A Proposed Fuzzy Logic Based Framework for E-Accounting Evaluation in Iraq

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ABSTRACT

International Federation of Accountants (IFAC) introduced a group of electronic accounting (E-Accounting) principles to make the accounting information more reliable and suitable for the electronic environment. This paper introduces the concept of E-Accounting and the differences between it and the traditional accounting, it determines the features of E-Accounting and problems associated with its application, and identifies the main principles of E-Accounting. In addition, this paper clarifies some concepts of fuzzy logic tools and its role to analyze the linguistic variables. The researchers use in the fuzzy logic tools to measure the quality of E-Accounting principles, and to rearrange them according to their affect on accounting statements by analyzing the outcomes of questionnaires. The researchers suggest a proposed framework to evaluate E-Accounting application in Iraq by measuring the quality and materiality of E-Accounting principles.

I. INTRODUCTION

The official emergence of accounting principles in the 1970's led to provide solutions to the most of accounting problems, to unify the financial transactions, to increase the role of international accounting, and to increase the foreign investment, but the rapid development of Information and Communication Technology (ICT) reduces the importance of traditional accounting, so IFAC develops a group of accounting principles for the electronic environment to increase the reliability, and materiality of E-Accounting .

II. E-ACCOINTING

A. The Concept of E-Accounting

E-Accounting can be defined as "to follow internal and external operational events as well as to document, record, archive, summarize those events, and to present summary information to the vested interest groups in an electronic environment"[1]. It can be defined also as "the application of online and Internet technologies to the business accounting function"[2]. E-accounting invariably offers a wide application of data processes and operation via the internet that entails other aspects such as registration, storage, business activity, production management, procurement and distribution, goods transfer, as well as after sales service [3].

B. The Differences between Traditional and Electronic Accounting

Accounting traditionally was processed manually with all transactions recorded in columnar papers and kept in voluminous binders. Once computers became popular and software affordable, accounting tasks moved into this medium, where concepts stayed the same but mechanics changed from papers to programs.

The main differences between traditional and electronic accounting can be classified as shown in table (1) [4],[5]

Table (1): The main differences between traditional and electronic accounting

Basis of Difference	Traditional Accounting	Electronic Accounting
Definition	The accountants keep physical register of journal and ledger for keeping the records of each transaction.	The accountants use computer and different accounting software for digital record of each transaction.
Calculation	All calculation of adding and subtracting are done manually. For example, the accountants find the balance of any ledger account, calculate the debit and credit side, and then find its difference for showing balance.	All the calculations are done by computer system. Accountants don't need not to calculate each account's balance; it is calculated automatically by computerized accounting system.
Ledger Accounts	Accountants check the journal, and then transfer figures to related accounts' debit or credit side through manual posting.	The system will automatically process the transactions and will make all the accounts ledgers due to have passed the voucher entries under its respected ledger account.
Trial	The accountants have to collect the	The system will produce trial balance

Balance	information of the balances of all accounts in the ledger, on this basis; the accountants have prepared the trial balance manually.	automatically.
Adjustment Entries Record	Both adjustment journal entries and its posting in the ledger accounts will be done manually one by one.	Only adjustment entries will pass in the electronic accounting system, posting in the ledger accounts will be done automatically.
Financial Statements	The accountants have to make the financial statements manually by careful transferring trial balance's figures in income statement and balance sheet.	The accountants don't need to prepare financial statement manually, financial statements will prepare automatically. It will also change after each voucher entry in the system which facility is not available in the manual accounting system.

C. The Principals of E-Accounting

The manager of organization must enhance the reliability of information that will produce by computer by identifying and assessing the information technology risks, IFAC developed principles of E-Accounting to make the accounting information more reliable[6].

Table (2) shows the main principles of e-accounting that developed by IFAC.

Table (2): The IFAC principles for E-Accounting and their requirements

Accounting Information Security	Accounting Information Processing
Integrity	Completeness
Availability	Accuracy
Confidentiality	Timeliness
Authenticity	Assessability
Authorization	Order
Non-repudiation	Inalterability

1)   Principles for accounting information security

A prerequisite for reliable information in an organization's books and records and, hence, the financial statements is secure accounting data and information.

Data are defined as the basis for information. Since data are processed using ICT applications and the underlying ICT infrastructure when obtaining accounting information, ICT applications and the underlying ICT infrastructure are also aspects relevant to accounting information security.

Management is responsible for meeting the prerequisites for accounting information security. To this end, it is necessary to develop, implement and maintain an appropriate security concept to ensure the required degree of information security.

A security concept comprises management's assessment of the security risks resulting from the use of ICT and, derived from this, the technological and organizational measures needed to help ensure an adequate platform for ICT applications and the appropriate and secure execution of ICT-aided business processes.

ICT systems are more likely to yield reliable accounting information when they meet the following security requirements[7]:

- *Integrity*: This requirement is fulfilled for an ICT system when data and information are complete and accurate, systems are complete and appropriate and all of these are protected against unauthorized modification and manipulation. Appropriate testing and release procedures are typical means by which the integrity of data, information and systems can be ensured. Technical measures to achieve this include firewalls and virus scanners. The reliability of ICT-aided accounting processes is improved when the ICT infrastructure and the data, information and ICT applications are used in a specified configuration and only authorized modifications are permitted.

- *Availability*: Under this requirement, the organization ensures the constant availability of the hardware, software, data and information to maintain business operations and that the hardware, software, data, information and the requisite ICT organization can be made operable within a reasonable period of time. It is important, therefore, to establish appropriate backup procedures for emergencies. In addition, the ability to convert digitally maintained books and records into human-readable format within a reasonable period of time is essential.

- *Confidentiality*: This requirement means that data obtained from third parties not be transmitted or disclosed without authorization. Organizational and technical measures, such as encryption technologies, include instructions to restrict the transmission of personal data to third parties, transmit encrypted data to authorized third parties, identify and verify the recipient of data and to delete stored personal data after a certain length of time.

- *Authenticity*: This requirement relates to the traceability of a business transaction to the individual who initiated it. This can be done by. When data or information are exchanged electronically, it is important that the other party be identified or identifiable. It may be convenient to use shared external or independent facilities for this purpose.

- *Authorization*: This requirement means that only certain persons, appointed in advance (so-called authorized persons), may access certain data, information and systems and that only authorized persons can use the rights defined for this system. This includes reading, creating, modifying and deleting data or information or the administration of an ICT system. Useful methods to achieve this are physical and logical security procedures. Organizational arrangements and technical systems for access protection are essential to segregate incompatible duties. Biometric systems will become more common in future to supplement ID cards and passwords.

- *Non-repudiation*: This requirement is defined as the ability of ICT-aided procedures to bring about desired legal consequences with binding effect. It should be difficult for the person initiating the transaction to deny its validity on the grounds that the transaction was unintended or unauthorized. The use of public key systems can help prevent repudiation.

The preceding security requirements also help serve to meet the need for the privacy of information. Unfortunately, there is no generally accepted definition of privacy. At a most basic level, privacy of information is tied to the ownership of information. Even though privacy and confidentiality are highly related, confidentiality does not automatically assure that privacy is not being abused or violated.

Since there are no universally accepted definitions as to what constitutes the ownership and privacy of information, it is important to develop and publish a privacy policy as an essential part of security policy.

This privacy policy establishes the agreement between the information provider and the information recipient as to the use of the information exchanged. It may be expedient, therefore, to publish a description of the privacy policy in management's privacy statement on the website.

2) Principles for appropriate accounting information processing
In an e-business environment, commercial activity generated by an enterprise's website is automatically interfaced with its "back office" systems, such as the internal reporting system, the inventory management system and the accounting system. An e-business activity becomes relevant to the accounting system if the e-business activity — in particular e-business transactions — affect assets or liabilities, result in expenses or income or lead to events requiring disclosure in the financial statements or other reports[8].

The reliability of accounting information relating to the entire e-business process is increased if the accounting system satisfies both accounting information security principles and the principles for appropriate accounting information processing.

The principles for appropriate accounting information processing are fulfilled where the e-business system and the entire ICT system safeguards comply with the following general requirements for the input, processing, output and storage of information and data about e-business transactions[9]:

- *The completeness*: refers to the extent and scope of processed e-business transactions, i.e., the recipient of transactions determines that all transactions are input completely into the e-business system. Each transaction should be individually identifiable and recorded separately.

The completeness of the recorded entries should be demonstrably preserved throughout processing and for the duration of the retention period.

- *The accuracy*: processed information should accurately reflect e-business transactions, i.e., recorded transactions should reflect the actual events and circumstances in conformity with the applicable financial reporting framework.

- *The timeliness*: e-business transactions should be recorded on a timely basis, i.e., as soon as possible after the transaction has occurred. When some time elapses between the occurrence of a transaction and its recording, further appropriate action may become necessary to determine completeness and accuracy of the entry recorded.

- *The assessability*: each item and disclosure in the financial statements should be verifiable in that it can be traced back to individual entries in the books and records and to the original source documents that support that entry. Furthermore, the assessability implies that an expert third party should be able to gain an insight into the transactions and position of the enterprise within a reasonable period of time.

- *The Order*: in an accounting system, accounting entries should be organized in both chronological order (a journal function) and by nature (e.g., by type of asset, liability, revenue or expense — a ledger function). Transactions and their recording should be identifiable and be capable of conversion into human readable format in a reasonable period of time.

- *The inalterability*: no entry or record may be changed after the posting date so that its original content can no longer be identified, unless the change to the original content can be identified by means of a log of such alterations. Therefore, alterations of entries or records should be made in a way that that both the original content and the fact that changes have been made are evident or can be made evident. For program-generated or program-controlled entries (automated or recurring vouchers), changes to the underlying data used to generate and control accounting entries would also be recorded. This applies, in particular, to the logging of modifications of settings relevant to accounting or the parameterization of software and the recording of changes to master data.

Before accepting a transaction for processing, it would be useful to verify the following[2]:

- That all transaction details have been entered by the customer

- The authenticity of the customer

- The availability of the products or services to be supplied

- The reasonableness of the order, for example, to identify an unusually large quantity resulting from an input error, or to identify erroneous duplicate orders

- The pricing structure applied, including delivery costs, where appropriate

- The method of payment or credit worthiness of the customer; and

- The non-reputability of the transaction in that its author cannot later deny having entered into it. In an e-business process, it is often not possible to provide evidence of transactions by way of conventional vouchers — nor should it be.

III. THE FUZZY LOGIC

Fuzzy logic is an extension of Boolean logic by Lotfi Zadeh in 1965 based on the mathematical theory of fuzzy sets, which is a generalization of the classical set theory[10].

By introducing the notion of degree in the verification of a condition, thus enabling a condition to be in a state other than true or false, fuzzy logic provides a very valuable flexibility for reasoning, which makes it possible to take into account inaccuracies and uncertainties.

A. The Concept of Fuzzy Logic

In 1965 Prof. Lotfi A. Zadeh introduced fuzzy sets, where many degrees of membership are allowed, and indicated with a number between 0 and 1. The point of departure for fuzzy sets is simply the generalization of the valuation set from the pair of numbers {0,1} to all the numbers in [0,1]. This is called a membership function and is denoted as A .x/, and in this way we have fuzzy sets. Membership functions are mathematical tools for indicating flexible membership to a set, modeling and quantifying the meaning of symbols. They can represent a subjective notion of a vague class, such as chairs in a room, size of people, and performance among others[11].

Furthermore, when linguistic variables are used, these degrees may be managed by specific functions. Irrationality can be described in terms of what is known as the fuzzjective[12].

B. Benefits of Fuzzy Logic

There are many benefits of using fuzzy logic, such as[13]:

- Fuzzy Logic describes systems in terms of a combination of numerics and linguistics (symbolic). This has advantages over pure mathematical (numerical) approaches or pure symbolic approaches because very often system knowledge is available in such a combination.

- Problems for which an exact mathematically precise description is lacking or is only available for very restricted conditions can often be tackled by fuzzy logic, provided a fuzzy model is present.

- Fuzzy logic sometimes uses only approximate data, so simple sensors can be used.

- The algorithms can be described with little data, so little memory is required.

- The algorithms are often quite understandable.

- Fuzzy algorithms are often robust, in the sense that they are not very sensitive to changing environments and erroneous or forgotten rules.

- The reasoning process is often simple, compared to computationally precise systems, so computing power is saved. This is a very interesting feature, especially in real time systems.

- Fuzzy methods usually have a shorter development time than conventional methods.

C. Fuzzy Logic Methodology (The Proposed Framework)

To analyze the results of the questionnaires by Fuzzy Logic tools. The results are processed by fuzzy logic function, built in Matlab ver. 10 according to the following steps[12]:

1. Determining the required ratios of the results.

2. Determining the weights of ratios and questions

3. Calculating all the ratios, based on the data of the questionnaires.

4. Calculating all the ratios according to their weights which resulted from step 3.

5. Calculating the rate of the linguistic variables by assuming a rated value to each linguistic variable by dividing the weight of each ratio into the number of linguistic variables.

6. Calculating the rate of triangular fuzzy numbers by using the function of fuzzy logic in MatLab ver.6.5.

7. Computing the weighted rates of triangular fuzzy numbers.

8. Determining the fuzzy Distance of each ratio by using the equations (1) and (2).

$$D2 , = b-M\ 2+13\ b-M\ c+a\ -2b + 118\ [\ c-b)2+ b-a\ 2 - 118\ c-b\ b-a\ f(\alpha)\approx\alpha....(1)$$

$$D2 , = b-M\ 2+12\ b-M\ c+a\ -2b + 19\ [\ c-b)2+ b-a\ 2 - 19\ c-b\ b-a\ f(\alpha)\approx1....(2)$$

IV. THE PRACTICAL PART

The researchers applied the proposed framework to analyze the results of the questionnaires by Fuzzy Logic for evaluating the requirements of E-Accounting principles, as following :

A. The coding of E-Accounting Principles :

Table (3) : The codes of E-Accounting principles' requirements

Principles	Requirements	Code
	Integrity	SP_1
	Availability	SP_2
Accounting Information Security	Confidentiality	SP_3
	Authenticity	SP_4
	Authorization	SP_5
	Non-repudiation	SP_6
	Completeness	PP_1
	Accuracy	PP_2
Principles for Appropriate Accounting Information processing	Timeliness	PP_3
	Assessability	PP_4
	Order	PP_5
	Inalterability	PP_6

B.   The designing of linguistic matrix :

This step will be done by collecting the linguistic data for the E-Accounting principles in table (4) .

Table (4) : The Linguistic Matrix

PP_6	PP_5	PP_4	PP_3	PP_2	PP_1	SP_6	SP_5	SP_4	SP_3	SP_2	SP_1	
M	W	M	H.M	M	A.S	A.W	M	W	M	W	A	G1
V.S	M	H.M	A.W	S	A.M	S	A.M	A.M	S	H.M	A.S	G2
A.W	M	A.S	W	V.S	V.W	W	H.M	A	V.S	S	H.M	G3
A.S	W	S	S	A.S	A.M	A.S	W	S	W	A.W	W	G4
A	A.W	A	A.S	V.S	A	A.M	H.M	V.W	H.M	A.M	S	G5
V.W	V.S	M	W	M	A.S	V.S	M	A.S	A.W	V.S	A.W	G6
A	V.W	A.W	H.M	S	M	S	S	A.M	M	S	A.S	G7
S	A.S	A	V.W	A.M	A.M	V.S	A.M	M	A.M	A	A.M	G8
A.M	W	S	A.W	A.W	A.W	S	A	A.W	S	H.M	M	G9
W	A	A.M	W	V.S	A.M	A	A.S	S	M	A.S	H.M	G10

C.   The designing of Materiality Matrix :

      This step will be done by collecting of the linguistic data of materiality for each principle of E-Accounting principles in table (5).

Table (5) : The Materiality Matrix

PP_6	PP_5	PP_4	PP_3	PP_2	PP_1	SP_6	SP_5	SP_4	SP_3	SP_2	SP_1	
A	V.W	A.M	H.M	S	H.M	M	M	A	A	W	V.W	G1
H.M	V.S	V.W	A	A.S	V.S	V.W	A.S	A.S	A.W	V.W	A.W	G2
V.W	A.S	H.M	A	A.M	A.W	V.S	A.W	V.W	V.S	V.S	W	G3
V.S	A	S	A	V.S	A	A.M	V.W	A.W	W	H.M	A.M	G4
W	A.M	W	A.M	A.W	V.W	M	A.M	V.S	H.M	A.M	S	G5
A.M	A.W	A.S	A.W	V.W	H.M	A.W	W	W	A.M	V.S	A.S	G6
V.W	S	A.M	V.S	V.W	M	H.M	S	A.M	H.M	A.W	A.M	G7
A.M	W	S	V.W	M	S	A.M	A.S	A	S	A.M	A.S	G8

A.W	H.M	S	S	S	A.M	A	H.M	H.M	V.S	A.S	A.M	**G9**
H.M	M	M	H.M	W	W	H.M	H.M	V.S	S	V.S	S	**G10**

D. Calculating the linguistic variable values:

To complete table (6), the researchers find the linguistic variable values numerically by using equation (1)

$$a_{ij} = \min\{a_{ijk}\}$$
$$b_{ij} = \frac{1}{k}\sum_{k=1}^{1} bijk \qquad \text{.... (1)}$$
$$c_{ij} = \max\{c_{ijk}\}$$

Table (6) : The linguistic variable values

V.S	A.S	S	H.M	A.M	M	A	W	A.W	V.W	
0.91	0.81	0.71	0.61	0.51	0.41	0.31	0.21	0.11	0	**Min**
0.955	0.855	0.755	0.655	0.555	0.455	0.355	0.255	0.155	0.05	**Ave**
1	0.9	0.8	0.7	0.6	0.5	0.4	0.3	0.2	0.1	**Max**

E. Calculating the numerical matrix of E-Accounting principles (quality and materiality) :

To complete tables (7) and (8), fuzzy weighted average for the linguistic variables in tables (4) and (5) will be found by using equations (2) – (5)

$$r_{ij} = \left\{ \frac{X_{ij}}{\sum_{i=1}^{m} X_{ij}} \right\} \qquad \text{.... (2)}$$

$$r_{ij} = \left\{ \frac{X_{ij}^{-1}}{\sum_{i=1}^{m} X_{ij}^{-1}} \right\} \qquad \text{.... (3)}$$

Table (7): The numerical
principles quality

$$r_{ij} = \left\{ \frac{a_{ij}}{\sum_{i=1}^{m} c_{ij}}, \frac{b_{ij}}{\sum_{i=1}^{m} b_{ij}}, \frac{c_{ij}}{\sum_{i=1}^{m} a_{ij}} \right\} \qquad \text{.... (4)}$$

matrix of E-Accounting

$$r_{ij} = \left\{ \frac{a_{ij}^{-1}}{\sum_{i=1}^{m} c_{ij}^{-1}}, \frac{b_{ij}^{-1}}{\sum_{i=1}^{m} b_{ij}^{-1}}, \frac{c_{ij}^{-1}}{\sum_{i=1}^{m} a_{ij}^{-1}} \right\} \qquad \text{.... (5)}$$

PP$_6$	PP$_5$	PP$_4$	PP$_3$	PP$_2$	PP$_1$	SP$_6$	SP$_5$	SP$_4$	SP$_3$	SP$_2$	SP$_1$	
0.429	0.359	0.490	0.359	0.640	0.449	0.590	0.510	0.429	0.500	0.550	0.510	Min
0.475	0.405	0.535	0.405	0.685	0.495	0.635	0.555	0.475	0.545	0.595	0.555	Ave
0.520	0.450	0.580	0.450	0.730	0.540	0.680	0.600	0.520	0.590	0.640	0.600	Max

Table (8): The numerical matrix of E-Accounting principles materiality

PP$_6$	PP$_5$	PP$_4$	PP$_3$	PP$_2$	PP$_1$	SP$_6$	SP$_5$	SP$_4$	SP$_3$	SP$_2$	SP$_1$	
0.378	0.459	0.519	0.439	0.438	0.439	0.399	0.479	0.469	0.560	0.549	0.489	Min
0.424	0.505	0.565	0.485	0.484	0.485	0.445	0.525	0.515	0.605	0.595	0.535	Ave
0.470	0.550	0.610	0.530	0.530	0.530	0.490	0.570	0.560	0.650	0.640	0.580	Max

F. Calculating the values of E-Accounting principles according to their materiality:

The values of E-Accounting principles according to their materiality in table (9) can be found by applying equation (6) on tables (7) and (8).

$$r_i = \sum_{j=1}^{n} w_j \times r_{ij} \qquad \textbf{.... (6)}$$

Table (9): The values of E-Accounting principles according to their materiality

PP$_6$	PP$_5$	PP$_4$	PP$_3$	PP$_2$	PP$_1$	SP$_6$	SP$_5$	SP$_4$	SP$_3$	SP$_2$	SP$_1$	
0.727	1.020	0.895	0.976	0.600	0.813	0.587	0.798	0.902	0.949	0.858	0.815	Min
0.894	1.247	1.055	1.198	0.707	0.980	0.700	0.945	1.084	1.110	0.999	0.963	Ave
1.096	1.532	1.245	1.476	0.828	1.180	0.831	1.118	1.305	1.300	1.164	1.137	Max

G. Calculating the values of triangular fuzzy numbers :

The values of triangular fuzzy numbers (a, b, c) in table (10) can be found by applying equations (7) and (8) on table (9)

$$D^2(\tilde{X}, M) = (b - M)^2 + \tfrac{1}{3}(b - M)[(c + a) - 2b]$$
$$+ \tfrac{1}{18}[(c - b)^2 + (b - a)^2] \qquad \text{....(7)}$$
$$- \tfrac{1}{18}[(c - b)(b - a)] \quad f(a) \approx a$$

$$D^2(\tilde{X}, M) = (b - M)^2 + \tfrac{1}{2}(b - M)[(c + a) - 2b]$$
$$+ \tfrac{1}{9}[(c - b)^2 + (b - a)^2] \qquad \text{....(8)}$$
$$- \tfrac{1}{9}[(c - b)(b - a)] \quad f(a) \approx 1$$

Table (10): The values of triangular fuzzy numbers (a, b, c)

PP_6	PP_5	PP_4	PP_3	PP_2	PP_1	SP_6	SP_5	SP_4	SP_3	SP_2	SP_1	
0.275	0.468	0.464	0.428	0.263	0.357	0.234	0.382	0.423	0.532	0.471	0.399	a
0.379	0.629	0.596	0.580	0.342	0.475	0.311	0.496	0.558	0.672	0.594	0.515	b
0.515	0.843	0.759	0.782	0.439	0.626	0.407	0.637	0.731	0.845	0.745	0.660	c

H. Calculating the fuzzy distance of E-Accounting principles :

1. the fuzzy distances for each and every E-Accounting principles by applying equations (9) and (10) on table (10), to create table (11).

$$Max\,(M) \geq \sup[D^a_{max\,i}\; s\;(\tilde{P}_i)] \qquad \text{.... (9)}$$
$$Min\,(M) \leq \inf[D^a_{max\,i}\; s\;(\tilde{P}_i)]$$

Table (11): The fuzzy distances for E-Accounting principles

PP_6	PP_5	PP_4	PP_3	PP_2	PP_1	SP_6	SP_5	SP_4	SP_3	SP_2	SP_1	
0.3808	0.2275	0.2385	0.2472	0.4172	0.3014	0.4605	0.2873	0.2559	0.2109	0.2385	0.2764	Min[i]
0.7249	0.4243	0.4205	0.4647	0.7440	0.5533	0.8405	0.5120	0.4662	0.3656	0.4119	0.4908	Max[i]

By using table (11), the E-Accounting principles can be arranged according to their fuzzy distances as shown in table (12) and table (13).

Table (12): Ascending arrangement of E-Accounting principles according to **Min[i]**

SP_6	PP_2	PP_6	PP_1	SP_5	SP_1	SP_4	PP_3	SP_2	PP_4	PP_5	SP_3	
0.4605	0.4172	0.3808	0.3014	0.2873	0.2764	0.2559	0.2472	0.2385	0.2385	0.2275	0.2109	Min[i]

Where: Min^i = smallest fuzzy distance between the variable being studied and the ideal point to it

Table (13): Ascending arrangement of E-Accounting principles according to **Max^i**

SP$_6$	PP$_2$	PP$_6$	PP$_1$	SP$_5$	SP$_1$	SP$_4$	PP$_3$	PP$_5$	PP$_4$	SP$_2$	SP$_3$	
0.8405	0.7440	0.7249	0.5533	0.5120	0.4908	0.4662	0.4647	0.4243	0.4205	0.4119	0.3656	**Max^i**

Where: Max^i = largest fuzzy distance between the variable being studied and the ideal point to it

Referring to table (3), the E-Accounting principles can be arranged according to their quality and materiality as shown as in table (14).

Table (14): The fuzzy arrangement of E-Accounting principles according to their quality and materiality

E-Accounting Principles	Code
Confidentiality	SP$_3$
Order (Availability)	PP$_5$(SP$_2$)
Assessability	PP$_4$
Availability (Order)	SP$_2$(PP$_5$)
Timeliness	PP$_3$
Authenticity	SP$_4$
Integrity	SP$_1$
Authorization	SP$_5$
Completeness	PP$_1$
Inalterability	PP$_6$
Accuracy	PP$_2$
Non-repudiation	SP$_6$

Results

1. The most important requirement to achieve the quality of E-Accounting is Confidentiality, and the less one is Non-repudiation

2. There is an overlap in quality level of order and availability requirements because of some of informatics impurities of using fuzzy logic tools.

3. Generally, the level of quality of accounting information security is more than the quality of principles for appropriate accounting information processing

4. The use of fuzzy logic tools for analyzing the questionnaire outcomes which has many linguistic variables helped to reduce the ambiguity in this research.

5. The rearrangement of E-Accounting principles according to their quality will pave the way for scholars, researchers, and accounting organizations to develop E-Accounting standards.

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