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Drivers Affecting Bitcoin Adoption as a Payment Mechanism in the Tourism Industry

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Abstract

While travelers' desire to visit the world's most remote places has grown, the inefficiency of global payments indicates a significant barrier to tourism growth. As an emerging, decentralized, and borderless digital innovation, Bitcoin technology seems to have the ability to serve as a payment alternative and address such fundamental inefficiencies. On the other hand, bitcoin adoption can only happen when tourists and business owners choose to operate bitcoin simultaneously. The study has developed a novel Bitcoin Collaborative Network and Tourism Collaborative Network model to examine Bitcoin adoption factors. Then a fuzzy DEMATEL method was applied to the factors influencing the adoption domain, as identified based on an extensive literature review, in-depth interviews, and an international Delphi process. The study offered a model for the heterogeneous collaborative network of Bitcoin and Tourism (BCN and TCN), revealing that Perceived Usefulness is the most influencing criterion and the most prominent variable in Bitcoin Adoption. Bitcoin Technological Complexity, Government Regulatory, and Bitcoin Awareness are the factors that give the highest impacts. Also, Bitcoin's Technological Complexity is the most significant factor in bitcoin adoption. The findings might assist businesses in adopting a new market expansion strategy and benefiting from technological spillover, while government officials can explore new supporting legislation.

Keywords: Bitcoin, Tourism, Blockchain, Technology Adoption, Fuzzy DEMATEL, Alternative Payment Mechanism.

Introduction

The tourism industry's convergence of emerging technologies and the rise of social media and digital platforms such as Airbnb, TravelbyBit, LockTrip, TripAdvisor, and so forth have let travelers access a greater variety of services and products (Lopez-Cordova, 2020; Flecha-Barrio et al., 2020). Such digital platforms have also made adventure tourism popular in remote parts of the world (Huddart & Stott, 2020; Nepal, 2020). But global conventional payment inefficiencies seem to constitute a significant obstacle to the development of the tourism industry. In addition, unbanked people, sanctions imposed, or domestic financial policies have also been considered essential factors (Seyfi & Hall, 2020; Findex, 2017). Meanwhile, bitcoin (Bitcoin -upper case- refers to the currency's Blockchain, while bitcoin -lower case- refers to the currency itself) geared with Blockchain promises to bring an open-source and democratic platform to its global users. One that is entirely decentralized and not governed by any authorities (Nakamoto, 2008). Given that numerous Blockchain applications exist in various industries ranging from identity management (Stockburger et al., 2021) to event ticketing systems (Liu, 2021), this study focuses on the payment feature of Blockchain. Of course, there are concerns about the dark sides of bitcoin, such as moneylending and hacking (Foley et al., 2019; Christopher, 2014). And also, controversies around the impact of bitcoin on economics and the mining environmental issues remain (Badea and Mungiu-Pupăzan, 2021). Some experts consider bitcoin as the alternate solution to the traditional payment mechanism. They argue that by having minimal internet connectivity and a $40 smartphone (Libra White Paper, 2019; Hashim, 2019), tourism organizations can offer a wide range of services and experiences to bitcoin-funded travelers (Wu & Chang, 2019). As one of the most decentralized cryptocurrencies in which no government is involved, we believe that bitcoin is superior to other cryptocurrencies in terms of wealth distribution and is worth studying (Sai et al., 2021). While a few studies have looked at the factors influencing bitcoin acceptance in tourism from the end-user and retailer perspectives, there is a relatively minor detail in the literature. As a result, the study's primary goal is to extract and classify the most influential factors and prioritize the barriers. The second aim is to capture the interdependence of the obstacles and the cause-effect interaction of the criteria. The present study employs the DEMATEL approach combined with a fuzzy system as the most appropriate tool for overcoming human-centric uncertainties.

Based on the previous, the inefficiency of global payment mechanisms can cause tourism disruption. Studies show that more than 40% of the Caribbean economy is unbanked or underbanked. At the same time, the primary source of income for these countries is tourism (Parker & Lawrence, 2020). The authors further discuss the negative affection of domestic restrictions and policies adopted (Parker & Lawrence, 2020). According to the World Bank (Findex, 2017), almost 1.7 billion people worldwide are unbanked. Other studies blame the Correspond Banking Relationships (CBRs) problems and the disruption imposed regarding money transfers (Kwok & Koh, 2019). Sanctions, on the other hand, impose trade barriers that have a major effect on tourism and foreign direct investment, leading to restrictions in operation (Seyfi & Hall, 2020). Sanctions affect supply and distribution chains. International banks' lack of existence and operation, difficulties in transferring money to foreign countries, interbank transfers, high money transfer costs, currency flow issues, or even the lack of access to foreign bank accounts is only a glimpse into a long list of problems (Kwok & Koh, 2019; Yartey, et al., 2017; Traveller, 2019; Binsky, 2018). Ultimately financial isolation caused by traditional financial inefficiencies will interrupt any local tourism business development. Bitcoin is a novel technology payment, and the adoption of any technology could potentially fail. As a result, this paper investigates the adoption of bitcoin technology using mathematical approaches. To examine how bitcoin can be used as an alternative to the traditional financial system, the Bitcoin and Tourism Collaborative Network was designed, and the “Adoption Domain” was introduced. This study aims to examine the factors affecting the domain.

The contribution of this study is the development of a Tourism Collaborative Network (TCN) and Bitcoin Collaborative Network (BCN) model and a joint spot, namely “Adoption Domain.” Bitcoin ecosystem presented and factors affecting the adoption process as net cause and net effects ranked and discussed.

The paper is structured as follows: Section Literature Review represents the latest reviews focusing on bitcoin, Blockchain, and the relevant applications in tourism. The model considered a contribution to this paper is addressed in the next section. In the section Data and Models, the methodology will be represented. In the next section, the results will be discussed. And finally, we refer to the contribution of the work and enumerate the suggestions for further studies and then the limitations of the study in the latest section.

Literature Review

Blockchain in the tourism industry

Over the past few years, Bitcoin and Blockchain technology has witnessed serious and forward-looking developments. The Blockchain application goes far beyond the bitcoin and cryptos. Businesses are increasingly developing their digital platforms by imitating Bitcoin (Wood, 2014). Recent studies (Nam et al., 2019) categorize the development of the Blockchain over three generations, the development of Bitcoin and cryptocurrencies, the rise of smart contracts, and the emergence of dApps (decentralized Apps). In this study, we narrowed the study of bitcoin as an electronic payment tool.

The combination of tourism, Blockchain, bitcoin, and cryptocurrencies is not a new approach. Still, it has gained a lot of traction in recent years. Small Island Economies (SIEs) have also welcomed Blockchain to boost their tourism industry in this respect (Kwok & Koh, 2019). “Dubai Smart Tourism 2.0” project and “CoolCousin travel company” (Bodkhe et al., 2019) are just a few of the numerous Blockchain-based projects. The Locktrip project, for instance, is an ERC-20 protocol-based coded token on the Ethereum Blockchain and the first distributive technology developed exclusively for the hospitality and tourism industries (Willie, 2019). As the vital flow of digital exchange, it employs its cryptocurrency, the LOC token. Camilleri (2020) argues that data-driven technologies help businesses achieve a competitive advantage, while Blockchain can provide better payment opportunities for customers. Since technology can assign new meanings to tourism (Xiang, 2018), bitcoin, powered by Blockchain, can propose new values to the hospitality sector. TUI (TUI Group) recreational groups already employed Blockchain technology for hospitality purposes (Önder and Treiblmaier, 2018), and Expedia.com, OneShot Hotels, CheapAir, and Webjet accept bitcoin in exchange for tour and airplane booking (Tyan et al., 2021). E-Gifter has also made payments through bitcoin (DU, 2019). According to the studies, employing cryptocurrencies enhances the tourism business and spreads a sense of satisfaction among travelers (Seigneur, 2018; Alaeddin & Altounjy, 2018). On the other hand, given that rural tourism has been hyped, taking advantage of the peer-to-peer payment method can generate sustainable revenue for remote areas and develop local businesses (Nieto & Rodríguez, 2021). As a transformative tool, Blockchain has the potential to build new business models (Tham & Sigala, 2020).

Bitcoin and Blockchain adoption background

Numerous studies about Bitcoin and its performance as a safe haven during COVID-19 have been reviewed (Mariana et al., 2021; Smales, 2019). Erceg et al. (2020) believe that the implementation of Blockchain can bring value to the tourism business, such as competitive advantage, improved customer satisfaction, and enhanced performance. Since the concept is still blurred and the technology is complex and young, individuals have little information about its core functions. Li et al. (2021) and Baur et al. (2015) discuss that for bitcoin to become a popular alternative currency, user adoption and its monetary value must be considered. Since bitcoin is a web-based currency, tourists will not feel the problem of money transfer or any regrading limits to overseas transactions; additionally, the chances of being a victim of theft and pickpocketing will be reduced (Wu & Chang, 2019). The authors also discuss the importance of experiential loyalty intentions and propose a model for executives planning to be paid in bitcoin. Lopez-Cordova, (2020) states the importance of digital platform development on international tourism, believing that the digital platforms would increase the demand for tourism services in terms of their impact on the financial and non-financial cost of travel. While the current understanding of Blockchain and its consequences for tourism is limited, Thees et al. (2020) believe Blockchain to be a groundbreaking technology in the tourism industry that can generate new resources. Jonker (2018) concludes that although retailers are interested in accepting cryptocurrencies, the critical barrier to adoption is “low consumer demand.” The author also emphasizes the network externalities. Biswas and Gupta (2019) also analyze obstacles to adopting and implementing Blockchain technology.

Fuzzy DEMATEL technique in relevant studies

In this study, we propose a Fuzzy Decision-Making Trial and Error Laboratory approach (DEMATEL) to clarify the interactions of the factors we explored in our previous study, build an intangible structural model, and rank and classify the criteria. Zadeh (1965) introduced the fuzzy set theory as a strengthening tool to measure the ambiguity of a concept. Given that experts use their experience to assess the affection weight of inter-relationships between each criterion, the study heavily relies on multiple human-relevant potential shortcomings and decisions. Since uncertainty in data derived from group knowledge is inevitable, it's critical to manage the findings' accuracy. Decision making trial and evaluation laboratory (DEMATEL) technique is a sort of structural modeling approach, broadly used to determine the cause-effect of interdependent factors (Gabus & Fontela, 1975) and to resolve complex problems in different areas such as the tourism industry (Altuntas & Gok, 2021), investigating Blockchain barriers (Farooque et al., 2020), BSC cause and effect relationship of strategy map (Jassbi et al., 2011) and so forth. To solve the dilemma, many of these experiments combine DEMATEL with various other techniques (Yazdi et al., 2020; Gupta & Barua, 2018). DEMATEL does not require a large amount of data. Still, it is a powerful technique for handling team knowledge from the benefit perspective. The method can also demonstrate the significant vital factors, the influence of cause and effect on each other, and visualize the sophisticated relation through a digraph or matrix. DEMATEL examines the interrelationships of the system components and transforms them into a directed graph to demonstrate the intensity, gauge the strength of the influence, and the direct and indirect relationship between sub-components. Due to the importance of the research objective, to maintain consistency and the avoidance of interviews with many people who may not be eligible enough to participate in the panel of experts, a defined limit to expert choice has been specified.

The Bitcoin Collaborative Network (BCN) and the Tourism Collaborative Network (TCN, as a heterogeneous ecosystem)

Considering that the Tourism Collaborative Network organization (TCN) is vast and diversified, Bitcoin could cover the conventional financial flaws as a distributed and peer-to-peer enabled network. Camarinha-Matos and Afsarmanesh (2004), proposed the idea of a Collaborative Network (CN) which is defined as a network consisting of a wide variety of entities, including people and organizations, "geographically distributed, and heterogeneous in terms of their operating environment, culture, social capital, and goals." To construct a relationship between Bitcoin as a medium of exchange with Tourism Network, in this case, the two ecosystems and their interactions must be investigated, as seen in Figure 1. We adopted the TCN and BCN model in a heterogeneous network context introduced by Daryaei et al. (2020) and modified the model to our best. TCN members were extracted based on UNWTO data (SafeCoastalTourism, 2021). Hoards, Miners, Mining Pools, Mining Hardware Companies, Full Nodes, Traders, and Bit Exchangers are among the Bitcoin early adopter's ecosystems proposed in this study. Both are heterogeneous and diverse, with a wide variety of leading actors. The functions of each player are disused in Table 1.

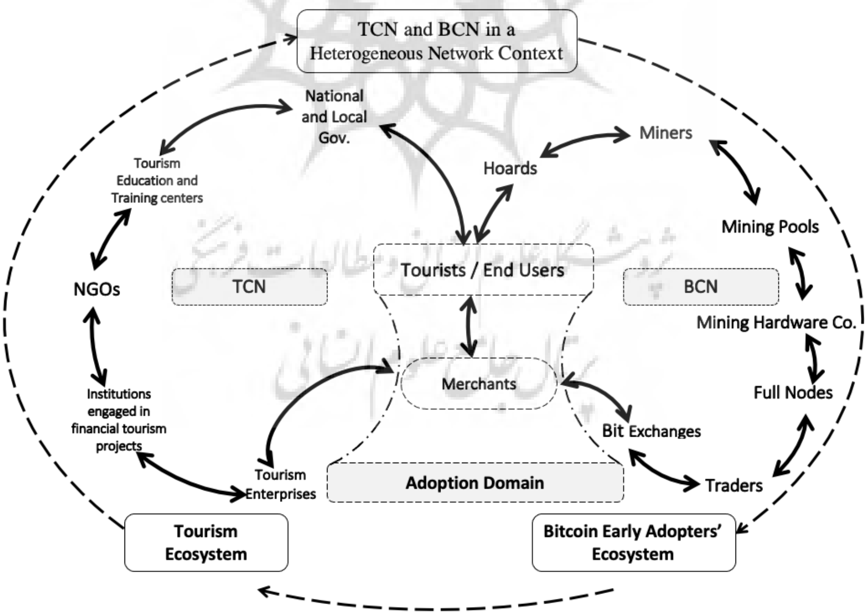

Fig. 1 Bitcoin Collaborative Network and Tourism Collaborative Network adopted from Daryaei et al., (2020).

Table 1. Bitcoin Early Adopters,

1	Hoards	People are holding and refuse to spend their coins.
2	Miners	Net contributors, purchase mining rigs and provide facilities aimed at producing Bit(coin)s.
3	Mining Pools	A joint group of miners who share their computational resources over a specific network to make an alliance and increase the probability of finding blocks.
4	Mining Hardware Companies	Manufactures build rig equipment to mine bitcoin.
5	Full Nodes	Contributors who make the net more decentralized and secure.
6	Bit Exchanges	A digital marketplace to buy and sell bitcoin.
7	Traders	Individuals to buy and sell bitcoin.
8	Tourists / End Users	Individuals to spend Bit(coin)s in exchange for goods or services.
9	Merchants/ Business Owners	Individuals to accept Bit(coin)s in exchange for goods or services.

While each function is an independent element, they need to collaborate simultaneously to make the whole chain work (TCN & BCN). “Adoption Domain” is considered the primary spot the two ecosystem shares. Merchants/Business Owners and Tourists/End-users are the critical members to collaborate and cooperate constantly. As a result, merchants and tourists/end-users must embrace and adopt bitcoin to initiate the entire network. At the same time, their preferences and decisions which influence this new form of collaboration -its adoption and acceptance- are likely to be identified to bring the technology as an alternative payment channel (Ammous, 2018). Investigating determinants that influence the “Adoption Domain” between two ecosystems will eventually contribute to establishing a collaboration between the two broad ecosystems discussed. The ecosystem could work more cohesively if the culture of cooperation within the addressed fragmented systems is expanded. Hence, it is critical to understand what barriers influence bitcoin adoption and the “Adoption Domain” from a human-centric standpoint.

Research Methodology

Based on an extensive literature review, in-depth interviews, and the international Delphi process in the tourism industry and payment mechanism, we identified factors impacting Bitcoin adoption in a previous study (Daryaei et al., 2020). As a result, "Competitive Advantages," "Perceived Usefulness," "Cheap Transaction Fees," "Fast Clearance," "Government Regulatory," "Loss of Bitcoin Private Keys," "Bitcoin Awareness," "Victim of Theft," "Perceived Compatibility," "Bitcoin Volatility," "Risk-Taking Personality," "Trust in Performance," and "Bitcoin Technological Complexity" validated by the experts as the key barriers. To better understand each factor's impact and interactions, in this study, we intend to rank the most influential factors and determine their priorities using fuzzy DEMATEL.

The fuzzy DEMATEL method

By adopting fuzzy triangular, a fuzzy DEMATEL is constructed as below steps:

Step 1: Determine the criteria and linguistic value

Experts were asked to evaluate criteria extracted from the previous study. Table 2 includes the linguistic evaluation and the corresponding fuzzy numbers. Triangular fuzzy numbers (TFNs) are used to reduce the ambiguity of judgments.

Table 2. Fuzzy Linguistic scale.

Scores	Linguistic Terms	Equivalent triangular fuzzy numbers (TFNs)		
		l	m	u
1	“No influence (NO)”	0	0	0.25
2	“Very low influence (VL)”	0	0.25	0.5
3	“Low influence (L)”	0.25	0.5	0.75
4	“High influence (H)”	0.5	0.75	1
5	“Very high influence (VH)”	0.75	1	1

Step 2: A fuzzy pair-wise comparison matrix Construction

An n×n matrix is first constructed to investigate the relationship pattern among the n parameters. A list of operational definitions of each item was circulated to the experts to ensure a shared comprehension of the meanings of each criterion. The participants were asked to assess the effect and influence of criterion i on criterion j on a scale of five linguistic words from 1 to 5 (as No influence (NO), Very low influence (VL), Low influence (L), High influence (H), Very high influence (VH), according to the study's fuzzy method.

Step 3: Forming an Expert Team

Twelve professionals with international tourism backgrounds who had somehow used bitcoins to buy or cryptocurrencies for traveling were invited. Some used bitcoin to book tours for foreign travelers inside Iran as business owners. Some were researchers in related fields, and some of these people also had a background in sales in tourism. Since very few people in this field are present in the tourism sector and are familiar with bitcoin, especially in the country, 7 of the top Iranian specialists were selected. To reach these people has been through Twitter and LinkedIn and company or academic websites. Table 3 demonstrates further information on the evaluators' characteristics and their fields of interest.

A pilot survey of six respondents from Iran was used to validate the questionnaire. Two academic researchers, including PhD candidates and students, two tourism experts, and two bitcoin/Blockchain users, were among the responses. They verified the survey questions and suggested revisions if any difficulties were, ensuring that communication and logic were clear. The survey questions' content validity and construct validity were also confirmed. The Cronbach alpha test was used to determine the internal consistency of the data, with values of alpha more significant than 0.7 considered adequate for deciding the questionnaire's reliability (Heale and Twycross 2015).

Table 3. Evaluators' Characteristics

Evaluators	Age	Gender	Level of Education	Experience/ Years	Job Title	Filed
1st Evaluator	36	Female	PhD in commerce	>15	Professor	Blockchain researcher
2nd Evaluator	49	Male	Bachelor in electronics	>20	Hotel manager	Hotel manager
3rd Evaluator	38	Male	Bachelor of computer science	>10	The administrator The administrator of a hotel website	Developer
4th Evaluator	40	Male	PhD in Economics	>5	Professor	Researcher and activist on the subject of crypto and tourism
5th Evaluator	29	Male	Bachelor in financial management	>6	Tour operator	Tourism company employee
6th Evaluator	30	Female	Bachelor in Computer/ Software	>8	The administrator of a crypto exchange website	Developer and website admin
7th Evaluator	50	Male	PhD in Management	>18	Investor	Crypto investor and trader

The final matrix Z, also known as the direct relation matrix, is generated by aggregating expert pair-wise comparisons, as shown in Appendix A. The following formula can be used to measure the matrix:

$$C = \{C_i | i = 1, 2, ..., n\} \tag{1}$$

$$z = \begin{bmatrix} 0 & \cdots & \tilde{z}_{n1} \\ \vdots & \ddots & \vdots \\ \tilde{z}_{1n} & \cdots & 0 \end{bmatrix}$$

Step 4: Obtaining the fuzzy direct-relation matrix

To acquire a fuzzy direct-relation matrix following formula can be applicable:

$$\tilde{x}_{ij} = \frac{\tilde{z}_{ij}}{r} = \left(\frac{l_{ij}}{r}, \frac{m_{ij}}{r}, \frac{u_{ij}}{r}\right) \tag{2}$$

where

$$r = \max_{i,j}\left\{\max_i \sum_{j=1}^{n} u_{ij}, \max_j \sum_{i=1}^{n} u_{ij}\right\} \qquad i, j \in \{1,2,3, \dots, n\} \tag{3}$$

Appendix B depicts the fuzzy direct-relation matrix.

Step 5: Calculating the fuzzy total-relation matrix

The fuzzy total-relation matrix can be obtained by the following formula:

$$\tilde{T} = \lim_{k \to +\infty}(\tilde{x}^1 \oplus \tilde{x}^2 \oplus \dots \oplus \tilde{x}^k) \tag{4}$$

If each element of the fuzzy total-relation matrix is expressed as $\tilde{t}_{ij} = (l''_{ij}, m''_{ij}, u''_{ij})$, it can be calculated as follows:

$$\left[l''_{ij}\right] = x_l \times (I - x_l)^{-1} \quad [m''_{ij}] = x_m \times (I - x_m)^{-1} \quad [u''_{ij}] = x_u \times (I - x_u)^{-1}$$

the fuzzy total-relation matrix is shown in Appendix C.

Step 6: Defuzzification

The defuzzification process was conducted based on the CFCS method proposed by Opricovic and Tzeng (2003) to convert the fuzzy numbers into crisp numbers. The crisp value of the total-relation matrix has been obtained using the following equations:

$$l_{ij}^{n}=\frac{\left(l_{ij}^{t}-\min l_{ij}^{t}\right)}{\Delta_{min}^{max}}\quad m_{ij}^{n}=\frac{(m_{ij}^{t}-min\, l_{ij}^{t})}{\Delta_{min}^{max}}\qquad u_{ij}^{n}=\frac{(u_{ij}^{t}-min\, l_{ij}^{t})}{\Delta_{min}^{max}} \tag{5}$$

So that

$$\Delta_{min}^{max}=\max u_{ij}^{t}-\min l_{ij}^{t}$$

Upper and lower bounds of normalized values can be obtained by:

$$l_{ij}^{s}={m_{ij}^{n}}\Big/{(1+m_{ij}^{n}-l_{ij}^{n})}$$

$$u_{ij}^{s}={u_{ij}^{n}}\Big/{(1+u_{ij}^{n}-l_{ij}^{n})}$$

$$x_{ij}=\frac{[l_{ij}^{s}\left(1-l_{ij}^{s}\right)+u_{ij}^{s}\times u_{ij}^{s}]}{[1-l_{ij}^{s}+u_{ij}^{s}]}$$

Appendix D shows the crisp total-relation matrix.

Step 7: Setting up a threshold value

A threshold value must be set up to obtain the digraph to figure the matrix inter-relationship. Given that the relationships among various factors are too complex and maybe minor and negligible, a threshold value must be set to avoid further complicating the diagram. Once the threshold is set for the T matrix, values that are smaller than the threshold are converted to zero, which in this study is equal to 0.065. Thus, only values with a large influence on the target variables will be measured, while minor impacts will be overlooked. Table 4 shows the crisp total-relationships matrix by considering the threshold value.

Table 4. The crisp total- relationships matrix by considering the threshold value

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13
C1	0	0	0	0.079	0.103	0.118	0	0.094	0	0.1	0.084	0.068	0.126
C2	0.093	0	0	0	0	0.091	0	0.093	0	0.098	0.085	0	0.106
C3	0.09	0	0	0	0.067	0.114	0	0.086	0	0.085	0.093	0.076	0.107
C4	0	0	0	0	0	0.088	0	0	0	0.073	0	0	0.069
C5	0	0	0	0	0	0.083	0	0	0	0.071	0	0	0.08
C6	0.07	0	0	0	0	0	0	0.101	0	0.097	0.106	0.08	0.107
C7	0.066	0	0	0	0	0.072	0	0.106	0	0.084	0.101	0	0.106
C8	0	0	0	0	0	0.089	0	0	0	0.084	0.078	0.067	0.099
C9	0	0	0	0	0	0.078	0	0.107	0	0.077	0.091	0	0.103
C10	0.067	0	0	0	0	0.088	0	0	0	0	0.073	0	0.088
C11	0.096	0	0	0	0	0.108	0	0.111	0	0.093	0	0.081	0.122
C12	0.113	0.087	0	0	0.077	0.121	0	0.105	0	0.104	0.119	0	0.13
C13	0.085	0	0	0	0	0.102	0	0.102	0	0.091	0.104	0.075	0

Step 8: Final output and creating the cause-and-effect diagram

In this step, the sum of each row and each column of T is computed as follows.

$$D = \sum_{j=1}^{n} T_{ij} \tag{6}$$

$$R = \sum_{i=1}^{n} T_{ij} \tag{7}$$

R represents the overall impact that criterion i has on criterion j. D stands for the overall effect experienced by criterion i from criterion j. Then, having D and R, D + R, and D-R, the cause-effect digraph was constructed using the data set (D + R, D - R). Each factor can be evaluated based on a horizontal vector (D + R) that measures the priority of each criterion and indicate the degree of significance in the adoption process. At the same time, the vertical axis (D-R) explains the degree of a criterion's impact on the system. Essentially, suppose the value is D-R>0. In that case, the criterion will be considered a member of a cause or influential group. In contrast, a member of the effect or influenced group (Jassbi et al., 2011). After plotting Network Relationship Map (NRM), the internal relationship among factors will be significant.

Result Analysis and Findings

Table 5 summarizes the output of the fuzzy DEMATEL. Following the table, each factor is sorted based on the impact, which D-R calculates. According to the table, the significance of 13 parameters can be prioritized by referring to (D+R) values, with "Perceived Usefulness (C13)" is the most crucial factor with a value of 2.354, and "Loss of Bitcoin Private Keys (C4)" being the least important factor with the value of 1.063. The findings also show that the cause group based on (D-R) values can be ordered, as shown in Table 5. Results reveal that the factors "Bitcoin Awareness (C1)", "Bitcoin Volatility (C2)", "Bitcoin Technological Complexity (C3)", "Loss of Bitcoin Private Keys (C4)", "Victim of Theft (C5)", "Cheap Transaction Fees (C7)", "Fast Clearance (C9)" and "Government Regulatory (C12)" are net causes. Also, refer to the value of (D-R) the factors "Trust in Performance (C6)", "Competitive Advantages (C8)", "Risk-Taking Personality (C10)", "Perceived Compatibility (C11)", and "Perceived Usefulness (C13)" are the net effects. "Technological Complexity (C3)", "Loss of Bitcoin Private Keys (C4)," and "Fast Clearance (C9)" are more independent and have not been influenced by the others. However, "Perceived Usefulness (C13)" has been affected the most by other variables. Table 5 also shows the number of impacts given or received. Both impact values show the quantity of the existing relationship.

Table 5. DEMATEL results

Criteria		R	D	D-R	D-R degree of a criterion's impact	D+R	D+R degree of a criterion's significance	No of impacts received	No of impacts given	
C	Bitcoin	0.2	1.0	0.8	1	1.2	11	0	8	Cause Group
C	Cheap	0.4	0.8	0.4	2	1.2	12	0	6	
C	Bitcoin	0.6	0.9	0.3	3	1.5	8	1	6	
C	Fast	0.5	0.8	0.3	4	1.3	10	0	5	
C	Govern	0.8	1.1	0.2	5	2.0	6	6	8	
C	Loss of	0.4	0.6	0.2	6	1.0	13	1	3	
C	Bitcoin	1.0	1.1	0.0	7	2.1	4	8	8	
C	Victim	0.6	0.6	0.0	8	1.3	9	3	3	
C	Perceive	1.2	0.9	-	9	2.1	3	9	6	Effect Group
C	Trust in	1.3	0.9	-	10	2.2	2	12	6	
C	Competi	1.2	0.7	-	11	2.0	5	9	5	
C	Risk-	1.1	0.6	-	12	1.8	7	12	4	
C	Perceive	1.4	0.9	-	13	2.3	1	12	6	

Using the coordinates of (D+ R, D-R), Fig 3. depicts the position of each criterion.

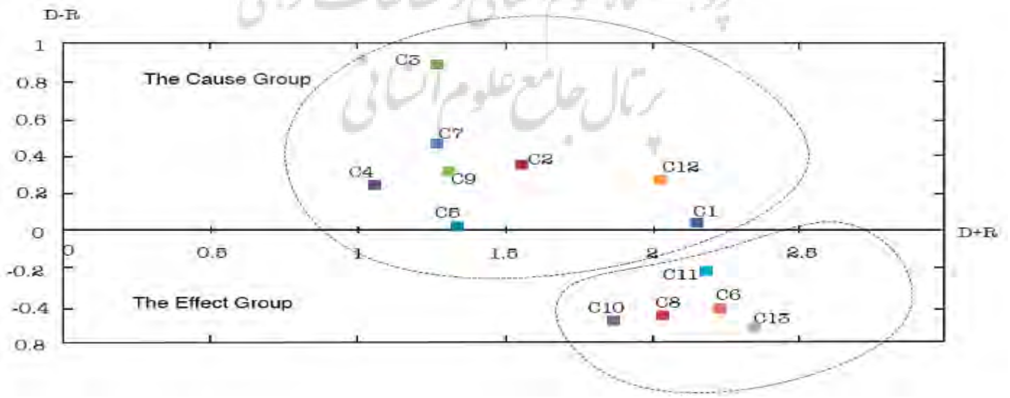

Fig 3. Cause-effect diagram

Discussion

Considering that the Cause group influences the Effects group, they should be given further consideration. Moreover, it can be concluded that improving the Cause criteria ultimately improves the Effects group. According to the findings, Bitcoin Technological Complexity, Government Regulatory, and Bitcoin Awareness are the factors that have the highest impacts. In contrast, Loss of Bitcoin Private Keys and Victim of Theft has minor effects given.

Perceived Usefulness has the highest D+R value of 2.354 and the lowest D-R, making it the most influenced criteria and the most prominent variable affecting Bitcoin Adoption. The concept of Usefulness for bitcoin is vast and subjective. Davis (1989) represents Perceived Usefulness as the degree to which an individual believes that using technology will be helpful to them and could improve overall performance. Spenkelink (2014) argues that it is beneficial for the company if the payout to the employees remains anonymous. By connecting further merchants to the Bitcoin payment network, bitcoin has become more widely known and available. The use of bitcoin by more retailers would lead to an improvement in adoption and the payment process. The network effects increase as the number of bitcoin acceptors grows and reduces the development costs. The importance of bitcoin's usability and Usefulness in terms of adoption has been highlighted in Alshamsi & Andras (2019) and Baur et al. (2015) studies.

The second highest prominent factor is Trust in Performance. Having trust in the Bitcoin mechanics reduces uncertainty and enhances the emerging technology adoption and acceptance. This finding is consistence with Shahzad et al.'s (2018) studies arguing that a higher level of trust leads to rapid adoption.

The third highest prominent factor is Perceived Compatibility. "Consistent with the existing values, past experiences, and needs of potential adopters" is how Compatibility is described (Moore & Benbasat, 1991). Consequently, integration with the conventional payment mechanisms improves system compatibility, increases the number of users, and thereby intensifies network effects. In contrast, low Compatibility decreases net effects (Grajek, 2010). The findings are also in line with Roussou & Stiakakis's (2019) research, which argues that incompatibility with other company systems is one of the main reasons for non-acceptance.

According to the findings, Bitcoin's Technological Complexity, Cheap Transaction Fees, and Bitcoin Volatility are the top three significant causal factors of Bitcoin Adoption. Policymakers and business owners should give it more attention.

Given the highest value of (D-R), Bitcoin Technological Complexity is the most significant factor in Bitcoin Adoption. Developing a Bitcoin wallet interface that is more user-friendly makes it easier to handle. "If grandmothers learn how to use bitcoin, we have access to the most acceptable and simplest technologies available ever!" (Daryaei, 2020). Thus, technology complexity should be considered the barrier to adopting bitcoin as a payment mechanism that adversely affects users' attitudes toward use. However, our findings suggest that uncertainty is one of the most critical factors influencing bitcoin acceptance. Blockchain technology and emerging technologies like Bitcoin are still taking their first steps. While the knowledge regarding Blockchain development is growing, the bitcoin wallets on the Blockchain platform continue to improve and be more user-friendly. These findings are consistent with the studies arguing that using Blockchain applications requires technical knowledge and skills. Developers need to improve the wallet to reduce the complexity of using Blockchain (Tyan et al., 2020). This complexity, as an obstacle, contributes to the lack of development of Blockchain in the tourism sector (Önder & Treiblmaier, 2019).

The Cheap Transaction Fee is the second highest cause value to the adoption process. Faster transactions at very low costs compared to the other payment method occurred basically because of no third parties (Nakamoto, 2008), which encourage tourists and merchants to embrace the advantages of bitcoin acceptance. This finding is consistent with a recent study claiming that bitcoin and Blockchain offer a low-cost to no-cost alternative for tourists and payers (Erceg, 2020; Hashim et al., 2019). In a study on the benefit of using bitcoin, the respondents pointed to the low transfer fee as one of the factors in accepting bitcoin (Roussou & Stiakakis, 2019).

Bitcoin Volatility is the third critical causal factor in the adoption process. The highest volatility contributes to higher uncertainty and ambiguity in the mind of adopters. It increases the risk of storing bitcoin as a source of value. Thus, "Bitcoin Volatility" has a negative effect on the adoption process and acceptance. This result is consistent with Andraschko & Britzelmaier's (2020) and Walton and Johnston's (2018) studies.

Conclusion

Given that Bitcoin is an entirely geographically independent financial system, the results of this study conducted in Iran can be broadly consistent with the results of other researchers. Also, problems such as lack of access to the global financial system are not unique to Iran. They are seen in many other countries such as African countries, the Caribbean, and the Small Island Economies (SIEs). Global conventional payments and financial inefficiencies cause severe damage to tourism development. Bitcoin offers a new feasible peer-to-peer payment alternative as an innovative digital payment solution for travelers and business owners. Given that Bitcoin and Tourism are heterogeneous networks, forming a shared language to understand each other seemed necessary. As a result, a conceptual TCN and BCN were developed, the Bitcoin ecosystem was defined, and the "Adoption Domain" was represented. As emerging disruption technology, Bitcoin is promised to offer a democratic solution to grant access to people at all socioeconomic levels. There is no need to be overseen by any central authorities. The benefit of decentralized tourism industry is that an integrated system would be accessible without a single point of failure or manipulation. Further, a centralized payment network cannot execute smart contracts with a diverse set of heterogeneous systems. The interpretability characteristics of Blockchain enable tourists to access a wide range of resources from disparate providers and the ability to access their assets from anywhere in the world. Future research could be relay on this vision.

This study shows that Bitcoin's Technological Complexity, Cheap Transaction Fee, and Bitcoin Volatility are the most important net cause and significant in Bitcoin Adoption. Therefore, improving the three mentioned criteria ultimately improves the Effects group and the adoption process. Employing easy-to-use and user-friendly wallets significantly by business owners and tourists reduces the complexity of using bitcoin. In recent years, the evolution of wallet technology has developed dramatically, and even business owners use crypto payment gateways. Such methods can reduce the uncertainty of using bitcoin as an alternative payment method. The cheap transaction fee is another important factor. It can be considered a potential motivation for using bitcoin if business owners accept bitcoin for goods and services. In that case, it creates a competitive advantage over traditional debit/credit cards and reduces settlement time. The volatility factor is another uncertainty it creates for business owners. Although one approach may be to invest in bitcoin, instant conversion to stable currencies can reduce risk. Also, with the expansion of bitcoin usage, bitcoin will be more steady. Bitcoin adoption removes the need to accept the global financial system and replaces it with a new people-centred financial system that is not dependent on race or religion. In addition to foreign tourists being able to book their tours via bitcoin, over one million Iranian nomads can offer their handicrafts directly.

The finding of this study contributes to the richness of the literature, and subsequent research can validate the conclusion, using other methods of analysis, try to improve and deploy a new model. This study proposes practical solutions from the perspectives of tourists and merchants, increasing the adoption of cryptocurrencies in the area of tourism and, as a result, the level of tourism revenue. The findings of this study will help policy influencers in tourism and cryptocurrency discussions cultivate a more consistent approach and assist tourism companies in adopting a new market growth strategy. However, businesses dealing in tourism can employ the proposed solution and adopt a new strategy for market expansion and business development. Government decision-makers can also consider this study by assuming supportive policies and reducing business barriers through intellectual property protections, Developing the required infrastructure, and preparing a bill for legislators to further improve tourism income and biodiversity growth. Given the newness of bitcoin and Blockchain, the lack of literature and even a limited number of people specializing in all three fields of payment, travel, and Blockchain were the study's limitations.

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References

Alaeddin, O., & Altounjy, R. (2018). Trust, technology awareness and satisfaction effect into the intention to use cryptocurrency among generation Z in Malaysia. *International Journal of Engineering & Technology*, *7*(4.29), 8-10.

Alshamsi, A., & Andras, P. (2019). User perception of Bitcoin usability and security across novice users. *International Journal of Human-Computer Studies*, *126*, 94-110.

Altuntas, F., & Gok, M. S. (2021). The effect of COVID-19 pandemic on domestic tourism: A DEMATEL method analysis on quarantine decisions. *International Journal of Hospitality Management*, *92*, 102719.

Ammous, S. (2018). *The bitcoin standard: the decentralized alternative to central banking*. John Wiley & Sons.

Andraschko, L. and Britzelmaier, B., 2020. Adaptation of cryptocurrencies in listed companies: empirical findings of a CFO survey in the German capital market. *International Journal of Big Data Management*, *1*(1), pp.26-49.

Badea, L., & Mungiu-Pupăzan, M. C. (2021). The economic and environmental impact of bitcoin. *IEEE Access*, *9*, 48091-48104.

Baur, A. W., Bühler, J., Bick, M., & Bonorden, C. S. (2015, October). Cryptocurrencies as a disruption? empirical findings on user adoption and future potential of bitcoin and co. In *Conference on e-Business, e-Services and e-Society* (pp. 63-80). Springer, Cham.

Binsky, D. (2018, June 28). World's Most Confusing Currency? (IRANIAN RIAL). Retrieved June 12, 2019, from https://www.youtube.com/watch?v=vFythWtEVZQ

Biswas, B., & Gupta, R. (2019). Analysis of barriers to implement blockchain in industry and service sectors. *Computers & Industrial Engineering*, *136*, 225-241.

Bodkhe, U., Bhattacharya, P., Tanwar, S., Tyagi, S., Kumar, N., & Obaidat, M. S. (2019, August). BloHosT: Blockchain enabled smart tourism and hospitality management. In *2019 international conference on computer, information and telecommunication systems (CITS)* (pp. 1-5). IEEE.

Camarinha-Matos, L. M., & Afsarmanesh, H. (2004). Collaborative networked organizations. *A research agenda for emerging business models*.

Camilleri, M. A. (2020). The use of data-driven technologies for customer-centric marketing. *International Journal of Big Data Management*, *1*(1), 50-63.

Christopher, C. M. (2014). Why on earth to people use bitcoin. *Bus. & Bankr. LJ*, *2*, 1.

Daryaei, M. (2020, April 16). Bitcoin for grandmas! Retrieved April 22, 2021, from https://medium.com/@Mdryie/Bitcoin-for-grandmas-3ac71b354a55/

Daryaei, M., Jassbi, J., Radfar, R., & Khamseh, A. (2020, November). Bitcoin Adoption as a New Technology for Payment Mechanism in a Tourism Collaborative Network. In *Working Conference on Virtual Enterprises* (pp. 167-176). Springer, Cham.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS quarterly*, 319-340.

Du, Z., 2019, July. Study on Observing the Evolution of Blockchain from the Perspective of Participatory Design. In *4th International Conference on Contemporary Education, Social Sciences and Humanities (ICCESSH 2019)* (pp. 1832-1837). Atlantis Press.

Erceg, A., Damoska Sekuloska, J., & Kelić, I. (2020, March). Blockchain in the Tourism Industry—A Review of the Situation in Croatia and Macedonia. In *Informatics* (Vol. 7, No. 1, p. 5). Multidisciplinary Digital Publishing Institute.

Farooque, M., Jain, V., Zhang, A., & Li, Z. (2020). Fuzzy DEMATEL analysis of barriers to Blockchain-based life cycle assessment in China. *Computers & Industrial Engineering*, *147*, 106684.

Findex. (2017). THE UNBANKED. Retrieved January 14, 2021, from globalfindex.worldbank.org

Flecha-Barrio, M. D., Palomo, J., Figueroa-Domecq, C., & Segovia-Perez, M. (2020). Blockchain Implementation in Hotel Management. In *Information and Communication Technologies in Tourism 2020* (pp. 255-266). Springer, Cham.

Foley, S., Karlsen, J. R., & Putniņš, T. J. (2019). Sex, drugs, and bitcoin: How much illegal activity is financed through cryptocurrencies?. *The Review of Financial Studies*, *32*(5), 1798-1853.

Gabus, A., & Fontela, E. (1972). World problems, an invitation to further thought within the framework of DEMATEL. *Battelle Geneva Research Center, Geneva, Switzerland*, 1-8.

Grajek, M. (2010). Estimating network effects and compatibility: Evidence from the Polish mobile market. *Information Economics and Policy*, *22*(2), 130-143.

Gupta, H., & Barua, M. K. (2018). A grey DEMATEL-based approach for modeling enablers of green innovation in manufacturing organizations. *Environmental Science and Pollution Research*, *25*(10), 9556-9578.

Hashim, M. J., Kamarudin, M. F., Arifin, N. A. M., & Khamis, M. R. (2019). Customer benefits on bitcoin as a medium of exchange. *ADVANCES IN BUSINESS RESEARCH INTERNATIONAL JOURNAL*, *5*(1), 22-30.

Heale, R., & Twycross, A. (2015). Validity and reliability in quantitative studies. *Evidence-based nursing*, *18*(3), 66-67.

Huddart, D., & Stott, T. (2020). Climate Change and Adventure Tourism. In *Adventure Tourism* (pp. 437-469). Palgrave Macmillan, Cham.

Jassbi, J., Mohamadnejad, F., & Nasrollahzadeh, H. (2011). A Fuzzy DEMATEL framework for modeling cause and effect relationships of strategy map. *Expert systems with Applications*, *38*(5), 5967-5973.

Jonker, N. (2018). What drives bitcoin adoption by retailers.

Kwok, A. O., & Koh, S. G. (2019). Is blockchain technology a watershed for tourism development?. *Current Issues in Tourism*, *22*(20), 2447-2452.

Li, J. P., Naqvi, B., Rizvi, S. K. A., & Chang, H. L. (2021). Bitcoin: The biggest financial innovation of fourth industrial revolution and a portfolio's efficiency booster. *Technological Forecasting and Social Change*, *162*, 120383.

Libra White Paper [PDF]. (2019, June). Geneva: Libra Association Members.

Liu, M. L. (2021). *A Hybrid Blockchain-Based Event Ticketing System* (Doctoral dissertation, University of Saskatchewan).

Lopez-Cordova, E. (2020). *Digital Platforms and the Demand for International Tourism Services*. The World Bank.

Mariana, C. D., Ekaputra, I. A., & Husodo, Z. A. (2021). Are Bitcoin and Ethereum safe-havens for stocks during the COVID-19 pandemic?. *Finance research letters*, *38*, 101798.

Moore, G. C., & Benbasat, I. (1991). Development of an instrument to measure the perceptions of adopting an information technology innovation. *Information systems research*, *2*(3), 192-222.

Nakamoto, S. (2008). Bitcoin: A peer-to-peer electronic cash system. https://bitcoin.org/bitcoin.pdf

Nam, K., Dutt, C. S., Chathoth, P., & Khan, M. S. (2019). Blockchain technology for smart city and smart tourism: latest trends and challenges. *Asia Pacific Journal of Tourism Research*, 1-15.

Nepal, S. K. (2020). Adventure travel and tourism after COVID-19–business as usual or opportunity to reset?. *Tourism Geographies*, *22*(3), 646-650.

Nieto Masot, A., & Ríos Rodríguez, N. (2021). Rural Tourism as a Development Strategy in Low-Density Areas: Case Study in Northern Extremadura (Spain). *Sustainability*, *13*(1), 239.

Opricovic, S., & Tzeng, G. H. (2003). Defuzzification within a multicriteria decision model. *International Journal of Uncertainty, Fuzziness and Knowledge-Based Systems*, *11*(05), 635-652.

Önder, I., & Treiblmaier, H. (2018). Blockchain and tourism: Three research propositions. *Annals of Tourism Research*, *72*(C), 180-182.

Parker, D. W., & Lawrence, W. W. (2020). Improving productivity of a financial firm: business model evolution in the Caribbean. *International Journal of Productivity and Performance Management*.

Roussou, I., & Stiakakis, E. (2019). Adoption of Digital Currencies: The Companies' Perspective. In *Operational Research in the Digital Era–ICT Challenges* (pp. 47-64). Springer, Cham.

Safe Coastal Tourism, "Stakeholders,". [Online]. Available: https://www.safecoastaltourism.org/article/stakeholders-tourism-development-according-unwto. [Accessed April. 4, 2021].

Sai, A. R., Buckley, J., & Le Gear, A. (2021). Characterizing wealth inequality in cryptocurrencies. *Frontiers in Blockchain*, 38.

Seigneur, J.M., 2018. Towards geneva crypto-friendly smart tourism. In *Etats Généraux du Tourisme*.

Seyfi, S., & Hall, C. M. (2020). Sanctions and tourism: effects, complexities and research. *Tourism Geographies*, *22*(4-5), 749-767.

Shahzad, F., Xiu, G., Wang, J., & Shahbaz, M. (2018). An empirical investigation on the adoption of cryptocurrencies among the people of mainland China. *Technology in Society*, *55*, 33-40.

Smales, L. A. (2019). Bitcoin as a safe haven: Is it even worth considering?. *Finance Research Letters*, *30*, 385-393.

Spenkelink, H. (2014). Identifying factors that influence the adoption of cryptocurrencies from a multiple stakeholder perspective. *Industrial Engineering and Management, Master's Thesis, Faculty of Management and Governance*.

Stockburger, L., Kokosioulis, G., Mukkamala, A., Mukkamala, R. R., & Avital, M. (2021). Blockchain-Enabled Decentralized Identify Management: The Case of Self-Sovereign Identity in Public Transportation. *Blockchain: Research and Applications*, 100014.

Tham, A., & Sigala, M. (2020). Road block (chain): bit (coin) s for tourism sustainable development goals?. *Journal of Hospitality and Tourism Technology*.

Thees, H., Erschbamer, G., & Pechlaner, H. (2020). The application of blockchain in tourism: use cases in the tourism value system. *European Journal of Tourism Research*, *26*, 2602-2602.

Traveller, I. (Producer). (2019, May 29). IRAN IS NOT FOR TOURISM - How to

Travel Iran. Retrieved June 12, 2019, from [Video file]. Retrieved April 10, 2021, from https://www.youtube.com/watch?v=85EKQyrPpno

Tyan, I., Yagüe, M. I., & Guevara-Plaza, A. (2020). Blockchain Technology for Smart Tourism Destinations. *Sustainability*, *12*(22), 9715.

Walton, A., & Johnston, K. (2018). Exploring perceptions of bitcoin adoption: the South African virtual community perspective. *Interdisciplinary Journal of Information, Knowledge & Management*, *13*.

Willie, P. (2019). Can all sectors of the hospitality and tourism industry be influenced by the innovation of blockchain technology?. *Worldwide Hospitality and Tourism Themes*.

Wood, G. (2014). Ethereum: A secure decentralised generalised transaction ledger. *Ethereum project yellow paper*, *151*(2014), 1-32.

Wu, H. C., & Chang, Y. Y. (2019). What drives experiential loyalty intentions?: The case of bitcoin travel. *International Journal of Hospitality & Tourism Administration*, 1-35.

Xiang, Z. (2018). From digitization to the age of acceleration. On information technology and tourism. Tourism Management Perspectives 25, 147–150.

Yartey, C. A., Narita, M. M., Nicholls, M. G. P., & Okwuokei, M. J. C. (2017). *The challenges of fiscal consolidation and debt reduction in the Caribbean*. International Monetary Fund.

Yazdi, M., Nedjati, A., Zarei, E., & Abbassi, R. (2020). A novel extension of DEMATEL approach for probabilistic safety analysis in process systems. *Safety science*, *121*, 119-136.

Zadeh, L. A. (1965). Information and control. *Fuzzy sets*, *8*(3), 338-353.

Appendix A. The direct relation matrix

	C1	C2	…..	C12	C13
C1	(0.000,0.000,0.000)	(0.036,0.107,0.357)	…..	(0.107,0.250,0.500)	(0.500,0.714,0.821)
C2	(0.357,0.536,0.714)	(0.000,0.000,0.000)	…..	(0.143,0.214,0.464)	(0.321,0.500,0.750)
…..	…..	…..	…..	…..	…..
C12	(0.464,0.679,0.857)	(0.429,0.607,0.750)	…..	(0.000,0.000,0.000)	(0.464,0.679,0.893)
C13	(0.214,0.429,0.679)	(0.143,0.214,0.464)	…..	(0.250,0.393,0.607)	(0.000,0.000,0.000)

Appendix B The normalized fuzzy direct-relation matrix

	C1	C2	…..	C12	C13
C1	(0.000,0.000,0.000)	(0.003,0.010,0.035)	…..	(0.010,0.024,0.048)	(0.048,0.069,0.080)
C2	(0.035,0.052,0.069)	(0.000,0.000,0.000)	…..	(0.014,0.021,0.045)	(0.031,0.048,0.073)
…	…..	…..	…..	…..	…..
C12	(0.045,0.066,0.083)	(0.042,0.059,0.073)	…..	(0.000,0.000,0.000)	(0.045,0.066,0.087)
C13	(0.021,0.042,0.066)	(0.014,0.021,0.045)	…..	(0.024,0.038,0.059)	(0.000,0.000,0.000)

Appendix C The fuzzy total-relation matrix					
	C1	C2	…..	C12	C13
C1	(0.010,0.032,0.135)	(0.009,0.026,0.126)	…..	(0.020,0.051,0.165)	(0.063,0.111,0.240)
C2	(0.042,0.076,0.193)	(0.004,0.014,0.089)	…..	(0.020,0.042,0.155)	(0.043,0.085,0.226)
…..	…..	…..	…..	…..	…..
C12	(0.056,0.099,0.222)	(0.047,0.075,0.168)	…..	(0.011,0.030,0.127)	(0.062,0.113,0.257)
C13	(0.029,0.067,0.188)	(0.019,0.035,0.130)	…..	(0.031,0.059,0.166)	(0.013,0.038,0.154)

Appendix D The crisp total-relation matrix								
	C1	C2	C3	C4	…..	C11	C12	C13
C1	0.049	0.044	0.025	0.079	…..	0.084	0.068	0.126
C2	0.093	0.026	0.014	0.023	…..	0.085	0.061	0.106
…..	…..	…..	…..	…..	…..	…..	…..	…..
C12	0.113	0.087	0.016	0.026	…..	0.119	0.046	0.13
C13	0.085	0.051	0.014	0.022	…..	0.104	0.075	0.058

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