a strong influence on the firm and the whole chain.

The results also show that C_{19} (manufacturer's familiarity with the retailer) and C_5 (workforce skills and training), which are ranked first and second on the ROI with values of 0.342 and 0.311, respectively, have a more influential effect on the other factors and will thus have significant potential to generate competitive advantage. In addition, C_5 (workforce skills and training) has also been ranked as the third greatest significant factor with the value of 5.724. This factor is thus introduced as a critical factor in the retailer selection process because it differentiates a firm from its competitors. Based on this analysis in addition to C_5, C_1 (management abilities and skills) and C_{12} (customer service orientation and capability) have been defined as highly critical factors.

From a dimension perspective, it can be seen from Table IV that organisational and financial strengths (D_1) is the most significant dimension with the largest $(\tilde{D}_i + \tilde{R}_i)^{def}$ value of 41.536 whereas logistics capabilities (D_4) is the least significant dimension with the smallest value of 10.57. To further investigate the cause-effect relationship of dimensions, technological capabilities (D_5) is the only net cause based on a positive $(\tilde{D}_i - \tilde{R}_i)^{def}$ value of 0.322.

• Step 6: the cause and effect diagram

Using the information from Table IV, the cause and effect diagram for the criteria and dimensions are presented in Figures 2 and 3, respectively. The factors in Table IV are mapped according to $(\tilde{D}_i + \tilde{R}_i)^{def}$ on the x-axis and $(\tilde{D}_i - \tilde{R}_i)^{def}$ on the y-axis. The cause group implies the meaning of an influencing criterion, with the influence used to estimate the weights of the criteria. Factors from the cause group have a higher priority and higher intensity in relation to the effect criteria. Effect criteria receive more influence and therefore have lower priority (Tseng and Lin, 2009). From a change perspective the cause criteria are more readily adapted as direct input change will lead to direct output change. The effect criteria are more difficult to influence directly and identified change activities may not result in predicted better performance. This is due to the natural influence of the cause criteria on the effect criteria. Effect criteria are by their nature directly influenced by the many cause criteria and thus less predictable in change efforts. Thus change efforts from a practice perspective are best spent on
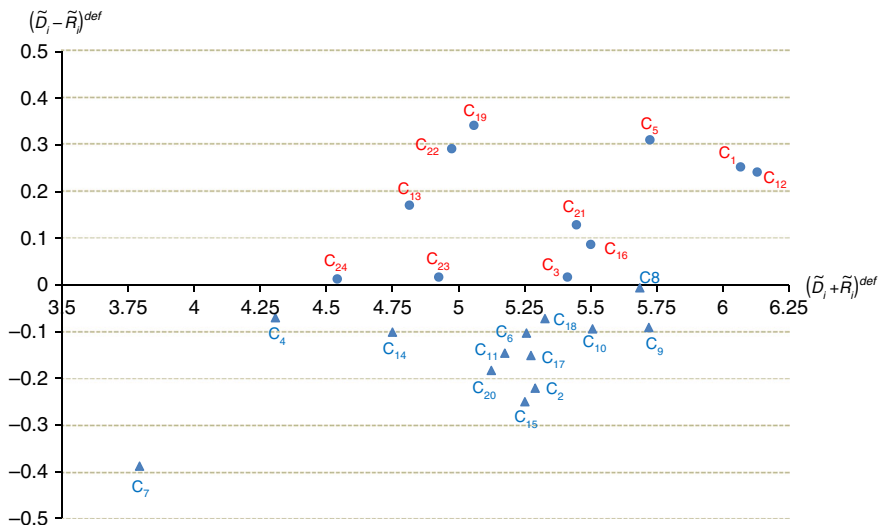
Note: Circle denoting cause and triangular denoting effect

Figure 2.
The cause and effect
diagram of criteria
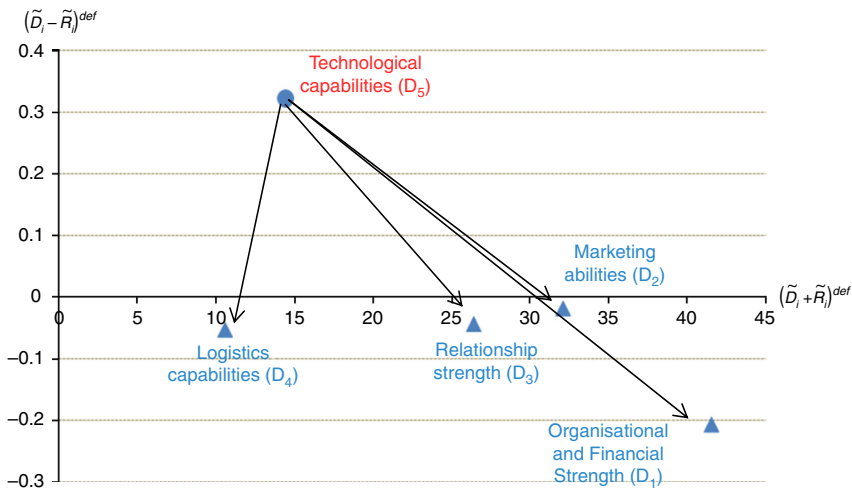
Note: Circle denoting cause and triangular denoting effect

Figure 3.
The cause and
effect diagram
of dimensions

cause criteria, which if carried out correctly should also positively impact upon effect criteria. In the criteria causal diagram, the retailer selection evaluation factors are visually divided into the cause group which includes C_1 (management abilities and skills), C_3 (flexible organisation), C_5 (workforce skills and training), C_{12} (customer service orientation and capability), C_{13} (product compatibility), C_{16} (willingness to share information), C_{19} (manufacturer's familiarity with the retailer), C_{21} (on-time deliveries), C_{22} (information security system), C_{23} (strong IT

infrastructure) and C_{24} (technology compatibility). The effect group is composed of C_2 (high internal alignment), C_4 (organisational size), C_6 (financial strength), C_7 (physical facilities), C_8 (reputation), C_9 (sales strength), C_{10} (market coverage), C_{11} (familiarity with the product), C_{14} (footfall), C_{15} (retailers commitment to agreed order), C_{17} (retailers' initiative to build trust), C_{18} (enthusiasm to collaboration) and C_{20} (inventory management). Generally, the factors in the effect group tend to be easily impacted by others, which makes effect factors unsuitable to be a critical success factor in a partner selection process. The findings of Figure 3 are more pronounced with only the D_5 (technological capabilities) being classified as a cause dimension.

- Step 7: set the threshold value and obtain the IRM

    The IRM, presented in Figure 4, was obtained by setting a threshold value equating to the average of the positive ROI values $(\tilde{D}_i - \tilde{R}_i)^{def}$ calculated as ($p = 0.146$) and selecting all factors that have an ROI in excess of this. The results show that six retailer selection factors from the cause group have a value greater than this threshold value. These elements are $C_{19} > C_5 > C_{22} > C_1 > C_{12} > C_{13}$. The arrowed line linking two retailer selection factors represents their interrelationship, and the width of the line represents the intensity of the interrelationship. The thicker the line, the higher the interrelationship intensity is. As an example, factor C_{19} has a high intensity with C_1, C_5, C_{12}, C_{13} and C_{22} meaning that C_{19} affects all these factors intensively. The IRM helps the reader to better understand the inner dependences within a set of cause factors.

3.3 Model and findings evaluation

In order to evaluate the veracity of the research findings the results were discussed with a medical device manufacturing company in Ireland, with high levels of recent collaborative activity. Results evaluation is based on presentation of the findings and acceptance (or not) of the results by the case organisation. The case organisation employs between 250 and 300 employees, and leads the distribution of nine million products per annum, seven million which they manufacture themselves and two
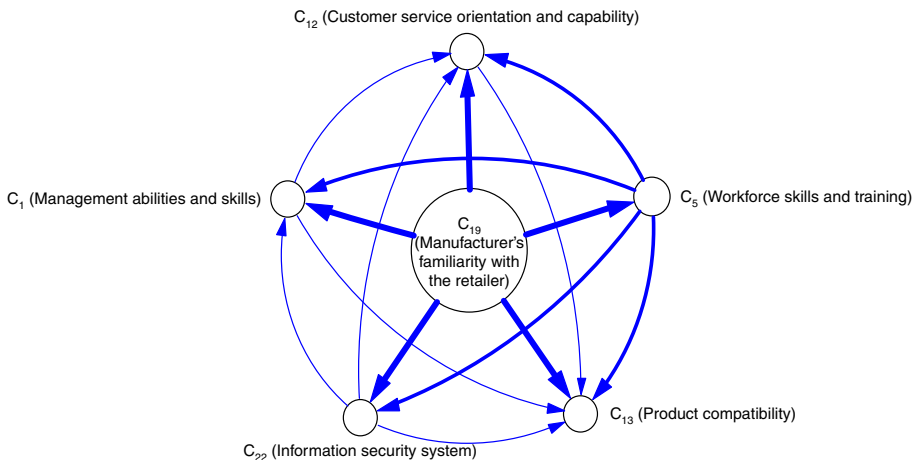
Figure 4.
The impact relationship map (IRM)

million where manufacturing is outsourced to a number of other medical device manufacturers. The case organisation distributes these products through ten large customers (distributers and retailers). The company have had positive collaboration experiences in recent times and have been actively continuing to grow their expertise in this domain in recent times.

The evaluation exercise was carried out onsite in the medical device manufacturer and involved a collective session with the five organisational experts presented in Section 2. Prior to presentation of the results the current methods of partner selection for collaboration and information sharing were analysed. The case organisation currently applies a number of alternative collaborative approaches (i.e. Vender Manager Inventory and Joint Forecasting and Replenishment) and practices high levels of information sharing with its retailers and suppliers. Following this prelude, the results and findings from the study were presented, which included the presentation of the original 24 factors and their dimensional classifications followed by the results of the DEMATEL study in terms of the ROS and ROI and associated cause and effect diagrams and the impact relationship map. Upon presentation of each of these components the group were in agreement that the results were significant and comprehensive and offered significant value for manufacturers' for the effective selection of retailers for CPFR Implementation. One item of note that was brought up during the validation process was the concept of "innovative capabilities". It was suggested by the case organisation that the innovative capabilities of a retailer plays a key role in the intensity of supply chain collaboration and information sharing. This they felt was an item that could have been included in the study.

To gain insights into the practical and managerial implications of the model, the group were asked in the context of the presentation to discuss: current factors used for retailer selection and evaluation for the purpose of collaboration/information sharing in the case organization; problems faced in using existing methods and techniques; and whether the proposed model would enhance current practice. In general, the expert group validated the findings as an appropriate and most importantly as a comprehensive representation of standard industry practice, with all five in agreement that the proposed model is a pragmatic solution for identifying and exploring the sophisticated interactions between retailer selection factors in collaboration and information sharing process.

Analysis of the case study indicates that the model of retailer selection for CPFR implementation is in line with the practicalities of work that is conducted in industry in selecting and forming collaborative trading partners. The validation process established that the model's functionality would address the original business problem with retailer selection for CPFR implementation and information sharing as a general goal. The model validation group suggested that using this proposed model, companies will be better able to select and systematically evaluate their trading partners for CPFR implementation and hence prioritise manufacturing management attention to the most significant and effective factors for retailer selection. Their feedback suggested that although there are several improvements required for supporting partner selection for CPFR implementation in industry, this model significantly advances current methodologies and represents a significant proportion of the attributes involved in retailer selection and evaluation. It was also implied that a benefit of using the proposed model as a decision support tool could be in identifying appropriate retailers for collaboration/information sharing.

4. Discussion

Although there is an abundance of literature in the domains of collaboration and information sharing, there is a paucity of research focusing on the area of retailer selection in the context of a collaborative scheme such as CPFR. Fundamentally, strong collaborative performance is driven by strong individual entities working from a strong common platform. Incorrect partner selection can have long lasting detrimental effects. This study seeks to address a number of these issues by developing a model for the purpose of retailer selection in the CPFR implementation domain. As an indication to the need for such a study, of the papers analysed only five factors (C_2, C_5, C_{17}, C_{22} and C_{23}) were found to have been previously identified and studied in the CPFR partnering domain (ECR Europe, 2001; Lin *et al.*, 2004; Chung and Leung, 2005; Lin and Chen, 2008; Fu *et al.*, 2010). The remaining 19 factors were extracted from other related paper sources and expert input.

The model presented goes beyond a simple description of the factors and through the execution of a fuzzy DEMATEL study collectively brings a comprehensive literature study and expert analysis to represent factor interdependencies in terms of the ROI and ROS, both quantitatively and visually for the 24 factors identified. From comparison of the ROI and ROS, three factors including manufacturer's familiarity with the retailer (C_{19}), workforce skills and training (C_5) and customer service orientation and capability (C_{12}) have been identified as critical when selecting retailers.

The results indicate that a manufacturer's familiarity with the retailer (C_{19}) is the most important factor when attempting to select a retailer for a CPFR implementation project. Based on these findings, a manufacturer's familiarity with the retailer will influence other criteria significantly more than it will be influenced by others. In line with the findings of Lin and Chen (2008) and ECR Europe (2001), this suggests that CPFR should not be seen as an approach to create a good relationship with new players, but rather, it can help to enhance a good relationship with an existing trading partner. Following C_{19}, workforce skills and training (C_5) has been identified as the next most critical criteria, based on ROI, in partner selection for CPFR implementation which is echoed in Chung and Leung (2005).

In terms of ROS, the results show that a retailer's customer service orientation and capability (C_{12}) is the most important factor for CPFR implementation and its improvement can lead to the amelioration of the whole system. Customer service capabilities like "on-shelf availability" generate a better service to end users and require high level of manufacturer and retailer cooperation to succeed. This can enhance information visibility across the supply chain. As retailers are typically the closest entity to end consumers and play a significant role in estimating and forecasting real needs and demands, this can lead to significantly improved demand forecast accuracy in the entire supply chain.

Additionally, the results of this study indicate that all the three factors from the technological capabilities dimension (D_1) including C_{22} (information security system), C_{23} (strong IT infrastructure) and C_{24} (technology compatibility) are identified as cause factors. Technology compatibility increases organisational readiness to adopt information sharing corporations with partners. Lack of technology compatibility by a trading partner is also known as an effective barrier in information sharing practise (Viswanathan *et al.*, 2007). Technological capabilities dimension is identified as the only net cause dimension which affects all other dimensions including organisational and financial strengths, marketing abilities, relationship strength and logistics capabilities. This highlights that

a retailer's technological capabilities can simplify and enhance the speed and flexibility of CPFR. These findings are in line with Lin *et al.* (2004) who pointed out that appropriate IT infrastructure is a critical factor for adopting CPFR, and Fu *et al.* (2010) who found that a partner's information security system is a critical factor for adopting. In addition, Andrews (2008) and Büyüközkan and Vardaloğlu (2012) suggest that companies prefer to select partners who are compatible technological with themselves. However, it is well documented in the CPFR literature that technology can play a role as a critical enabler (as echoed in this study), it is worth mentioning that, technology is no longer seen as a major barrier to success (ECR Europe, 2001; Attaran and Attaran, 2007; Panahifar *et al.*, 2014). This, example, clearly differentiates between the two different kinds of critical factors for CPFR implementation, enablers and barriers. To summarise, for successful CPFR implementation, technology is an important enabler however, it is also not a dominant barrier.

In this study, D_1 (organisational and financial strengths) and D_2 (marketing abilities) are the two most important dimensions with the greatest collective dimension significance (DS) values. However, by further considering causal relationships, improving both marketing abilities and organisational and financial strengths dimensions cannot effectively strengthen retailers' performance in CPFR implementation alone because these two dimensions are extremely influenced by the other three dimensions.

5. Conclusion
Through a comprehensive literature review and expert opinion, the main retailer selection and evaluation factors for CPFR implementation are identified. A fuzzy DEMATEL approach is then used to rank and analysis the interaction among identified criteria. The findings are finally evaluated using a case study from a high-tech industry. These criteria are categorised and quantified into two categories, cause and effect, with the complex interactions between retailer selection criteria transformed into a visible structural model, which captures and physically represents the most important and dominant factors. From a CPFR implementation theoretical perspective, this research significantly extends existing studies in this domain with 19 of the identified 24 criteria having not been previously identified and studied in the CPFR partnering domain.

From a practical-based perspective, the presented model provides guidance in the preparation for and development of CPFR implementation projects for both manufacturers and retailers. The new evaluation model helps enhance manufacturers understanding of the relevant criteria and their attributes, providing significance and weightings for retailer identification and selection. It is also important that organisations understand the differences between cause and effect criteria, as identified visually in Figure 2. From a change perspective, the cause criteria are more readily adapted as direct input change will lead to direct output change. The effect criteria are more difficult to influence directly and identified change activities may not result in predicted better performance. This is due to the natural influence of the cause criteria on the effect criteria. Effect criteria are by their nature directly influenced by the many cause criteria and thus less predictable in change efforts. Thus, change efforts from a practice perspective are best spent on cause criteria, which if carried out correctly, should also positively impact upon effect criteria.

Of the 24 practical factors, a manufacturer's familiarity with the retailer has been shown to be the highest impact criteria in the study. As a cause criterion, this clearly suggests its practical importance and its relevant potential influence on the effect criteria. As is well documented in the literature, familiarity with trading partners can

lead to a development of trust, which has been shown in previous studies to be an important dimension for trading partners. In other words, familiarity with the retailer allows the manufacturer to expedite CPFR implementation with them. This can also help a manufacturer in assessing the retailers' potential capabilities according to anticipated and realistic benefits, common business goals and organisational and cultural differences. In terms of ROI, it is noted that a retailer's customer service orientation and capability (C_{12}) is the most important factor for CPFR implementation. Customer service capabilities like "on-shelf availability" generate a better service to end users and require high level of manufacturer and retailer collaboration to succeed. Appropriate customer service capabilities enhance information visibility across partners which CPFR is essentially designed for. Additionally, in a broader sense, as this research considers comprehensive factors of the retailer selection process, the proposed evaluation structural model in supply chain management can also be used as an analytical monitoring tool to further develop an overall retailer evaluation approach.

A limitation to the current study is its focus on the high-tech sector. The criteria developed in this study have been derived from a general literature review, but have been refined through an expert group with a primary focus in the high-tech industries. Further, evaluation of these criteria in extended industrial domains would be useful to ensure broader validity. A second limitation is related to the validation of the findings. Although, an evaluation process has been conducted to evaluate the veracity of the research findings, extended industrial validation and testing of the developed model in an actual CPFR implementation project would significantly add to result validation.

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Appendix

Criteria	Management abilities and skills	High internal alignment	Flexible organisation	Organisational size	Workforce skills and training	Financial strength	Physical facilities	Reputation	Sales strength	Market coverage	Familiarity with the product(s)	Customer service orientation and capability
Management abilities and skills	–	VH	VH	NO	VH	H	L	H	H	H	NO	H
High internal alignment	NO	–	VH	NO	H	L	NO	H	H	H	H	NO
Flexible organisation	NO	H	–	H	H	H	L	H	VH	H	H	VH
Organisational size	NO	VH	H	–	H	H	H	H	VH	VH	H	H
Workforce skills and training	H	VH	VH	H	–	H	NO	VH	VH	VH	VH	VH
Financial strength	VL	VL	NO	H	H	–	VH	H	H	H	VL	H
Physical facilities	VL	H	L	NO	NO	VL	–	VL	L	L	NO	VL
Reputation	NO	L	NO	NO	NO	L	VL	–	H	VH	VL	H
Sales strength	NO	NO	NO	H	L	VH	H	H	–	–	L	H
Market coverage	NO	NO	NO	H	NO	VH	L	H	VH	–	H	H
Familiarity with the product(s)	VH	L	H	NO	NO	L	NO	H	VH	H	–	H
Customer service orientation and capability	VH	NO	H	NO	H	H	NO	H	VH	H	H	–
Product compatibility	H	H	NO	NO	NO	VL	NO	VL	VL	VL	H	L
Footfall	NO	NO	NO	H	NO	H	VL	VH	VH	VH	NO	H
Retailers' commitment to agreed order	NO	NO	NO	NO	NO	H	NO	NO	H	NO	NO	H
Willingness to share information	H	VH	H	NO	H	H	NO	H	H	H	H	VH
Retailers' initiative to build trust	NO	NO	NO	NO	NO	VL	NO	NO	VL	L	NO	L
Enthusiasm to collaboration	L	VH	L	NO	NO	L	NO	H	H	H	L	H

(continued)

Table AI.
Assessment data
fuzzy matrix
of an expert

Table AI.

Criteria	Product compatibility	Footfall	Retailers' commitment to agreed order	Willingness to share information	Retailers' initiative to build trust	Enthusiasm to collaboration	Manufacturer's familiarity with the retailer	Inventory management	On-time delivery efficiency	Information security system	Strong IT infrastructure	Technology compatibility
Manufacturer's familiarity with the retailer	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Inventory management	NO	NO	L	NO	NO	H	NO	H	H	H	NO	NO
On-time delivery efficiency	NO	NO	NO	NO	NO	H	NO	VH	VH	VH	NO	H
Information security system	NO	NO	H	NO	NO	L	NO	L	L	NO	NO	NO
Strong IT infrastructure	H	H	H	NO	L	L	NO	VL	L	NO	NO	VL
Technology compatibility	NO	L	H	NO	NO	L	NO	VL	L	NO	NO	NO
Management abilities and skills	NO	H	NO	H	VH	H	H	H	H	L	L	NO
High internal alignment	NO	NO	NO	NO	L	NO	H	H	H	L	L	L
Flexible organisation	NO	NO	NO	H	NO	NO	NO	NO	H	H	NO	NO
Organisational size	H	NO	L	L	L	H	H	H	L	H	H	H
Workforce skills and training	L	VL	L	VH	H	H	VH	VH	VH	H	NO	NO
Financial strength	L	H	H	H	L	L	L	H	H	VH	VH	H
Physical facilities	NO	L	NO	NO	NO	NO	NO	L	VL	NO	NO	NO
Reputation	NO	H	H	H	H	H	H	NO	NO	NO	NO	NO
Sales strength	NO	H	NO	NO	H	H	L	NO	NO	NO	NO	NO
Market coverage	NO	H	NO	NO	NO	NO	L	VL	NO	NO	NO	NO
Familiarity with the product(s)	H	H	NO	H	H	H	H	L	H	VL	NO	NO
Customer service orientation and capability	VL	H	L	H	H	H	H	L	H	VL	VL	VL
Product compatibility	–	H	VL	L	VL	VL	VL	NO	NO	NO	NO	NO
Footfall	NO	–	VL	NO	NO	NO	NO	L	L	NO	NO	NO

Factor	1	2	3	4	5	6	7	8	9	10
Retailers' commitment to agreed order	-	H	L	H	NO	H	H	NO	NO	NO
Willingness to share information	L	-	VH	VH	VH	H	H	NO	NO	NO
Retailers' initiative to build trust	NO	L	-	H	L	NO	NO	NO	NO	NO
Enthusiasm to collaboration	L	H	VH	-	H	L	VL	L	L	L
Manufacturer's familiarity with the retailer	NO	H	VH	VH	-	L	L	NO	NO	NO
Inventory management	H	L	L	NO	NO	-	VH	NO	NO	NO
On-time delivery efficiency	H	H	VL	VL	NO	VH	-	NO	NO	NO
Information security system	NO	NO	L	NO	NO	NO	NO	-	VH	NO
Strong IT infrastructure	NO	NO	L	VL	NO	VH	H	VH	-	NO
Technology compatibility	NO	NO	L	VL	NO	L	H	L	H	-

Table AI.

Table AII.
The initial direct-relation fuzzy matrix $\tilde{Z}$

Criteria	C_1	C_2	C_3	C_4	C_5	C_6	C_7	C_8	C_9	C_{10}	C_{11}	C_{12}	C_{13}	C_{14}	C_{15}	C_{16}	C_{17}	C_{18}	C_{19}	C_{20}	C_{21}	C_{22}	C_{23}	C_{24}
C_1	(0, 0, 0)	(0.65, 0.88, 0.92)	(0.48, 0.71, 0.92)	(0.29, 0.48, 0.73)	(0.65, 0.90, 0.94)	(0.52, 0.75, 0.90)	(0.19, 0.35, 0.60)	(0.56, 0.81, 0.95)	(0.52, 0.77, 0.96)	(0.56, 0.81, 0.96)	(0.54, 0.77, 0.92)	(0.58, 0.83, 0.1)	(0.33, 0.50, 0.69)	(0.29, 0.52, 0.73)	(0.33, 0.50, 0.67)	(0.60, 0.85, 1)	(0.60, 0.85, 0.98)	(0.69, 0.94, 1)	(0.35, 0.65, 0.83)	(0.65, 0.90, 1)	(0.67, 0.92, 0.98)	(0.60, 0.85, 0.96)	(0.60, 0.85, 0.94)	(0.58, 0.67, 0.94)
C_2	(0.65, 0.88, 0.94)	(0, 0, 0)	(0.67, 0.92, 1)	(0.29, 0.56, 0.81)	(0.42, 0.63, 0.85)	(0.33, 0.52, 0.77)	(0.13, 0.23, 0.48)	(0.27, 0.46, 0.71)	(0.33, 0.52, 0.77)	(0.21, 0.33, 0.58)	(0.38, 0.56, 0.75)	(0.42, 0.60, 0.79)	(0.17, 0.29, 0.52)	(0.06, 0.15, 0.40)	(0.21, 0.40, 0.65)	(0.27, 0.46, 0.71)	(0.21, 0.42, 0.67)	(0.44, 0.63, 0.79)	(0.17, 0.33, 0.58)	(0.50, 0.71, 0.94)	(0.54, 0.77, 0.94)	(0.44, 0.67, 0.85)	(0.42, 0.65, 0.83)	(0.42, 0.65, 0.83)
C_3	(0.44, 0.65, 0.90)	(0.60, 0.85, 1)	(0, 0, 0)	(0.31, 0.48, 0.73)	(0.50, 0.79, 1)	(0.52, 0.77, 0.96)	(0.29, 0.48, 0.73)	(0.42, 0.65, 0.90)	(0.46, 0.71, 0.88)	(0.31, 0.44, 0.71)	(0.33, 0.50, 0.73)	(0.58, 0.83, 0.98)	(0.23, 0.38, 0.63)	(0.21, 0.42, 0.67)	(0.35, 0.56, 0.81)	(0.48, 0.73, 0.96)	(0.31, 0.48, 0.71)	(0.42, 0.65, 0.88)	(0.19, 0.31, 0.63)	(0.44, 0.67, 0.85)	(0.33, 0.52, 0.77)	(0.33, 0.52, 0.73)	(0.29, 0.46, 0.67)	(0.25, 0.42, 0.63)
C_4	(0.29, 0.46, 0.73)	(0.52, 0.69, 0.94)	(0.33, 0.52, 0.77)	(0, 0, 0)	(0.50, 0.73, 0.90)	(0.46, 0.65, 0.83)	(0.27, 0.46, 0.69)	(0.15, 0.31, 0.52)	(0.21, 0.35, 0.56)	(0.40, 0.63, 0.77)	(0.15, 0.33, 0.58)	(0.25, 0.44, 0.69)	(0.15, 0.29, 0.52)	(0.15, 0.27, 0.52)	(0.15, 0.23, 0.52)	(0.21, 0.40, 0.65)	(0.15, 0.31, 0.56)	(0.29, 0.48, 0.71)	(0.17, 0.29, 0.54)	(0.19, 0.33, 0.60)	(0.15, 0.27, 0.52)	(0.19, 0.35, 0.60)	(0.23, 0.56, 0.81)	(0.15, 0.29, 0.56)
C_5	(0.65, 0.90, 0.98)	(0.65, 0.90, 0.98)	(0.67, 0.92, 1)	(0.29, 0.46, 0.65)	(0, 0, 0)	(0.56, 0.81, 0.94)	(0.23, 0.38, 0.56)	(0.63, 0.88, 0.98)	(0.58, 0.83, 0.98)	(0.46, 0.69, 0.85)	(0.58, 0.83, 0.98)	(0.71, 0.96, 1)	(0.46, 0.63, 0.90)	(0.38, 0.56, 0.81)	(0.40, 0.63, 0.83)	(0.44, 0.63, 0.81)	(0.56, 0.81, 0.96)	(0.56, 0.88, 0.94)	(0.48, 0.71, 0.85)	(0.44, 0.71, 0.94)	(0.50, 0.71, 0.96)	(0.44, 0.58, 0.83)	(0.5, 0.56, 0.81)	(0.23, 0.38, 0.63)
C_6	(0.40, 0.63, 0.81)	(0.25, 0.48, 0.73)	(0.27, 0.48, 0.73)	(0.38, 0.63, 0.88)	(0.33, 0.58, 0.83)	(0, 0, 0)	(0.29, 0.44, 0.65)	(0.42, 0.65, 0.88)	(0.48, 0.63, 0.81)	(0.54, 0.75, 0.90)	(0.35, 0.54, 0.75)	(0.44, 0.67, 0.85)	(0.23, 0.38, 0.63)	(0.23, 0.38, 0.63)	(0.21, 0.38, 0.63)	(0.31, 0.54, 0.79)	(0.31, 0.54, 0.79)	(0.21, 0.38, 0.63)	(0.15, 0.29, 0.54)	(0.42, 0.65, 0.88)	(0.31, 0.54, 0.79)	(0.46, 0.71, 0.90)	(0.46, 0.71, 0.90)	(0.31, 0.56, 0.81)
C_7	(0.13, 0.29, 0.54)	(0.08, 0.23, 0.44)	(0.13, 0.29, 0.54)	(0.25, 0.48, 0.73)	(0.08, 0.23, 0.42)	(0.29, 0.52, 0.75)	(0, 0, 0)	(0.21, 0.44, 0.67)	(0.13, 0.27, 0.52)	(0.35, 0.58, 0.77)	(0.13, 0.25, 0.50)	(0.15, 0.31, 0.56)	(0.10, 0.23, 0.48)	(0.23, 0.40, 0.50)	(0.15, 0.29, 0.54)	(0.08, 0.21, 0.40)	(0.04, 0.19, 0.44)	(0.06, 0.17, 0.42)	(0.02, 0.10, 0.38)	(0.19, 0.42, 0.67)	(0.31, 0.54, 0.79)	(0.08, 0.23, 0.48)	(0.10, 0.25, 0.50)	(0.02, 0.15, 0.40)
C_8	(0.44, 0.60, 0.88)	(0.46, 0.69, 0.90)	(0.4, 0.54, 0.85)	(0.19, 0.33, 0.58)	(0.31, 0.52, 0.77)	(0.44, 0.67, 0.90)	(0.27, 0.48, 0.73)	(0, 0, 0)	(0.58, 0.77, 1)	(0.52, 0.7, 0.85)	(0.33, 0.58, 0.83)	(0.54, 0.79, 0.98)	(0.33, 0.50, 0.77)	(0.29, 0.50, 0.73)	(0.44, 0.69, 0.94)	(0.52, 0.77, 0.96)	(0.63, 0.88, 1)	(0.60, 0.85, 1)	(0.42, 0.65, 0.90)	(0.31, 0.52, 0.71)	(0.42, 0.63, 0.79)	(0.33, 0.52, 0.69)	(0.33, 0.52, 0.69)	(0.33, 0.46, 0.71)
C_9	(0.54, 0.77, 0.92)	(0.38, 0.60, 0.79)	(0.4, 0.63, 0.77)	(0.38, 0.52, 0.75)	(0.58, 0.83, 0.98)	(0.48, 0.71, 0.81)	(0.29, 0.48, 0.67)	(0.63, 0.88, 0.96)	(0, 0, 0)	(0.69, 0.94, 0.98)	(0.60, 0.85, 0.94)	(0.60, 0.85, 0.98)	(0.56, 0.79, 0.90)	(0.42, 0.58, 0.73)	(0.42, 0.67, 0.83)	(0.35, 0.56, 0.73)	(0.40, 0.58, 0.75)	(0.44, 0.67, 0.83)	(0.33, 0.56, 0.63)	(0.29, 0.52, 0.77)	(0.46, 0.69, 0.85)	(0.27, 0.52, 0.77)	(0.19, 0.33, 0.67)	(0.19, 0.33, 0.58)
C_{10}	(0.23, 0.34, 0.63)	(0.25, 0.38, 0.58)	(0.27, 0.40, 0.60)	(0.21, 0.33, 0.54)	(0.38, 0.56, 0.77)	(0.60, 0.85, 1)	(0.42, 0.60, 0.79)	(0.44, 0.73, 0.94)	(0.65, 0.90, 1)	(0, 0, 0)	(0.46, 0.69, 0.88)	(0.54, 0.77, 0.85)	(0.31, 0.52, 0.69)	(0.42, 0.65, 0.83)	(0.44, 0.67, 0.88)	(0.44, 0.65, 0.83)	(0.35, 0.58, 0.79)	(0.35, 0.54, 0.75)	(0.35, 0.56, 0.75)	(0.33, 0.48, 0.79)	(0.48, 0.71, 0.85)	(0.35, 0.58, 0.77)	(0.44, 0.63, 0.85)	(0.35, 0.49, 0.75)
C_{11}	(0.52, 0.75, 0.92)	(0.35, 0.58, 0.77)	(0.44, 0.65, 0.85)	(0.21, 0.33, 0.54)	(0.40, 0.56, 0.77)	(0.38, 0.56, 0.81)	(0.13, 0.29, 0.75)	(0.40, 0.65, 0.94)	(0.65, 0.90, 1)	(0.42, 0.60, 0.79)	(0, 0, 0)	(0.67, 0.94, 0.98)	(0.50, 0.83, 0.94)	(0.31, 0.56, 0.77)	(0.35, 0.58, 0.79)	(0.25, 0.44, 0.65)	(0.33, 0.56, 0.77)	(0.33, 0.56, 0.77)	(0.46, 0.69, 0.83)	(0.19, 0.35, 0.60)	(0.19, 0.33, 0.58)	(0.06, 0.15, 0.40)	(0.13, 0.25, 0.50)	(0.15, 0.29, 0.52)
C_{12}	(0.69, 0.94, 1)	(0.56, 0.79, 0.92)	(0.54, 0.71, 0.98)	(0.35, 0.54, 0.73)	(0.63, 0.88, 1)	(0.48, 0.73, 0.92)	(0.35, 0.56, 0.75)	(0.58, 0.81, 0.94)	(0.65, 0.90, 1)	(0.58, 0.83, 0.96)	(0.56, 0.81, 0.98)	(0, 0, 0)	(0.46, 0.69, 0.88)	(0.46, 0.71, 0.88)	(0.65, 0.92, 0.98)	(0.50, 0.75, 0.94)	(0.56, 0.81, 0.96)	(0.54, 0.79, 0.94)	(0.54, 0.77, 0.90)	(0.35, 0.58, 0.81)	(0.48, 0.73, 0.92)	(0.35, 0.58, 0.79)	(0.40, 0.65, 0.90)	(0.35, 0.58, 0.83)

Criteria	C_1	C_2	C_3	C_4	C_5	C_6	C_7	C_8	C_9	C_{10}	C_{11}	C_{12}	C_{13}	C_{14}	C_{15}	C_{16}	C_{17}	C_{18}	C_{19}	C_{20}	C_{21}	C_{22}	C_{23}	C_{24}
C_{13}	(0.35, 0.56, 0.81)	(0.38, 0.60, 0.85)	(0.29, 0.50, 0.75)	(0.21, 0.35, 0.60)	(0.31, 0.54, 0.79)	(0.29, 0.52, 0.75)	(0.15, 0.23, 0.48)	(0.40, 0.65, 0.88)	(0.40, 0.65, 0.88)	(0.46, 0.71, 0.88)	(0.65, 0.90, 1)	(0.52, 0.77, 0.94)	(0, 0, 0)	(0.46, 0.69, 0.88)	(0.42, 0.67, 0.85)	(0.23, 0.48, 0.69)	(0.23, 0.48, 0.69)	(0.19, 0.40, 0.60)	(0.38, 0.63, 0.83)	(0.23, 0.42, 0.67)	(0.15, 0.35, 0.58)	(0.06, 0.27, 0.52)	(0.08, 0.29, 0.54)	(0.19, 0.42, 0.65)
C_{14}	(0.27, 0.50, 0.75)	(0.15, 0.33, 0.58)	(0.17, 0.35, 0.60)	(0.19, 0.42, 0.65)	(0.13, 0.33, 0.58)	(0.38, 0.60, 0.79)	(0.21, 0.40, 0.63)	(0.35, 0.60, 0.77)	(0.42, 0.67, 0.83)	(0.31, 0.56, 0.75)	(0.33, 0.56, 0.75)	(0.27, 0.32, 0.37)	(0.15, 0.38, 0.63)	(0, 0, 0)	(0.65, 0.81)	(0.29, 0.52, 0.73)	(0.40, 0.63, 0.83)	(0.27, 0.44, 0.65)	(0.35, 0.52, 0.67)	(0.40, 0.63, 0.83)	(0.46, 0.60, 0.85)	(0.17, 0.31, 0.56)	(0.17, 0.31, 0.56)	(0.17, 0.31, 0.56)
C_{15}	(0.27, 0.48, 0.73)	(0.23, 0.42, 0.67)	(0.27, 0.48, 0.73)	(0.17, 0.38, 0.60)	(0.27, 0.46, 0.65)	(0.38, 0.63, 0.85)	(0.10, 0.29, 0.54)	(0.38, 0.60, 0.81)	(0.42, 0.67, 0.85)	(0.29, 0.50, 0.71)	(0.23, 0.46, 0.71)	(0.33, 0.58, 0.79)	(0.29, 0.52, 0.75)	(0.29, 0.52, 0.73)	(0, 0, 0)	(0.31, 0.54, 0.75)	(0.38, 0.63, 0.81)	(0.33, 0.54, 0.75)	(0.33, 0.50, 0.69)	(0.46, 0.67, 0.88)	(0.50, 0.75, 0.94)	(0.29, 0.48, 0.73)	(0.33, 0.52, 0.77)	(0.31, 0.52, 0.77)
C_{16}	(0.48, 0.73, 0.88)	(0.48, 0.73, 0.83)	(0.52, 0.77, 0.90)	(0.31, 0.44, 0.63)	(0.44, 0.69, 0.83)	(0.46, 0.67, 0.90)	(0.27, 0.46, 0.65)	(0.54, 0.79, 0.94)	(0.40, 0.65, 0.79)	(0.33, 0.52, 0.71)	(0.33, 0.50, 0.69)	(0.44, 0.65, 0.75)	(0.31, 0.52, 0.71)	(0.42, 0.67, 0.85)	(0.44, 0.67, 0.88)	(0, 0, 0)	(0.65, 0.92, 1)	(0.50, 0.71, 0.88)	(0.65, 0.90, 1)	(0.31, 0.54, 0.79)	(0.27, 0.48, 0.73)	(0.35, 0.54, 0.73)	(0.44, 0.69, 0.83)	(0.44, 0.69, 0.83)
C_{17}	(0.46, 0.67, 0.85)	(0.31, 0.54, 0.73)	(0.32, 0.42, 0.06)	(0.40, 0.58, 0.77)	(0.33, 0.54, 0.73)	(0.31, 0.46, 0.60)	(0.40, 0.58, 0.73)	(0.58, 0.81, 0.94)	(0.50, 0.75, 0.90)	(0.46, 0.69, 0.83)	(0.29, 0.50, 0.69)	(0.65, 0.90, 0.96)	(0.38, 0.58, 0.77)	(0.35, 0.58, 0.73)	(0.67, 0.92, 0.98)	(0.65, 0.90, 0.98)	(0, 0, 0)	(0.31, 0.52, 0.73)	(0.29, 0.44, 0.63)	(0.17, 0.31, 0.56)	(0.27, 0.42, 0.60)	(0.25, 0.40, 0.58)	(0.25, 0.40, 0.58)	(0.23, 0.38, 0.63)
C_{18}	(0.58, 0.73, 0.90)	(0.52, 0.75, 0.85)	(0.38, 0.63, 0.79)	(0.33, 0.52, 0.71)	(0.42, 0.60, 0.75)	(0.33, 0.46, 0.73)	(0.35, 0.56, 0.73)	(0.60, 0.83, 0.94)	(0.38, 0.60, 0.79)	(0.38, 0.58, 0.77)	(0.40, 0.63, 0.81)	(0.42, 0.58, 0.75)	(0.31, 0.46, 0.65)	(0.35, 0.58, 0.77)	(0.54, 0.79, 0.96)	(0.50, 0.71, 0.88)	(0.21, 0.40, 0.65)	(0, 0, 0)	(0.56, 0.83, 0.94)	(0.21, 0.40, 0.65)	(0.44, 0.67, 0.85)	(0.42, 0.69, 0.83)	(0.29, 0.52, 0.73)	(0.21, 0.35, 0.60)
C_{19}	(0.38, 0.56, 0.75)	(0.31, 0.52, 0.71)	(0.33, 0.46, 0.65)	(0.29, 0.42, 0.60)	(0.42, 0.77, 0.88)	(0.48, 0.71, 0.90)	(0.27, 0.46, 0.65)	(0.44, 0.67, 0.85)	(0.38, 0.54, 0.73)	(0.50, 0.73, 0.92)	(0.58, 0.81, 0.88)	(0.38, 0.60, 0.77)	(0.42, 0.63, 0.75)	(0.33, 0.56, 0.75)	(0.56, 0.81, 0.96)	(0.65, 0.90, 1)	(0.33, 0.50, 0.69)	(0.56, 0.83, 0.94)	(0, 0, 0)	(0.27, 0.48, 0.69)	(0.27, 0.50, 0.71)	(0.38, 0.56, 0.71)	(0.15, 0.35, 0.60)	(0.21, 0.42, 0.64)
C_{20}	(0.48, 0.75, 0.88)	(0.48, 0.71, 0.85)	(0.35, 0.60, 0.85)	(0.13, 0.31, 0.56)	(0.35, 0.58, 0.81)	(0.40, 0.67, 0.85)	(0.27, 0.48, 0.73)	(0.29, 0.54, 0.73)	(0.27, 0.44, 0.73)	(0.27, 0.52, 0.73)	(0.29, 0.50, 0.75)	(0.27, 0.44, 0.65)	(0.13, 0.33, 0.58)	(0.25, 0.48, 0.73)	(0.35, 0.56, 0.75)	(0.38, 0.58, 0.77)	(0.17, 0.31, 0.56)	(0.21, 0.40, 0.65)	(0.25, 0.46, 0.71)	(0, 0, 0)	(0.79, 0.90, 1)	(0.38, 0.58, 0.79)	(0.33, 0.56, 0.81)	(0.21, 0.42, 0.67)
C_{21}	(0.58, 0.81, 0.92)	(0.56, 0.79, 0.90)	(0.44, 0.60, 0.85)	(0.35, 0.56, 0.75)	(0.38, 0.60, 0.77)	(0.46, 0.71, 0.90)	(0.29, 0.50, 0.69)	(0.52, 0.71, 0.81)	(0.52, 0.79, 0.90)	(0.52, 0.83, 0.73)	(0.27, 0.40, 0.58)	(0.44, 0.69, 0.88)	(0.29, 0.50, 0.69)	(0.58, 0.83, 0.92)	(0.65, 0.96, 1)	(0.38, 0.50, 0.65)	(0.33, 0.50, 0.69)	(0.44, 0.67, 0.85)	(0.33, 0.50, 0.69)	(0.79, 0.90, 1)	(0, 0, 0)	(0.25, 0.46, 0.67)	(0.31, 0.48, 0.71)	(0.23, 0.44, 0.69)
C_{22}	(0.46, 0.65, 0.90)	(0.27, 0.40, 0.60)	(0.48, 0.71, 0.92)	(0.44, 0.63, 0.75)	(0.31, 0.52, 0.73)	(0.35, 0.56, 0.75)	(0.21, 0.40, 0.63)	(0.27, 0.48, 0.69)	(0.29, 0.54, 0.73)	(0.38, 0.60, 0.77)	(0.35, 0.56, 0.81)	(0.48, 0.69, 0.88)	(0.29, 0.50, 0.75)	(0.29, 0.50, 0.75)	(0.38, 0.58, 0.83)	(0.54, 0.73, 0.96)	(0.38, 0.63, 0.81)	(0.42, 0.69, 0.83)	(0.25, 0.44, 0.69)	(0.38, 0.58, 0.79)	(0.17, 0.38, 0.58)	(0, 0, 0)	(0.42, 0.60, 0.75)	(0.33, 0.56, 0.75)
C_{23}	(0.48, 0.77, 0.90)	(0.50, 0.73, 0.85)	(0.35, 0.56, 0.79)	(0.19, 0.40, 0.63)	(0.31, 0.50, 0.71)	(0.31, 0.54, 0.77)	(0.23, 0.44, 0.65)	(0.19, 0.40, 0.60)	(0.33, 0.58, 0.79)	(0.38, 0.60, 0.77)	(0.27, 0.50, 0.75)	(0.40, 0.65, 0.83)	(0.21, 0.42, 0.65)	(0.23, 0.46, 0.71)	(0.25, 0.40, 0.60)	(0.31, 0.50, 0.69)	(0.38, 0.60, 0.79)	(0.29, 0.52, 0.73)	(0.19, 0.40, 0.65)	(0.42, 0.73, 0.81)	(0.40, 0.65, 0.81)	(0.42, 0.60, 0.75)	(0, 0, 0)	(0.50, 0.75, 0.92)
C_{24}	(0.29, 0.52, 0.73)	(0.40, 0.63, 0.81)	(0.27, 0.46, 0.69)	(0.19, 0.25, 0.44)	(0.19, 0.35, 0.60)	(0.31, 0.54, 0.77)	(0.10, 0.23, 0.50)	(0.17, 0.29, 0.58)	(0.25, 0.50, 0.75)	(0.21, 0.42, 0.60)	(0.15, 0.29, 0.54)	(0.27, 0.44, 0.69)	(0.25, 0.46, 0.69)	(0.25, 0.46, 0.71)	(0.23, 0.42, 0.67)	(0.33, 0.58, 0.81)	(0.27, 0.44, 0.65)	(0.17, 0.33, 0.58)	(0.15, 0.35, 0.60)	(0.29, 0.54, 0.77)	(0.42, 0.65, 0.88)	(0.29, 0.54, 0.79)	(0.50, 0.75, 0.92)	(0, 0, 0)

Table AII.

Table AIII.
The normalised initial direction-relation fuzzy matrix $\tilde{X}$

Criteria	C_1	C_2	C_3	C_4	C_5	C_6	C_7	C_8	C_9	C_{10}	C_{11}	C_{12}	C_{13}	C_{14}	C_{15}	C_{16}	C_{17}	C_{18}	C_{19}	C_{20}	C_{21}	C_{22}	C_{23}	C_{24}
C_1	(0, 0, 0)	(0.031, 0.042, 0.044)	(0.023, 0.034, 0.044)	(0.014, 0.023, 0.035)	(0.031, 0.043, 0.045)	(0.025, 0.036, 0.43)	(0.009, 0.017, 0.029)	(0.027, 0.039, 0.046)	(0.025, 0.037, 0.046)	(0.027, 0.039, 0.046)	(0.026, 0.037, 0.044)	(0.028, 0.040, 0.048)	(0.016, 0.024, 0.033)	(0.014, 0.025, 0.035)	(0.016, 0.024, 0.032)	(0.029, 0.041, 0.048)	(0.029, 0.041, 0.048)	(0.033, 0.045, 0.048)	(0.017, 0.031, 0.040)	(0.031, 0.043, 0.048)	(0.032, 0.044, 0.047)	(0.029, 0.041, 0.046)	(0.029, 0.041, 0.045)	(0.028, 0.032, 0.045)
C_2	(0.031, 0.042, 0.045)	(0, 0, 0)	(0.032, 0.044, 0.048)	(0.016, 0.027, 0.039)	(0.020, 0.030, 0.041)	(0.016, 0.025, 0.037)	(0.006, 0.011, 0.023)	(0.013, 0.022, 0.034)	(0.016, 0.025, 0.037)	(0.010, 0.016, 0.028)	(0.018, 0.027, 0.036)	(0.020, 0.029, 0.038)	(0.008, 0.014, 0.025)	(0.003, 0.007, 0.019)	(0.010, 0.019, 0.031)	(0.013, 0.022, 0.034)	(0.010, 0.020, 0.032)	(0.021, 0.030, 0.038)	(0.008, 0.016, 0.028)	(0.024, 0.034, 0.045)	(0.026, 0.037, 0.045)	(0.021, 0.032, 0.041)	(0.020, 0.031, 0.031)	(0.020, 0.031, 0.031)
C_3	(0.021, 0.032, 0.043)	(0.029, 0.041, 0.048)	(0, 0, 0)	(0.015, 0.023, 0.035)	(0.026, 0.038, 0.048)	(0.025, 0.037, 0.046)	(0.014, 0.023, 0.035)	(0.020, 0.031, 0.043)	(0.022, 0.034, 0.042)	(0.015, 0.021, 0.034)	(0.016, 0.024, 0.035)	(0.028, 0.040, 0.047)	(0.011, 0.018, 0.030)	(0.010, 0.020, 0.032)	(0.017, 0.027, 0.039)	(0.023, 0.035, 0.046)	(0.015, 0.023, 0.034)	(0.020, 0.031, 0.042)	(0.009, 0.015, 0.030)	(0.021, 0.032, 0.041)	(0.016, 0.025, 0.037)	(0.016, 0.025, 0.035)	(0.014, 0.022, 0.032)	(0.012, 0.020, 0.030)
C_4	(0.014, 0.022, 0.035)	(0.025, 0.033, 0.045)	(0.016, 0.025, 0.037)	(0, 0, 0)	(0.024, 0.035, 0.043)	(0.022, 0.031, 0.043)	(0.013, 0.022, 0.033)	(0.007, 0.015, 0.025)	(0.010, 0.017, 0.027)	(0.019, 0.030, 0.037)	(0.007, 0.016, 0.028)	(0.012, 0.021, 0.033)	(0.007, 0.014, 0.025)	(0.007, 0.013, 0.025)	(0.007, 0.011, 0.025)	(0.010, 0.019, 0.031)	(0.007, 0.015, 0.027)	(0.014, 0.023, 0.034)	(0.008, 0.014, 0.026)	(0.009, 0.016, 0.029)	(0.007, 0.013, 0.025)	(0.009, 0.017, 0.029)	(0.011, 0.020, 0.031)	(0.007, 0.014, 0.027)
C_5	(0.031, 0.043, 0.047)	(0.031, 0.043, 0.047)	(0.031, 0.044, 0.048)	(0.014, 0.022, 0.031)	(0, 0, 0)	(0.027, 0.039, 0.045)	(0.011, 0.018, 0.027)	(0.030, 0.042, 0.047)	(0.028, 0.040, 0.047)	(0.022, 0.033, 0.041)	(0.017, 0.026, 0.036)	(0.034, 0.046, 0.048)	(0.013, 0.022, 0.030)	(0.010, 0.018, 0.027)	(0.019, 0.030, 0.040)	(0.021, 0.030, 0.039)	(0.023, 0.039, 0.046)	(0.023, 0.042, 0.045)	(0.023, 0.034, 0.041)	(0.023, 0.034, 0.045)	(0.021, 0.034, 0.046)	(0.021, 0.034, 0.040)	(0.022, 0.034, 0.043)	(0.015, 0.027, 0.039)
C_6	(0.019, 0.030, 0.039)	(0.012, 0.023, 0.035)	(0.013, 0.023, 0.035)	(0.018, 0.030, 0.042)	(0.016, 0.028, 0.040)	(0, 0, 0)	(0.014, 0.021, 0.031)	(0.020, 0.031, 0.042)	(0.023, 0.030, 0.039)	(0.026, 0.036, 0.043)	(0.017, 0.026, 0.036)	(0.021, 0.032, 0.041)	(0.011, 0.018, 0.030)	(0.011, 0.018, 0.030)	(0.010, 0.018, 0.030)	(0.015, 0.026, 0.038)	(0.015, 0.026, 0.038)	(0.018, 0.030, 0.030)	(0.007, 0.014, 0.026)	(0.020, 0.031, 0.042)	(0.015, 0.026, 0.038)	(0.022, 0.034, 0.043)	(0.022, 0.034, 0.043)	(0.027, 0.039, 0.039)
C_7	(0.006, 0.014, 0.026)	(0.004, 0.011, 0.021)	(0.006, 0.014, 0.026)	(0.012, 0.023, 0.035)	(0.004, 0.011, 0.020)	(0.014, 0.025, 0.036)	(0, 0, 0)	(0.010, 0.021, 0.032)	(0.006, 0.013, 0.025)	(0.017, 0.028, 0.037)	(0.006, 0.012, 0.024)	(0.007, 0.015, 0.027)	(0.005, 0.011, 0.023)	(0.010, 0.019, 0.030)	(0.007, 0.014, 0.026)	(0.004, 0.010, 0.021)	(0.002, 0.009, 0.021)	(0.003, 0.008, 0.020)	(0.001, 0.005, 0.018)	(0.009, 0.020, 0.032)	(0.015, 0.026, 0.038)	(0.004, 0.011, 0.023)	(0.005, 0.012, 0.024)	(0.001, 0.007, 0.019)
C_8	(0.021, 0.029, 0.042)	(0.022, 0.033, 0.043)	(0.019, 0.026, 0.041)	(0.009, 0.016, 0.028)	(0.015, 0.025, 0.037)	(0.021, 0.032, 0.043)	(0.013, 0.023, 0.035)	(0, 0, 0)	(0.028, 0.037, 0.048)	(0.025, 0.035, 0.041)	(0.016, 0.028, 0.040)	(0.037, 0.048)	(0.023, 0.024, 0.037)	(0.014, 0.024, 0.035)	(0.015, 0.025, 0.037)	(0.019, 0.025, 0.037)	(0.021, 0.042, 0.048)	(0.029, 0.041, 0.048)	(0.020, 0.031, 0.043)	(0.025, 0.034, 0.038)	(0.020, 0.030, 0.037)	(0.025, 0.033, 0.037)	(0.016, 0.025, 0.033)	(0.016, 0.022, 0.034)
C_9	(0.026, 0.037, 0.044)	(0.018, 0.029, 0.038)	(0.019, 0.030, 0.037)	(0.025, 0.036, 0.045)	(0.028, 0.040, 0.047)	(0.023, 0.030, 0.039)	(0.014, 0.023, 0.032)	(0.030, 0.042, 0.046)	(0, 0, 0)	(0.033, 0.045, 0.047)	(0.029, 0.041, 0.045)	(0.029, 0.041, 0.046)	(0.027, 0.038, 0.043)	(0.020, 0.028, 0.035)	(0.020, 0.032, 0.040)	(0.017, 0.027, 0.035)	(0.019, 0.028, 0.036)	(0.021, 0.032, 0.040)	(0.016, 0.024, 0.030)	(0.014, 0.023, 0.037)	(0.022, 0.033, 0.041)	(0.007, 0.013, 0.025)	(0.009, 0.016, 0.016)	(0.009, 0.016, 0.028)
C_{10}	(0.011, 0.016, 0.030)	(0.012, 0.018, 0.028)	(0.013, 0.019, 0.029)	(0.020, 0.031, 0.041)	(0.018, 0.027, 0.037)	(0.029, 0.041, 0.048)	(0.020, 0.029, 0.038)	(0.021, 0.035, 0.045)	(0.035, 0.047, 0.048)	(0, 0, 0)	(0.022, 0.033, 0.042)	(0.026, 0.037, 0.041)	(0.015, 0.025, 0.033)	(0.020, 0.031, 0.037)	(0.021, 0.032, 0.040)	(0.010, 0.021, 0.031)	(0.017, 0.028, 0.038)	(0.017, 0.026, 0.036)	(0.017, 0.027, 0.040)	(0.016, 0.023, 0.038)	(0.023, 0.034, 0.041)	(0.017, 0.025, 0.037)	(0.021, 0.030, 0.041)	(0.017, 0.023, 0.036)
C_{11}	(0.025, 0.036, 0.044)	(0.017, 0.028, 0.037)	(0.021, 0.031, 0.041)	(0.010, 0.016, 0.026)	(0.019, 0.027, 0.036)	(0.018, 0.027, 0.039)	(0.006, 0.014, 0.024)	(0.019, 0.031, 0.040)	(0.031, 0.043, 0.048)	(0.020, 0.029, 0.038)	(0, 0, 0)	(0.032, 0.045, 0.047)	(0.024, 0.040, 0.045)	(0.015, 0.027, 0.037)	(0.017, 0.028, 0.038)	(0.012, 0.021, 0.031)	(0.016, 0.027, 0.037)	(0.016, 0.027, 0.037)	(0.022, 0.033, 0.040)	(0.009, 0.017, 0.029)	(0.009, 0.016, 0.028)	(0.003, 0.007, 0.019)	(0.006, 0.012, 0.024)	(0.007, 0.014, 0.025)
C_{12}	(0.033, 0.045, 0.048)	(0.027, 0.038, 0.044)	(0.026, 0.034, 0.047)	(0.017, 0.026, 0.035)	(0.030, 0.042, 0.048)	(0.023, 0.035, 0.04)	(0.017, 0.027, 0.036)	(0.028, 0.039, 0.045)	(0.031, 0.043, 0.048)	(0.028, 0.040, 0.046)	(0.027, 0.039, 0.047)	(0, 0, 0)	(0.022, 0.033, 0.042)	(0.022, 0.034, 0.042)	(0.031, 0.044, 0.047)	(0.024, 0.036, 0.045)	(0.026, 0.039, 0.046)	(0.026, 0.038, 0.045)	(0.026, 0.037, 0.043)	(0.017, 0.028, 0.039)	(0.028, 0.035, 0.044)	(0.017, 0.028, 0.038)	(0.019, 0.031, 0.043)	(0.017, 0.028, 0.040)

Criteria	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20	C21	C22	C23	C24
C_{13}	(0.017, 0.027, 0.039)	(0.018, 0.029, 0.041)	(0.014, 0.024, 0.036)	(0.010, 0.017, 0.029)	(0.015, 0.026, 0.038)	(0.014, 0.025, 0.036)	(0.007, 0.011, 0.023)	(0.019, 0.031, 0.042)	(0.019, 0.031, 0.042)	(0.022, 0.034, 0.042)	(0.031, 0.043, 0.048)	(0.025, 0.037, 0.045)	(0, 0, 0)	(0.022, 0.033, 0.042)	(0.020, 0.032, 0.041)	(0.011, 0.023, 0.033)	(0.011, 0.023, 0.033)	(0.009, 0.019, 0.029)	(0.018, 0.030, 0.040)	(0.011, 0.020, 0.032)	(0.007, 0.017, 0.028)	(0.003, 0.013, 0.025)	(0.004, 0.014, 0.026)	(0.009, 0.020, 0.031)
C_{14}	(0.013, 0.024, 0.036)	(0.007, 0.016, 0.028)	(0.008, 0.017, 0.029)	(0.009, 0.020, 0.031)	(0.006, 0.016, 0.028)	(0.018, 0.029, 0.038)	(0.010, 0.019, 0.030)	(0.017, 0.029, 0.037)	(0.020, 0.032, 0.040)	(0.015, 0.027, 0.036)	(0.016, 0.027, 0.036)	(0.013, 0.025, 0.035)	(0.007, 0.018, 0.030)	(0, 0, 0)	(0.019, 0.031, 0.039)	(0.014, 0.025, 0.035)	(0.019, 0.030, 0.040)	(0.013, 0.021, 0.031)	(0.017, 0.025, 0.032)	(0.019, 0.030, 0.040)	(0.022, 0.029, 0.041)	(0.008, 0.015, 0.027)	(0.008, 0.015, 0.027)	(0.008, 0.015, 0.027)
C_{15}	(0.013, 0.023, 0.035)	(0.011, 0.020, 0.032)	(0.013, 0.023, 0.035)	(0.008, 0.018, 0.029)	(0.013, 0.022, 0.031)	(0.018, 0.030, 0.041)	(0.005, 0.014, 0.026)	(0.018, 0.029, 0.039)	(0.020, 0.032, 0.041)	(0.014, 0.024, 0.034)	(0.011, 0.022, 0.034)	(0.016, 0.028, 0.038)	(0.014, 0.025, 0.036)	(0.014, 0.025, 0.035)	(0, 0, 0)	(0.015, 0.026, 0.036)	(0.018, 0.030, 0.039)	(0.016, 0.026, 0.036)	(0.016, 0.024, 0.033)	(0.022, 0.032, 0.042)	(0.024, 0.036, 0.045)	(0.014, 0.023, 0.035)	(0.016, 0.025, 0.037)	(0.015, 0.025, 0.037)
C_{16}	(0.023, 0.035, 0.042)	(0.023, 0.035, 0.040)	(0.025, 0.037, 0.043)	(0.015, 0.021, 0.030)	(0.021, 0.033, 0.040)	(0.022, 0.032, 0.039)	(0.013, 0.022, 0.031)	(0.026, 0.038, 0.045)	(0.019, 0.031, 0.038)	(0.016, 0.025, 0.034)	(0.016, 0.024, 0.033)	(0.021, 0.031, 0.036)	(0.015, 0.025, 0.034)	(0.020, 0.032, 0.041)	(0.021, 0.032, 0.042)	(0, 0, 0)	(0.031, 0.044, 0.048)	(0.029, 0.038, 0.047)	(0.018, 0.028, 0.037)	(0.015, 0.026, 0.038)	(0.013, 0.023, 0.035)	(0.017, 0.026, 0.035)	(0.021, 0.033, 0.040)	(0.021, 0.033, 0.040)
C_{17}	(0.022, 0.032, 0.041)	(0.015, 0.026, 0.035)	(0.015, 0.020, 0.029)	(0.019, 0.028, 0.037)	(0.016, 0.026, 0.035)	(0.015, 0.022, 0.029)	(0.013, 0.019, 0.028)	(0.028, 0.039, 0.045)	(0.024, 0.036, 0.043)	(0.022, 0.033, 0.040)	(0.014, 0.024, 0.033)	(0.031, 0.043, 0.046)	(0.018, 0.028, 0.037)	(0.017, 0.028, 0.035)	(0.032, 0.044, 0.047)	(0.031, 0.043, 0.047)	(0, 0, 0)	(0.015, 0.025, 0.035)	(0.014, 0.021, 0.030)	(0.015, 0.027, 0.038)	(0.013, 0.020, 0.029)	(0.012, 0.019, 0.028)	(0.012, 0.019, 0.028)	(0.011, 0.018, 0.030)
C_{18}	(0.028, 0.035, 0.043)	(0.025, 0.036, 0.041)	(0.018, 0.030, 0.038)	(0.016, 0.025, 0.034)	(0.020, 0.029, 0.036)	(0.016, 0.022, 0.035)	(0.017, 0.025, 0.037)	(0.029, 0.040, 0.045)	(0.018, 0.029, 0.038)	(0.018, 0.028, 0.037)	(0.019, 0.030, 0.039)	(0.020, 0.028, 0.036)	(0.015, 0.022, 0.031)	(0.017, 0.029, 0.037)	(0.026, 0.038, 0.046)	(0.024, 0.034, 0.042)	(0.025, 0.037, 0.044)	(0, 0, 0)	(0.017, 0.029, 0.038)	(0.010, 0.019, 0.031)	(0.009, 0.020, 0.030)	(0.008, 0.019, 0.031)	(0.011, 0.018, 0.030)	(0.010, 0.010, 0.020)
C_{19}	(0.018, 0.027, 0.036)	(0.015, 0.025, 0.034)	(0.016, 0.022, 0.031)	(0.014, 0.020, 0.030)	(0.020, 0.028, 0.037)	(0.023, 0.034, 0.043)	(0.013, 0.022, 0.031)	(0.021, 0.032, 0.041)	(0.018, 0.026, 0.035)	(0.024, 0.035, 0.044)	(0.028, 0.039, 0.042)	(0.018, 0.029, 0.037)	(0.020, 0.030, 0.036)	(0.016, 0.027, 0.035)	(0.027, 0.039, 0.046)	(0.031, 0.043, 0.048)	(0.025, 0.037, 0.042)	(0.027, 0.040, 0.045)	(0, 0, 0)	(0.013, 0.023, 0.033)	(0.013, 0.024, 0.034)	(0.018, 0.027, 0.034)	(0.007, 0.017, 0.030)	(0.010, 0.020, 0.032)
C_{20}	(0.023, 0.036, 0.042)	(0.023, 0.034, 0.041)	(0.017, 0.029, 0.041)	(0.006, 0.015, 0.027)	(0.017, 0.028, 0.039)	(0.019, 0.032, 0.041)	(0.013, 0.023, 0.035)	(0.014, 0.026, 0.035)	(0.013, 0.021, 0.035)	(0.013, 0.025, 0.035)	(0.014, 0.024, 0.036)	(0.013, 0.021, 0.031)	(0.006, 0.016, 0.028)	(0.012, 0.023, 0.035)	(0.017, 0.027, 0.036)	(0.018, 0.028, 0.037)	(0.008, 0.018, 0.030)	(0.010, 0.019, 0.031)	(0.012, 0.022, 0.034)	(0, 0, 0)	(0.021, 0.033, 0.040)	(0.020, 0.030, 0.037)	(0.016, 0.027, 0.039)	(0.010, 0.020, 0.032)
C_{21}	(0.028, 0.039, 0.044)	(0.027, 0.038, 0.043)	(0.021, 0.029, 0.041)	(0.017, 0.027, 0.036)	(0.018, 0.029, 0.037)	(0.022, 0.034, 0.043)	(0.014, 0.024, 0.033)	(0.025, 0.034, 0.039)	(0.025, 0.038, 0.043)	(0.025, 0.040, 0.045)	(0.013, 0.019, 0.028)	(0.021, 0.033, 0.042)	(0.014, 0.024, 0.033)	(0.028, 0.040, 0.044)	(0.031, 0.046, 0.048)	(0.018, 0.035, 0.046)	(0.024, 0.033, 0.039)	(0.021, 0.032, 0.041)	(0.016, 0.024, 0.033)	(0.038, 0.043, 0.048)	(0, 0, 0)	(0.012, 0.022, 0.032)	(0.015, 0.023, 0.034)	(0.011, 0.021, 0.033)
C_{22}	(0.022, 0.031, 0.043)	(0.013, 0.019, 0.029)	(0.023, 0.034, 0.044)	(0.021, 0.030, 0.039)	(0.015, 0.025, 0.035)	(0.017, 0.027, 0.037)	(0.010, 0.019, 0.030)	(0.013, 0.023, 0.033)	(0.014, 0.026, 0.035)	(0.018, 0.028, 0.038)	(0.017, 0.027, 0.039)	(0.023, 0.033, 0.042)	(0.014, 0.024, 0.036)	(0.014, 0.024, 0.036)	(0.018, 0.028, 0.040)	(0.015, 0.024, 0.033)	(0.013, 0.021, 0.031)	(0.020, 0.033, 0.040)	(0.018, 0.027, 0.034)	(0.020, 0.030, 0.037)	(0.008, 0.018, 0.028)	(0, 0, 0)	(0.027, 0.038, 0.043)	(0.016, 0.027, 0.036)
C_{23}	(0.023, 0.037, 0.043)	(0.024, 0.035, 0.041)	(0.017, 0.027, 0.038)	(0.009, 0.019, 0.030)	(0.015, 0.024, 0.035)	(0.015, 0.026, 0.037)	(0.011, 0.021, 0.031)	(0.009, 0.019, 0.029)	(0.016, 0.028, 0.038)	(0.018, 0.029, 0.037)	(0.013, 0.024, 0.036)	(0.019, 0.031, 0.040)	(0.010, 0.020, 0.031)	(0.011, 0.022, 0.034)	(0.012, 0.019, 0.032)	(0.016, 0.028, 0.039)	(0.018, 0.029, 0.038)	(0.014, 0.025, 0.035)	(0.009, 0.019, 0.031)	(0.020, 0.035, 0.039)	(0.019, 0.031, 0.039)	(0.020, 0.029, 0.036)	(0, 0, 0)	(0.015, 0.026, 0.036)
C_{24}	(0.014, 0.025, 0.035)	(0.019, 0.030, 0.039)	(0.013, 0.022, 0.033)	(0.009, 0.012, 0.021)	(0.009, 0.017, 0.029)	(0.015, 0.026, 0.037)	(0.005, 0.011, 0.024)	(0.014, 0.028)	(0.012, 0.024, 0.036)	(0.010, 0.020, 0.029)	(0.007, 0.014, 0.026)	(0.013, 0.021, 0.033)	(0.012, 0.022, 0.033)	(0.012, 0.022, 0.034)	(0.011, 0.020, 0.032)	(0.016, 0.028, 0.039)	(0.018, 0.029, 0.038)	(0.016, 0.028)	(0.007, 0.017, 0.029)	(0.014, 0.026, 0.037)	(0.020, 0.031, 0.042)	(0.014, 0.026, 0.038)	(0.024, 0.036, 0.044)	(0, 0, 0)

Table AIII.

Table AIV.
The values of X_i, X_m and X_r

X_i

	C_1	C_2	C_3	C_4	C_5	C_6	C_7	C_8	C_9	C_{10}	C_{11}	C_{12}	C_{13}	C_{14}	C_{15}	C_{16}	C_{17}	C_{18}	C_{19}	C_{20}	C_{21}	C_{22}	C_{23}	C_{24}
C_1	0	0.031	0.023	0.014	0.031	0.025	0.009	0.027	0.025	0.027	0.026	0.028	0.016	0.014	0.016	0.029	0.029	0.033	0.017	0.031	0.032	0.029	0.029	0.0279
C_2	0.031	0	0.032	0.016	0.020	0.016	0.006	0.013	0.016	0.010	0.018	0.020	0.008	0.003	0.010	0.013	0.010	0.021	0.008	0.024	0.026	0.021	0.020	0.02
C_3	0.021	0.029	0	0.015	0.026	0.025	0.014	0.020	0.022	0.015	0.016	0.028	0.011	0.010	0.017	0.023	0.015	0.020	0.009	0.021	0.016	0.016	0.014	0.012
C_4	0.014	0.025	0.016	0	0.024	0.022	0.013	0.007	0.010	0.019	0.007	0.012	0.007	0.007	0.007	0.010	0.007	0.014	0.008	0.009	0.007	0.009	0.011	0.007
C_5	0.031	0.031	0.032	0.018	0	0.027	0.011	0.030	0.028	0.026	0.028	0.034	0.013	0.010	0.019	0.015	0.015	0.027	0.023	0.021	0.024	0.021	0.017	0.011
C_6	0.019	0.012	0.013	0.012	0.004	0	0.014	0.020	0.023	0.017	0.017	0.021	0.011	0.011	0.010	0.004	0.002	0.010	0.007	0.020	0.015	0.022	0.022	0.015
C_7	0.006	0.004	0.006	0.009	0.015	0.014	0	0.010	0.006	0.025	0.006	0.007	0.005	0.010	0.007	0.025	0.030	0.003	0.001	0.009	0.015	0.004	0.005	0.001
C_8	0.021	0.022	0.019	0.025	0.015	0.021	0.013	0	0.028	0.033	0.016	0.026	0.016	0.014	0.021	0.017	0.019	0.029	0.020	0.015	0.020	0.016	0.016	0.016
C_9	0.026	0.018	0.019	0.020	0.028	0.029	0.014	0.030	0	0.020	0.029	0.029	0.027	0.020	0.020	0.010	0.017	0.021	0.016	0.014	0.022	0.007	0.009	0.009
C_{10}	0.011	0.012	0.013	0.010	0.018	0.018	0.020	0.021	0.035	0	0.022	0.026	0.015	0.020	0.021	0.012	0.016	0.017	0.017	0.016	0.023	0.017	0.021	0.017
C_{11}	0.025	0.017	0.021	0.017	0.019	0.023	0.006	0.019	0.031	0.028	0	0.032	0.024	0.015	0.017	0.024	0.027	0.016	0.022	0.009	0.009	0.003	0.006	0.007
C_{12}	0.033	0.027	0.026	0.017	0.030	0.014	0.017	0.028	0.031	0.022	0.027	0	0.022	0.022	0.031	0.011	0.011	0.026	0.026	0.017	0.023	0.017	0.019	0.017
C_{13}	0.017	0.018	0.008	0.009	0.015	0.018	0.007	0.019	0.019	0.015	0.031	0.025	0	0.022	0.020	0.014	0.019	0.009	0.018	0.011	0.007	0.008	0.004	0.009
C_{14}	0.013	0.007	0.013	0.008	0.006	0.018	0.010	0.017	0.020	0.014	0.016	0.013	0.007	0	0.019	0.015	0.018	0.013	0.017	0.019	0.022	0.014	0.008	0.008
C_{15}	0.013	0.011	0.025	0.015	0.013	0.022	0.005	0.018	0.019	0.016	0.011	0.016	0.014	0.014	0	0	0.031	0.016	0.016	0.022	0.024	0.017	0.016	0.015
C_{16}	0.023	0.023	0.015	0.019	0.021	0.015	0.013	0.026	0.024	0.022	0.016	0.021	0.015	0.020	0.021	0	0.018	0.029	0.018	0.015	0.013	0.012	0.021	0.021
C_{17}	0.022	0.015	0.018	0.016	0.016	0.016	0.013	0.028	0.018	0.016	0.014	0.031	0.018	0.017	0.032	0.031	0	0.015	0.014	0.008	0.013	0.008	0.012	0.011
C_{18}	0.028	0.025	0.016	0.014	0.020	0.016	0.017	0.029	0.013	0.018	0.019	0.020	0.015	0.017	0.026	0.024	0.025	0	0.012	0.010	0.009	0.018	0.011	0.01
C_{19}	0.018	0.015	0.017	0.006	0.020	0.023	0.013	0.021	0.025	0.024	0.028	0.018	0.020	0.016	0.027	0.031	0.025	0.027	0	0.013	0.021	0.020	0.007	0.01
C_{20}	0.023	0.023	0.021	0.017	0.017	0.019	0.013	0.014	0.014	0.013	0.014	0.013	0.006	0.012	0.017	0.018	0.008	0.010	0.012	0	0	0.012	0.016	0.01
C_{21}	0.028	0.027	0.021	0.021	0.018	0.022	0.014	0.025	0.016	0.025	0.013	0.021	0.014	0.028	0.031	0.015	0.016	0.021	0.016	0.038	0.008	0.020	0.015	0.011
C_{22}	0.022	0.013	0.023	0.021	0.015	0.017	0.010	0.013	0.012	0.018	0.017	0.023	0.014	0.014	0.018	0.026	0.018	0.020	0.012	0.018	0.019	0	0.027	0.016
C_{23}	0.023	0.024	0.017	0.009	0.015	0.015	0.011	0.009	0.016	0.018	0.013	0.019	0.010	0.011	0.012	0.015	0.013	0.014	0.009	0.020	0.020	0.020	0	0.015
C_{24}	0.014	0.019	0.013	0.009	0.009	0.015	0.005	0.008	0.012	0.010	0.007	0.013	0.012	0.012	0.011	0.016	0.018	0.008	0.007	0.014	0.020	0.014	0.024	0

X_m

	C_1	C_2	C_3	C_4	C_5	C_6	C_7	C_8	C_9	C_{10}	C_{11}	C_{12}	C_{13}	C_{14}	C_{15}	C_{16}	C_{17}	C_{18}	C_{19}	C_{20}	C_{21}	C_{22}	C_{23}	C_{24}
C_1	0	0.0419	0.0339	0.023	0.0429	0.0359	0.017	0.0389	0.0369	0.0387	0.0369	0.0399	0.024	0.025	0.024	0.0409	0.0409	0.0449	0.0309	0.0429	0.0439	0.0409	0.0409	0.0319
C_2	0.0419	0	0.0439	0.0269	0.0299	0.025	0.011	0.022	0.025	0.016	0.0269	0.0289	0.014	0.007	0.019	0.022	0.02	0.0299	0.016	0.0339	0.0369	0.0319	0.0309	0.0309
C_3	0.0319	0.0409	0	0	0.0379	0.0369	0.023	0.0309	0.0339	0.021	0.024	0.0399	0.018	0.02	0.0269	0.0349	0.023	0.0309	0.015	0.0319	0.025	0.025	0.022	0.02
C_4	0.022	0.0329	0.025	0	0.0349	0.0309	0.022	0.015	0.017	0.0299	0.016	0.021	0.014	0.013	0.011	0.019	0.015	0.023	0.014	0.016	0.013	0.017	0.02	0.014
C_5	0.0429	0.0429	0.0439	0.022	0	0.0389	0.018	0.0419	0.0399	0.0329	0.0399	0.0459	0.022	0.018	0.0299	0.0299	0.0389	0.0419	0.0339	0.0339	0.0339	0.0279	0.0269	0.018
C_6	0.0299	0.023	0.023	0.0299	0.0279	0	0.021	0.0309	0.0299	0.0359	0.0259	0.0319	0.018	0.018	0.018	0.0259	0.0259	0.018	0.014	0.0309	0.0259	0.0339	0.0339	0.0269
C_7	0.014	0.011	0.014	0.016	0.011	0.025	0	0.021	0.013	0.0279	0.012	0.015	0.011	0.019	0.014	0.01	0.009	0.018	0.005	0.02	0.025	0.011	0.012	0.007
C_8	0.0289	0.0329	0.0259	0.0359	0.0248	0.0319	0.023	0	0.0369	0.0349	0.0279	0.0379	0.024	0.024	0.0329	0.0369	0.0419	0.0409	0.0309	0.025	0.0299	0.025	0.025	0.022
C_9	0.0369	0.0289	0.0299	0.0309	0.0399	0.0339	0.023	0.0419	0	0.0449	0.0409	0.0409	0.0379	0.0279	0.0319	0.0269	0.0279	0.0319	0.024	0.025	0.0329	0.013	0.016	0.016
C_{10}	0.0164	0.018	0.019	0.016	0.0269	0.0409	0.0289	0.0349	0.0469	0	0.0329	0.0369	0.025	0.0311	0.0319	0.021	0.0279	0.0259	0.0269	0.023	0.0339	0.0279	0.0299	0.0234
C_{11}	0.0359	0.0279	0.0309	0.016	0.0269	0.0269	0.014	0.0309	0.0429	0.0289	0	0.0449	0.0399	0.0269	0.0279	0.021	0.0269	0.0269	0.0329	0.017	0.016	0.007	0.012	0.014

C_1	C_2	C_3	C_4	C_5	C_6	C_7	C_8	C_9	C_{10}	C_{11}	C_{12}	C_{13}	C_{14}	C_{15}	C_{16}	C_{17}	C_{18}	C_{19}	C_{20}	C_{21}	C_{22}	C_{23}	C_{24}
0.0449	0.0379	0.0339	0.0259	0.0419	0.0349	0.0269	0.0389	0.0429	0.0399	0.0389	0	0.0329	0.0339	0.0439	0.0359	0.0389	0.0379	0.0369	0.0279	0.0349	0.0279	0.0309	0.0279
0.0269	0.0289	0.024	0.017	0.0259	0.025	0.011	0.0309	0.0309	0.0339	0.0429	0.0369	0	0.0329	0.0319	0.023	0.023	0.019	0.0299	0.02	0.017	0.013	0.014	0.02
0.024	0.016	0.017	0.02	0.016	0.0289	0.019	0.0289	0.0319	0.0269	0.0269	0.025	0.018	0	0.0309	0.025	0.0299	0.021	0.025	0.0299	0.0289	0.015	0.015	0.015
0.023	0.02	0.023	0.018	0.022	0.0299	0.014	0.0289	0.0319	0.024	0.022	0.0279	0.025	0.025	0	0.0259	0.0299	0.0259	0.024	0.0319	0.0339	0.0259	0.0329	0.0329
0.0349	0.0349	0.0369	0.0279	0.0329	0.0319	0.022	0.0379	0.0309	0.025	0.024	0.0309	0.0279	0.0319	0.0439	0	0.0439	0.0379	0.0279	0.0259	0.023	0.019	0.019	0.018
0.0319	0.0259	0.02	0.025	0.0259	0.022	0.019	0.0389	0.0359	0.0329	0.024	0.0429	0.022	0.0279	0.0379	0.0339	0.0369	0	0.0289	0.019	0.02	0.019	0.018	0.017
0.035	0.0359	0.0299	0.02	0.0289	0.022	0.0269	0.0399	0.0289	0.0279	0.0299	0.0279	0.0299	0.0269	0.0389	0.0429	0.0369	0.0399	0	0.023	0.024	0.0269	0.018	0.02
0.0269	0.025	0.022	0.025	0.0369	0.0339	0.022	0.0319	0.0259	0.0349	0.0389	0.0289	0.022	0.0269	0.0269	0.0279	0.0369	0.0319	0.0289	0.023	0.02	0.0299	0.018	0.017
0.0359	0.0339	0.0289	0.015	0.0369	0.0319	0.023	0.0259	0.021	0.025	0.024	0.021	0.016	0.023	0.0269	0.0279	0.018	0.019	0.022	0	0.0329	0.0299	0.0269	0.02
0.0389	0.0379	0.0289	0.0269	0.0289	0.0339	0.023	0.0339	0.0379	0.0399	0.0269	0.0329	0.024	0.0399	0.0459	0.0184	0.024	0.0319	0.024	0.0429	0	0.022	0.023	0.021
0.0309	0.019	0.0339	0.0299	0.025	0.0279	0.019	0.023	0.0259	0.0279	0.024	0.0329	0.024	0.024	0.0279	0.0349	0.0299	0.0329	0.021	0.0279	0.018	0	0.0379	0.0269
0.0369	0.0349	0.0269	0.019	0.024	0.0269	0.021	0.019	0.0279	0.0289	0.024	0.0309	0.02	0.022	0.019	0.024	0.021	0.025	0.019	0.0349	0.0309	0.0289	0	0.0259
0.025	0.0299	0.022	0.012	0.017	0.0259	0.011	0.014	0.024	0.02	0.014	0.021	0.022	0.022	0.02	0.0279	0.0289	0.016	0.017	0.0259	0.0309	0.0259	0.0359	0
X_r																							
0	0.0439	0.0439	0.0349	0.0449	0.0429	0.0289	0.0459	0.0459	0.0459	0.0439	0.0479	0.0329	0.0349	0.0319	0.0479	0.0469	0.0479	0.0399	0.0479	0.0469	0.0459	0.0449	0.0449
0.0449	0	0.0479	0.0389	0.0409	0.0369	0.023	0.0339	0.0369	0.0279	0.0359	0.0379	0.025	0.019	0.0309	0.0339	0.0319	0.0379	0.0279	0.0449	0.0449	0.0409	0.0399	0.0399
0.0429	0.0479	0	0.0349	0.0479	0.0459	0.0349	0.0429	0.0419	0.0339	0.0349	0.0469	0.0299	0.0319	0.0389	0.0459	0.0339	0.0419	0.0299	0.0409	0.0369	0.0349	0.0319	0.0299
0.0349	0.0449	0.0369	0	0.0429	0.0399	0.0329	0.025	0.0269	0.0369	0.0279	0.0329	0.025	0.025	0.025	0.0309	0.0269	0.0339	0.0259	0.0289	0.025	0.0289	0.0309	0.0269
0.0469	0.0469	0.0369	0.0309	0	0.0449	0.0269	0.0469	0.0269	0.0409	0.0469	0.0479	0.0299	0.0269	0.0399	0.0389	0.0459	0.0449	0.0409	0.0449	0.0459	0.0399	0.0389	0.0299
0.0389	0.0349	0.0349	0.0419	0.0399	0	0.0309	0.0419	0.0389	0.0429	0.0359	0.0409	0.0299	0.0299	0.0299	0.0379	0.0379	0.0299	0.0259	0.0419	0.0379	0.0429	0.0429	0.0389
0.0259	0.021	0.0259	0.0349	0.02	0.0359	0	0.0319	0.025	0.0369	0.024	0.0269	0.023	0.0299	0.0259	0.019	0.021	0.02	0.018	0.0319	0.0379	0.023	0.024	0.019
0.0419	0.0429	0.0409	0.0279	0.0369	0.0429	0.0349	0	0.0479	0.0409	0.0399	0.0469	0.0369	0.0349	0.0449	0.0459	0.0479	0.0479	0.0429	0.0339	0.0369	0.0329	0.0329	0.0339
0.0439	0.0379	0.0369	0.0449	0.0469	0.0389	0.0319	0.0459	0	0.0469	0.0449	0.0459	0.0429	0.0349	0.0399	0.0349	0.0359	0.0399	0.0299	0.0369	0.0409	0.025	0.0319	0.0279
0.0299	0.0279	0.0289	0.0409	0.0369	0.0479	0.0379	0.0449	0.0479	0	0.0419	0.0409	0.0329	0.0398	0.0419	0.0309	0.0379	0.0359	0.0359	0.0379	0.0409	0.0369	0.0409	0.0359
0.0439	0.0369	0.0409	0.0259	0.0359	0.0389	0.024	0.0399	0.0409	0.0379	0	0.0469	0.0449	0.0369	0.0379	0.0309	0.0369	0.0369	0.0399	0.0289	0.0279	0.019	0.024	0.025
0.0479	0.0439	0.0469	0.0349	0.0479	0.0439	0.0359	0.0449	0.0479	0.0459	0.0469	0	0.0419	0.0419	0.0409	0.0449	0.0459	0.0449	0.0429	0.0389	0.0439	0.0379	0.0429	0.0399
0.0389	0.0409	0.0259	0.0289	0.0279	0.0359	0.023	0.0419	0.0399	0.0419	0.0479	0.0449	0	0.0419	0.0409	0.0329	0.0329	0.0289	0.0319	0.0319	0.0279	0.025	0.0259	0.0309
0.0359	0.0279	0.0289	0.0309	0.0309	0.0379	0.0299	0.036	0.0409	0.0359	0.0359	0.0349	0.0299	0	0.0369	0.0349	0.0399	0.0309	0.0319	0.0399	0.0409	0.0269	0.0269	0.0269
0.0349	0.0319	0.0349	0.0289	0.0309	0.0409	0.0259	0.0389	0.0349	0.0339	0.0339	0.0379	0.0359	0.0349	0	0.0359	0.0389	0.0359	0.0329	0.0419	0.0449	0.0349	0.0369	0.0369
0.0419	0.0399	0.0429	0.0299	0.0399	0.0389	0.0309	0.0449	0.0379	0.0339	0.0329	0.0359	0.0339	0.0409	0.0419	0	0.0479	0.0469	0.0369	0.0379	0.0349	0.0349	0.0399	0.0399
0.0409	0.0349	0.0289	0.0369	0.0349	0.0289	0.0279	0.0449	0.0429	0.0399	0.0329	0.0459	0.0369	0.0349	0.0469	0.0469	0	0.0349	0.0299	0.0269	0.0289	0.0279	0.0279	0.0299
0.0429	0.0409	0.0439	0.0339	0.0359	0.0349	0.0349	0.0449	0.0379	0.0369	0.0389	0.0359	0.0309	0.0369	0.0459	0.0419	0.0439	0	0.0379	0.0309	0.0299	0.0309	0.0299	0.0289
0.0359	0.0339	0.0309	0.0289	0.0419	0.0429	0.0309	0.0409	0.0349	0.0439	0.0419	0.0369	0.0359	0.0359	0.0459	0.0479	0.0419	0.0449	0	0.0329	0.0339	0.0339	0.0289	0.0319
0.0419	0.0409	0.0409	0.0269	0.0389	0.0429	0.0349	0.0349	0.0349	0.0349	0.0359	0.0309	0.0279	0.0349	0.0359	0.0369	0.0299	0.0309	0.0339	0	0.0399	0.0369	0.0389	0.0319
0.0439	0.0429	0.0409	0.0359	0.0369	0.0429	0.0329	0.0389	0.0349	0.0449	0.0279	0.0419	0.0329	0.0439	0.0479	0.0309	0.0329	0.0409	0.0329	0.0479	0	0.0319	0.0339	0.0329
0.0429	0.0289	0.0439	0.0389	0.0349	0.0369	0.0299	0.0329	0.0349	0.0379	0.0389	0.0419	0.0359	0.0359	0.0399	0.0459	0.0389	0.0399	0.0329	0.0379	0.0279	0.0359	0.0429	0.0359
0.0349	0.0389	0.0329	0.021	0.0289	0.0369	0.024	0.0279	0.0359	0.0289	0.0259	0.0329	0.0329	0.0339	0.0319	0.0389	0.0379	0.0279	0.0289	0.0369	0.0419	0.0379	0.0439	0

Table AIV.

	C_1	C_2	C_3	C_4	C_5	C_6	C_7	C_8	C_9	C_{10}	C_{11}	C_{12}	C_{13}	C_{14}	C_{15}	C_{16}	C_{17}	C_{18}	C_{19}	C_{20}	C_{21}	C_{22}	C_{23}	C_{24}
C_1	0.019	0.047	0.039	0.002	0.046	0.009	0.019	0.044	0.043	0.043	0.041	0.046	0.028	0.027	0.033	0.044	0.045	0.049	0.030	0.045	0.047	0.041	0.042	0.039
C_2	0.043	0.012	0.043	0.009	0.031	0.006	0.013	0.025	0.028	0.021	0.028	0.033	0.016	0.012	0.021	0.024	0.021	0.032	0.017	0.034	0.036	0.029	0.029	0.028
C_3	0.034	0.041	0.012	0.007	0.037	0.014	0.021	0.033	0.035	0.027	0.027	0.041	0.020	0.019	0.029	0.034	0.027	0.032	0.019	0.032	0.027	0.025	0.024	0.020
C_4	0.023	0.033	0.024	-0.005	0.031	0.015	0.018	0.015	0.019	0.027	0.015	0.021	0.013	0.013	0.015	0.017	0.015	0.022	0.014	0.016	0.015	0.015	0.017	0.013
C_5	0.048	0.046	0.046	0.004	0.015	0.013	0.020	0.046	0.044	0.038	0.042	0.051	0.025	0.022	0.034	0.036	0.042	0.042	0.035	0.035	0.038	0.032	0.029	0.022
C_6	0.031	0.023	0.023	0.011	0.026	-0.010	0.020	0.031	0.034	0.037	0.027	0.033	0.019	0.019	0.021	0.025	0.025	0.021	0.015	0.029	0.025	0.030	0.030	0.022
C_7	0.011	0.009	0.010	0.009	0.008	0.010	0.003	0.015	0.011	0.021	0.010	0.012	0.008	0.014	0.011	0.008	0.006	0.007	0.005	0.013	0.019	0.007	0.009	0.004
C_8	0.035	0.035	0.032	-0.000	0.028	0.010	0.021	0.014	0.042	0.038	0.029	0.041	0.026	0.024	0.034	0.038	0.042	0.041	0.030	0.026	0.019	0.026	0.026	0.025
C_9	0.041	0.032	0.032	0.016	0.041	0.009	0.022	0.044	0.016	0.047	0.042	0.044	0.037	0.031	0.034	0.030	0.032	0.034	0.027	0.027	0.032	0.017	0.026	0.018
C_{10}	0.025	0.025	0.025	0.011	0.030	0.010	0.027	0.034	0.048	0.013	0.034	0.040	0.024	0.030	0.033	0.022	0.029	0.029	0.027	0.026	0.035	0.026	0.020	0.025
C_{11}	0.037	0.028	0.031	0.003	0.030	0.017	0.013	0.031	0.043	0.031	0.011	0.044	0.032	0.024	0.028	0.023	0.027	0.027	0.031	0.020	0.034	0.011	0.030	0.015
C_{12}	0.050	0.043	0.041	0.006	0.045	0.008	0.026	0.045	0.048	0.044	0.042	0.019	0.034	0.034	0.047	0.039	0.042	0.042	0.038	0.036	0.020	0.029	0.015	0.028
C_{13}	0.028	0.028	0.023	0.004	0.024	0.008	0.013	0.029	0.030	0.032	0.040	0.036	0.008	0.029	0.030	0.020	0.021	0.019	0.026	0.024	0.038	0.010	0.031	0.016
C_{14}	0.023	0.016	0.016	0.003	0.015	0.005	0.015	0.026	0.029	0.024	0.024	0.023	0.014	0.007	0.028	0.023	0.027	0.022	0.024	0.038	0.016	0.015	0.012	0.014
C_{15}	0.024	0.021	0.023	0.001	0.022	0.010	0.011	0.028	0.031	0.024	0.021	0.027	0.021	0.022	0.010	0.025	0.028	0.026	0.024	0.029	0.030	0.021	0.015	0.022
C_{16}	0.037	0.036	0.037	0.006	0.033	0.009	0.021	0.040	0.033	0.029	0.028	0.036	0.025	0.030	0.034	0.013	0.043	0.042	0.028	0.019	0.033	0.027	0.024	0.030
C_{17}	0.035	0.027	0.027	0.011	0.028	0.010	0.020	0.040	0.037	0.034	0.026	0.044	0.027	0.027	0.044	0.042	0.012	0.027	0.024	0.021	0.025	0.021	0.031	0.020
C_{18}	0.041	0.037	0.028	0.008	0.031	0.004	0.024	0.041	0.031	0.030	0.030	0.034	0.024	0.026	0.038	0.035	0.037	0.012	0.026	0.024	0.024	0.017	0.022	0.018
C_{19}	0.032	0.028	0.028	0.006	0.032	0.005	0.020	0.034	0.032	0.036	0.040	0.032	0.029	0.026	0.039	0.043	0.037	0.039	0.010	0.009	0.024	0.027	0.021	0.019
C_{20}	0.034	0.033	0.026	-0.000	0.026	0.011	0.019	0.024	0.024	0.023	0.023	0.024	0.013	0.019	0.026	0.027	0.018	0.020	0.019	0.050	0.030	0.027	0.017	0.017
C_{21}	0.042	0.040	0.034	0.008	0.031	0.010	0.022	0.039	0.039	0.038	0.026	0.036	0.024	0.038	0.044	0.028	0.029	0.034	0.026	0.013	0.013	0.022	0.026	0.020
C_{22}	0.034	0.025	0.034	0.014	0.026	0.007	0.017	0.025	0.026	0.029	0.028	0.036	0.022	0.023	0.029	0.037	0.029	0.031	0.021	0.019	0.019	0.009	0.036	0.024
C_{23}	0.034	0.034	0.027	0.002	0.025	0.006	0.017	0.020	0.027	0.028	0.023	0.030	0.017	0.019	0.022	0.025	0.023	0.024	0.017	0.028	0.028	0.027	0.008	0.022
C_{24}	0.023	0.027	0.021	0.003	0.017	0.007	0.010	0.017	0.021	0.018	0.015	0.022	0.018	0.019	0.019	0.024	0.026	0.016	0.013	0.029	0.020	0.020	0.030	0.006

Table AV.
The values of matrices $\left[l''_{ij}\right]$

Criteria	C_1	C_2	C_3	…	C_{22}	C_{23}	C_{24}
C_1	(0.019, 0.068, 0.24)	(0.047, 0.105, 0.277)	(0.039, 0.094, 0.276)	…	(0.041, 0.091, 0.251)	(0.042, 0.094, 0.260)	(0.039, 0.079, 0.247)
C_2	(0.043,0.090, 0.025)	(0.012, 0.048, 0.198)	(0.043, 0.087, 0.243)	…	(0.029, 0.069, 0.214)	(0.029, 0.070, 0.221)	(0.028, 0.065, 0.211)
C_3	(0.034, 0.084, 0.026)	(0.041, 0.090, 0.258)	(0.012, 0.048, 0.211)	…	(0.025, 0.065, 0.221)	(0.024, 0.064, 0.227)	(0.020, 0.057, 0.213)
C_4	(0.023, 0.060, 0.215)	(0.033, 0.068, 0.215)	(0.024, 0.058, 0.207)	…	(0.015, 0.046, 0.180)	(0.017, 0.050, 0.189)	(0.013, 0.041, 0.176)
C_5	(0.048, 0.106, 0.283)	(0.046, 0.102, 0.271)	(0.046, 0.100, 0.271)	…	(0.032, 0.076, 0.238)	(0.029, 0.077, 0.246)	(0.022, 0.063, 0.226)
C_6	(0.031, 0.079, 0.251)	(0.023, 0.070, 0.237)	(0.023, 0.067, 0.236)	…	(0.030, 0.071, 0.220)	(0.030, 0.073, 0.229)	(0.022, 0.061, 0.214)
C_7	(0.011, 0.042, 0.177)	(0.009, 0.037, 0.165)	(0.010, 0.038, 0.169)	…	(0.007, 0.032, 0.150)	(0.009, 0.034, 0.157)	(0.004, 0.027, 0.145)
C_8	(0.035, 0.085, 0.271)	(0.035, 0.085, 0.260)	(0.032, 0.075, 0.258)	…	(0.026, 0.067, 0.225)	(0.026, 0.062, 0.234)	(0.025, 0.061, 0.224)
C_9	(0.041, 0.095, 0.026)	(0.032, 0.085, 0.025)	(0.032, 0.082, 0.025)	…	(0.017, 0.059, 0.021)	(0.020, 0.062, 0.227)	(0.018, 0.057, 0.021)
C_{10}	(0.025, 0.071, 0.248)	(0.025, 0.069, 0.235)	(0.025, 0.067, 0.235)	…	(0.026, 0.068, 0.219)	(0.030, 0.072, 0.231)	(0.025, 0.060, 0.021)
C_{11}	(0.037, 0.085, 0.024)	(0.028, 0.075, 0.231)	(0.031, 0.075, 0.234)	…	(0.011, 0.045, 0.191)	(0.015, 0.052, 0.203)	(0.015, 0.049, 0.194)
C_{12}	(0.050, 0.111, 0.296)	(0.043, 0.101, 0.280)	(0.041, 0.093, 0.282)	…	(0.029, 0.078, 0.247)	(0.031, 0.084, 0.261)	(0.028, 0.074, 0.246)
C_{13}	(0.028, .075, 0.296)	(0.028, 0.074, 0.236)	(0.023, 0.066, 0.023)	…	(0.010, 0.049, 0.198)	(0.012, 0.052, 0.207)	(0.016, 0.053, 0.202)
C_{14}	(0.023, 0.068, 0.229)	(0.016, 0.058, 0.212)	(0.016, 0.056, 0.213)	…	(0.015, 0.048, 0.189)	(0.015, 0.050, 0.197)	(0.014, 0.046, 0.187)
C_{15}	(0.024, 0.71, 0.242)	(0.021, 0.066, 0.229)	(0.023, 0.065, 0.231)	…	(0.021, 0.059, 0.208)	(0.024, 0.063, 0.218)	(0.022, 0.058, 0.208)
C_{16}	(0.037, 0.092, 0.263)	(0.036, 0.089, 0.250)	(0.037, 0.087, 0.252)	…	(0.027, 0.070, 0.221)	(0.031, 0.078, 0.234)	(0.030, 0.073, 0.223)
C_{17}	(0.035, 0.084, 0.245)	(0.027, 0.075, 0.229)	(0.027, 0.066, 0.223)	…	(0.021, 0.058, 0.199)	(0.022, 0.060, 0.208)	(0.020, 0.055, 0.199)
C_{18}	(0.041, 0.087, 0.254)	(0.037, 0.077, 0.241)	(0.030, 0.077, 0.238)	…	(0.017, 0.053, 0.208)	(0.021, 0.060, 0.215)	(0.018, 0.054, 0.204)
C_{19}	(0.032, 0.082, 0.251)	(0.028, 0.077, 0.238)	(0.028, 0.071, 0.235)	…	(0.027, 0.068, 0.214)	(0.017, 0.061, 0.218)	(0.019, 0.059, 0.210)
C_{20}	(0.034, 0.083, 0.246)	(0.033, 0.078, 0.235)	(0.026, 0.071, 0.234)	…	(0.027, 0.066, 0.208)	(0.024, 0.065, 0.218)	(0.017, 0.053, 0.201)
C_{21}	(0.042, 0.095, 0.264)	(0.040, 0.091, 0.252)	(0.034, 0.079, 0.249)	…	(0.022, 0.066, 0.217)	(0.026, 0.069, 0.228)	(0.020, 0.061, 0.216)
C_{22}	(0.034, 0.082, 0.257)	(0.025, 0.068, 0.233)	(0.034, 0.079, 0.246)	…	(0.009, 0.040, 0.181)	(0.036, 0.078, 0.230)	(0.024, 0.063, 0.213)
C_{23}	(0.034, 0.085, 0.245)	(0.034, 0.081, 0.233)	(0.027, 0.070, 0.229)	…	(0.027, 0.066, 0.205)	(0.008, 0.040, 0.179)	(0.022, 0.060, 0.203)
C_{24}	(0.023, 0.067, 0.227)	(0.027, 0.069, 0.221)	(0.021, 0.059, 0.215)	…	(0.020, 0.058, 0.198)	(0.030, 0.069, 0.212)	(0.006, 0.030, 0.160)

Table AVI.
The total-relation
fuzzy matrix $\tilde{T}$

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About the authors

Farhad Panaihfar is currently a PhD Researcher and Part Time Lecturer in the Department of Design and Manufacturing Technology at the University of Limerick. His research interests are supply chain design and planning, simulation modelling, Fuzzy logic, multiple-criteria decision-making and reengineering. Farhad Panaihfar is the corresponding author and can be contacted at: farhad.panahifar@ul.ie

Cathal Heavey is an Associate Professor of Operations Management in the Department of Design and Manufacturing Technology at the University of Limerick. His research interests include simulation modelling of discrete-event systems, modelling and analysis of supply chains and manufacturing systems, process modelling, component-based simulation and decision support systems.

P.J. Byrne is an Associate Professor of Operations/Supply Chain Management in Dublin City University Business School and Head of the Management Group in the school. His research interests include supply chain design, analysis and optimization, cloud based simulation, discrete event simulation, industrial applications of simulation modeling for the manufacturing and services sectors and business process optimisation.