Student's Intentions to Use M-Learning: An Empirical Perspective from the Philippines

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Abstract

M-learning is the future modern way of learning; so it is important for the students to keep pace with changing technology and time. M-learning has a key position in the development of new teaching methodologies for higher education students. Learning through M-technology is free of limitation; the student can access the knowledge and information at any time and any place. This research paper measures the intention of students to learn from modern and innovative method that is M-technology. For this research paper data is collected from Filipino tertiary students to perform statistical analysis i.e. structural Equation modeling (SEM) using AMOS-21. Results indicate that student's innovative behavior, lecturer influence, usefulness and ease of use of technology has positive impact on student's intention towards M-learning.

Keywords: M-learning, M-technology, Lecturer Influence, Innovativeness, Perceived Usefulness, Perceived Ease of Use

1. Inrtoduction

M-technology adoption in developing countries has been rapidly increasing for the past few years. In some countries like Bangladesh, Philippines and Nepal people are purchasing mobiles as the substitute of computers and laptops (Union, 2013; Poong, Yamaguchi, & Takada, 2017). The emergence of smart phones has changed the traditional way of using mobile phones. Due to the competition between the mobile manufacturing companies, not only the prices of mobile phones are decreasing but also there is improvement in functionalities and software which increases the user's innovativeness but also learning performance. According to Poong, Yamaguchi, & Takada (2017) mobile phones are the most affordable tool of communication through which users can share ideas and can enhances their

learning as compared to the computers. Benefit of mobile technology is that user can access the learning material independent of place and time (Barnes & Vidgen, 2002; Young, Hongxiu, & Christer, 2010). Mobile technology provides its users learning opportunities and user can learn is no longer bounded by physical location of the learner. With the advancement of technology mobile devices are getting smart, ease to carry and powerful (Yang, 2005; Gan, 2015).

Learning through M-Technology is becoming popular among the researchers and policy maker's references (Wen-Hsiung, Yen-Chun, Chun-Yu, Hao-Yun, & Sih-Han, 2012; Furió, Seguí & Vivó, 2014). According to Park, Nam, & Cha (2012) emergence of new technologies and convergence of world into global village bring rapid changes in human access to information and learning performance. On the daily basis new knowledge and information is developed which required continuous improvement in skills. Due to the reason there is a need for fast, timely and widely available technologies which help in improving learning process (Wen-Hsiung, Yen-Chun, Chun-Yu, Hao-Yun, & Sih-Han, 2012). M-technology provide users numerous new opportunities to get timely access to information and learn new knowledge in the field of their interest. Mobile technology has established itself as a tool of communication and part of our socialization practices (Traxler, 2007; Motiwalla, 2005)**.** M-learning is to learn with the help of smart phones, tablets, laptop and other portable devices. M-learning is unstructured and informal way of learning. Mobile phones are no longer used only for making calls, sending text messages, MMS, but it also provides number of benefits to its users. M-technology can allow user to connect to internet and other useful applications. Now a day's mobile technology is widely used in education and on its way to become substitute of traditional education (Ravenscroft, 2000; Young, Hongxiu, & Christer, 2010).

E-learning using internet and M-learning using mobile device, students can use this educational technology at any time and any place according to their convenience. The objective and aim of using m-technologies is to eliminate the constraint of limiting education only to schools, classes and home, these technologies bring education closer to students with which they are familiar, skilled in using them every day (Chen & Huang, 2010). These technologies help in designing new teaching methods which helps students to keep themselves in innovative and creative activities during their education (Hu, Lu, & Tzeng, 2014; Uzunboylu & F.Ozdamli, 2011). In educational process the use of communication technology is new therefore there is a need of continuous monitoring and improvement by acquiring experience and knowledge in the field. M-technology is at the stage of development, so it is necessary for teacher to have IT literacy in order to have interactive sessions with students (Suwantarathip & Orawiwatnakul, 2015).

This research paper examines the students' intention towards adopting m-technology in order to enhance their learning. For this, Technology Acceptance Model (TAM) is supportive in understanding the acceptance of m-technology for learning process. Accordingly, six factors, including perceived usefulness, perceived ease of use, lecturer influence, and innovativeness are projected to find the Filipino students studying in higher educational institutes intention to use m-learning. Data was collected from students of the Philippine higher educational

institutions. SPSS and structural equation modeling using Amos is done to do empirical analysis. This paper covers eight sections which include introduction of the research paper, literature review, research methodology, data analysis, discussions, argument, and implications and future studies.

1.1 Research Model

Davis (1989) proposed Technology Acceptance Model (TAM), a socio-technical model which helps researchers in examining the individual behavior towards technology acceptance. There are two ascendants variables which predicts the behavioral intention of the individuals these are perceived ease of use (PEU) and perceived usefulness (PU). PEU is the degree to which an individual believes that technology can be used without any physical and mental effort (Davis, Bagozzi, & Warshaw, 1992; Hart & Porter, 2004), whereas, PU, is believe which defines as degree to which technology enhances individuals learning and job performance (Davis, 1989). The exogenous variables are PEU and PU and endogenous variable and they are true predictor of technology adoption intention. However, many researchers modify and do extensions in TAM to strengthen their prediction according to their research domain (Chaurasia, et al., 2016; Chena & Ma, 2016; Chuah, Rauschnabel, Krey, Nguyen, Ramayah, & Lade, 2016; Arifina & Frmanzah, 2015).

To study the mobile learning acceptance among Korean university students, (Park, Nam, & Cha, 2012) adopt extended TAM with PEU, PU are important determinants with external factors such as social norm, self-efficacy which contribute to intention to use. To investigate the mobile learning among students of Pakistani universities Iqbal & Qureshi (2012) used extended TAM, they used PEU, PU, social influence and perceived playfulness to measure student's intention. Tan, Leong, & Lin (2014) examine the influence of society on student's intention to use M-technology with addition of PU and personal innovativeness. Liu, Li, & Carlsson (2010) explore undergraduate student's intention to adopt M-technology learning using extended TAM, using PEU, PU and pro-activeness. For this research extended and modified TAM is used using PEU, PU, perceived pleasure, Lecturer influence, Innovativeness.
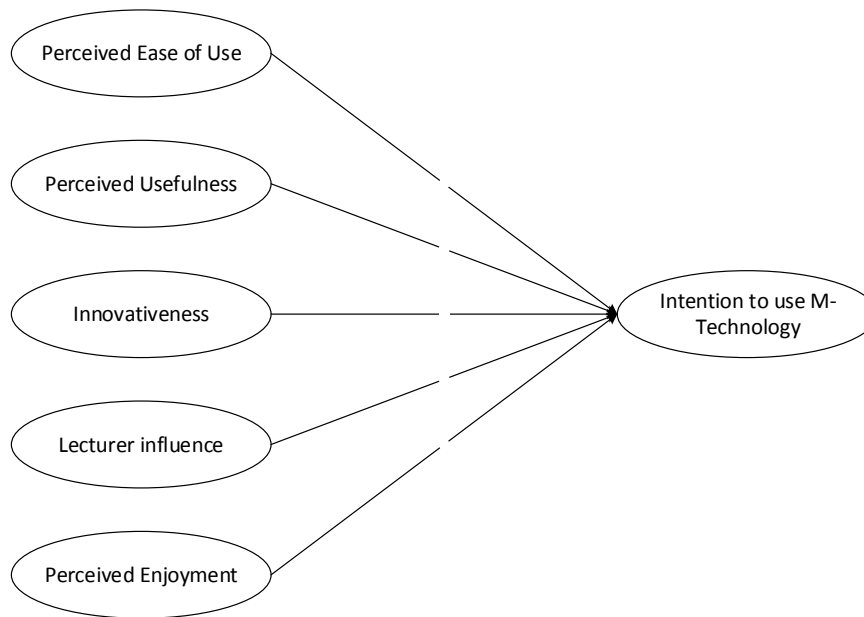
Figure 1. Theoretical framework for the study.

2. Literature Review

2.1 Innovativeness

Innovativeness is the person believes that he/she have positive adoption towards new technology. Innovativeness is individual adopt the new technology at the early stage of its cycle without considering about the complexity and performance evaluation of the technology because they key objective is to learn and get benefited from the innovation (Lu, Yao, & Yu, 2005). It is observing that individual with high innovativeness has high adoption rate of new technology. Individual with innovativeness are risk takers and has the ability to deal with uncertainty. According to Rogers (2003) there are four kinds of innovators these are early adopters, early majority, late majority and laggards. Early adopters are individuals who are risk takers and are among the first once how experience and evaluate new technology. Early majority are individual characteristics in which individual experience new technology once they got some feedback about it. Late majority and laggards are individuals' characteristics in which users are risk averse they experience technology when they are sure about it. According to Pedersen (2005) early majority and early adopters are young people who are considered to be risk-takers and innovators. In case of m-technology researchers found the same trends that youngsters are among the early majority. In this research study, target population is student and it is believed that the students with innovative personality have positive rate of adoption of m-technology. Liu & Huang (2015) examine that there is positive relation between the innovativeness and m-technology adoption.

2.2 Lecturer Influences

Lecturer is considering as leadership who has the ability to motivate and influence the attitude and performance of the students and they are accountable for the achievements and performance for the students. According to Ahmad & Love (2013) and Venkatesh, Morris,

Davis, & Davis (2003) lecturer influence is the person who has the experience to use new m-technology and extent to which he/she can influence to teach other people about the usage and benefits of new technology. Venkatesh, Morris, & Ackerman (2000) explain that lecturer influence has positive impact on the students to adopt new technology. Lecturer can motivate students and let them know about the benefits of the technology and its influence on their learning performance. Poong, Yamaguchi, & Takada (2017) study examine that lecturer influence has positive impact on students to learn through m-technology.

2.3 Perceived Ease of Use (PEU)

PEU is the degree to which an individual considers that technology can be used without any physical and mental effort (Davis F. D., 1989). PEU has the positive impact on adoption of new technology. PEU is also referred as self-efficacy, according to (Zhao et al., 2016) defined PEU as individual believe on himself that he/she has the ability to use new-technology. Self-efficacy is important and influential determinant which built up the attitude of an individual to use technology and enhances intentions. Usability of the new technology depends upon its nature of ease and benefits it can offer to its user (F. Asmi, Zhou, He, & Han, 2017). Wang, Wu, & Wang (2009) m-technology is useful, ease to learn and convenient for students because they can easily learn from it and hence improve their learning capability. Opportunity that M-technology is giving to students is that they have accessibility to the information quickly at anytime and anyplace. Previous studies examine that PEU has positive significant effect on intention to use m-technology.

2.4 Perceived Usefulness (PU)

Whereas, PU is individual believe which defines degree to which technology enhances individuals learning and job performance (Dulcica, Pavlicb, & Silicc, 2012; Liu, Li, & Carlsson, 2010; Alrafi, 2007). Researchers examine that PU significantly affect the user attitude and this attitude further leads intention of user to earn from m-technology. Due to the decrease in prices and competition among mobile companies, these companies are offering more functions in the mobile technology which are user friendly and improve the learning performance of its user (Fagan, Kilmon, & Pandey, 2012). Due to the usefulness of m-technology individuals are adopting m-technology to learn, access information and for communication purpose. Many researchers examine that usefulness, benefits and learning associated with m-technology causes a major shift from e-learning to m-learning. M-technology has positive significant relation with attitude and intention to adopt m-learning.

2.5 Perceived Enjoyment (PE)

Perceived enjoyment is defined as "the degree to which individual enjoy the activities of using technology, while anticipating the performance consequences" (Davis et al., 1992). PE has a positive significant impact on individual learning and performance behavior (Fahad Asmi, Zhou, & Lu, 2017)(Pe-Than et al., 2014). Heijden (2003) and HsuL & Lin (2008) concluded that perceived enjoyment has significant impact behavioral intention to use m-technology that enhances user learning. According to Davis et al (1992), PE is similar to intrinsic motivation that motivates the user of the m-technology to learn and enhance learning

by indulging in fun activities. According to Hung et al (2016) students enjoy less when they interact with a technology having utilitarian benefits as compared to the technology which fulfill their hedonic needs (Nysveen, Pedersen, & Thorbjørnsen, 2005; Xu, Lin, & Chan, 2012). There is still a question that M-learning provides students a platform through which they can learn with collaboration and enjoyment. There is a research that students intend to use technology which useful, easy and full of enjoyment. Learning while engaging in fun activities student learn more as compared to serious environment.

2.6 Intention towards M-Learning

Attitude is psychological tendency of an individual to express their feeling and thoughts either in favor or disfavor of some entity after evaluating it (Kinicki & Krietner, 2009). Intention is a cognitive interpretation of an individual which define individual intention to act in favor of certain situation (Kolvereid, 1996). (Harjer & Habib, 2013) define attitude as the emotional state of individual in which individual has a feeling to react on certain situation after evaluating the benefits, gains from activity, technology and objects. Studing attitude is important because it leads towards the intention of an individual (Zimmerman, 2008). (Ajzen & Fishbein, 1980; Kolvereid, 1996) define Intention as cognitive depiction of an individual to act upon certain situation. According to ref M-technology provides students opportunity in accessibility to the information quickly at anytime and anyplace. There is still a question that M-learning provides students a platform through which they can learn with collaboration and enjoyment. Due to the usefulness of m-technology individual are adopting m-technology to learn, access information and for communication purpose. Lecturer is considering as leadership who has the ability to motivate and influence the attitude and performance of the students. Individual with innovativeness are risk takers and has the ability to deal with uncertainty. From the above supporting literature following hypothesis are presented

H1: Innovativeness has positively associated with intention of the students towards M-learning

H2: Lecturer influence has positive impact on intention of the students towards M-learning

H3: PU has positive impact on intention of the students towards M-learning

H4: PEU has positive impact on intention of the students towards M-learning

H5: PE has positive impact on intention of the students towards M-learning

3. Research Design and Methods

3.1 Instrumentation

This study is on M-technology and intention of students towards M-technology learning. A survey was conducted to gather data. Questionnaire is consisted of two parts: first part used to have basic information of respondents based on their age, gender, education and mobile user; and Second part measures intention of students to learn through M-technology terms of perceived usefulness, perceived ease of use, innovativeness, lecturer influence and intention to use m-technology using seven-point Likert scale. All questionnaire items were adapted

from different studies (Miloševic, ivkovic, Manasijevic, & Nikolic, 2015; Huang, Chiu, & Hong, 2015; Al-Ani & Sarab M. Hameed, 2013) with little modifications of words and sentences in accordance with the current study.

3.2 Sample Design and Scale Validation

For statistical analysis data were collected from students who are the active user of m-technology and students of the Philippine national universities. With the modification of words and sentences certain items and structure, final questionnaire. There was also offered a reward in terms of free coupon from a local sponsor to encourage the respondents for questionnaire completion. The survey data was stored in a secure database. A total of 386 responses were received during three weeks. 26 questionnaires were deleted from the database because of the incomplete information, resulting into 360 valid sample sizes. Table 1 shows demographics of respondents.

Table 1. Descriptive Information of the Sample

Measures	Frequency	Percentage
Gender		
Male	125	34.72
Female	235	65.27
Age		
20 or under	62	17.22
21-30	132	36.66
31-40	121	33.61
40 and above	45	12.5

4. Data Analysis and Results

Analysis of Moment Structure (AMOS 24) was employed to test the data and to examine the research hypothesis. For this purpose, a two-stage analysis method is used to analyze model measurement and structural model evaluation. Firstly, exploratory factor analysis (EFA) was used to test reliability; Cronbach's Alpha was run to test the validity of data. The acceptable value of Cranach's Alpha is greater than 0.7(Hair, et al., 1995), all values greater than 0.7 were considered for further analysis. Secondly, Structural equation modeling (SEM) technique was carried out to estimate the measurement and structural model simultaneously. The construct validity of measurement model was assessed by examining convergent and discriminate validity. For this purpose, convergent validity of constructs was measured through composite reliability (CR) and average variance extracted (AVE).

The threshold level for Cronbach Alpha, CR, and AVE is 0.7, 0.7 and 0.5 respectively (Hair, Anderson, Tatham, & Black, 1995). Therefore, results in Table 2 indicate good convergent validity as all values meet the required criteria. Furthermore, discriminant validity was assessed by using correlation method proposed (Fornell & Larcker, 1981). Discriminant validity is verified when a measure does not highly correlate with another measure from which it should be different (Venkatraman, 1989). For this study, it was determined by comparing the relationship between the correlation among constructs and the square root of

the AVE of all the constructs. Table 3 shows that the square roots of the AVE are greater than the correlation among the given constructs which meets the given criteria.

4.1 Common Method Biases

Harman's one-factor test was used to test common method bias (Podsakoff, et al., 2003) by considering that data were collected from the single source and the responses were collected from the same individuals. There is often an issue if the single factor explains more than 50% of the variance (Harman, 1976). Results revealed that after classifying all items into six factors, the first factor explained only 17.66% variance. Therefore, this study shows no common method biases.

Moreover, to test the validity of the initial scale KMO and Bartlett's test of sphericity was employed using SPSS. The value of KMO was 7.14, which was above the threshold value 0.7. The p-value of Bartlett's test of Sphericity was also zero; so found to be significant.

Table 2. Results of Confirmatory Factor Analysis

Constructs	Indicators	Factor Loadings	Cronbach's Alpha	Average Variance Extracted (AVE)	Composite Reliability(CR)
Perceived Enjoyment	PE1	.766	0.778		
	PE2	.826			
	PE3	.729		0.554	0.784
Innovativeness	I1	.812	0.823	0.611	0.825
	I2	.764			
	I3	.795			
Lecturer influence	LI1	.897	0.932	0.776	0.933
	LI2	.861			
	LI3	.866			
	LI4	.883			
Perceived Usefulness	PU1	.825	0.794	0.565	0.795
	PU2	.768			
	PU3	.737			
Perceived Ease-of-use	PEU1	.869	0.885	0.722	0.886
	PEU2	.805			
	PEU3	.839			
Intention to use m-learning	IUM1	.851	0.789	0.568	0.797
	IUM2	.758			
	IUM3	.793			

Table 3. Composite Reliability, Average Variance Extracted and Correlation

	Construct	CR	AVE	1	2	3	4	5	6
1	Intention towards m-learning	0.797	0.568	**0.754**					
2	Lecturer Influence	0.933	0.776	0.202	**0.881**				
3	Perceived Ease of use	0.886	0.722	0.483	0.338	**0.850**			
4	Innovativeness	0.825	0.611	0.425	0.486	0.483	**0.782**		
5	Perceived Enjoyment	0.784	0.554	0.379	0.283	0.514	0.489	**0.744**	
6	Perceived usefulness	0.795	0.565	0.403	0.483	0.456	0.459	0.546	**0.751**

Note: Square root of average variance extracted (AVE) is shown on the diagonal of the matrix; inter-construct correlations are shown below the diagonal.

4.2 Fitting Indices for Measurement and Structural Model

The study evaluated the following goodness-of-fit indices through employing SEM technique along AMOS 24 and CFA (Confirmatory Factor Analysis) (Table 2). For a good-fit model, AGFI (Adjusted Goodness-of-Fit Index) should be greater than 0.8 and RMSEA (Root Mean Square Error of Approximation) should be less than 0.08(Hair, et al., 1995; McQuitty, 2004). Moreover, it is suggested that NFI, TLI, GFI, CFI, and IFI should be greater than 0.9 and the value of CMIN/DF or x^2-square should be less than 3(Miles & Shevlin, 2007; Hu & Bentler , 1999). From the outcomes shown in table 4, it can be observed that structural and measurement model indicate acceptable fit with the observed data in comparison with suggested criteria.

Table 4. Results of Model Goodness-of-fit

Indices	Criterion	Measurement model	Structural model
AGFI	>0.8	0.884	0.954
GFI	>0.9	0.917	0.987
RMSEA	<0.08	0.061	0.050
NFI	>0.9	0.919	0.974
CFI	>0.9	0.951	0.987
TLI	>0.9	0.939	0.964
IFI	>0.9	0.952	0.988
CMIN/DF	<3.00	2.340	1.901

Note: AGFI (Adjusted Goodness-of-Fit Index), GFI (Goodness-of-Fit Index), RMSEA (Root Mean Square Error of Approximation), NFI (Normed Fit Index), CFI (Comparative Fit Index), PGFI (Parsimony Goodness-of-Fit Index), PCFI (Parsimony Comparative Fit Index)

4.3 Results of Hypothesis Testing

After signifying the validity of measurement model, next step was to test the hypothesized relationships using structural equation modeling (SEM). The results from the structural model indicate that all proposed hypothesis was supported by the data except 'Perceived Enjoyment', results indicate that Innovativeness has positive impact on intention of the students towards M-learning (β =0.303, t=7.075, p<0.001), lecturer influence has positive impact on intention of the students towards M-learning (β =0.330, t=6.822, p<0.001), usefulness has positive impact on intention of the students towards M-learning (β =0.191, t= 5.122, p<0.001), ease of use has positive impact on intention of the students towards M-learning (β =0.128, t= 2.944, p<0.01). Where-as perceived enjoyment has the positive impact on the intention of the students towards M-learning but its non-significant β= .062 and non-significant value of p= .261 these findings support H1, H2, H3 and H4 are significant.

5. Discussion and Conclusion

This paper examines the intention of Filipino tertiary students towards m-learning. Results of this study assemble by structural equation modeling using AMOS-21. Results indicate that PEU, PU, enjoyment, innovativeness and lecturer influence are the important determinants of student's intention towards m-learning. Results show that 98.5% of the students at national universities are the active user of m-technology. Lecturer influence, innovativeness, PU and

PEU of m-technology are important determinants of intention-behavior of students towards m-learning whereas perceived enjoyment shows a positive impact but it's non-significant.

Perceived usefulness has the positive impact on the intention of students towards m-learning results are according to expectation as in previous studies examine that students can achieve maximum learning from m-learning as compared from old or traditional methods of learning that are books, notes, and lectures. M-technology helps students to interact with each other discuss their problems and by doing brainstorming they can come up with the solution of the problems which they are facing while studying. Ease of use is also an important determinant of learning, as m-technology is easy to use and excess that is why student finds it more attractive to communicate and learn through m-technology and their intention towards m-learning enhance. Lecturer influences have significant effect on student intention towards m-learning. The lecturer is the mentor for the students. Students gather information from their mentors and perform accordingly and it is expected from mentor to improve the learning performance of the students (Gibson, 2004). Innovativeness is the personal capability of an individual to extract information and knowledge using m-technology and results show that students with high innovative capability have positive significant relationship with intention to use technology for m-learning.

All the factors like innovativeness, PU, PEU and lecturer influence other than perceived enjoyment as the positive impact on m-learning intentions. This shows that innovativeness, PU, and PEU encourage and motivate students to learn through m-technology. It also shows the importance of lecturer influence, it is important for professors and teachers to build a strong interaction between students and them by using latest m-technology and encourage students to use m-technology so that students can learn new ways to getting information and knowledge.

Finally, there is some limitation associated with this research as the data is collected in cross-sectional time horizon and empirical analysis is done at Philippine national universities. The sample size is small which cannot represent the whole educational system intended to use m-learning. For future researchers, sample size can be increased with the addition of the extension of variables to measure intention of students towards m-learning.

Due to the decrease in cost of mobile devices and adaptation of the people to the mobile environments leads to shifting from using the desktop to mobile devices. This shifting changes the behavior of people teaching, learning, accessing information and interacting with each other. The usage of smartphone in Philippine is increasing day by day it is expected to double by 2022.
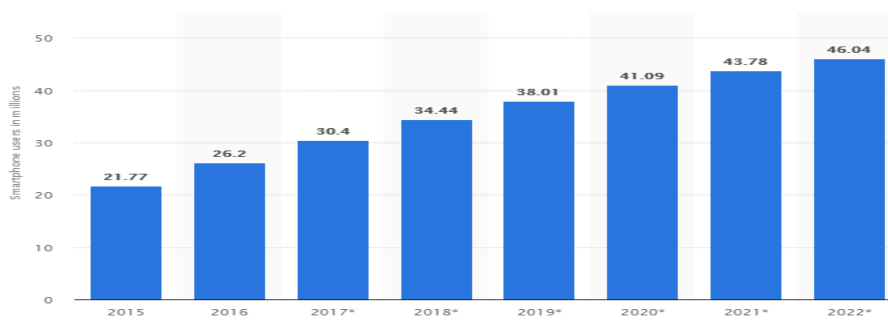
Figure 1. (Portal, 2017)

From the pedagogical perspective, e-learning is based on the text (blogs, articles) and graphical instructions; while m-learning is based on voice, video, graphical, and animation instructions. Where e-learning occurs in classroom, laboratory or at home, m-learning can be occurred at any place and at any time. M-learning is no more an option but it becomes necessity in this modern and progressing world. M-learning is the beginning and it can play a vital role in the educational process.

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