An investigative study on the causal relationships of the antecedents of organizational citizenship behavior (OCB) among employees in the hospitality industry using fuzzy DEMATEL: A case in Cebu Philippines

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Abstract: This paper attempts to identify the antecedents of organizational citizenship behavior (OCB) in the hospitality industry and to determine their causal relationships. In order to elucidate this objective, a case study in Cebu, Philippines was conducted. Expert decision-makers holding key positions in top hotels and restaurants were asked to identify the OCB antecedents they observe and experience in practice. Twenty-six (26) antecedents were identified by experts and 24 were from current literature. Using fuzzy decision-making trial and evaluation laboratory (DEMATEL) to understand the causal relationships of these antecedents with imprecise information, key findings were reported in this work. First, organizational commitment emerge as the most prominent antecedent with the highest number of impacts, both given and received. On the other hand, employees' age is the least prominent antecedent showing limited relationships with other antecedents. Furthermore, human resource practices appear as the most influential antecedent which shows higher degree of causality to other antecedents. Finally, job satisfaction and employee engagement have the highest number of impacts received which means that they are more dependent with other antecedents in the list. These results would aid decision-makers in the hospitality industry formulate policies that would improve OCB in their workplace.

Key Words: organizational citizenship behavior; antecedents; fuzzy set theory; DEMATEL; hospitality industry

1. INTRODUCTION

Bateman and Organ (1983) coined the term organizational citizenship behaviour (OCB) for the extra-role behaviour of employees in the workplace.

Organ (1988) then defined OCB as "individual behavior that is discretionary, not directly or explicitly recognized by the formal reward system, and that in the aggregate promotes the effective functioning of the organization". This definition provided the groundwork that led to the development

of OCB as a field in organization studies and has become an important topic of discussion for the past three decades. One important finding that scholars became interested in OCB is its link toward productivity and increased efficiency. Podsakoff et al. (1997) pointed out that OCB is significant in achieving organizational effectiveness and this has put the field into the limelight. This was supported by Nielsen et al. (2009) who demonstrated the impact of OCB on organizational performance. It was shown by a series of findings that employees demonstrating OCB have been found to go beyond their formal duties, see George (1991).

Due to the significance of OCB employee performance, current discussions of OCB studies have been extensively directed to the understanding of the antecedents of OCB and their overlaps with similar important constructs, i.e. contextual performance, prosocial organizational behavior, extra-role behaviour. Previous studies highlighted the puzzling question: What makes an employee show OCB?. Various attempts were presented in current literature; e.g. Koys (2001) and Yoon and Suh (2003) pointed out that job satisfaction and organizational commitment are some of the antecedents of OCB. Over time, as global organizational dynamics changes, a wide array of determinants has been identified. This has been made possible through recent investigations of OCB with other emerging concepts and disciplines. Known antecedents of OCB in current literature include job satisfaction (Gonzales & Garazo, 2006; Yee et al., 2008), employee engagement and job embeddedness (Rurkkum & Bartlett, 2012), organizational commitment (Gautam et al., 2004), high-performance human resource practices (Mukhtar et al., 2012), self-efficacy (Dominguez et al., 2013), transformational leadership (Podsakoff et al., 2000), self-serving motives (Bolino & Klotz, 2015) and culture (Paine & Organ, 2000).

While it is believed that culture differences among countries lead to differences in OCB—individually or collectively, current literature failed to directly point out the similarities and differences of the antecedents in both context of Western and Eastern cultures. Paine & Organ (2000) argued that culture plays an important role in employees' desire and willingness to engage in OCB. Focusing on situational causes of the nature of an employees' job or working relationships, there is a missing work in explaining the nature of OCB based on cultural context (Becton & Field, 2009). Moreover, most of the existing studies of OCB have been conducted in Western cultures, ignoring other cultures represented in the global economy, e.g. Philippine context. Important findings generated by Moorman and Blakely (1995) suggest that if an individual holds collectivistic values or norms, the likelihood to perform citizenship behaviours is high. This elicitation of collectivism as a norm is prevalent in Eastern countries. However, this notion has not gained enough attention in current literature.

Aside from the lack of understanding of OCB studies in Eastern countries which include identifying of OCB antecedents, current literature merely identifies the antecedents without due exploration on its dynamics and interrelationships. The lack of understanding of the interrelationships of OCB antecedents may provide a myopic view on the real causes of OCB. While identified antecedents in literature were already established with some empirical support, it is worth noting that some, if not all, of these antecedents may have impacts to any other antecedents due to their loosely defined boundaries and overlaps. This would definitely help managers in better understanding the complexities of these highly vague constructs as well as help them make better decisions for organizational policy-making, development of human resource programs, incentive and reward schemes, resource allocation and medium to long-term planning. It is also plausible to note that, due to the cultural background differences among countries and the socio-economic environment, these interrelationships are highly homogeneous to organizations with closer cultural contexts and industrial make-ups. Thus, it is argued that employees in these industries are more susceptible to show OCB and to a certain degree, service organizations require some forms of OCB.

With these gaps in current literature, this paper intends to achieve two objectives: (1) to identify OCB antecedents in an Eastern developing country, and (2) to model the causal relationships of these antecedents, both in a particular industry. A case study in the Philippine hospitality industry is carried out in this work. Particularly, the case location is situated in one of the most industrialized cities in Philippines which is currently an emerging tourism and business hub. Service industry, where hospitality industry belongs, is growing steadily since the mid-20th century and current economic figures demonstrate the significance of identifying OCB antecedents in order to support the growth of hospitality industry in the locality as well as understanding the complex causal relationships of these antecedents to aid managers in making better decisions on relevant areas in their respective organizations.

To address the objectives, a purposive survey of hospitality experts was conducted which attempts to extract OCB antecedents they observe and experience in practice. Expert respondents were carefully selected to ensure that the results reflect expert judgments. Due to the subjectivity of OCB antecedents a fuzzy decision-making trial and evaluation laboratory (DEMATEL) was adopted in order to understand the causal relationships of these antecedents. Fuzzy set theory was popularized by Zadeh (1965) in order to handle imprecise and uncertain information. Since then, fuzzy set theory became popular in multiple criteria decision making (MCDM) methods as the former is able to handle uncertainty in decision-making especially when human judgments are made under incomplete information. Fuzzy DEMATEL is recently used in organization studies in understanding causal relationships of factors, criteria or constructs under various domains. The main departure of this work in relation to the current literature is the identification of relevant OCB antecedents in an Eastern developing country and understanding their complex relationships that takes into the uncertainty of the decision-making process.

2. METHODOLOGY

The proposed procedure in carrying out the objectives of this work is detailed as follows:

1. Form an expert group that comprises decision-makers in the hospitality industry. These include people from top management, human resource directors and an academic who have an extensive knowledge and experience on people management, human resource appraisal and performance management and organization. Managers from top hotels and restaurants must be first invited and if invitation is denied, succeeding hotels and restaurants in the list would be invited. Invitation comes with a background check on the expertise and experience of an individual decision-maker.

2. The expert group would be asked to list down and discuss all antecedents of OCB in their workplace. Critical elaboration of the role of antecedents and their significance must be performed.

3. The final list of antecedents includes the antecedents defined in current literature and the antecedents obtained from Step 2.

4. Another expert group would be asked to elicit the degree of causal impact of one antecedent to another antecedent using the linguistic scale in Table 1. Form a fuzzy direct-relation matrix $Z = \left(\tilde{z}_{ij} \right)_{nxn} = \left(z_{ij}^l, z_{ij}^m, z_{ij}^u \right)$ where $\tilde{z}_{ij}$ signifies the impact of antecedent i on antecedent j represented as a fuzzy number from Table 1. This is represented using Eq. 1.

$$Z = \left(\tilde{z}_{ij} \right)_{nxn} = \begin{bmatrix} \tilde{z}_{11} & \cdots & \tilde{z}_{1j} & \cdots & \tilde{z}_{1n} \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ \tilde{z}_{i1} & \cdots & \tilde{z}_{ij} & \cdots & \tilde{z}_{in} \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ \tilde{z}_{n1} & \cdots & \tilde{z}_{nj} & \cdots & \tilde{z}_{nn} \end{bmatrix} \quad \text{(Eq. 1)}$$

Table 1. Linguistic scale for fuzzy DEMATEL

Linguistic variable	Code	(TFNs)
No influence	NO	(0, 0.01, 0.3)
Very low influence	VLI	(0.2, 0.3, 0.5)
Low influence	LI	(0.3, 0.5, 0.7)
High influence	HI	(0.5, 0.7, 0.9)
Very high influence	VHI	(0.7, 0.9, 1.0)

5. Obtain the fuzzy normalized direct-relation matrix using Eq. (2) and (3).

$$X = \left(x_{ij} \right)_{nxn} = \begin{bmatrix} x_{11} & \cdots & x_{1j} & \cdots & x_{1n} \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ x_{i1} & \cdots & x_{ij} & \cdots & x_{in} \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ x_{n1} & \cdots & x_{nj} & \cdots & x_{nn} \end{bmatrix} \quad \text{(Eq. 2)}$$

$$x_{ij} = \left(\frac{\tilde{z}_{ij}}{r} \right) = \left(\frac{z_{ij}^l}{r}, \frac{z_{ij}^m}{r}, \frac{z_{ij}^u}{r} \right), r = \max_{1 \le i \le n} \sum_{j=1}^{n} z_{ij}^u \quad \text{(Eq. 3)}$$

6. Define X_l, X_m and X_u using Eq. 4 and Eq. 5.

$$X = \left(x_{ij} \right)_{nxn} = \left(x_{ij}^l, x_{ij}^m, x_{ij}^u \right) \quad \text{(Eq. 4)}$$

$$X_l = \left(x_{ij}^l \right)_{nxn}, X_m = \left(x_{ij}^m \right)_{nxn}, X_u = \left(x_{ij}^u \right)_{nxn} \quad \text{(Eq. 5)}$$

7. Construct the fuzzy total relation matrix $T = \left(t_{ij}^l, t_{ij}^m, t_{ij}^u \right)_{nxn}$ and define T_l, T_m and T_u using Eq. 6, Eq. 7, and Eq. 8.

$$\tilde{T} = \lim_{k \to \infty} \left(\tilde{X}^1 + \tilde{X}^2 + \ldots + \tilde{X}^k \right) \quad \text{(Eq. 6)}$$

$$\left[t_{ij}^l \right] = X_l \times \left(I - X_l \right)^{-1},$$

$$\left[t_{ij}^m \right] = X_m \times \left(I - X_m \right)^{-1},$$

$$\left[t_{ij}^l \right] = X_u \times \left(I - X_u \right)^{-1} \quad \text{(Eq. 7)}$$

$$T_l = \left[t_{ij}^l \right], T_m = \left[t_{ij}^m \right], T_u = \left[t_{ij}^u \right] \quad \text{(Eq. 8)}$$

8. Defuzzify the entries in the fuzzy total relation matrix using Eq. 9. Form the non-fuzzy total relation matrix $T = \left(t_{ij} \right)_{nxn}$ where each entry represents the total impact of a row antecedent on the column antecedent.

$$t_{ij} = \left(t_{ij}^l + 4t_{ij}^m + t_{ij}^u \right) \Big/ 6 \quad \text{(Eq. 9)}$$

9. Compute the values of influence and relation as shown in Eq. 10 and Eq. 11. Then, compute for the $D + R$ and $D - R$ values and map the antecedents in a 2-tuple $\left(D + R, D - R \right)$ map. Some antecedents may have $t_i - t_j > 0$ and thus greatly influence other antecedent. These antecedents are referred to as dispatchers. On the other hand, some antecedents may have $t_i - t_j < 0$ and they are greatly influenced by other antecedents. They are referred to as receivers. The value of $D + R$ indicates the degree of relationship between each antecedent with other antecedent. Antecedents having greater values of $D + R$ have stronger relationships with other antecedents while those having smaller values of $D + R$ have less of a relationship with others (Seyed-Hosseini et al., 2006).

$$D = \left(\sum_{j=1}^{n} t_{ij} \right)_{nx1} = \left(t_i \right)_{nx1} \quad \text{(Eq. 10)}$$

$$R = \left(\sum_{i=1}^{n} t_{ij} \right)_{1xn}^{T} = \left(t_j \right)_{nx1} \quad \text{(Eq. 11)}$$

10. Set a threshold value α to filter out some negligible causal relationships in the total relation matrix. The threshold value must be agreed by the expert decision-makers. If $t_{ij} \ge \alpha$, then the causal impact of antecedent i on antecedent j is significant.

11. Form the adjacency matrix $A = \left(a_{ij} \right)_{nxn}$ where

$$a_{ij} = \begin{cases} 1 & if \quad t_{ij} \ge \alpha \\ 0 & if \quad t_{ij} < \alpha \end{cases} \quad \text{(Eq. 12)}$$

The adjacency matrix provides a view on the impact relationships of the antecedents. If $a_{ij} = 1$, then an arrow emanates from

antecedent i to antecedent j on the $(D+R, D-R)$ map. This eventually forms a directed graph where each antecedent represents a vertex and the directed edge is defined by Eq. 12.

3. CASE STUDY

A case study was conducted in the hospitality industry of Cebu, Philippines. Cebu, Philippines, a province in central Philippines, has one of the largest tourism investments in the country (Tourism Investment Portfolio, 2008) and recent statistics shows that Cebu has an approximate 20 % share of the country's total visitor arrivals in February 2017 (Tourism Statistics, 2017). Aside from the limited OCB studies in the Philippines and in Cebu in particular, these figures demonstrate the significance of identifying OCB antecedents in order to support the growth of hospitality industry in the locality as well as understanding the complex causal relationships of these antecedents in order to aid managers in making better decisions on relevant areas in their respective organizations.

Expert decision-makers from top hotels and restaurants were identified in order to extract from them the OCB antecedents they observe and experience in practice. Ten expert respondents were obtained in a two-month purposive sampling survey. The median age of the respondents is from 46 years old while the mode is at 52. The age span is at 28 to 54 years old with 60 % of the respondents aged 44 years old and above. Seven out of the ten respondents are female while three are male. Eight got their undergraduate degrees from top universities in Cebu while one got a degree from Japan and one from Manila, the Philippine capital city. Five of them got a degree in business and economics, two got psychology degrees while the rest got social science and medical-related degrees. Five of these respondents have graduate degrees in business and management as well as in psychology. Four experts are currently working in hotels and resorts, two are in food and beverage, one is in airline and the rest are in spa and

massage and travel agency. Nine of these respondents are currently holding top management positions that span from being a general manager, managing director, chief executive officer, director for human resource, to marketing and communications director. One expert respondent is an expert researcher in organization studies. All respondents have more than ten years of industry experience with a maximum of 27 years. These qualifications highlight the expertise of the respondents in the subject domain. These experts were asked to answer two questions: (1) In your experience, what programs / activities / projects you have implemented that increased the level of satisfaction of your front line employees in order for them to provide service beyond what is expected of them?, and (2) What organizational support should be provided to keep employees satisfied?. With the OCB antecedents obtained from current literature, Table 2 shows the final list of OCB antecedents. Noted that due to the construction of the survey questions, the antecedents obtained from the survey are set from the perspectives of the management. Twenty-six (26) antecedents were identified by the expert decision-makers.

Table 2. Final list of OCB antecedents

No.	Antecedents	Source
1	leader support	Literature
2	positive attitude about their (employees') relationship with an organization	Literature
3	prosocial values	Literature
4	organizational concerns	Literature
5	impression management	Literature
6	role perception	Literature
7	leaders' behavior	Literature
8	leader-member exchange	Literature
9	fairness perception	Literature
10	individual disposition	Literature
11	employees' age	Literature
12	attitudinal variables	Literature
13	personality traits	Literature
14	task characteristics	Literature
15	workplace-related elements	Literature
16	job satisfaction (this is widely accepted)	Literature
17	employee engagement	Literature
18	job embeddedness	Literature
19	organizational commitment	Literature
20	human resource practices	Literature
21	self-efficacy	Literature
22	transformational leadership	Literature
23	self-serving motives	Literature
24	culture	Literature
25	setting standards	Survey

26	creating management programs	Survey
27	implementing incentive schemes	Survey
28	providing training	Survey
29	top management support	Survey
30	team-building activities	Survey
31	equipping sessions	Survey
32	employee empowerment	Survey
33	immersion	Survey
34	top management acting as role models	Survey
35	trust and respect for roles and functions	Survey
36	high degree of management involvement in organizational activities	Survey
37	goal setting	Survey
38	stabilized pay system	Survey
39	strict policy implementation and reinforcement	Survey
40	extended training and benefits to family members	Survey
41	cultural training (Japanese)	Survey
42	leadership development programs	Survey
43	professional development programs	Survey
44	engagement programs	Survey
45	competitive compensation and benefits	Survey
46	fair and transparent performance management program	Survey
47	open communication with management	Survey
48	recognition program	Survey
49	proper channels of communication	Survey
50	leisure time and organized play with all employees	Survey

Another set of expert group which comprises OCB experts were tasked to elicit judgments on the degree of impact of one antecedent on another antecedent. Using the linguistic scale in Table 1 with corresponding triangular fuzzy numbers, the fuzzy initial direct-relation matrix Z is shown in Table 2. For brevity, the fuzzy normalized direct relation matrix as well as the fuzzy total relation matrix are not shown in this paper. Table 3 presents the non-fuzzy total relation matrix using a sequence of formulation presented in Eq. 2 through Eq. 9. From the non-fuzzy total relation matrix, the D and R vectors were computed. From these vectors, $D+R$ and $D-R$ vectors were also computed using Eq. 10 and Eq. 11, respectively. Table 4 presents these vectors. Using Eq. 12, the adjacency matrix of antecedents is shown in Table 5.

Table 2. Fuzzy direct-relation matrix

#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.5,0.75,1.0)	(0,0,0.25)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)
2	(0.75,1.0,1.0)	(0,0,0.25)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.5,0.75,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
3	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
4	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
5	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
6	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
7	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
8	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
9	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
10	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
11	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)
12	(0.5,0.75,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
13	(0.25,0.5)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.5,0.75,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.25,0.5,0.25)
14	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)
15	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0,0,0.25)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0,0,0.25)
16	(0,0.25,0.5)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0.25,0.5)	(0,0,0.25)
17	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)
18	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0,0.25,0.5)	(0.25,0.5,0.25)	(0.25,0.5,0.25)
19	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
20	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
21	(0.5,0.75,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.5,0.75,1.0)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0.25,0.5)
22	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.5,0.75,1.0)
23	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.5,0.75,1.0)	(0.75,1.0,1.0)	(0.5,0.75,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.25,0.5,0.25)
24	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
25	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
26	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
27	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.5,0.75,1.0)	(0.25,0.5,0.25)
28	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
29	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
30	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
31	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0,0.25,0.5)	(0.5,0.75,1.0)	(0.25,0.5,0.25)
32	(0.5,0.75,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0.25,0.5)	(0.25,0.5,0.25)
33	(0.25,0.5)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0,0,0.25)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)
34	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.25,0.5,0.25)
35	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0.25,0.5)	(0.25,0.5,0.25)
36	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0.25,0.5)	(0.25,0.5,0.25)
37	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
38	(0.25,0.5)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.5,0.75,1.0)	(0,0.25,0.5)	(0,0,0.25)	(0,0,0.25)
39	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0,0,0.25)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)
40	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0.5,0.75,1.0)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0.5,0.75,1.0)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)
41	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)
42	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0,0,0.25)
43	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0,0,0.25)
44	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0,0,0.25)
45	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0,0,0.25)
46	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0,0,0.25)
47	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0,0,0.25)
48	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0,0,0.25)
49	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0,0,0.25)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)
50	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0,0,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)

Table 2. Fuzzy direct-relation matrix (continuation)

#	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.5,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.5,0.75,1.0)	(0.75,1.0,1.0)	(0.5,0.75,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
2	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
3	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
4	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
5	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
6	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
7	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
8	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
9	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
10	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
11	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)
12	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
13	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.5,0.75,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
14	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0,0,0.25)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.75,1.0,1.0)
15	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)
16	(0,0,0.25)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)
17	(0.75,1.0,1.0)	(0,0,0.25)	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
18	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
19	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
20	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
21	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0,0.25,0.5)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0,0,0.25)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)
22	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
23	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
24	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
25	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
26	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
27	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)
28	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.25,0.5,0.25)	(0.75,1.0,1.0)
29	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)
30	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0,0,0.25)
31	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
32	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.5,0.75,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0.25,0.5)	(0.5,0.75,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
33	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0,0,0.25)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)
34	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
35	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.5,0.75,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0.25,0.5)	(0.5,0.75,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
36	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
37	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
38	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0,0,0.25)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)
39	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)
40	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0,0,0.25)	(0.5,0.75,1.0)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0.5,0.75,1.0)
41	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0,0,0.25)	(0.5,0.75,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0,0,0.25)	(0,0,0.25)	(0.25,0.5,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)
42	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
43	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
44	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
45	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.5,0.75,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
46	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.5,0.75,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
47	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
48	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
49	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)
50	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)

Table 2. Fuzzy direct-relation matrix (continuation)

#	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
1	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.5,0.75,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.5,0.75,1.0)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
2	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.5,0.75,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0,0.25,0.5)	(0,0.25,0.5)	(0.75,1.0,1.0)	(0,0,0.25)
3	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
4	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
5	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
6	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
7	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
8	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.5,0.75,1.0)	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
9	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
10	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
11	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)
12	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
13	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.5,0.75,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
14	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.5,0.75,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
15	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0,0,0.25)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)
16	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0,0,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0,0,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)
17	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.25,0.5,0.25)	(0,0.25,0.5)	(0,0.25,0.5)	(0,0.25,0.5)	(0,0,0.25)
18	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
19	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
20	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
21	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.75,1.0,1.0)	(0.5,0.75,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0,0.25,0.5)	(0,0,0.25)	(0,0,0.25)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.25,0.5,0.25)	(0,0,0.25)
22	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
23	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0,0.25,0.5)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
24	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
25	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)
26	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.25,0.5,0.25)
27	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0,0.25,0.5)	(0.5,0.75,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.75,1.0,1.0)
28	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
29	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
30	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0,0,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)
31	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0,0,0.25)	(0,0,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.5,0.75,1.0)
32	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0,0,0.25)	(0.25,0.5,0.25)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.75,1.0,1.0)
33	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0,0,0.25)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0,0,0.25)	(0.25,0.5,0.25)	(0,0.25,0.5)	(0,0.25,0.5)	(0,0.25,0.5)	(0,0,0.25)
34	(0.5,0.75,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0,0,0.25)	(0,0,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)
35	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0,0,0.25)	(0.25,0.5,0.25)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)
36	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0.25,0.5,0.5)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
37	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
38	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)
39	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)
40	(0,0,0.25)	(0.25,0.5,0.25)	(0,0,0.25)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)
41	(0.25,0.5,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)
42	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0.75,1.0,1.0)
43	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0,0,0.25)	(0,0,0.25)	(0.25,0.5,0.25)	(0,0,0.25)	(0,0,0.25)	(0.75,1.0,1.0)
44	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0,0,0.25)	(0,0,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0,0,0.25)	(0.75,1.0,1.0)
45	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0,0,0.25)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)

46(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
47(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0,0,0.25)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
48(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0,0,0.25)	(0,0,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0,0,0.25)	(0.75,1.0,1.0)
49(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0,0,0.25)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)
50(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0,0,0.25)		(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)

Table 2. Fuzzy direct-relation matrix (continuation)

	46	47	48	49	50
1	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.5,0.75,1.0)	(0.75,1.0,1.0)
2	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.5,0.75,1.0)	(0.75,1.0,1.0)
3	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
4	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
5	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
6	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
7	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
8	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
9	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
10	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
11	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)
12	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
13	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
14	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
15	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)
16	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)
17	(0,0,0.25)	(0.5,0.75,1.0)	(0,0,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)
18	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
19	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
20	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
21	(0.5,0.75,1.0)	(0.75,1.0,1.0)	(0.5,0.75,1.0)	(0.75,1.0,1.0)	(0,0,0.25,0.5)
22	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
23	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
24	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
25	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0,0,0.25)	(0,0,0.25,0.5)
26	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25,0.5)
27	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)
28	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
29	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
30	(0.5,0.75,1.0)	(0.75,1.0,1.0)	(0.5,0.75,1.0)	(0.75,1.0,1.0)	(0.5,0.75,1.0)
31	(0.5,0.75,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.25,0.5,0.25)
32	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)
33	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0.25,0.5,0.25)
34	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0.25,0.5,0.25)	(0.75,1.0,1.0)	(0.25,0.5,0.25)
35	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.5,0.75,1.0)
36	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
37	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
38	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)
39	(0,0,0.25)	(0.5,0.75,1.0)	(0,0,0.25)	(0.5,0.75,1.0)	(0,0,0.25)
40	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0.5,0.75,1.0)
41	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)	(0,0,0.25)
42	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
43	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
44	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
45	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
46	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
47	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
48	(0.75,1.0,1.0)	(0.75,1.0,1.0)	(0,0,0.25)	(0.75,1.0,1.0)	(0.75,1.0,1.0)
49	(0.5,0.75,1.0)	(0.5,0.75,1.0)	(0.25,0.5,0.25)	(0,0,0.25)	(0,0,0.25)
50	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0.25,0.5,0.25)	(0,0,0.25)

Table 3. Non-fuzzy total relation matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	0.08846	0.11688	0.11516	0.11139	0.11460	0.11393	0.09566	0.11788	0.11688	0.11243	0.02384	0.11288	0.10833	0.08734	0.08379	0.11852	0.11907	0.10850	0.11885	0.08878	0.11269	0.11163	0.11126	0.11735	0.11463
2	0.10167	0.09287	0.10541	0.10192	0.10488	0.10842	0.10799	0.11210	0.11113	0.11078	0.02269	0.11124	0.10282	0.08807	0.08463	0.11263	0.11308	0.10706	0.11291	0.07608	0.11096	0.10611	0.10073	0.11154	0.10909
3	0.10151	0.12110	0.10102	0.11528	0.11864	0.11832	0.11778	0.12227	0.12110	0.12075	0.02451	0.12138	0.11663	0.09481	0.09103	0.12285	0.12333	0.11657	0.12314	0.09148	0.12112	0.11577	0.11960	0.12157	0.11901
4	0.11228	0.12335	0.12149	0.09915	0.12085	0.12018	0.11981	0.12453	0.12335	0.12295	0.04323	0.12351	0.11849	0.09625	0.09241	0.12512	0.12561	0.11869	0.12542	0.09323	0.12298	0.11759	0.12169	0.12374	0.12088
5	0.11019	0.12105	0.11923	0.09731	0.10033	0.11794	0.11757	0.12221	0.12105	0.12066	0.03330	0.12121	0.11629	0.09447	0.09069	0.12279	0.12327	0.11649	0.12308	0.09150	0.12069	0.11540	0.11943	0.12144	0.11863
6	0.11043	0.12104	0.11922	0.11522	0.11858	0.09999	0.11756	0.12221	0.12104	0.12065	0.02450	0.12128	0.11653	0.09473	0.09095	0.12279	0.12327	0.11647	0.12308	0.08247	0.12102	0.11572	0.11950	0.12151	0.11895
7	0.11139	0.12210	0.12026	0.11622	0.11962	0.11929	0.10032	0.12328	0.12210	0.12170	0.02469	0.12234	0.11755	0.09555	0.09173	0.12386	0.12435	0.11749	0.12416	0.09222	0.12208	0.11672	0.12054	0.12257	0.11999
8	0.11047	0.12100	0.11022	0.11518	0.11854	0.11822	0.11752	0.10384	0.12100	0.12061	0.02449	0.12118	0.11649	0.09470	0.09092	0.12269	0.12317	0.11643	0.12298	0.09141	0.12098	0.11567	0.11945	0.12147	0.11891
9	0.11151	0.12223	0.12039	0.11635	0.11975	0.11942	0.11871	0.12341	0.10396	0.12183	0.04301	0.12247	0.11767	0.09565	0.09184	0.12399	0.12448	0.11762	0.12429	0.09233	0.12221	0.11685	0.12067	0.12270	0.12012
10	0.11043	0.12104	0.11922	0.11522	0.11858	0.11826	0.11756	0.12221	0.12104	0.10238	0.02450	0.12128	0.11653	0.09473	0.09095	0.12279	0.12327	0.11647	0.12308	0.08247	0.12102	0.11572	0.11950	0.12151	0.11895
11	0.00809	0.00865	0.00861	0.00844	0.00865	0.00846	0.00849	0.00875	0.00865	0.00865	0.00390	0.00875	0.00843	0.00718	0.00701	0.00880	0.00883	0.00848	0.00883	0.00703	0.00867	0.00837	0.00861	0.00871	0.00854
12	0.10744	0.12237	0.12053	0.11649	0.11989	0.11939	0.11893	0.12355	0.12237	0.12199	0.03393	0.10433	0.11771	0.09565	0.09184	0.12413	0.12462	0.11777	0.12443	0.09247	0.12220	0.11682	0.12079	0.12280	0.12009
13	0.09213	0.11614	0.11440	0.11056	0.11379	0.11348	0.11306	0.11726	0.11614	0.11582	0.02356	0.11237	0.09362	0.09099	0.07837	0.11781	0.11827	0.11182	0.11809	0.06983	0.11618	0.11104	0.11472	0.11658	0.11007
14	0.10438	0.11446	0.10868	0.10507	0.10817	0.11193	0.11118	0.11544	0.11446	0.11409	0.03242	0.11454	0.11010	0.07129	0.08607	0.11603	0.11653	0.11016	0.11634	0.06870	0.11438	0.10929	0.11297	0.11491	0.11247
15	0.09129	0.09986	0.09844	0.09525	0.09800	0.09757	0.09706	0.10083	0.09986	0.09956	0.02171	0.10013	0.09624	0.07854	0.06133	0.10139	0.10185	0.09623	0.10167	0.07588	0.09999	0.09556	0.09865	0.10033	0.09817
16	0.07743	0.09989	0.09848	0.09526	0.09803	0.09770	0.09731	0.10076	0.09989	0.09964	0.03898	0.10009	0.09648	0.06606	0.05879	0.08289	0.10147	0.08729	0.10136	0.05891	0.09980	0.09577	0.09871	0.10021	0.09825
17	0.09507	0.10417	0.10261	0.09918	0.10207	0.10179	0.10118	0.10514	0.10417	0.10383	0.03964	0.10436	0.10044	0.08349	0.06226	0.10564	0.10780	0.09130	0.10590	0.06815	0.10417	0.09978	0.10285	0.10458	0.10239
18	0.10641	0.11668	0.11497	0.11112	0.11436	0.11366	0.11333	0.11780	0.11668	0.11630	0.02363	0.11690	0.09823	0.08210	0.07863	0.11844	0.11899	0.09402	0.11877	0.07968	0.11649	0.09329	0.11511	0.11713	0.11439
19	0.11239	0.12347	0.12161	0.11753	0.12096	0.12029	0.11992	0.12465	0.12347	0.12307	0.04327	0.12363	0.11861	0.09635	0.09249	0.12533	0.12590	0.11881	0.10740	0.09332	0.12327	0.11770	0.12181	0.12395	0.12100
20	0.11227	0.12334	0.12148	0.11741	0.12083	0.12017	0.11979	0.12452	0.12334	0.12294	0.02494	0.12350	0.11848	0.09624	0.09239	0.12519	0.12577	0.11868	0.12554	0.07495	0.12314	0.11757	0.12168	0.12381	0.12087
21	0.07790	0.10042	0.09894	0.08686	0.09446	0.09847	0.08885	0.10115	0.10042	0.10016	0.02063	0.10047	0.09698	0.07995	0.06304	0.10156	0.10188	0.08779	0.10176	0.07664	0.08206	0.08239	0.09923	0.10074	0.09889
22	0.11093	0.12160	0.11977	0.11575	0.11913	0.11880	0.11810	0.12277	0.12160	0.12120	0.02458	0.12184	0.11706	0.09515	0.08727	0.12326	0.12367	0.11701	0.12351	0.09185	0.12140	0.09798	0.12004	0.12198	0.11949
23	0.08492	0.11269	0.11105	0.09845	0.10639	0.11012	0.10572	0.11366	0.11269	0.11241	0.02267	0.11288	0.10873	0.07946	0.07592	0.11415	0.11455	0.09957	0.11440	0.06750	0.11267	0.10793	0.09308	0.11308	0.11077
24	0.11192	0.12282	0.12097	0.11691	0.12032	0.11983	0.11929	0.12400	0.12282	0.12242	0.02485	0.12302	0.11811	0.09597	0.09214	0.12467	0.12525	0.11818	0.12501	0.09280	0.12279	0.11724	0.12121	0.10507	0.12053
25	0.10698	0.11744	0.11569	0.11182	0.11508	0.11449	0.11408	0.11845	0.11744	0.11707	0.03309	0.11751	0.11289	0.09229	0.08864	0.11906	0.11958	0.11303	0.11937	0.08911	0.11726	0.11204	0.11590	0.11789	0.09690
26	0.10908	0.11969	0.11790	0.11398	0.11731	0.11694	0.11625	0.12072	0.11969	0.11930	0.02424	0.11977	0.11511	0.09375	0.09007	0.12129	0.12177	0.11518	0.12158	0.09049	0.11951	0.11427	0.11813	0.12012	0.11755
27	0.09663	0.10602	0.10447	0.09705	0.09991	0.08533	0.10300	0.10706	0.10602	0.10568	0.02163	0.10619	0.10198	0.07945	0.07114	0.10748	0.10782	0.10207	0.10770	0.08108	0.10551	0.10109	0.10461	0.10627	0.09491
28	0.10769	0.11803	0.11626	0.10837	0.11157	0.11532	0.11463	0.11916	0.11803	0.11764	0.02388	0.11827	0.11364	0.09240	0.08872	0.11981	0.12037	0.11358	0.12014	0.07725	0.11818	0.11285	0.11653	0.11857	0.11600
29	0.11227	0.12334	0.12148	0.11741	0.12083	0.12017	0.11979	0.12452	0.12334	0.12294	0.02494	0.12350	0.11848	0.09624	0.09239	0.12519	0.12577	0.11868	0.12554	0.09321	0.12314	0.11757	0.12168	0.12381	0.12087
30	0.10357	0.11350	0.11180	0.10813	0.11128	0.11089	0.11024	0.11435	0.11350	0.11313	0.02306	0.11349	0.10928	0.08984	0.08632	0.11481	0.11518	0.10924	0.11508	0.08665	0.11332	0.10852	0.11206	0.11386	0.11155
31	0.10460	0.11441	0.11272	0.10895	0.11212	0.11178	0.11113	0.11526	0.11441	0.11404	0.02323	0.11446	0.09630	0.08615	0.07780	0.11573	0.11610	0.11012	0.11596	0.08726	0.11423	0.10939	0.11296	0.11477	0.11250
32	0.09703	0.11076	0.10918	0.10555	0.10863	0.10830	0.10767	0.11158	0.11076	0.11043	0.02263	0.11077	0.10669	0.07351	0.07497	0.11211	0.11256	0.10664	0.11239	0.06640	0.11078	0.10185	0.10938	0.11120	0.10891

No.																									
33	0.07368	0.09133	0.09004	0.08711	0.08963	0.08925	0.08896	0.09203	0.09133	0.09110	0.01982	0.09143	0.08807	0.07276	0.07000	0.09250	0.09288	0.08806	0.09274	0.05601	0.09143	0.08741	0.09027	0.09173	0.08980
34	0.10236	0.11217	0.11056	0.10686	0.10998	0.10959	0.10895	0.11300	0.11217	0.11180	0.02264	0.11215	0.10800	0.07088	0.07632	0.11346	0.11383	0.10795	0.11369	0.08567	0.11199	0.10725	0.11074	0.11252	0.11024
35	0.10148	0.11118	0.10959	0.10595	0.10903	0.10871	0.10800	0.11200	0.11118	0.11082	0.02268	0.11117	0.10707	0.07381	0.07525	0.11254	0.11298	0.10702	0.11281	0.06670	0.11117	0.10225	0.10977	0.11161	0.10932
36	0.10758	0.11803	0.11632	0.11242	0.11570	0.11498	0.11464	0.11891	0.11803	0.11764	0.02372	0.11793	0.11351	0.07828	0.07950	0.11938	0.11977	0.11358	0.11962	0.08967	0.11749	0.11251	0.11644	0.11831	0.11565
37	0.11160	0.12259	0.12075	0.11670	0.12010	0.11944	0.11907	0.12351	0.12259	0.12219	0.02470	0.12249	0.11777	0.09567	0.09185	0.12401	0.12441	0.11797	0.12426	0.09266	0.12206	0.11687	0.12095	0.12290	0.12014
38	0.04326	0.06187	0.06104	0.05939	0.06099	0.04256	0.06056	0.06229	0.06187	0.06174	0.01271	0.05782	0.04584	0.03392	0.03217	0.06252	0.06270	0.05987	0.06264	0.05013	0.04356	0.04139	0.05703	0.05791	0.04282
39	0.08063	0.08817	0.08692	0.08410	0.08653	0.08615	0.08571	0.08885	0.08817	0.08791	0.01922	0.08823	0.08499	0.07088	0.06823	0.08922	0.08951	0.08498	0.08941	0.06787	0.08806	0.08439	0.08710	0.08847	0.08669
40	0.02374	0.02612	0.02570	0.02508	0.02578	0.02551	0.02547	0.04048	0.02612	0.02607	0.00845	0.04035	0.02526	0.01997	0.01924	0.04062	0.04072	0.02504	0.04069	0.01936	0.02612	0.02497	0.02586	0.02625	0.02570
41	0.01588	0.01762	0.01744	0.01681	0.01736	0.01722	0.01704	0.01779	0.01762	0.01760	0.00649	0.01773	0.01695	0.01410	0.01296	0.02703	0.03623	0.01669	0.03206	0.01333	0.03590	0.01668	0.01746	0.02685	0.01735
42	0.09965	0.10921	0.10764	0.10403	0.10707	0.10670	0.10607	0.11001	0.10921	0.10885	0.02195	0.10918	0.10515	0.06854	0.06507	0.11045	0.11081	0.10510	0.11067	0.06556	0.10903	0.10442	0.10782	0.10954	0.10733
43	0.10063	0.11028	0.10871	0.10506	0.10812	0.10775	0.10712	0.11110	0.11028	0.10993	0.02217	0.11026	0.10619	0.06922	0.06572	0.11154	0.11190	0.10614	0.11177	0.06622	0.11010	0.10545	0.10888	0.11062	0.10839
44	0.10274	0.11259	0.11098	0.10726	0.11038	0.11000	0.10936	0.11343	0.11259	0.11223	0.02264	0.11257	0.10840	0.07086	0.06728	0.11388	0.11425	0.10836	0.11411	0.07693	0.11241	0.10765	0.11116	0.11294	0.11065
45	0.10688	0.11714	0.11546	0.11158	0.11484	0.11445	0.11377	0.11801	0.11714	0.11676	0.02348	0.11712	0.11278	0.07377	0.07004	0.11849	0.11887	0.11273	0.11872	0.08477	0.11695	0.11200	0.11565	0.11751	0.11512
46	0.10765	0.11826	0.11656	0.11265	0.11594	0.11521	0.11487	0.11914	0.11826	0.11788	0.02370	0.11816	0.11360	0.07437	0.07061	0.11961	0.12000	0.11381	0.11985	0.08567	0.11773	0.11273	0.11667	0.11855	0.11588
47	0.10688	0.11714	0.11546	0.11158	0.11484	0.11445	0.11377	0.11801	0.11714	0.11676	0.02348	0.11712	0.11278	0.07377	0.07004	0.11849	0.11887	0.11273	0.11872	0.08477	0.11695	0.11200	0.11565	0.11751	0.11512
48	0.10274	0.11259	0.11098	0.10726	0.11038	0.11000	0.10936	0.11343	0.11259	0.11223	0.02264	0.11257	0.10840	0.07086	0.06728	0.11388	0.11425	0.10836	0.11411	0.07693	0.11241	0.10765	0.11116	0.11294	0.11065
49	0.08984	0.09827	0.09688	0.09373	0.09644	0.09602	0.09552	0.09923	0.09827	0.09798	0.02136	0.09854	0.09471	0.07738	0.07439	0.09978	0.10023	0.09470	0.10006	0.07472	0.09840	0.09404	0.09708	0.09874	0.09661
50	0.06316	0.06901	0.06807	0.06589	0.06779	0.06743	0.06711	0.06969	0.06901	0.06882	0.01576	0.06923	0.06655	0.05440	0.05233	0.07008	0.07039	0.06656	0.07028	0.05258	0.06911	0.06607	0.06820	0.06935	0.06786

Table 3. Non-fuzzy total relation matrix (continuation)

No.	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
1	0.10933	0.11055	0.11179	0.11294	0.11519	0.11384	0.11579	0.10755	0.11422	0.11613	0.11613	0.11552	0.05201	0.11304	0.06774	0.06645	0.10152	0.10053	0.09958	0.09971	0.10616	0.11272	0.10156	0.10487	0.10476
2	0.10393	0.10507	0.10635	0.10744	0.10961	0.10825	0.11018	0.09722	0.10462	0.11053	0.11050	0.10991	0.04490	0.10744	0.06513	0.05513	0.08296	0.08214	0.09533	0.07702	0.09213	0.10725	0.09721	0.09959	0.09973
3	0.11340	0.11464	0.11603	0.11722	0.11972	0.11810	0.12030	0.11594	0.11871	0.12073	0.12070	0.11997	0.03905	0.11730	0.07959	0.05925	0.10530	0.10427	0.10327	0.10336	0.11016	0.11705	0.10536	0.11319	0.10875
4	0.11518	0.11644	0.11785	0.11906	0.12160	0.11995	0.12219	0.11771	0.12057	0.12262	0.12259	0.12185	0.05813	0.11914	0.08075	0.06029	0.10694	0.10590	0.10489	0.10497	0.11188	0.11889	0.10701	0.11492	0.11045
5	0.11304	0.11427	0.11566	0.11685	0.11933	0.11772	0.11991	0.11552	0.11833	0.12034	0.12031	0.11958	0.05706	0.11692	0.07925	0.05918	0.10496	0.10393	0.10294	0.10302	0.10980	0.11667	0.10502	0.11278	0.10839
6	0.11335	0.11458	0.11597	0.11717	0.11966	0.11804	0.12024	0.11584	0.11865	0.12066	0.12064	0.11991	0.03899	0.11724	0.07947	0.05923	0.10525	0.10422	0.10322	0.10331	0.11011	0.11699	0.10531	0.11310	0.10869
7	0.11433	0.11558	0.11698	0.11819	0.12070	0.11907	0.12129	0.11685	0.11968	0.12172	0.12169	0.12095	0.03948	0.11826	0.08015	0.05980	0.10616	0.10512	0.10411	0.10421	0.11106	0.11801	0.10623	0.11408	0.10964
8	0.11331	0.11454	0.11593	0.11712	0.11956	0.11800	0.12016	0.11580	0.11855	0.12056	0.12054	0.11986	0.03915	0.11720	0.07530	0.05930	0.10521	0.10419	0.10319	0.10328	0.11007	0.11695	0.10528	0.11306	0.10860
9	0.11446	0.11571	0.11711	0.11831	0.12083	0.11919	0.12142	0.11697	0.11981	0.12185	0.12182	0.12108	0.03955	0.11839	0.08025	0.05989	0.10628	0.10524	0.10423	0.10432	0.11119	0.11814	0.10634	0.11420	0.10976
10	0.11335	0.11458	0.11597	0.11717	0.11966	0.11804	0.12024	0.11584	0.11865	0.12066	0.12064	0.11991	0.03899	0.11724	0.07947	0.05923	0.10525	0.10422	0.10322	0.10331	0.11011	0.11699	0.10531	0.11310	0.10869
11	0.00825	0.00834	0.00841	0.00850	0.00863	0.00855	0.00864	0.00841	0.00859	0.00867	0.00867	0.00858	0.00485	0.00845	0.00626	0.00578	0.00791	0.00783	0.00771	0.00768	0.00815	0.00849	0.00780	0.00824	0.00799
12	0.11443	0.11568	0.11708	0.11829	0.12080	0.11917	0.12139	0.11696	0.11978	0.12182	0.12179	0.12105	0.04867	0.11836	0.08027	0.05987	0.10625	0.10522	0.10421	0.10429	0.11116	0.11811	0.10632	0.11420	0.10973
13	0.10877	0.10996	0.11129	0.11244	0.11483	0.11327	0.11539	0.11123	0.11387	0.11579	0.11577	0.11099	0.03698	0.11250	0.07655	0.05667	0.10104	0.10006	0.09909	0.09918	0.10570	0.11229	0.10110	0.10868	0.10438
14	0.09333	0.09450	0.10559	0.10676	0.11301	0.11166	0.11348	0.10954	0.11214	0.11389	0.11381	0.11323	0.04542	0.10172	0.06624	0.06114	0.09963	0.09865	0.09770	0.09785	0.10414	0.11063	0.09961	0.10708	0.10287
15	0.09366	0.09467	0.09579	0.09678	0.09880	0.09756	0.09925	0.09569	0.09800	0.09960	0.09958	0.09893	0.03373	0.09676	0.06609	0.05722	0.08720	0.08634	0.08547	0.08550	0.09111	0.09665	0.08714	0.09345	0.08988
16	0.08990	0.09083	0.09188	0.09283	0.09468	0.09341	0.09515	0.09175	0.09388	0.09548	0.09544	0.09489	0.03159	0.08789	0.05886	0.04044	0.07866	0.07789	0.07720	0.07685	0.08232	0.08773	0.07884	0.08458	0.08113
17	0.09756	0.09862	0.09983	0.10086	0.10297	0.10162	0.10348	0.09973	0.10211	0.10383	0.10381	0.10320	0.03314	0.09681	0.06623	0.05175	0.07726	0.07650	0.07592	0.07111	0.07695	0.09665	0.07360	0.08837	0.08470
18	0.10908	0.11027	0.11151	0.11266	0.11501	0.11354	0.11557	0.11134	0.11404	0.11598	0.11595	0.11531	0.05583	0.11277	0.07649	0.06623	0.10117	0.10018	0.09922	0.09929	0.10583	0.11245	0.10123	0.10870	0.10447
19	0.11529	0.11655	0.11797	0.11918	0.12171	0.12015	0.12231	0.11783	0.12069	0.12274	0.12271	0.12197	0.05818	0.11925	0.08082	0.06949	0.10705	0.10600	0.10499	0.10507	0.11199	0.11900	0.10711	0.11503	0.11055
20	0.11517	0.11643	0.11784	0.11905	0.12158	0.12002	0.12218	0.11770	0.12056	0.12261	0.12258	0.12184	0.05811	0.11913	0.08073	0.06940	0.10693	0.10588	0.10487	0.10495	0.11187	0.11887	0.10700	0.11491	0.11043
21	0.08536	0.07730	0.09245	0.09340	0.09518	0.09405	0.09557	0.09237	0.09445	0.09999	0.09582	0.09949	0.03173	0.08336	0.04951	0.04101	0.08401	0.08319	0.07747	0.06841	0.08773	0.09730	0.08401	0.09431	0.07650
22	0.11386	0.11511	0.11650	0.11770	0.12020	0.11849	0.12079	0.11637	0.11919	0.12122	0.12119	0.12045	0.03931	0.11778	0.07983	0.05040	0.10573	0.10469	0.10369	0.10378	0.11061	0.11753	0.10579	0.11361	0.10919
23	0.10569	0.10684	0.10805	0.10916	0.11131	0.10988	0.11190	0.10796	0.11037	0.11224	0.11222	0.11166	0.03551	0.10927	0.06520	0.04985	0.09806	0.09710	0.09616	0.09624	0.10257	0.10896	0.09810	0.10541	0.10112
24	0.11484	0.11610	0.11751	0.11872	0.12124	0.11968	0.12183	0.11737	0.12022	0.12226	0.12223	0.12149	0.04884	0.11879	0.08051	0.06923	0.10663	0.10559	0.10458	0.10466	0.11155	0.11854	0.10670	0.11459	0.11012
25	0.10975	0.11094	0.11229	0.11344	0.11573	0.11434	0.11634	0.11216	0.11476	0.11670	0.11668	0.11608	0.05218	0.11350	0.06841	0.06266	0.09798	0.09702	0.09612	0.09598	0.10256	0.10921	0.09823	0.09150	0.09140
26	0.10418	0.10418	0.11461	0.11578	0.11812	0.11665	0.11865	0.11447	0.11717	0.11907	0.11900	0.11840	0.04769	0.11577	0.06951	0.05870	0.10397	0.10296	0.09197	0.09305	0.10873	0.11562	0.10399	0.11185	0.09321
27	0.09016	0.08199	0.09252	0.09348	0.09556	0.09405	0.09502	0.09217	0.08979	0.10132	0.10537	0.10466	0.05236	0.10238	0.07091	0.04307	0.08845	0.08758	0.08673	0.09089	0.09653	0.09325	0.09260	0.08093	0.09579
28	0.11386	0.11511	0.09483	0.10530	0.11669	0.11519	0.11726	0.11297	0.11571	0.11767	0.11765	0.11693	0.03761	0.11433	0.07553	0.06679	0.10266	0.10165	0.10067	0.10076	0.10739	0.11410	0.10271	0.11030	0.10600
29	0.11517	0.11643	0.11784	0.10079	0.12158	0.12002	0.12218	0.11770	0.12056	0.12261	0.12258	0.12184	0.05811	0.11913	0.08073	0.06940	0.10693	0.10588	0.10487	0.10495	0.11187	0.11887	0.10700	0.11491	0.11043
30	0.10629	0.10745	0.09803	0.11004	0.09370	0.11061	0.11260	0.10864	0.11102	0.11291	0.11288	0.11244	0.03675	0.10994	0.05730	0.04692	0.09898	0.08909	0.08789	0.07899	0.09922	0.10972	0.09520	0.10607	0.10170
31	0.10721	0.10838	0.10966	0.11078	0.11286	0.09324	0.11350	0.10951	0.11191	0.11381	0.11379	0.11340	0.03703	0.11087	0.05761	0.04726	0.09073	0.08984	0.08897	0.09363	0.10005	0.11061	0.10007	0.10692	0.09347
32	0.09015	0.10115	0.10627	0.10735	0.10932	0.10809	0.09163	0.10611	0.10842	0.11021	0.11017	0.10974	0.03536	0.10744	0.05653	0.04611	0.09248	0.09153	0.05307	0.09677	0.10307	0.09262	0.09955	0.09542	
33	0.08566	0.08659	0.08762	0.08852	0.09018	0.08920	0.09066	0.07340	0.08945	0.09092	0.09090	0.09459	0.03041	0.09261	0.04713	0.04810	0.07010	0.06941	0.06874	0.06425	0.07837	0.09250	0.07524	0.08964	0.07696
34	0.10530	0.10645	0.10756	0.10866	0.11065	0.10932	0.11128	0.10736	0.10945	0.11156	0.11156	0.11112	0.03609	0.10882	0.05661	0.04625	0.08886	0.08799	0.08722	0.08682	0.09312	0.10844	0.08915	0.10483	0.09146
35	0.09053	0.10154	0.10666	0.10775	0.10973	0.10850	0.11031	0.10648	0.10883	0.09236	0.11058	0.11015	0.03553	0.10784	0.05567	0.05475	0.09284	0.09193	0.09107	0.09103	0.09715	0.10347	0.09298	0.09991	0.09579
36	0.11041	0.11161	0.11282	0.11398	0.11609	0.10572	0.11675	0.09871	0.11511	0.11707	0.09878	0.11652	0.05627	0.11406	0.05951	0.04848	0.10256	0.10156	0.10059	0.10069	0.10717	0.11369	0.10246	0.10990	0.10592
37	0.11448	0.11573	0.11713	0.11833	0.12059	0.11913	0.12127	0.11699	0.11957	0.12161	0.12158	0.10284	0.05779	0.11842	0.06200	0.05074	0.10629	0.10525	0.10425	0.10434	0.11120	0.11816	0.10636	0.11422	0.10952
38	0.04084	0.04128	0.04175	0.04219	0.04304	0.04250	0.04323	0.04153	0.04262	0.04338	0.04437	0.04306	0.01805	0.04177	0.04306	0.02311	0.03751	0.03714	0.03702	0.03656	0.03917	0.04196	0.03764	0.04039	0.03895
39	0.08269	0.08359	0.08459	0.08546	0.08706	0.08604	0.08752	0.08451	0.08636	0.08777	0.08775	0.08736	0.02958	0.07126	0.04576	0.03796	0.06348	0.06285	0.06233	0.06162	0.06656	0.08535	0.06380	0.08254	0.06517
40	0.02424	0.02473	0.02483	0.02535	0.03994	0.02540	0.03505	0.02487	0.03975	0.04012	0.04012	0.02582	0.01120	0.02515	0.01636	0.01410	0.02245	0.02223	0.02398	0.02173	0.02338	0.02510	0.02237	0.02421	0.03744
41	0.01644	0.01645	0.01689	0.01706	0.01737	0.02631	0.01743	0.01688	0.01726	0.01757	0.01748	0.01742	0.00805	0.01667	0.01154	0.01006	0.01522	0.01507	0.01479	0.01454	0.01577	0.01700	0.01513	0.01637	0.01545
42	0.10252	0.10364	0.10472	0.10579	0.10772	0.10642	0.10834	0.10453	0.10682	0.10863	0.10861	0.10819	0.03487	0.10595	0.05464	0.04453	0.07721	0.07645	0.07587	0.09325	0.09938	0.10557	0.07776	0.10206	0.09784
43	0.10353	0.10466	0.10576	0.10684	0.10879	0.10747	0.10941	0.10556	0.10787	0.10970	0.10968	0.10926	0.03522	0.10700	0.05518	0.04498	0.08729	0.08721	0.07663	0.09417	0.10036	0.10661	0.07853	0.10306	0.09881
44	0.10569	0.10684	0.10796	0.10907	0.11106	0.10972	0.11169	0.10776	0.11013	0.11200	0.11198	0.11154	0.03614	0.10923	0.05653	0.04611	0.08921	0.08833	0.07843	0.09613	0.10245	0.10884	0.08037	0.10522	0.10087
45	0.10996	0.11115	0.11232	0.11347	0.11555	0.11415	0.11621	0.11211	0.11457	0.11652	0.11650	0.11605	0.03762	0.11364	0.05884	0.04799	0.10187	0.10088	0.09991	0.08174	0.10658	0.11323	0.10194	0.10946	0.10494
46	0.11069	0.11189	0.11307	0.11422	0.11631	0.11491	0.11698	0.11285	0.11533	0.11730	0.11727	0.11682	0.05620	0.11439	0.05934	0.04839	0.10254	0.10153	0.10057	0.10065	0.08901	0.11398	0.10260	0.11018	0.10563
47	0.10996	0.11115	0.11232	0.11347	0.11555	0.11415	0.11621	0.11211	0.11457	0.11652	0.11650	0.11605	0.03762	0.11364	0.05884	0.04799	0.10187	0.10088	0.09991	0.10000	0.10658	0.09497	0.10194	0.10946	0.10494
48	0.10569	0.10684	0.10796	0.10907	0.11106	0.10972	0.11169	0.10776	0.11013	0.11200	0.11198	0.11154	0.03614	0.10923	0.05653	0.04611	0.08921	0.08833	0.07843	0.09613	0.10245	0.10884	0.08037	0.10522	0.10087
49	0.09217	0.09317	0.09427	0.09524	0.09723	0.09601	0.09767	0.09417	0.09644	0.09802	0.09800	0.09736	0.03319	0.09522	0.06513	0.05640	0.08586	0.08501	0.08420	0.08414	0.08966	0.09511	0.08084	0.07779	0.07442
50	0.06478	0.06548	0.06624	0.06693	0.06831	0.06746	0.06861	0.06618	0.06777	0.06885	0.06884	0.06838	0.02406	0.06688	0.04582	0.03980	0.06039	0.05980	0.05917	0.05917	0.06305	0.06684	0.06030	0.06463	0.05298

Table 4. Categorization of OCB antecedents

No.	Antecedents	D	R	D+R	D-R	Category
1	leader support	5.23040	2.065514	7.29591	3.16488	net cause
2	positive attitude about their (employees') relationship with an organization	4.91637	2.293625	7.21000	2.62275	net cause
3	prosocial values	5.46197	2.260537	7.72251	3.20143	net cause
4	organizational concerns	5.59856	2.181871	7.78043	3.41669	net cause
5	impression management	5.46699	2.245344	7.71234	3.22165	net cause
6	role perception	5.45854	2.221872	7.68042	3.23667	net cause
7	leaders' behaviors	5.51547	2.228791	7.74426	3.28668	net cause
8	leader-member exchange	5.45221	2.325797	7.77801	3.12641	net cause
9	fairness perception	5.53981	2.293625	7.83343	3.24618	net cause
10	individual disposition	5.45854	2.286484	7.74503	3.17206	net cause
11	employees' age	0.40493	0.475372	0.88030	-0.07044	net effect
12	attitudinal variables	5.53741	2.304546	7.84196	3.23287	net cause
13	personality traits	5.19392	2.180413	7.37434	3.01351	net cause
14	task characteristics	5.10766	1.601568	6.70923	3.50609	net cause
15	workplace-related elements	4.53025	1.548493	6.07874	2.98175	net cause
16	job satisfaction	4.31356	2.345133	6.65869	1.96842	net cause
17	employee engagement	4.56227	2.362561	6.92483	2.19971	net cause
18	job embeddedness	5.23122	2.207904	7.43913	3.02332	net cause

19	organizational commitment	5.61383	2.355305	7.96914	3.25853	net cause
20	human resource practices	5.58949	1.614324	7.20382	3.97517	net cause
21	self-efficacy	4.31558	2.290508	6.60609	2.02507	net cause
22	transformational leadership	5.47877	2.165905	7.64468	3.31287	net cause
23	self-serving motives	4.99630	2.260479	7.25678	2.73582	net cause
24	culture	5.56195	2.306429	7.86838	3.25552	net cause
25	setting standards	5.25905	2.235153	7.49420	3.02390	net cause
26	creating management programs	5.37056	2.104946	7.47551	3.26562	net cause
27	implementing incentive schemes	4.63766	2.147947	6.78561	2.48971	net cause
28	providing training	5.30587	2.143933	7.44980	3.16194	net cause
29	top management support	5.58949	2.175676	7.76517	3.41382	net cause
30	team-building activities	5.03120	2.240391	7.27159	2.79081	net cause
31	equipping sessions	5.07151	2.199292	7.27081	2.87222	net cause
32	employee empowerment	4.88498	2.247468	7.13244	2.63751	net cause
33	immersion	4.06054	2.148699	6.20924	1.91184	net cause
34	top management acting as role models	4.95272	2.221644	7.17436	2.73108	net cause
35	trust and respect for roles and functions	4.90742	2.259118	7.16654	2.64831	net cause
36	high degree of management involvement in organizational activities	5.26567	2.258545	7.52422	3.00713	net cause
37	goal setting	5.51504	2.238412	7.75345	3.27663	net cause
38	stabilized pay system	2.26531	0.818905	3.08421	1.44640	net cause
39	strict policy implementation and reinforcement	3.87935	2.193685	6.07303	1.68566	net cause
40	extended training and benefits to family members	1.33662	1.222509	2.55913	0.11411	net cause
41	cultural training (Japanese)	0.88038	1.040755	1.92114	-0.16037	net effect
42	leadership development programs	4.80037	1.877541	6.67791	2.92283	net cause
43	professional development programs	4.85712	1.849874	6.70699	3.00724	net cause
44	engagement programs	4.97895	1.814598	6.79355	3.16435	net cause
45	competitive compensation and benefits program	5.22125	1.855978	7.07723	3.36527	net cause
46	fair and transparent performance management program	5.28000	2.00671	7.28671	3.27329	net cause
47	open communication with management	5.22125	2.17604	7.39729	3.04521	net cause
48	recognition program	4.97895	1.867382	6.84633	3.11157	net cause
49	proper channels of communication	4.43963	2.106829	6.54646	2.33280	net cause
50	leisure time and organized play with all employees	3.13547	1.984657	5.12012	1.15081	net cause

Table 5. Adjacency matrix of antecedents

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	No. of impacts
1	0	1	0	0	0	0	1	0	1	0	0	0	0	0	0	1	1	0	1	0	0	0	0	1	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	1	0	0	1	1	1	1	1	1	0	1	1	0	0	1	1	1	1	0	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	1	0	0	0	0	30
4	0	1	1	0	1	1	1	1	1	1	0	1	1	0	0	1	1	1	1	0	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	1	0	0	0	0	32
5	0	1	1	0	0	1	1	1	1	1	0	1	1	0	0	1	1	1	1	0	1	0	1	1	0	0	0	1	1	1	1	0	1	1	1	1	1	0	1	0	0	0	0	0	0	1	0	0	0	0	27
6	0	1	1	0	1	0	1	1	1	1	0	1	1	0	0	1	1	1	1	0	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	1	0	0	0	0	30
7	0	1	1	1	1	1	0	1	1	1	0	1	1	0	0	1	1	1	1	0	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	1	0	0	0	0	31
8	0	1	0	0	1	1	1	0	1	1	0	1	1	0	0	1	1	1	1	0	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	1	0	0	0	0	28
9	0	1	1	1	1	1	1	1	0	1	0	1	1	0	0	1	1	1	1	0	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	1	0	0	0	0	32
10	0	1	1	0	1	1	1	1	1	0	0	1	1	0	0	1	1	1	1	0	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	1	0	0	0	0	30
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	1	1	1	1	1	1	1	1	1	0	0	1	0	0	1	1	1	1	0	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	1	0	0	0	0	31
13	0	1	0	0	0	0	1	1	1	1	0	0	0	0	0	1	1	0	1	0	1	0	0	1	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	1	0	0	0	0	0	1	1	1	0	1	0	0	0	1	1	0	1	0	1	0	0	1	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	12
19	0	1	1	1	1	1	1	1	1	1	0	1	1	0	0	1	1	1	0	0	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	1	0	0	0	0	32
20	0	1	1	1	1	1	1	1	1	1	0	1	1	0	0	1	1	1	1	0	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	1	0	0	0	0	33
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	0	1	1	1	1	1	1	1	1	1	0	1	1	0	0	1	1	1	1	0	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	1	0	0	0	0	31
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	1	1	1	1	1	1	1	1	1	0	1	1	0	0	1	1	1	1	0	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	1	0	0	0	0	32
25	0	1	0	0	0	0	0	1	1	1	0	1	0	0	0	1	1	0	1	0	1	0	0	1	0	1	0	0	1	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16
26	0	1	1	0	1	1	1	1	1	1	0	1	0	0	0	1	1	0	1	0	1	0	1	1	0	0	0	1	1	1	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	25
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	1	1	0	0	0	0	1	1	1	0	1	0	0	0	1	1	0	1	0	1	0	1	1	0	1	0	0	1	1	0	1	0	1	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	19
29	0	1	1	1	1	1	1	1	1	1	0	1	1	0	0	1	1	1	1	0	1	1	1	1	0	1	1	0	1	1	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	1	0	0	0	0	32
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	0	1	1	0	0	0	1	1	1	1	0	1	0	0	0	1	1	0	1	0	1	0	1	1	0	0	0	0	1	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16
37	0	1	1	1	1	1	1	1	1	1	0	1	1	0	0	1	1	1	1	0	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0	1	0	0	0	0	32
38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45	0	1	0	0	0	0	0	1	1	1	0	1	0	0	0	1	1	0	1	0	1	0	0	1	0	0	0	0	1	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14
46	0	1	1	0	1	0	0	1	1	1	0	1	0	0	0	1	1	0	1	0	1	0	1	1	0	0	0	1	1	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19
47	0	1	0	0	0	0	0	1	1	1	0	1	0	0	0	1	1	0	1	0	1	0	1	1	0	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
No. of impacts	0	25	17	9	16	15	15	24	24	23	0	22	15	0	0	27	27	15	26	0	24	12	20	24	0	18	0	7	14	15	20	16	23	14	17	25	24	21	0	16	0	0	0	0	0	0	0	15	0	0	0

The expert decision-maker agreed that the threshold value for the significant impact relationships of OCB antecedents must be set at the 75th percentile of all the values in the total relation matrix as shown in Table 3. This makes $\alpha = 0.11570$. With this threshold value, the adjacency matrix was developed as shown in Table 5. Table 5 shows the impact relationships of OCB antecedents. Results highlight that human resource practices of the hospitality industry as an OCB antecedent emerges with the highest number of impacts. It shows that human resource practices impact 33 out of 50 antecedents. In particular, it impacts positive attitude of employees, prosocial values, organizational concerns, impression management, role perception, leader behaviour, leader-member exchange, attitudinal variables, personality traits, workplace-related elements, job satisfaction, employee engagement, job embeddedness, organizational commitment, self-efficacy, transformational leadership, self-serving motives, culture, setting standards, implementing incentive schemes, providing training, top management support, team-building activities, equipping sessions, employee empowerment, immersion, top management acting as role models, trust and respect for roles and functions, high degree of management involvement in organizational activities, goal setting, strict policy implementation and reinforcement, and open communication with management. This means that human resource practices cause the increase or decrease of these OCB antecedents and are thus crucial in enhancing the aforementioned antecedents which it impacts. This result emphasizes the role of HR not just in formulating policies that directly enhance OCB but it also provides and supports infrastructures in enhancing other OCB antecedents. This is consistent with the findings of Organ et al. (2006) and Sun et al. (2007) who pointed out that HR practices are essential since they signal to employees that the organization values them, and this gives rise to a feeling of obligation among employees to perform their duties well for the benefit of the organization. It is closely followed by organizational concerns, fairness perception, organizational commitment,

culture, top management support, and top management acting as role models with 32 impact antecedents. Note that these six OCB antecedents impact almost similar antecedents with what the human resource practices antecedent impacts. Leaders' behavior, attitudinal variables and transformational leadership impact 31 antecedents while prosocial values, role perception and individual disposition have 30 antecedents on which they impact. These show that with antecedents having at least 30 impact antecedents, only four antecedents, e.g. attitudinal variables, prosocial values, role perception and individual disposition, are employee-oriented where employees take major control. Nine OCB antecedents, on the other hand, are externally controlled with the management having a crucial role.

On the other hand, it is also worthy to highlight the OCB antecedents with the highest number of antecedents which impacted them. Job satisfaction and employee engagement emerged as the antecedents which are highly dependent with other antecedents. A total of 27 antecedents impacts job satisfaction and employee engagement. This is probably due to the nature of these antecedents which depends largely on the perception and outlook of individual employees. They are followed by organizational commitment with 26 antecedents and positive attitude about their (employees') relationship with an organization and trust and respect for roles and functions with 25 antecedents. Observe that these antecedents are employee-oriented. This means that the perceptions and the reactions of employees to work beyond what is required of them depend on some other OCB antecedents. These results can be observed directly in practice. This implies that the policies of HR develop and improve other antecedents and these antecedents help enhance job satisfaction and employee engagement.

Despite being impacted by a higher number of antecedents, job satisfaction and employee engagement are still net causes as shown in Table 4 since they also impact a relatively higher number of antecedents. In fact, Table 4 shows that only

employee's age and cultural training are the net effects. It means that these antecedents are just effects of other antecedents. It can be also pointed out from Table 4 that organizational commitment is the most prominent antecedent given the highest $t_i + t_j$ value which means that it has stronger relationships with other antecedents in terms of impacts given and received. Culture follows as the most prominent antecedent which implies the importance of culture in impacting OCB antecedents. On the other hand, employee's age is the least prominent antecedent. It must be also emphasized that human resource practices yield the most influential OCB antecedent as shown in its $t_i - t_j$ value. These results would help decision-makers and policy-makers in formulating policies and strategies for enhancing OCB. HR managers play a crucial role in crafting such strategies in order motivate other antecedents which would eventually improve OCB.

4. CONCLUSION

Due to the importance of identifying the OCB antecedents and their interrelationships in an Eastern culture setting, this study proposes a case in a hospitality industry in Cebu, Philippines with the use of fuzzy DEMATEL. Expert decision-makers holding key important positions in top hotels and restaurant were asked to identify the OCB antecedents they observe and experience practice. This paper was able to report these antecedents along with the antecedents identified from domain literature.

Using fuzzy DEMATEL to understand the causal relationships of these antecedents under uncertainty, key findings were reported in this work. First, organizational commitment emerge as the most prominent antecedent with the highest degree of impacts, both given and received. On the other hand, employees' age is the least prominent antecedent and with the lowest number of impact relationships with other antecedents. Furthermore, human resource practices appear as the most

influential antecedent which means that they cause largely a significant number of antecedents. Finally, job satisfaction and employee engagement have the highest number of impacts received. This means that they are more dependent with other antecedents in the list. These results would aid decision-makers in the hospitality industry formulate policies that would improve OCB in their workplace. These may also serve as guidelines in resource allocation decisions, employee performance evaluation and human resource strategy formulation, among others.

5. ACKNOWLEDGMENT

6. REFERENCES

Bateman, T.S., & Organ, D.W. (1983). Job satisfaction and the good soldier: the relationship between affect and employee citizenship. Academy of Management Journal, 26, 587-595.

Becton, J. Bret, Field, H.S. (2009). Cultural differences in organizational citizenship behavior: a comparison between Chinese and American employees. The International Journal of Human Resource Management, 20(8), 1651-1669.

Bolino, M.C., & Klotz, A.C. (2015). The paradox of the unethical organizational citizen: The link between organizational citizenship behavior and unethical behavior at work. Current Opinion in Psychology, 6, 45–49.

Dominguez, M., Enache, M., Sallan, J. & Simo, P. (2013). Transformational Leadership as an Antecedent of Change-Oriented Organizational Citizenship Behavior. Journal of Business Research, 66(10), 2147-2152.

Gautam, T., Van Dick, R.V., Wagner, U., Upadhay, N., & Davis, A.J. (2005). Organization

citizenship behavior commitment in Nepal. Asian Journal of Social Psychology, 8(3), 305–314.

George, J.M. (1991). State or trait: effects of positive mood on prosocial behavior at work. Journal of Applied Psychology, 76, 299–307.

Gonzales, J., & Garazo, T. (2006). Structural relationship between organizational service orientation, contac employee job satisfaction and citizenship behavior. International Journal of Service Industry Management, 17(1), 23-50.

Koys, D.J. (2001). The effects of employee satisfaction, organizational citizenship behavior, and turnover on organizational effectiveness: A unit-level, longitudinal study. Personnel Psychology, 54, 101-114.

Mukhtar, A., Sial, M.A., Imran, A., & Jilani, S. (2012). Impact of hr practices on organizational citizenship behavior and mediating effect of organizational commitment in NGOs in Pakistan. World Applied Sciences Journal, 18(7), 901-908.

Moorman, R.H., & Blakely, G.L. (1995). Individualism-Collectivism as an individual difference predictor of organizational citizenship behavior. Journal of Organizational Behavior, 16, 127–142.

Nielsen, T.M., Hrivnak, G.A., & Shaw, M. (2009). Organizational citizenship behavior and performance: A meta-analysis of group-level research. Small Group Research, 40(5), 555 – 577.

Organ, D.W. (1988). Organizational citizenship behavior: The good soldier syndrome. Lexington, M.A: Lexington Books.

Organ, D.W., Podsakoff, P.M., MacKenzie, S.M. (2006). Organizational citizenship behavior: its nature, antecedents, and consequences. Sage Publications, Inc.: U.S.

Paine, J.B. & Organ, D.W. (2000). The cultural matrix of organizational citizenship behavior: Some preliminary conceptual and empirical observations. Human Resources Management Review, 10, 45-59.

Podsakoff, P.M., & MacKenzie, S.B. (1997). The impact of organizational citizenship behavior on organizational performance: A review and suggestions for future research. Human Performance, 10, 133–151.

Podsakoff, P.M., MacKenzie, S.B., Paine, J.B., & Bachrach, D.G. (2000). Organizational citizenship behaviors: A critical review of the theoretical and empirical literature and suggestions for future research. Journal of Management, 26, 513-563.

Rurkkum, S., & Bartlett, K. (2012). The relationship between employee engagement and organizational citizenship behaviour in Thailand. Human Resource Development International, 15(2), 154-174.

Seyed-Hosseini, S.M., Safaei, N., & Asgharpour, M.J. (2006). Reprioritization of failures in a system failure mode and effects analysis by decision making trial and evaluation laboratory technique. Reliability Engineering & System Safety, 91(8), 872-881.

Sun, L.Y., Aryee, S., & Law, K. (2007). High performance human resource management practices, citizenship behaviour, and organizational performance: a relational perspective. Academy of Management Journal, 50, 558–77.

Tourism Investment Portfolio, (2008). Chapter 3: Philippine Tourism Industry. Accessed: http://tourism.gov.ph/Downloadable%20Files/Chap3%20Philippine%20Tourism%20Industry.pdf

Tourism Statistics, (2017). Industry Performance for Travel and Tourism: February 2017. Accessed: http://tourism.gov.ph/Pages/IndustryPerformance.aspx

Yee, R., Yeung, A., & Cheng, T. (2008). The impact of employee satisfaction on quality and profitability in high-contact service industries. Journal of Operations Management, 26, 651-668.

Yoon, M. H. & Suh, J. (2003). Organizational citizenship behaviors and service quality as external effectiveness of contact employees. Journal of Business Research, 56(8), 597–611.

Zadeh, L.A. (1965). Fuzzy set. Information and Control, 18(3), 338-353.