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ASSESSING THE UNIVERSITY ONLINE LEARNING ADAPTED WITH UTAUT2 MODEL: A FUZZY Z-AHP APPROACH

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ABSTRACT. The development of the online technologies has impacted the higher education to improve true knowledge. This paper aims to evaluate the eight constructs of the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Hedonic Motivation, Habit, Behavioral Intention, and the last Use Behavior, based on the use of an online learning application such as Google Classroom. The main reason that is chosen this application is that it's free and students can easily access it. The proposed method to classify the eight constructs of the UTAUT2 model from the most important to the last important is Fuzzy Z-AHP with triangular fuzzy numbers (TFN). This method achieves effective results based on Z-numbers and also on their reliability. The data were collected through a survey of 210 samples from students of the University of Durres during the pandemic Covid-19 The findings suggested that the most important construct was Social Influence (SI) and the last important was Facilitating Conditions (FC). This results help the higher education policies to be oriented better regarding the online learning.

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1. Introduction

The academic world underwent a radical change regarding the online learning as a result of the impact of the coronavirus pandemic. The greatest difficulty was to implement a digital platform in order that lecturers and students could interact during the online learning. This way of learning is one of the most used strategic applications of information technology, more related to the educational field of teaching and learning. Systems related to them play an essential role in promoting new teaching methods [1]. There are several platforms used in educational institutions which include Moodle, Blackboard, Google Classroom etc. Google Classroom was the digital platform which was supported by them in a short time. Both teachers and students had an easy way to navigate with Google layout, also a lot of means to access Google Classroom. Android, Smartphone and Personal computer are some of the ways to access online learning [2]. In order to better assess the impact that had Google Classroom and it's development toward teachers and students, has been considered the online learning theory of acceptance and use of a new technology 2 (UTAUT2), recognizeded for its eight constructs. Namely the construcs are : Performance Expectancy (PE), Effort Expectancy(EE), Social Influence (SI), Facilitating Conditions (FC), Hedonic Motivations (HM), Habit (HT), Behavioral Intention (BI), and Use Behavior (UB) Venkatesh et al [3] and [4]. Performance expectancy shows the degree to which using a technology will ensure benefits to students to better perform some activities. Social Influence is defined as the student's perceive degree related to the importance that others have in using a new technology. Habit is defined as the extent to which people tend to perform behaviors automatically because of learning [5] and [6]. Behavioral Intention shows the degree to which a person will perform or not perform some specified future behavior [4] and [7]. Use behavior is defined mostly from the effect of behavioral intention [8]. Some of the literaure that have studied the UTAUT2 theory are as follow: T.H Tseng studied the number of the massive open online courses (MOOCs) to investigate the drivers of teachers' acceptance and use of MOOCs from the perspective of the extended unified theory of acceptance and use of technology (UTAUT2) [9]. Mateus Martins studied the acceptance of e-books by identifying the effects of constructs PE, EE, SI, FC, Ht, Price Value, and HM, moderated by Age, Gender and Experience on the intention of use and actual use of this technology [10]. Kumar and Bervell [11] employed UTAUT2 theory to investigate the factors that influence behavioral intention (BI) to use an online platform from the students 'point of view. Tamilmani et al (2021) [12] treated the UTAUT2 theory and found that $BI \rightarrow UB$ as the strongest path with all significant values, $PE \rightarrow BI$ emerged as the most utilized path with most significant values underscoring the emphasis placed by consumers on utilitarian value. The paper of Droogenbroeck et al [13] validated the Unified Theory of Acceptance and Use of Technology (UTAUT2) in the context of e-grocery and enriched it with five constructs. Arain et al [14] in their study not only used UTAUT2 as a base theoretical framework but also extended it using five other constructs: ubiquity, information quality, system quality, appearance quality and satisfaction. Xhafaj et al (2021) [15] used UTAUT2 theory to explore the number of factors that affect the use of Google Classroom in Albanian universities, by using the methodological developments of partial least squares structural equation modelling technique (PLS- SEM). Kosova et al studied the traditional mathematics and new methods of teaching through programming [17] and [18]. Related to UTAUT2 theory in best of our knowledge, are a few studies regarding decision making problems to evaluate better the importance of each of these constructs, so which of them is thought to be the most effective for the online learning. The most used method in Multi Criteria Decision Making problems (MCDM) is Analytic Hierarchic Process (AHP) developed by Thomas Saaty [19] and [20]. To deal with uncertainty in complex problems AHP is combined with fuzzy logic Zadeh [21], named as the Fuzzy AHP (FAHP). Ali Hakan IÅ§Äśk used the Fuzzy AHP (FAHP) to determine the e-learning environment [22]. Yasemin A. Turker showed that the decision making and selection process is crucial, because the online platform systems functions are different from each other, and they all have various features. It was targeted to help and facilitate the decision-making process of the online platform systems for institutions [23]. Qendraj (2021) et al ranked the constructs of UTAUT2 theory for some public universities in Albania with FAHP method [16]. This study aims to rank the constructs of UTAUT2 theory from the most important to the last important of Performance Expectancy (PE), Effort Expectancy(EE), Social Influence (SI), Facilitating Conditions (FC), Hedonic Motivations (HM), Habit (HT), Behavioral

Intention (BI), and Use Behavior (UB) via Fuzzy Z-AHP method. This method extracts a unique result in terms of ranking using Z-fuzzy numbers. The reason that are chosen the triangular fuzzy numbers for Fuzzy Z-AHP is that they are usually adopted to deal with the vagueness of decisions related to the linguistic variables. The results orient better the higher education policies toward the online learning. Figure 1 shows the hierarchy of the study.

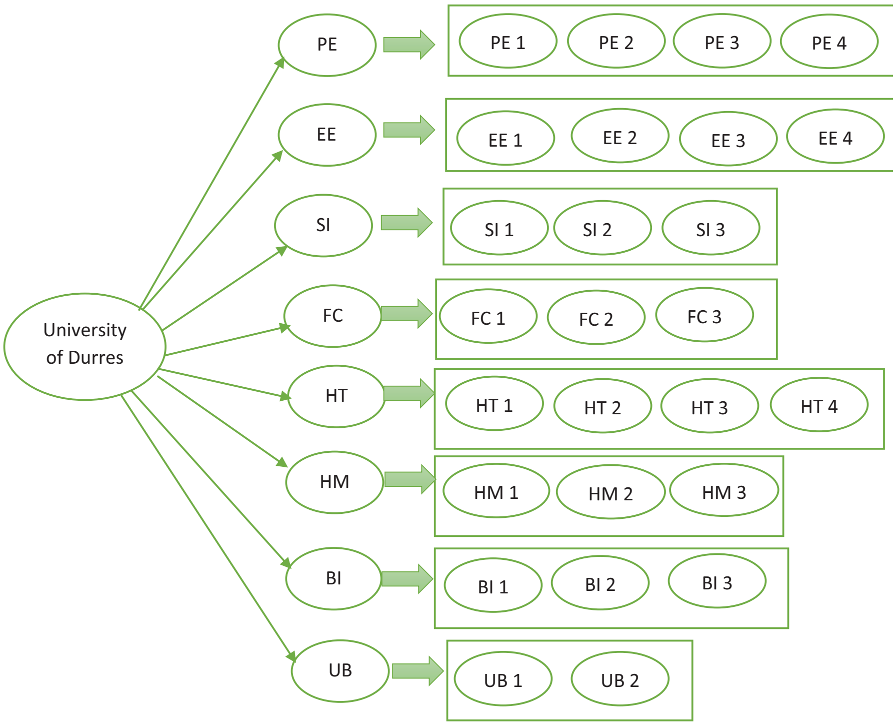

FIGURE 1. The hierarchy of the study.

2. CONSTRUCTS COMPOSITION

Performance Expectancy (PE)

(1) I find Google Classroom useful in this course (PE1)
(2) Using Google Classroom enables me to achieve course related tasks more quickly (downloading notes, assignment submission, etc.) (PE2).
(3) Using Google Classroom increases my learning productivity (PE3).
(4) If I use Google Classroom, I will increase my chances of passing the course (PE4).

Effort Expectancy (EE)

(1) It is easy for me to become skilful at using Google Classroom (EE1).
(2) I find Google Classroom easy to use (EE2).
(3) Learning how to use Google Classroom is easy for me (EE3).
(4) My interaction with Google Classroom is clear and understandable (EE4).

Social Influence (SI)

(1) People who are important to me think that I should take part in Google Classroom (SI1).
(2) People who influence my behaviour think that I should use Google Classroom (SI2).
(3) People whose opinions I value prefer that I use Google Classroom (SI3).

Facilitating conditions (FC)

(1) I have the resources necessary to take part in Google Classroom (FC1).
(2) I have the knowledge necessary to take part in Google Classroom (FC2).
(3) I can get help from others when I have difficulties while using Google Classroom (FC3).

Habit (HT)

(1) Using Google Classroom has become a habit for me (HT1).
(2) Using Google Classroom has become natural to me (HT2).
(3) Using Google Classroom is addictive (HT3).

Hedonic Motivation (HM)

(1) The use of Google Classroom is fun, compared to traditional classroom (HM1).
(2) The use of Google Classroom is enjoyable, compared to traditional classroom (HM2).
(3) The use of Google Classroom is entertaining, compared to traditional classroom (HM3).

Behavioural Intention (BI)

(1) I intend to continue using Google Classroom in the future (BI1).
(2) It is worth to recommend the Google Classroom for other students (BI2).

(3) I plan to continue to use Google Classroom frequently (BI3).

Use Behaviour (UB)

(1) I use Google Classroom for writing quizzes and submitting assignments behaviour (UB1).
(2) I use Google Classroom to interact with online materials, peers and instructor (UB2).

3. Data collection

The data of this study were collected from 210 students of mathematics courses from bachelor and master degree, age from $18-23$ years old, during the may-june of 2020. The online survey was based in the model UTAUT2. The latter is realized by the implementation of Google Form that has been sent to the students. They had the options to answer on a $1-5$ likert scale: $1-$ Strongly disagree, $2-$Disagree, $3-$ Nor agree or disagree, $4-$Agree, $5-$ Strongly Agree. Students were chosen after studying their subject and done the exam. So they had used the Google Classroom platform for the online learning, and were able to answer immediately.

4. Fuzzy Z-AHP method

The fuzzy numbers represent in the real line the fuzzy sets [24]. Fuzzy set introduced by Zadeh extended the AHP into Fuzzy AHP (FAHP). Fuzzy Z-numbers include fuzzy reliability related to the fuzzy restriction that enables to analyze the uncertainty that happened from the reliability of the decision maker [25]. The Z-number is associated with an uncertain variable Z and denoted as Z=(A,B). A is a fuzzy subset of the domain X of the uncertain variable Z, and B is a fuzzy subset that shows the probability or the reliability of X. Assume that $X = \{u_1, u_2, , u_n\}$, and A a fuzzy set in X, $\mu_A : X \to [0, 1]$ the membership function of the triangular fuzzy number $u_i = (a_1, a_2, a_3)$ is shown by equation (4.1), while the membership function for set B is shown by equation (4.2). A simple Z fuzzy number represents the two sets A and B with their membership functions, so a simple Z fuzzy number is shown in the figure 2.

$$\mu_A(u_i) = \begin{cases} \frac{u_i - a_1}{a_2 - a_1}, & a_1 \leq u_i \leq a_2; \\ \frac{a_3 - u_i}{a_3 - a_2}, & a_2 \leq u_i \leq a_3; \\ 0, & a_3 \leq u_i \leq +\infty. \end{cases} \tag{4.1}$$

$$\mu_B(u_i) = \begin{cases} \frac{u_i - b_1}{b_2 - b_1}, & b_1 \leq u_i \leq b_2; \\ \frac{b_3 - u_i}{b_3 - b_2}, & b_2 \leq u_i \leq b_3; \\ 0, & b_3 \leq u_i \leq +\infty. \end{cases} \tag{4.2}$$

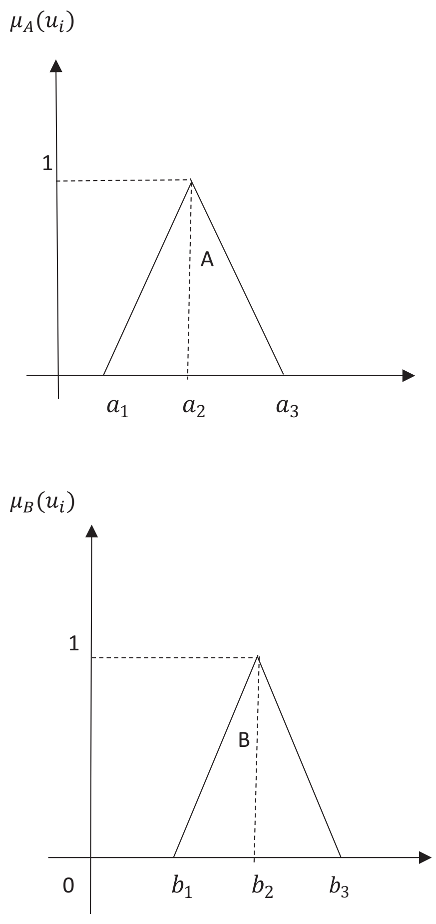

FIGURE 2. A simple Z-fuzzy number

The restriction $B(X) : X$ is A maps a probability restriction into the membership function $\mu_B(u_i)$. $B(X) : X$ is $A \rightarrow Poss(X = u) = \mu_A(u_i)$

TABLE 1. B-reliability scale with Z-fuzzy numbers

Linguistic reliability	Triangular Z-fuzzy reliability scale
Equally reliable	(1,1,1)
Moderately reliable	(0.2, 0.3, 0.4)
Strongly reliable	(0.4, 0.5, 0.6)
Very strongly reliable	(0.6, 0.7, 0.8)
Extremely strong reliable	(0.8, 0.9, 1)
Intermediate reliability values	(0.1, 0.2, 0.3)
Intermediate reliability values	(0.3, 0.4, 0.5)
Intermediate reliability values	(0.5, 0.6, 0.7)
Intermediate reliability values	(0.7, 0.8, 0.9)

In the table 1 are shown the values for the B-reliability scale with Z-fuzzy numbers. The linguistic variables are used to describe the decision makers judgments by expressing them as triangular fuzzy numbers (TFN). In table 2 are shown the triangular fuzzy numbers as a restriction for the Z-fuzzy number.

TABLE 2. Z-restriction with TFN numbers

Saaty scale	Saaty importance	Triangular fuzzy numbers
1	Equal important	(1,1,1)
3	Moderate important	(2,3,4)
5	Strong important	(4,5,6)
7	Very strong important	(6,7,8)
9	Extremely strong important	(9,9,9)
2	Intermediate values	(1,2,3)
4	Intermediate values	(3,4,5)
6	Intermediate values	(5,6,7)
8	Intermediate values	(7,8,9)

Fuzzy Z-AHP is an extension to the fuzzy numbers of the Z-AHP method. AHP method was developed by Thomas Saaty [19] and is used only with crisp numbers. According to Zadeh (2011) AHP is extended as Fuzzy Z-AHP.The analytic hierarchy process is a method that decompose the problem in a hierarchy. The decision matrix is the first that is calculated to start AHP for the complex problem, doing pairwise comparisons $(n(n-1))/2$. When applying AHP the decision maker needs to answer a question: which of the constructs impacts more the use Google Classroom? Firslty is done the construction of the decision matrix based on the

Saaty scale for the importance with the crisp numbers $1, \ldots, 9$ [26]. Firstly the matrix with crisp numbers must be consistent and the IC determined from AHP method must be less than 0.1 [27]. Then this matrix is converted into Z-numbers. The steps for Fuzzy Z-AHP are below:

- The decision matrix is formed with Z-numbers
- Z-numbers are converted into fuzzy numbers
- Calculate the fuzzy weights
- The defuzzification method
- Normalized weights
- The ranked constructs

If the Z-number is denoted $Z = (A, B) = (u_1, u_2), u_1 \in A, u_2 \in B$, Z-number is converted into a regular fuzzy number:

The reliability (u_2) is converted into a crisp number with the equation

$$\alpha = \frac{\int u_i \mu_B(u_1) du}{\int \mu_B(u_1) du}. \tag{4.3}$$

The first component (u_1) is calculated by adding the weight of the reliability to the part of the restriction:

$$Z^{\alpha} = \{u_i, \mu_{A^{\alpha}}(u_i) \mid \mu_{A^{\alpha}}(u_i) = \alpha \mu_A(u_i), u_i \in [0, 1]\}. \tag{4.4}$$

The weighted restriction is converted into a regular fuzzy number:

$$Z^{'} = \{u_i, \mu_{Z'}(u_i) \mid \mu_{Z'}(u_i) = \mu_A(\frac{u_i}{\sqrt{\alpha}}), \mu(u_i) \in [0, 1]\}. \tag{4.5}$$

After converting the Z-number into a regular fuzzy number $Z^{'}$ is formed the decision matrix with fuzzy numbers.

$$\tilde{A} = \begin{pmatrix} 1 & \cdots & \tilde{\alpha_{1n}} \\ \vdots & \ddots & \vdots \\ \tilde{\alpha_{n1}} & \cdots & 1 \end{pmatrix} \textit{where } \alpha_{ij} = \frac{1}{\alpha_{ji}}. \tag{4.6}$$

For each of the constructs is calculated the fuzzy geometric mean value $\tilde{r_i}$

$$\tilde{r_i} = (\prod_{i=1}^{n} \tilde{\alpha_{1n}})^{1/n}. \tag{4.7}$$

The fuzzy weights are calculated:

$$\tilde{\omega_i} = \tilde{r_i} \otimes (\tilde{r_1} \otimes \tilde{r_2} \otimes \cdots \otimes \tilde{r_n})^{-1}. \tag{4.8}$$

The defuzzification of the weights $\tilde{\omega_i} = (\omega_i^{(1)}, \omega_i^{(2)}, \omega_i^{(3)})$ is denoted with a_{ij} using the method of Center of Area (COA) [16].

$$a_{ij} = \frac{\omega_i^{(1)} + \omega_i^{(2)} + \omega_i^{(3)}}{3} \tag{4.9}$$

The last step is to normalize the weights:

$$N_i = \frac{a_{ij}}{\Sigma a_{ij}}. \tag{4.10}$$

The decision matrix is constructed with Z-numbers (restriction and reliability) and shows all the numerical values of the linguistic restriction variables from fuzzy set A and linguistic reliability variables from fuzzy set B which are unique to the problem.

Our results are robust because this matrix has only one $\alpha = \frac{\int u_i \mu_B(u_1)du}{\int \mu_B(u_1)du}$ determined. The calculation of this integral are as follow:

$$I_1 = \int u_i \mu_B(u_1)du = \int_{a_2}^{b_2} u\cdot(\frac{u-b_1}{b_2-b_1})du + \int_{b_2}^{c_2} u\cdot(\frac{b_3-u}{b_3-b_2})du = \frac{(b_3-b_1)[b_1+b_2+b_3]}{6},$$

$$I_2 = \int \mu_B(u_1)du = \int_{a_2}^{b_2} (\frac{u-b_1}{b_2-b_1})du + \int_{b_2}^{c_2} (\frac{b_3-u}{b_3-b_2})du = \frac{(b_3-b_1)}{2},$$

$$\alpha = \frac{I_1}{I_2} = \frac{b_1+b_2+b_3}{3}.$$

The value of α is fixed and fully defined for this decision matrix with Z-numbers. Starting from this value all the respective calculation()()s are unique in their results. So the ranked results are unique.

Results

The decision matrix constructed for the model UTAUT2 with its 8 constructs resulted to be consistent with IC=0.0933 less than 0.1 based on the AHP theory. The decision matrix formed in this way is consistent. Table 3 shows this matrix.

TABLE 3. The decision matrix for the constructs with crisp numbers.

	PE	EE	SI	FC	HT	HM	BI	UB
PE	1	3	2	8	6	5	4	3
EE	1/3	1	1/5	5	2	4	6	2
SI	1/2	5	1	8	6	9	5	3
FC	1/8	1/5	1/8	1	2	1/5	1/6	1/8
HT	1/6	1/2	1/6	1/2	1	1/2	1/2	1/4
HM	1/5	1/4	1/9	5	2	1	1/5	1/2
BI	1/4	1/6	1/5	6	2	5	1	1/2
UB	1/3	1/2	1/3	8	4	2	2	1

All the crisps numbers of the decision matrix have to be converted as a Z number with the two parts restriction and reliability. (See table 4)

TABLE 4. Z number (restriction and reliability)

	PE	EE	SI	FC	HT	HM	BI	UB
PE	(1,1,1) (1,1,1)	(2,3,4) (0.2,0.3, 0.4)	(1,2,3) (0.1,0.2,0.3)	(7,8,9) (0.7,0.8,0.9)	(5,6,7) (0.5,0.6,0.7)	(4,5,6) (0.4,0.5,0.6)	(3,4,5) (0.3,0.4,0.5)	(2,3,4) (0.2,0.3,0.4)
EE	(0.25,0.33,0.5) (0.7,0.8,0.9)	(1,1,1) (1,1,1)	(0.16,0.2,0.25) (0.3, 0.4,0.5)	(4,5,6) (0.4,0.5,0.6)	(1,2,3) (0.1,0.2,0.3)	(3,4,5) (0.3,0.4,0.5)	(5,6,7) (0.5,0.6,0.7)	(1,2,3) (0.1,0.2,0.3)
SI	(0.33,0.5,1) (0.5 0.6, 0.7)	(4,5,6) (0.4,0.5,0.6)	(1,1,1) (1,1,1)	(7,8,9) (0.7,0.8,0.9)	(5,6,7) (0.5,0.6,0.7)	(9,9,9) (0.1, 0.2,0.3)	(4,5,6) (0.4,0.5,0.6)	(2,3,4) (0.2,0.3,0.4)
FC	(0.1,0.12,0.14) (0.1,0.2,0.3)	(0.1,0.2,0.25) (0.3, 0.4,0.5)	(0.1,0.12,0.14) (0.1,0.2,0.3)	(1,1,1) (1,1,1)	(1,2,3) (0.1,0.2,0.3)	(0.16,0.2,0.25) (0.3, 0.4,0.5)	(0.14,0.16,0.2) (0.3,0.4,0.5)	(0.1,0.12,0.14) (0.1,0.2,0.3)
HT	(0.14,0.16,0.2) (0.3,0.4,0.5)	(0.33,0.5,1) (0.5,0.6,0.7)	(0.14,0.16,0.2) (0.3,0.4,0.5)	(0.33,0.5,1) (0.5,0.6,0.7)	(1,1,1) (1,1,1)	(0.33,0.5,1) (0.4,0.5,0.6)	(0.33,0.5,1) (0.4,0.5,0.6)	(0.2,0.25,0.33) (0.6 0.7, 0.8)
HM	(0.16,0.2,0.25) (0.3, 0.4,0.5)	(0.2,0.25,0.33) (0.6 0.7, 0.8)	(0.1,0.1,0.1) (0.1,0.2,0.3)	(4,5,6) (0.4,0.5,0.6)	(1,2,3) (0.1,0.2,0.3)	(1,1,1) (1,1,1)	(0.16,0.2,0.25) (0.3, 0.4,0.5)	(0.33,0.5,1) (0.4,0.5,0.6)
BI	(0.2,0.25,0.33) (0.6,0.7,0.8)	(0.14,0.16,0.2) (0.3,0.4,0.5)	(0.16,0.2,0.25) (0.3, 0.4,0.5)	(5,6,7) (0.5,0.6,0.7)	(1,2,3) (0.1,0.2,0.3)	(4,5,6) (0.4,0.5,0.6)	(1,1,1) (1,1,1)	(0.33,0.5,1) (0.4,0.5,0.6)
UB	(0.25,0.33,0.5) (0.7,0.8,0.9)	(0.33,0.5,1) (0.5,0.6,0.7)	(0.25,0.33,0.5) (0.7,0.8,0.9)	(7,8,9) (0.7,0.8,0.9)	(3,4,5) (0.3,0.4, 0.5)	(1,2,3) (0.1,0.2,0.3)	(1,2,3) (0.1,0.2,0.3)	(1,1,1) (1,1,1)

Solving the integral about α we fond that $\alpha = \frac{(b_1+b_2+b_3)}{3}$. Table 5 shows the Z number with α value.

TABLE 5. Z number and α value

	PE	EE	SI	FC	HT	HM	BI	UB
PE	(1,1,1) (1)	(2,3,4) (0.3)	(1,2,3) (0.2)	(7,8,9) (0.8)	(5,6,7) (0.6)	(4,5,6) (0.5)	(3,4,5) (0.4)	(2,3,4) (0.3)
EE	(0.25,0.33,0.5) (0.8)	(1,1,1) (1)	(0.16,0.2,0.25) (0.4)	(4,5,6) (0.5)	(1,2,3) (0.2)	(3,4,5) (0.4)	(5,6,7) (0.6)	(1,2,3) (0.2)
SI	(0.33,0.5,1) (0.6)	(4,5,6) (0.5)	(1,1,1) (1)	(7,8,9) (0.8)	(5,6,7) (0.6)	(9,9,9) (0.2)	(4,5,6) (0.5)	(2,3,4) (0.3)
FC	(0.1,0.12,0.14) (0.2)	(0.16,0.2,0.25) (0.4)	(0.1,0.12,0.14) (0.2)	(1,1,1) (1)	(1,2,3) (0.2)	(0.16,0.2,0.25) (0.4)	(0.14,0.16,0.2) (0.4)	(0.1,0.12,0.14) (0.2)
HT	(0.14,0.16,0.2) (0.4)	(0.33,0.5,1) (0.6)	(0.14,0.16,0.2) (0.4)	(0.33,0.5,1) (0.6)	(1,1,1) (1,1,1)	(0.33,0.5,1) (0.5)	(0.33,0.5,1) (0.5)	(0.2,0.25,0.33) (0.7)
HM	(0.16,0.2,0.25) (0.4)	(0.2,0.25,0.33) (0.7)	(0.1,0.1,0.1) (0.2)	(4,5,6) (0.5)	(1,2,3) (0.2)	(1,1,1) (1)	(0.16,0.2,0.25) (0.4)	(0.33,0.5,1) (0.5)
BI	(0.2,0.25,0.33) (0.7)	(0.14,0.16,0.2) (0.4)	(0.16,0.2,0.25) (0.4)	(5,6,7) (0.6)	(1,2,3) (0.2)	(4,5,6) (0.5)	(1,1,1) (1)	(0.33,0.5,1) (0.5)
UB	(0.25,0.33,0.5) (0.8)	(0.33,0.5,1) (0.6)	(0.25,0.33,0.5) (0.8)	(7,8,9) (0.8)	(3,4,5) (0.4)	(1,2,3) (0.2)	(1,2,3) (0.2)	(1,1,1) (1)

Applying equations (4.4) (4.5) is obtained the table 6.

TABLE 6. Regular Z-fuzzy number (Z')

	PE	EE	SI	FC	HT	HM	BI	UB
PE	(1,1,1)	(1.1,1.65,2.2)	(0.45,0.9,1.35)	(6.2,7.1,8)	(3.8,4.6,5.4)	(2.8,3.5,4.2)	(1.9,2.5,3.2)	(1.1,1.65,2.2)
EE	(0.22,0.29,0.4)	(1,1,1)	(0.1,0.12,0.15)	(2.8,3.5,4.2)	(0.45,0.9,1.35)	(1.9,2.5,3.2)	(3.8,4.6,5.4)	(0.45,0.9,1.35)
SI	(0.25,0.4,0.7)	(2.8,3.5,4.2)	(1,1,1)	(6.2,7.1,8)	(3.8,4.6,5.4)	(4.1,4.1,4.1)	(2.8,3.5,4.2)	(1.1,1.65,2.2)
FC	(0.05,0.05,0.06)	(0.1,0.12,0.15)	(0.05,0.05,0.06)	(1,1,1)	(0.45,0.9,1.35)	(0.1,0.12,0.15)	(0.09,0.1,0.12)	(0.05,0.05,0.06)
HT	(0.09,0.1,0.12)	(0.25,0.4,0.7)	(0.09,0.1,0.12)	(0.25,0.4,0.7)	(1,1,1)	(0.25,0.4,0.7)	(0.25,0.4,0.7)	(0.16,0.17,0.27)
HM	(0.1,0.12,0.15)	(0.16,0.17,0.27)	(0.05,0.05,0.05)	(2.8,3.5,4.2)	(0.45,0.9,1.35)	(1,1,1)	(0.1,0.12,0.15)	(0.25,0.4,0.7)
BI	(0.16,0.17,0.27)	(0.09,0.1,0.12)	(0.1,0.12,0.15)	(3.8,4.6,5.4)	(0.45,0.9,1.35)	(2.8,3.5,4.2)	(1,1,1)	(0.25,0.4,0.7)
UB	(0.22,0.29,0.4)	(0.25,0.4,0.7)	(0.22,0.29,0.4)	(6.2,7.1,8)	(1.9,2.5,3.2)	(0.45,0.9,1.35)	(0.45,0.9,1.35)	(1,1,1)

Equations (4.7)- (4.10) have been applied to rank the constructs. Table 7 shows the results.

As is shown from the results, the Social Influence (SI) is the most important criteria referring all the others. SI indicates that the use of the online learning via Google Classroom provided benefits for them in performing certain activities. The

TABLE 7. The ranked constructs

	$\tilde{r}_i$	$\tilde{\omega}_i$	a_{ij}	N_i	Rank
PE	(1.69, 2.17, 2.8)	(0.16, 0.28, 0.45)	0.29	0.28	2
EE	(0.74, 1.02, 1.29)	(0.07, 0.13, 0.2)	0.133	0.13	3
SI	(1.94, 2.39, 2.78)	(0.19, 0.31, 0.44)	0.313	0.3	1
FC	(0.12, 0.14, 0.17)	(0.01, 0.02, 0.027)	0.019	0.018	8
HT	(0.22, 0.28, 0.42)	(0.02, 0.036, 0.06)	0.038	0.037	7
HM	(0.26, 0.33, 0.43)	(0.02, 0.04, 0.07)	0.043	0.042	6
BI	(0.45, 0.57, 0.75)	(0.04, 0.07, 0.12)	0.076	0.074	5
UB	(0.64, 0.91, 1.02)	(0.06, 0.12, 0.16)	0.113	0.11	4

second ranked is (PE), related to Google Classroom they have found it useful for the course of math. The last important resulted to be the Facilitating Conditions (FC) because as the first time using Google Classroom they had difficulties in knowledge and resources.

5. CONCLUSIONS

This paper assesed the online learning via Google Classroom platform, for students of bachelor and master degree in math courses. Have been included all the constructs of the UTAUT2 theory that are: Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Habit, Hedonic Motivation, Behavioral Intention and Use Behavior. The online survey was developed for these students during the pandemic situation may-june 2020. Fuzzy Z-AHP method is more capable of capturing a human judgment for complex decision problems than the other multi criteria decision making problems. The findings orient that the most important construct was Social Influence (SI) and the last important was Facilitating Conditions (FC). There were some different math courses and also the results depand on the type of the subject they studied for. Another factor that influenced the results was also the pandemic situation of Covid-19, being for the first time online and learning for the first time a new platform. The study helps students and lecturers to interact together for the online learning. There are also some limitations according the sample of data, maybe in further studies to develop the survey even for some lecturers in order to evaluate their difficulties and their adoption for a new online learning platform.

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