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CONTRIBUTING FACTORS FOR STUDENT PERCEPTION TO USE E-LEARNING SYSTEMS

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ABSTRACT

E-learning is considered an effective approach within higher education institutions. However, e-learning is faced with several problems such as e-learning engagement challenges, and limited types of developed models used that affect students' continuity use of e-learning. This research argues how the learning takes place; the conceptual acceptance model construction factors needed for contributing factors. The deployment of factors includes the support assessment, behaviour intention, and student perceptions that e-learning systems validate learners' learning outcomes such as effectiveness, academic performance, student satisfaction, and continuity to use. This study aims to find the contributing factors that affect the continuity to use e-learning systems. The model was developed of 11 construction relationships tested by the PLS-SEM program. A survey was constructed and distributed among 95 participants from Al-Buraimi University College, Oman (BUC). The research mentioned all hypotheses with significant remarks that supported the proposed model impact. This research combined two e-learning systems TAM and ECT models for e-learning system continuity.

Keywords: *Contributing factors, ECT, TAM, PLS-SEM, E-learning.*

1. BACKGROUND

An e-learning system is a type of learning utilizing electronic technology to assist, and support learning in the educational sector [1][2]. The exponential growth of students who used developed communication technologies and various tools, versions, and capacity has opened doors to some e-learning system changes. This growth of e-learning systems emphasis the growth of the factors used to enhance e-learning. Many studies focused on assessing e-learning systems from one acceptance model rather than enhancing the combination of many theories of acceptance e-learning models for the continuous intention of use [3]. According to the new century of learning by distance learning as one of the popular developed services to connect the world countries easily, there's a need to get continuity of using these systems.

Moreover, there was a need to focus on three areas of successful e-learning, factor, people and context. The factor area identifies the type of material and what ease of relationships you want to deliver to your students [4][5]. In this research, the undergraduate students are the key. The third area was the context. It is essential to link the content and students to deliver the knowledge connected to everyone, or for some groups or individual context.

The theories' goal is to understand the relationship amongst factors used in the models. Various studies described the significant relationship between adoption and technology acceptance elements, which lead to e-learning continuity [6]. Expectation-Confirmation theory ECT model used for the constant purpose to use a system. In contrast, Technology Acceptance Model TAM indicate the contributing elements to be a continued e-learning system [7].

The students' continuity of use could only measure the existing acceptance model's factors. For example, the TAM model includes perceived usefulness, ease of use, attitude and behaviour intention to get system acceptance [5][8]. Also, the ECT model used perceived usefulness, confirmation, and satisfaction for continuity of use. Therefore, these models are not sufficient individually for determining the contributing factors used in e-learning systems [7][9].

This research problem is derived from several previous research pieces have studied the e-learning system plan's various technologies [10][11]. However, studies that include the continuity factors have remained lacking. These factors are used on constant using e-learning within the organizational level of HEIs and still extensive lack of individual students [6][12]. Therefore, a proposed model to construct the relationships among these factors where findings are determined contributing factors to the continuous use of e-learning.

This research consists of multi-sections, starting with a background on e-learning systems moving through e-learning acceptance as TAM, and ECT models. Second, the factors used in this research are based on the models selected for the study and their impacts on each other. Third, extract the causal relationships among these factors based on the proposed model factors and the hypotheses defined in this research. Forth, how the data analysed and the survey validity with all constructed items used in the model. Finally, the conclusion and the research limitations.

2. E-LEARNING SYSTEMS

E-learning systems are the educational enablers of the 21st-century and have a massive impact on educational ecologies [13][14]. Researchers use different terms to identify the e-learning system as Web 2.0 [15], application software, or internet use. Web 2.0 is the most frequently used e-learning system. These e-learning systems create a new method of interaction, enhancing the relationship; can share content and developing communication between students. These features are essential to the continuity of the use environment. These features also can identify clearly with the same critical factors determined by theoretical e-learning models of TAM, and ECT [16].

2.1 E-learning System Acceptance

The e-learning system is a type of self-assessment used to carry out benchmarking or rating a particular domain. The standard e-learning assessment checks if the HEI has attained a required acceptance level in the universities' context. For an e-learning system, many factors used to assess system acceptance [17]. One aspect is the course content based on teachers' material contents, qualifications, and experience [18][19][20]. Another important factor includes the supporting Assessment, which is e-learning platforms and applications used by the teachers to deliver the material easily accessed and followed by the students. This acceptance step aims to develop the continuity of use, which used the same e-learning acceptance factors [21].

Therefore, for universities to improve their e-learning systems needs to assess the learning and teaching processes and find the criteria that affect their e-learning systems' success and increase student satisfaction. No matter how many factors used to construct a genuinely helpful e-learning system, there are still factors that suffer from inconsistent e-learning use [9][22].

According to [23][10] researchers tried to determine the main factors that have significant impact on e-learning continuity. But still, they lack with the research model and a validated results when it's used with high range of students [42]. [41] Pointed to the importance of enhancing e-learning in addition to future recommendation to enhance the continuity of e-learning use.

2.2 Technology Acceptance Model (TAM)

This model presented by [5][1] considered as one of the initial models used to investigate the acceptance of using technologies and e-learning in advance.

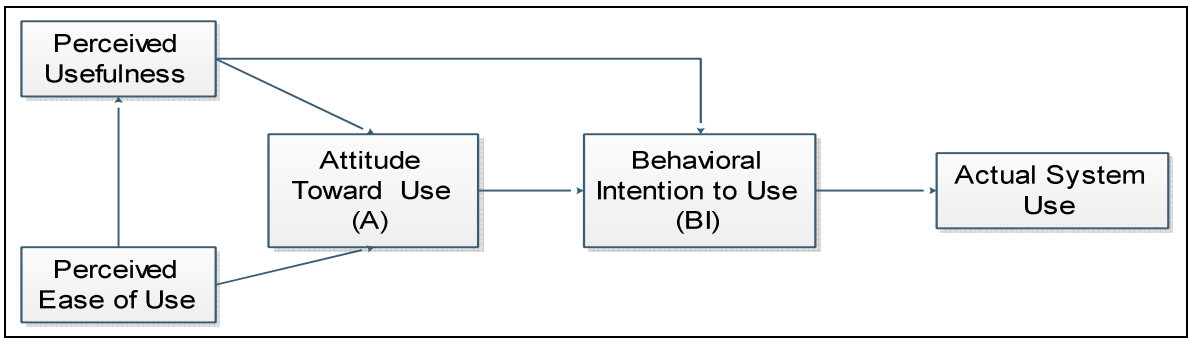

Figure 1: Technology Acceptance Model (TAM)

Figure 1 shows that the original TAM consists of four notable factors, PU, PEOU, Attitude towards behaviour and behavioural intention, all pointing towards system use [5][1]. Furthermore, TAM justifies the relationship of technology intention to use for a behavioural purpose. These factors are highly accepted to validate its use [28]. PEOU refers to "the degree to which a person believes that using a particular system would be a free effort" [5][40]. PEOU refers to what users expect on the easiest to determine e-learning acceptance.

Referring to [5][1], Perceived Usefulness (PU) can define as the "extent where a user perceives that a technology assists in improving capability and effectiveness to complete a task". The attitude factor is not easy factors to define, it depends on learner attitude to use technology [2][23][24].

[25] tries to determine essential elements for the student's e-learning continuity. Besides, their trust in the e-learning system's services that consider the technology integration, support assessment, and student satisfaction as the significant factors. For this reason, [25] and [26] decides to use the original TAM with its essential factors to shed light on the system services that influence directly e-learning continuity.

2.3 Expectation-Confirmation Theory (ECT)

ECT has introduced for the marketing domain since 1980. This model was developed originally by [23][41] as seen in Figure 2. The ECT model by [23] consists of five constructs, namely 1) perceived usefulness, 2) expectation, 3) confirmation, 4) satisfaction and 5) repurchase intention.

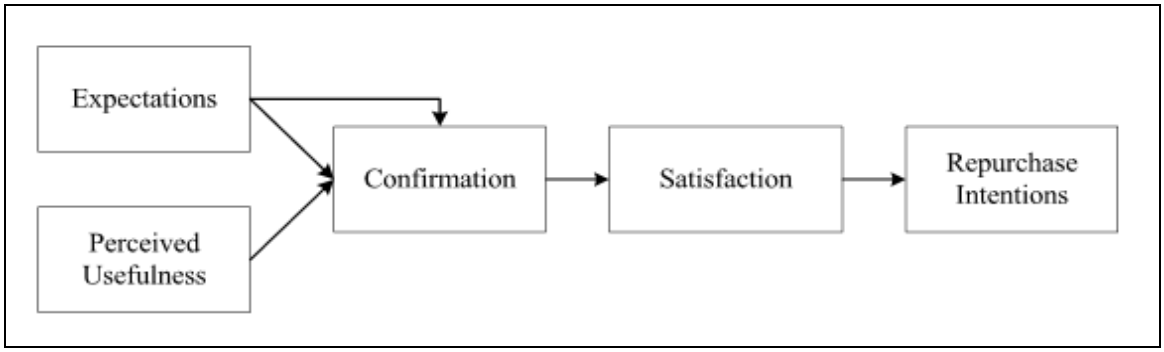

Figure 2: Expectation-Confirmation Theory (ECT)

These five constructs are related to the buyer's behaviour regarding any products or services' purchasing process. When a buyer buys a product, it may be due to perceived usefulness if the purchase meets the users' expectations. Recently ECT theory came to use in the information system and e-learning. It used to justify the continuity and the satisfaction of students using the e-learning system and technology information by [4][26][27].

3. FACTORS USED IN THIS STUDY

Table 1 shows the frequent factors indicated by (On) indicates that the element is existing in the reference and (N) indicates that the elements not found to have such effects. This

research analyses 22 articles related to the research title as follows. The factors used in this research are Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Course Contents (CC), Behavioral Intention (BI), Academic Performance (AP), Support Assessment (SA), Student Satisfaction (SS), Effectiveness (EFF), Continuity of Use (CU).

Table 1: Summary of Most Frequently Referred Factors

References	PU	PEOU	CC	BI	AP	SA	SS	EFF	CU
[7]	On	On		On		N	On	On	
[23]	On	On	N				On		
[9]			On				On	On	
[36]	On	On	On					On	On
[1]	On		On	N		On	On	On	
[13]	On	On							On
[19]	On	On			N				N
[16]	On	On		On					On
[17]			On	On					
[15]			On		N	On			On
[2]	On	On						On	On
[30]	On	On		On	On	On			
[3]			On		On	On			On
[18]	N	N			On	On			On
[11]			On	On				On	On
[10]	On	On		On					On
[35]	On	On			On			N	On
[28]	On	On	On				On	On	On
[40]	On	On	On					On	On
[41]					On	On		On	
[42]	On	On					On		On
[8]	On	On		On			On		On

4. EXTRACTING CAUSAL RELATIONSHIP BETWEEN FACTORS

Based on the preceding discussion, it is required to examine the impact of e-learning to continuity of use. It needed to investigate if the e-learning system takes place in the educational process. Table 2 determined these relationships.

Table 2: Causal Relationships from Literature

Elements	Causal Link	Model	References
Perceived usefulness	PU→ BI	TAM	[5][1] [16] [27][41]
	PU→SS	ECT	[16][19] [27] [1]
Perceived ease of use	PEOU→PU	TAM	[5] [4][28] [13]
	PEOU→BI	TAM	[5][7]
	PEOU→SS	ECT	[14]
Course Content	CC→EFF	Adopted model	[9][40][42]
	CC→ SA	Adopted model	[3][1]
Behavioural Intention	BI→ AP	E-learning	[29] [30][41]
Support Assessment	SA→ CU	Adopted model	[15][31][16]
Effectiveness	EFF→ CU	E-learning	[2][32]
Academic Performance	AP→CU	Adopted model	[18] [33]
Student Satisfaction	SS→ CU	ECT	[16][19][13][40]

The main problem relates to how universities can optimize the constant choice to fit with the teaching techniques and student performance to add value to universities' e-learning systems [34]. Therefore, there is a need to generate a comprehensive application system to enhance all

the suggested technologies with more tool collaborations to indirectly relationship.

5. DEVELOPMENT OF RESEARCH CONCEPTUAL MODEL

This section explains how this study has developed its conceptual research model named the Acceptance Model. The literature review had identified the gaps in relationship factors from various models of acceptance technology in continuous intention to use e-learning from multiple researchers [21][22][39]. New complementary elements generated for the model enhance academic performance based on the constant choice to continuity of use.

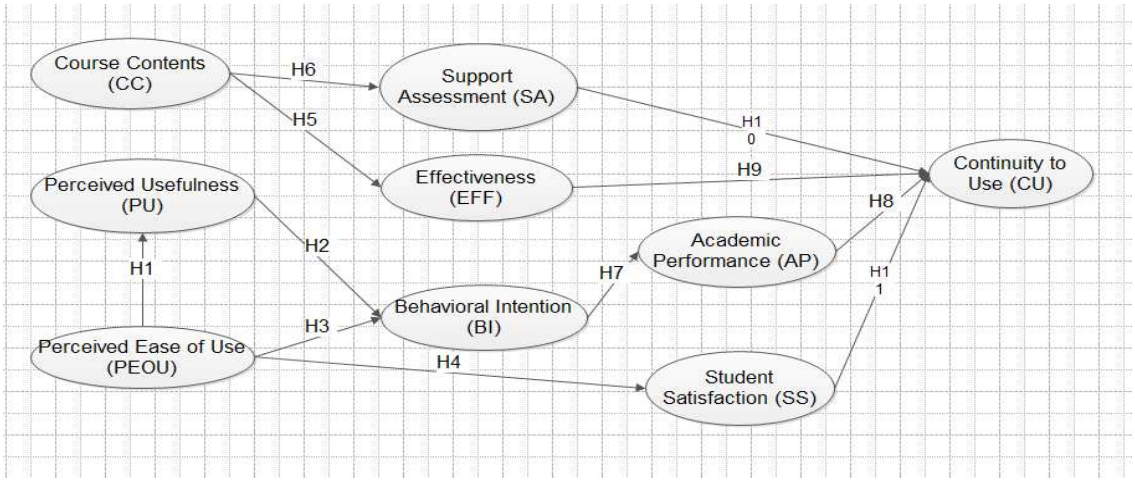

Figure 3: Research Conceptual of Acceptance Model [27]

The acceptance model can measure the impact of e-learning continuity based on the nine dependent and independent factors, as shown in Figure 3 that the questionnaire survey would test.

5.1 Research Hypotheses

This research's hypotheses developed according to the factors identified from the literature, explained in the previous subsection. TAM and ECT models were adopted as an appropriate theoretical model to investigate students' continuity of use [35]. Findings from prior studies suggested that performance expectancy positively correlates with behavioural intention.

Therefore, these three factors, namely PU, PEOU, and BI, are the main factors to evaluate acceptance. Still, these elements are not enough to prove the significance of continuity of use unless they are connected to extra elements from another tested technology model to identify the positive effects elements on the improvement of continuous intention [26][36].

H1: A significant influence from PEOU to PU.

H2: A directed significant influence from PU to BI.

H3: A directed significant influence from PEOU to BI.

H4: A directed significant influence from PEOU to SS.

H5: A directed significant influence from CC to EFF.

H6: A directed significant influence from CC to SA.

H7: A directed significant influence from BI to AP.

H8: A directed significant influence from AP to CU.

H9: A directed significant influence from EFF to CU.

H10: A directed significant influence from SA to CU.

H11: A directed significant influence from SS to CU.

5.2 Pilot Study

The pilot test was conducted at BUC for undergraduate students. They were 38 undergraduate students from Information Technology Department. The hard copy of the

questionnaire was distributed during the class time [27][37]. The aim was to check if students could answer the questionnaire without any difficulty. The participants selected for the pilot study received a preliminary declaration stating that their participation was voluntary to complete the questionnaire survey. The sample data collected analysed using Statistical Package for the Social Sciences SPSS program, where the Cronbach's Alpha value was 0.83, it shows a high reliability and give a green light to conduct the real collection for the research aim and proposed model.

6. DATA ANALYSIS

The survey questionnaires were distributed to students from four HEIs. From that, 103 respondents' questionnaire feedback received, but only 95 responses deemed valid to proceed with this study. The data derived from the survey distributed for undergraduate students at BUC. The results tested by SPSS program in addition to Partial Least Squares PLS-SEM program. Both programs identified the Mahalanobis value at $p<0.001$ [32].

6.1 Content Reliability Test

Data from the pilot test was then tested for reliability. Table 3 determines the pilot study results based on Cronbach's Alpha test. The survey consists of 23 items divided into 9 factors. All the items were constructed from the research paper [32][39][42]. The survey items designed in this study are shown in Table 4.

Table 3: Pilot Study

Acronym	Latent Factors	Items	Cronbach's Alpha
PU	Perceived Usefulness	3	0.925
PEOU	Perceived Ease of Use	2	0.792
CC	Course Content	3	0.891
SA	Support Assessment	2	0.759
AP	Academic Performance	3	0.845
BI	Behavioural Intention	3	0.889
SS	Student Satisfaction	2	0.831
EFF	Effectiveness	2	0.725
CU	Continuity of Use	3	0.874
Total Items		23	

Table 4: Factors measures constructs [1][3][10]

Factors	Code	Measures
Perceived Usefulness	PU1	E-learning systems enhance student usefulness
	PU2	E-learning systems improve student performance
	PU3	E-learning systems smoothly translate material to student knowledge.
Perceived Ease of Use	PEOU1	E-learning systems are easy to use
	PEOU2	E-learning systems help student to upload assignment and project easily.
Course Content	CC1	E-learning systems encourage student to think.
	CC2	Course assignments are easily understandable.
	CC3	Courses is updated with developments.
Support Assessment	SA1	E-learning systems trusted in time and quality
	SA2	Assignment is clearly explained.
Academic Performance	AP1	I anticipate good grades in courses with these systems.
	AP2	I anticipate better grades in classes used this technology.
	AP3	E-learning systems effective with student interaction
Behavioural Intention	BI1	I learned with course used e-learning technology.
	BI2	I recommending the e-learning systems to other students.
	BI3	I recommended to use e-learning in the future.
Continuity of use	CU1	I prefer continuity of using e-learning systems.
	CU2	e-learning help to earn time and interest.
	CU3	I prefer to keep using e-learning in the future.
Student Satisfaction	SS1	E-learning systems are user-friendly
	SS2	I happy with e-learning use.
Effectiveness	EF1	I like to recommend it to friends.
	EF2	e-learning help student to learn a lot.

6.2 Construct Validity

6.2. 1 Evaluation of Reliability and Convergent Validity

Next, results from Table 5 depicted the item loading, the Average of variance Error AVE, Curial reliability CR and Cronbach's alpha values for all constructs/factors in the measurement model, which exceeded the recommended threshold values [34]. According to these results, all constructs are accepted in the values of Alpha Cronbach's were values greater than 0.7. the CR values are also greater than 0.7 for all proposed constructs. Finally, AVE values to be accepted should be greater than 0.5. it's already excellent results given in this model based on the PLS-SEM program.

The main PLS-Sem standard are the Alpha value should be equal or greater than 0.7, as in Table 5, all constructed items are above 0.7. Also, CR right results it should be equal or greater than 0.7, as same as Alpha value. Furthermore, the AVE value to be accepted should be greater than 0.5, and the validation of the research model given all construct are above the mentioned value.

Table 5: Item loading and reliability

Construct	Item	Loading	Alpha	CR	(AVE)
Support Assessment	SA1	0.685	0.733	0.803	0.673
	SA2	0.740			
Academic Performance	AP1	1.000	1.000	1.000	1.000
	AP2	0.580			
	AP3	0.702			
Behaviour Intention	BI1	0.937	0.814	0.813	0.689
	BI2	0.707			
	BI3	0.673			
Effectiveness	EF1	0.630	0.754	0.807	0.680
	EF2	0.725			
Perceived Ease of Use	PEOU1	0.832	0.709	0.826	0.704
	PEOU2	0.846			
Student Satisfaction	SS1	0.849	0.813	0.826	0.704
	SS2	0.828			
Perceived Usefulness	PU1	0.765	0.943	0.904	0.703
	PU2	0.908			
	PU3	0.823			
Course Content	CC1	1.000	0.884	1.000	1.000
	CC2	0.592			
	CC3	0.627			
Continuity of Use	CU1	0.873	0.883	0.875	0.700
	CU2	0.868			
	CU3	0.765			

6.2.2 Path Value Results

Results from the model validation reveal that the survey data supported 11 out of 11 views. The results are shown in Table 6. Both tested p-value and B results should accept as B>=0.1 and p<0.01 or p<0.001. It explains the hypotheses works has pushed through a survey of 9 factors used views. Therefore, each of the hypothesised relationships is briefly described below:

H1 result shows a great influence between PEOU and PU, where (β = 0.130) represents the path between PEOU and PU. H2 results point to a positive influence between PU and BI. It is supported by the work where (β = 0.213) shows that the hypothesis is substantial. H3 result points to an accepted influence between PEOU and BI, where (β =0.176) highlights a positive association. H4 results in a great influence between PEOU and SS, with values (β = 0.15). H5 results in a good influence between CC and effectiveness, where (β =0.129) shows the positive connection. H6 results in a positive influence between course content and support assessment with a value of (β =0.203) indicating CC and meaningful.

H7 result shows an excellent influence between BI and AP with (β =0.360), indicating an accepted relationship. H8 result shows a good influence between AP and continuity with values (β =0.152) indicating a good relationship. H9

result shows an accepted influence between effectiveness and continuity with the values (β =0.260), revealing a substantial association. H10 result shows a positive influence between support assessment and continuity with values (β =0.164) showing a positive relationship. H11 result shows a significant influence between student satisfaction and the continuity of use with values (β =0.192).

Table 7 show the summarized values from the current model system and the previous studies results. The yellow highlighted cells in Table 7, it shows the high values accomplished in this research that is much more than highest values from the previous studies with same type of relationship.

Table 6: Path coefficient and β results

	Relationship	β	P-value	Bias	Support
H1	Perceived Ease Of Use → Perceived Usefulness	0.130	0.000	0.009	Supported
H2	Perceived Usefulness → Behavioral Intention	0.213	0.001	-0.004	Supported
H3	Perceived Ease Of Use → Behavioral Intention	0.176	0.001	-0.007	Supported
H4	Perceived Ease Of Use → Student Satisfaction	0.150	0.050	0.000	Supported
H5	Course Content → Effectiveness	0.129	0.000	-0.004	Supported
H6	Course Content → Support Assessment	0.203	0.000	0.000	Supported
H7	Behavioural Intention → Academic Performance	0.360	0.000	0.000	Supported
H8	Academic Performance → Continuity of Use	0.152	0.021*	0.000	Supported
H9	Effectiveness → Continuity of Use	0.260	0.000	0.001	Supported
H10	Support Assessment → Continuity of Use	0.164	0.031	0.000	Supported
H11	Student Satisfaction → Continuity of Use	0.192	0.000	0.005	Supported

Table 7: Summarized Current results with Previous Studies results

	Current	Prev.	Current	Prev.	Current	Prev.
Construct	Alpha	Alpha	CR	CR	(AVE)	(AVE)
Support Assessment	0.733	0.730	0.803	0792	0.673	0.610
Academic Performance	1.000	0.893	1.000	0.833	1.000	0.837
Behavioral Intention	0.814	0.822	0.813	0.679	0.689	0.701
Effectiveness	0.754	0.864	0.807	0.820	0.680	0.830
Perceived Ease of Use	0.709	0.683	0.826	0.832	0.704	0.540
Student Satisfaction	0.813	0.825	0.826	0.820	0.704	0.715
Perceived Usefulness	0.943	0.931	0.904	0.759	0.703	0.693
Course Content	0.884	0.730	1.000	0.972	1.000	0.950
Continuity of Use	0.883	0.871	0.875	0.651	0.700	0.620

7. RESEARCH CONCLUSION AND LIMITATIONS

Continuous use of e-learning has become significant to determine elements contributing to the continuity of use in HEIs. The fast changes produced in the acceptance of continual choice to use e-learning systems need a response to the developed theoretical models' factors and merging among essential elements. The study identified the

independent and dependent factors to develop the acceptance of contributing elements for e-learning system continuity. The study developed a model to construct the relationships among these factors for continuity of use e-learning systems. The aim is to determine the essential elements for e-learning system continuity of use. To accomplish this aim, the model constructed with 11 hypotheses. The validated results show a sufficient supporting to the 11 hypotheses given in the study.

This research has some limitations of the sample selection concerned in one college in Oman for the researcher advisory list. That's why maybe this model does not have the same significant supported factors in the other universities.

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