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Blockchain Model for Fuzzy Green Certification of Business

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Abstract

The current paper present the fuzzy green certification of business as a component of the strategy to promote green marketing. Fuzzy green certification is part of the concept of life quality and is the method for examining a product using the basic human perception. This analysis is based on fuzzy logic that allows the processing of data represented by linguistic terms. To construct the fuzzy mathematical model of fuzzy green certification of business, the number and linguistic terms of the sensory perception analysis scale must be established. Each linguistic terms used is represented by a set of values in the range [0, 1], described by a member, generally to a set of three linguistic terms from the total set of dimensions linguistic. For the fuzzy fuzzy green certification of the business we used membership functions with a triangular distribution. Thus, the linguistic terms of perception with which experts appreciate the sensory characteristics of business varieties are transformed into so-called triplets belonging to three of the values of the scale. The triangular belonging functions were used in this model to assess the degree of belonging to three of the linguistic terms, with different weights. Indices of fuzzy green certification associated with business varieties are certified using a blockchain model that is an information technology that offers the opportunity to develop local markets for green business.

Keywords: Blockchain, Green Certificate, Agriculture

Introduction

The fuzzy green certification provides the encompassing variety in five modes of contact without, however, representing an awareness of the action of the varied external or internal stimulus (Sawant *et al.*, 2013; Balasubramanian *et al.*, 2014; Shobana *et al.*, 2018). The first informational communication with the external world is that the sensory reception (Kemp, Hollowood and Hort, 2013), (Solanke, Jaybhaye and Jadhav, 2018), (Vanishree,

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Kammar and Nidoni, 2016), (Gaur, 2015). The reflection of some isolated properties of the objects of reality acts (Aande, Agbidye and Adah, 2020), (Priya S S and Kowsalya S, 2015). Therefore, the reflection of the thing within the perception features a fragmentary character, one-dimensional, not allowing its identification (Mehra and Singh, 2017), (Köster, 2009), (Dhillon *et al.*, 2020).

In humans, the notice of the feeling puts into operation logical operators of analysis-evaluation, discernment-delimitation between the stimulus and its informational model, of designative reporting (the internal subjective image refers to the external stimulus that caused it the perceptions are characterized by a series of qualities on the idea of which we will identify, compare, analyze, and interpret. These qualities are modality, intensity, duration, affective tone and cognitive value. Counting on the character of the sources that generate them, the perceptions are the sources are external (Kemp, Hort and Hollowood, 2017; Charry *et al.*, 2020). Sensitivity is that the function of cells called receptors that appear and gradually differentiate during evolution and is exerted as a function (Schiano, Harwood and Drake, 2017; Yu, Low and Zhou, 2018).

If a person experiences perceptions at low concentrations of stimulants, his sensitivity threshold is higher. The differential threshold is considered the smallest difference between the values of the stimuli, capable of producing a change in perceptions.

Fuzzy green certification uses the ability of sense organs to identify and interpret perceptions, perceived by their receptors and transmitted to the cerebral hemispheres (Qiong, 2017). Thus, this complex system that participates in the identification and interpretation of perceptions is called the analyzer system. The receptor sensors of the sense organs identify a specific source of energy. The energy is taken up and transformed into nervous excitation and transmitted to the cerebral hemispheres, which transform it into perception.

Fuzzy comparative fuzzy green certification is a scientific method that can be used as an important criterion for evaluating the quality of business (Garitta *et al.*, 2015; Ciappini *et al.*, 2016; Ciappini, 2019).

Fuzzy green certification is a particularly important method for assessing the quality of business, which can be objective and subjective in determining properties, having an important role in establishing authenticity, in classification and standardization (Esmerino *et al.*, 2015; Elizagoyen *et al.*, 2017; Garitta *et al.*, 2018).

In fuzzy green certification, the perception of experts may be affected by uncertainty and for this reason the qualitative assessment, based on linguistic terms. Zadeh and Kacprzyk consider that the qualitative method for assessing the sensory perception in this context is more realistic than the quantitative approach (Kacprzyk, 2013), (Kacprzyk and Zadeh, 2012).

The blockchain quality certification model has the ability to create a specific market for green business based on short supply chains, without intermediaries.

The blockchain solution for the lack of transparency is certification of business quality by allowing any person to participate to fuzzy senzory analysis.

The smart contract it is created for each physical green business order and deployed to blockchain network. All those involved in the supply chain of the green product can interact with the blockchain system to obtain quality certificates. A blockchain system is thus used to certify the quality of the product (Figorilli *et al.*, 2018; Lucena *et al.*, 2018; Sander, Semeijn and Mahr, 2018).

Material and Method

The business is homogenized and left to rest and it is well homogenized and appreciated such transparent, bright, opalescent or cloudy. Fuzzy comparative fuzzy green certification is a scientific method that can be used to interpret recorded data of perceptions (Kaushik *et al.*, 2015). In fuzzy green certification, the perception of experts may be affected by uncertainty and for this reason the qualitative assessment, based on linguistic terms (Chen *et al.*, 2009). They consider that the qualitative method for assessing the sensory perception in this context is more realistic than the quantitative approach. The results recorded for these characteristics can be unsatisfactory, satisfying, medium, goo, excellent. These linguistic terms used for the qualitative assessment of sensory attributes are transformed into triplets of numerical values using the membership functions. Thus, the quality of a sensory attribute is assessed using fuzzy logic (working with values between 0 and 1 (Wang, Li and Shi, 2012) through three numerical values (on a scale from 0 to 100), which reflects the share of belonging to three of the five values languages (Du and Sun, 2004). The classification of the analyzed business is based on the comparison of these evaluations based on linguistic terms (Tsang *et al.*, 2019), (Khan *et al.*, 2019). This analysis is based on fuzzy logic that allows processing the data represented by linguistic terms (Shinde and Pardeshi, 2014; Kaushik *et al.*, 2015; Ayca and Hasan, 2017). To build the fuzzy mathematical model of fuzzy green certification of business, the number and linguistic terms of the sensory perception analysis scale be established. Each linguistic terms used to assess sensory qualities has a certain meaning,

which is represented by a set of values in the range [0, 1], described using a membership, generally to a set of three linguistic terms from the total set of linguistic sizes. For the fuzzy fuzzy green certification of the business we used membership functions with a triangular distribution. Thus, the linguistic terms of perception with which experts appreciate the sensory characteristics of business varieties are converted into so-called triplets belonging to three of the values of the scale. The triangular belonging functions were used in this model to assess the degree of belonging to three of the linguistic terms, with different weights. For developing the fuzzy model, we used Matlab R2020b.

Each attribute in the fuzzy green certification has a relative weight in the total green index. The relative weight that each green attribute has in the calculation of the global green certification index is established using qualitative assessments, based on linguistic terms, using a fuzzy sensory scale with the following five linguistic terms.

This relative weight is established on the basis of the assessments of a set of 20 experts who provide assessments on the green certification of busines. The relative weight that each green attribute has in the calculation of the global green certification index is established using qualitative assessments, based on linguistic terms, using a fuzzy scale with the following five linguistic terms.

QCrel = QC / Qt;

QSrel = QS / Qt;

QErel = QE / Qt;

QTrel = QT / Qt;

QSCrel = QSC / Qt

Qt is calculated as the sum of the first values in the triplets QC, QS, QE, QT and QSC (the importance of cost, security, efficiency, transparency and smart contract) with which the sensory quality is evaluated through the functions of belonging to the linguistic values by experts. Each attribute of the fuzzy green business analysis CC, CS, CE, CT and CSC (experts' perception of cost, security, efficiency, transparency and smart contract) is calculated based on the assessments of 20 experts who participated in this green certification analysis and who made qualitative assessments using linguistic terms (unsatisfactory, satisfactory, average, good, excellent). These linguistic values are transformed into triplets of numerical values with the help of the functions belonging to three of the linguistic terms. This set of three numerical values that is used to reflect the quality for each green business attribute, in the comparative assessment of bee samples, were used to obtain a global green certification index (CG) that sums the products between the calculated sensory triplets. For each of the quality attributes with the relative weight of each attribute:

CG = CC ⊗ QCrel ⊕ CS ⊗ QSrel ⊕ CE ⊗ QErel ⊕ CT ⊗ QTrel⊕ CSC ⊗ QSCrel;

k(a, b, c) = (ka, kb , kc);

(a, b, c) ⊕ (d, e, f) = (a+d, b+e, c+f);

(a, b, c) ⊗ (d, e, f) = (ad, ae+db, af+dc);

a, b, c > 0.

$$\mu(x) = \begin{cases} 0 & \text{if } x \leqslant a - b \\ \dfrac{x - a + b}{b} & \text{if } a - b \leqslant x \leqslant a \\ \dfrac{a + c - x}{c} & \text{if } a \leqslant x \leqslant a + c \\ 0 & \text{if } a + c \leqslant x \end{cases}$$

Figure 1: Fuzzy triangular membership function

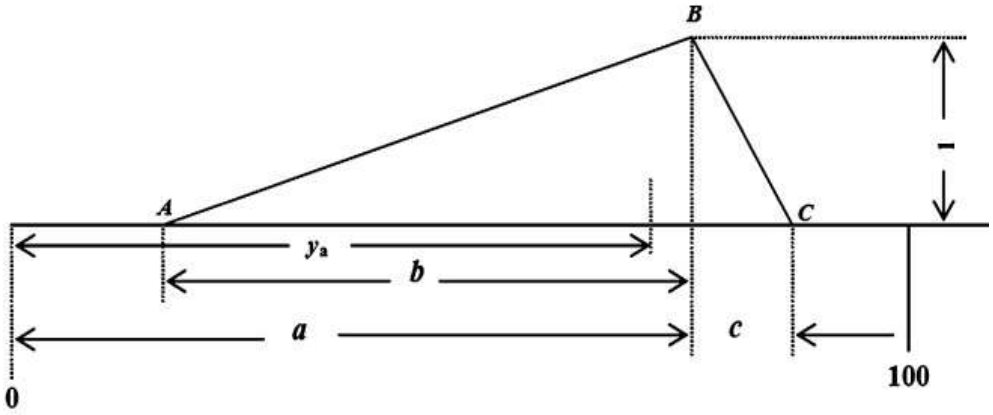

Figure 2: Graphic representation of green perception through the fuzzy triplet (a, b, c).

The blockchain model for certifying the quality of green business represents a decentralized system that through the transparency of information offers the opportunity to develop the market of green business.

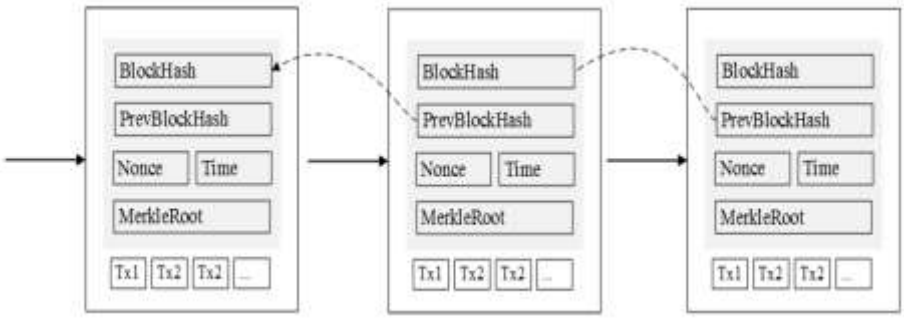

Figure 1: Blockchain model (Uurtsaikh Jamsrandorj, 2017)

Each block records the following information:

-Index: position of the block in the chain (the first block has the index 0).

-Time: the time when the block was created.

- BlockHash: a unique numeric value that identifies block data.

- PreviousBlockHash: a unique hash reference of the previous block.

- MerkleRoot: the summary of all transactions in the block.

For each assortment of green business each beekeeper adds a new block with index 0, also called Genesis,

Within this model of business quality certification, beekeepers and distributors are supposed to register the lots sold in the blockchain system. The data entered in the blockchain system is verify and then protected by the hash function.

The distributor adds a new block that enters data on packaging, transport conditions, business safety, temperature, and vehicle and delivery conditions.

Retailers or retail stores register a new block with data on the conditions of reception, storage, business safety.

Each block is send to a blockchain node wich will keep its own copy within a shared register. The implementation of the blockchain model for the certification of the quality of green business by means of geographical data, realizes a mapping of the nodes of the supply chain, offering the possibility to optimize the market relations.

Through this blockchain quality certification system, consumers can access all this information about the respective batch of green business that can be found in the shared register.

Results And Discussions

Blockchain technology offers the opportunity to implement smart contracts in the field of green products, which through the transparency of quality certification offers the advantage of promoting local resources on global markets. Smart contract is a useful term to develop an informative program that is easy to market to your business or to use a blessing to buy a sale (Chang, Hwang and Yang, 2018; Basnayake and Rajapakse, 2019).

The presence of blockchain certification for green business is a form of consumer protection. Thus, the blockchain system offers a shared and verifiable certification of qualities, which is secure and not centrally coordinated.

The risk of business security has necessitated the adoption of a system of blockchain traceability technology, which is an effective tool for quality certification. In this paper, we proposed the certification of the green certification of green business using a blockchain system that provides safety and integrity. The blockchain system is based on the use of smart contracts (Prashar *et al.*, 2020).

Table 1: Calculation of triplets of sensory quality attributes in the calculation of the global sensory quality index of honey varieties

Green attributes	Calculation of the set of numerical values associated with green attributes, in Matlab	Triplets associated with green attributes
Cost	QC = (0*[0 0 25] + 0*[25 25 25] +6*[50 25 25] +8*[75 25 25] +6*[100 25 0])/20	75 25 17.5
Security	QS = (0*[0 0 25] + 0*[25 25 25] +3*[50 25 25] +11*[75 25 25] +6*[100 25 0])/20	78.75 25 17.5
Eficiency	QE = (0*[0 0 25] + 0*[25 25 25] +4*[50 25 25] +10*[75 25 25] +6*[100 25 0])/20	77.5 25 17.5
Transparency	QT = (0*[0 0 25] + 0*[25 25 25] +6*[50 25 25] +8*[75 25 25] +6*[100 25 0])/20	75 25 17.5
Smart Contract	QSC = (0*[0 0 25] + 0*[25 25 25] +6*[50 25 25] +7*[75 25 25] +7*[100 25 0])/20	76.25 25 16.25
	Qt = QC(1)+QS(1)+QE(1)+QT(1)+QSC(1);	382.5

Table 2: Calculation of the relative weight of sensory quality attributes in the calculation of the global green certification index of business

Green attributes	Calculation of the set of numerical values associated with green attributes, in Matlab	Triplets associated with quality attributes
Cost	QCrel = QC / Qt	0.1961 0.0654 0.0458
Security	QSrel = QS / Qt	0.2059 0.0654 0.0458
Eficiency	QErel = QE / Qt	0.2026 0.0654 0.0458
Transparency	QTrel = QT / Qt	0.1961 0.0654 0.0458
Smart Contract	QSCrel = QSC / Qt	0.1993 0.0654 0.0425

CS = CC x QCrel + CS x QSrel + CE x QErel + CT x QTrel + CSC x QSCrel;

The blockchain model of quality certification achieves the traceability of green business throughout the chain.

The digitalization of the current green business system and the regulations on the safety and traceability of green products require increasing the certification to ensure compliance of practices with regulations in force in the field of green business.

Conclusions

This blockchain system that certifies the green certification of business, provides secure and easy to understand information by consumers, contributing to the development of local markets in the virtual environment.

The adoption of a model based on blockchain technology allows certification of the quality of green business, offering consumers certain guarantees regarding the safety and quality of business, contributing to the development of local stains. Thus, through this blockchain model for certifying the quality of green business, a strategic advantage is obtained in terms of capitalizing on green business and developing local markets.

Promoting the development of markets for green business is part of all measures to combat climate change, efficient management, reducing costs and risks of production by promoting models of green marketing.

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