

Research Article

Revised and Extended Mobile Commerce Technology Adaption Model

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Abstract: This research is designed to cover literature gaps in the intention to adopt mobile commerce in Jordan as development country. In one hand we explored and identified the non-technological factors that affect the intention to adopt mobile commerce. In the other hand we introduced a revised and extended mobile commerce technology adaption model based on the available literature and based on the Technology Acceptance Model (TAM). Our result shows that our proposed model is valid. Our model validity was confirmed using Loading Factor and Kaiser-Meyer-Olkin (KMO). The result of this research shows that Perceived Usefulness (PU), Perceived Ease of Use (PEOU), privacy, compatibility, government policy, legal protection, risk, cost and social-culture values factors have a direct significant effect in the intention to adopt mobile commerce. This research also finds that those factors are different in their effect in the mobile commerce adoption decision where legal protection factor has the highest impact in mobile commerce adoption decision while perceived usefulness factor has the lowest impact in making such decision. The result also shows that there is a positive relationship between all study factors and the intention to adapt mobile commerce except for risk and cost factors.

Keywords: Jordan, M-commerce, non-technological factors, technology adaption model

INTRODUCTION

“Mobile Commerce is any transaction that involve the transfer of ownership to use goods and services, which is initiated and/or completed by using mobile access to computer-mediated networks” (Tiwari and Buse, 2010). Both mobile commerce and electronic commerce involve conducting transactions over the Internet, but in m-commerce transactions are done over mobile networks. In mobile commerce the consumers can conduct transactions from remote locations using their mobile devices to saves time and costs. Mobile commerce also can be useful for the companies by allowing them to reach a wider range of customers without time and space limitations. M-commerce really affect various fields of our life, i.e., finance, industry and many others. Because of m-commerce benefits; the adaption of firms in m-commerce has increased day after day; this will introduce so many types of business services in low cost.

There are many economical, technical, cultural, legal and political factors facing m-commerce adoption in developed countries such as Jordan, these factors should be identified. To identify those factors; the researchers used the Technology Acceptance Model (TAM) in many cases in the field of M-Commerce

adoption and acceptance of new technology (Kini, 2009; Saad and Suleiman, 2010; Tarasewich *et al.*, 2002; Wixom and Todd, 2005; Wu and Wang, 2005; Yang, 2005; Sudha *et al.*, 2010; Saifullah Sadi and Mohamad Fauzan, 2011; Basem and Bassam, 2012; Ghassan *et al.*, 2013; Feras *et al.*, 2013). This research will study the factors that affect the intention to adopt mobile commerce in Jordan from non-technological point view since the technological factors are studied by other researchers (Feras *et al.*, 2013). Also a revised M-Commerce technology adaption model is introduced and validated by the researchers in this study.

Saad and Suleiman (2010) applied TAM and found that perceived trust, perceived usefulness, perceived ease of use, social and cultural values have significant effect on the intention to deploy mobile commerce technology and they found also that the economical issue is not significant. Yang (2005) used and employ the Technology Acceptance Model (TAM) to examine factors affecting Singaporeans attitudes toward m-commerce, the results for this research shows that there is positive relationships between the following factors: PU, PEOU, AT, innovativeness, adoption behavior and demographics and between the adoption of M-commerce. YANG Results found and support the applicability of TAM and its extension to examine and

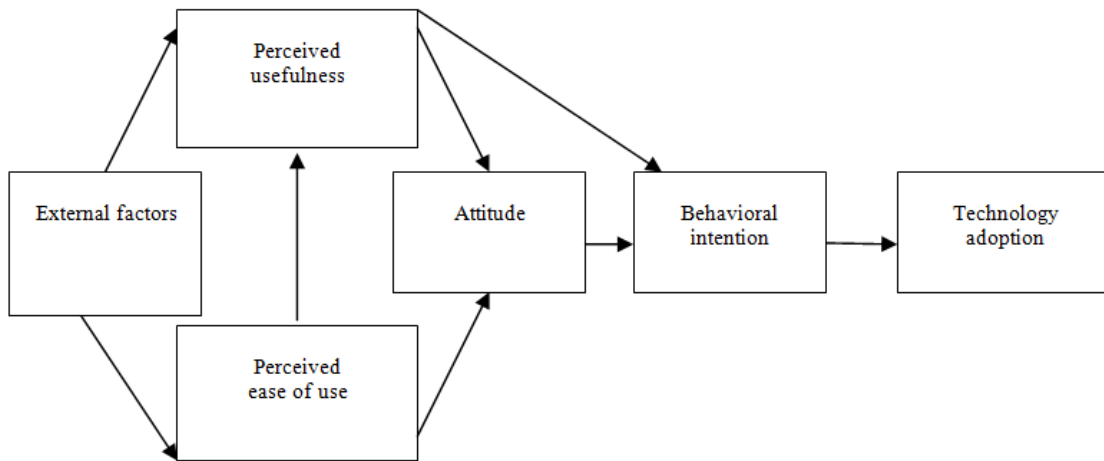


Fig. 1: Technology Acceptance Model (TAM)

test M-commerce adoption by Singapore consumers. Wu and Wang (2005) presents an extended Technology Acceptance Model (TAM) that integrates innovation diffusion theory, perceived risk and cost into the TAM to investigate what determines user Mobile Commerce (MC) acceptance factors. They find that all of the previous variables except perceived ease of use affect the behavioral intention of the users. Also they found that compatibility had the most significant effect. Kini (2009) in his study to the electronic and mobile commerce adoption in Chile shows that the following factors: mobile access speed, service quality and price, needs improvement. Tarasewich *et al.* (2002) identifies then categorizes some of m-commerce issues so that interested people have a starting point for focusing their activities within the m-commerce area. In Feras *et al.* (2013), the authors introduced extended and revised mobile commerce technology adaption model suitable for Jordan as development country, the model covered only the technological barriers for mobile commerce technology adaption. In Ghassan *et al.* (2013) the authors studied a subset from the non-technological barriers such as personal and societal norms perspectives that affect the adoption of M-Commerce in Jordan. In Basem and Bassam (2012) the authors explored trust and social influence factors that affect the customer acceptance of M-Commerce Services in Jordan, this study covers the actual use of M-Commerce not the intention to use of M-Commerce.

By reviewing the previous available literature; we identified four gaps that should be evaluated and resolved. First: there is no valid Mobile Commerce Technology Adaption Model suitable for Jordan as development country. Second: no research covers all the non-technical factors (such as social, economical, legal, cultural and political) that affect the intention to adopt mobile commerce in Jordan as development country. Third: most of the previous studies studied and focused on the factors that affect the actual use of

Mobile Commerce, in this study we will focus on the barriers that affect the intention to use Mobile Commerce. Forth: the previous studies in Jordan and in similar development countries chooses study populations that are usually not aware of mobile commerce since the mobile commerce is not implemented in those countries, to overcome this gap; our study chooses the mobile commerce companies employees as the study population.

Technology Acceptance Model (TAM) is usually used to study the adoption and acceptance of new technology in the field of Information Systems (IS) by many researchers in many situations. TAM usage also is Popular in m-commerce adoption and acceptance of new technology (Kini, 2009; Saad and Suleiman, 2010; Tarasewich *et al.*, 2002; Wixom and Todd, 2005; Wu and Wang, 2005; Yang, 2005; Sudha *et al.*, 2010; Saifullah Sadi and Mohamad Fauzan, 2011; Basem and Bassam, 2012; Ghassan *et al.*, 2013; Feras *et al.*, 2013). As shown in Fig. 1 TAM introduce Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) as factors that determine an individual's intention to use a system. Perceived usefulness is seen as being directly affected by perceived ease of use.

Perceived usefulness is the person's perception of how the use of a specific system will increase the job performance for the employees within an organizational context (Wixom and Todd, 2005). PEOU define the degree to which the intended user expects the target system to be free of effort (Wixom and Todd, 2005). According to the TAM model; the PU and PEOU will usually have a real impact on the one's attitude toward the use of a particular technology. Attempts to extend TAM have generally taken one of three approaches (Feras *et al.*, 2013) by introducing factors from related models to TAM, by introducing additional or alternative belief factors and finally by examining moderators of perceived usefulness and perceived ease of use. During the last decade of

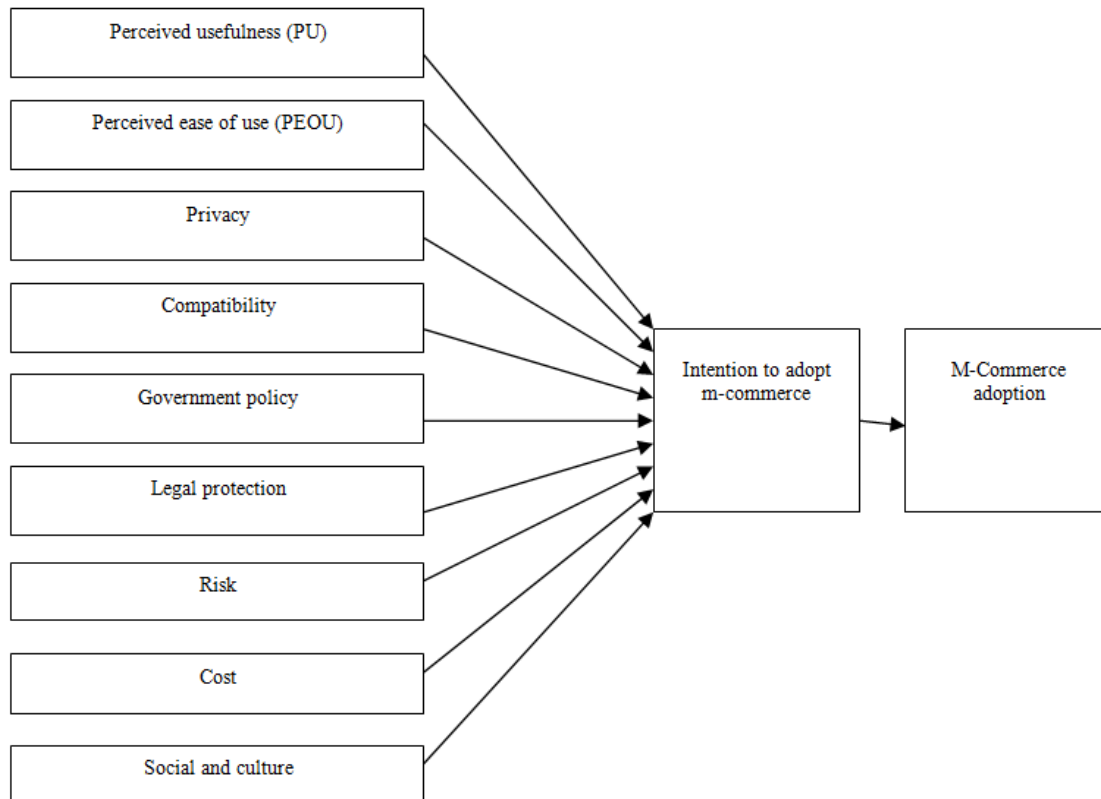


Fig. 2: The proposed study model

technology adaption research; TAM model prove its validity within the this kind of research, so we will TAM extend, validat and use the TAM model to guide our proposed M-Commerce Adoption Model. Our proposed model in Fig. 2 and based on TAM and the available literature will be designed to contain the following non-technological external factors: privacy, compatibility, Government policy, legal protection, risk, cost and social-culture values. In the modified proposed model in Fig. 2 we suggested that there is direct relationship between the PU, PEOU, privacy, compatibility, Government policy, legal protection, risk, cost and social-culture values with the intention to adopt M-Commerce.

MATERIALS AND METHODS

Study importance and objectives: Compared to e-commerce, m-commerce has limited academic research available on the literature in development countries such Jordan because it is still in its early stages of development and the majority of consumers didn't has any chance to use or adopt the m-commerce in their daily lives (Basem and Bassam, 2012; Ghassan *et al.*, 2013; Feras *et al.*, 2013). The overall aims of this study can be categorized in two major parts: first: investigate and identify the major non-technological factors that

affect the intention to use m-commerce in Jordan. Second: introduce and validate a revised and extended mobile commerce technology adaption model suitable for Jordan as development country.

The study problem: This study used the Technology Acceptance Model (TAM) and the previous studies to propose a modified model then use it to explore the non-technological factors affecting the intention to adopt m-commerce in Jordan.

The study hypotheses: Based on proposed model the null hypotheses of the study can be drafted as follows:

- H1:** Perceived Usefulness (PU) has no direct significant effect on the intention to adopt m-commerce in Jordanian telecommunication company.
- H2:** Perceived Ease of Use (PEOU) has no direct significant effect on the intention to adopt m-commerce in Jordanian telecommunication company.
- H3:** Privacy has no direct significant effect on the intention to adopt m-commerce in Jordanian telecommunication company.
- H4:** Compatibility of E-Commerce adoption has no direct significant effect on the intention to adopt

m-commerce in Jordanian telecommunication company.

- H5:** Government policy has no direct significant effect on the intention to adopt m-commerce in Jordanian telecommunication company.
- H6:** Legal protection has no direct significant effect on the intention to adopt m-commerce in Jordanian telecommunication company.
- H7:** Risk has no direct significant effect on the intention to adopt m-commerce in Jordanian telecommunication company.
- H8:** Cost has no direct significant effect on the intention to adopt m-commerce in Jordanian telecommunication company.
- H9:** Social and culture values has no direct significant effect on the intention to adopt m-commerce in Jordanian telecommunication company.

The study methodology:

Study population and sample: The study population is all Jordanian mobile owners and they are: Zain, Umniah and Orange. A number of questionnaires have been distributed to each company. The questionnaires were distributed to 159 persons and the number of questionnaires approved for purposes of research and analysis was 153 persons.

Data collection methods: We design our own questionnaire based on the literature, then we send it to be evaluated by a number of specialized persons, then the questionnaire reliability were evaluated using Cronbach's Alpha. The questionnaire consists of eleven sections. The first section collects demographic data about questionnaires respondents in order to ensure that respondents have the necessary knowledge of computer-based information systems and questionnaire contents and are able to answer its questions. The last ten sections aim to investigate the effect of the factors (Perceived Usefulness (PU), Perceived Ease of Use (PEOU), privacy, compatibility, Government policy, legal protection, risk, cost, social-culture values and m-commerce use) in the intention to adopt m-commerce by telecommunication companies in Jordan.

Data analysis methods: To achieve the study objectives and testing its hypotheses, the following statistical methods have been used:

- Questionnaire reliability using Cronbach's Alpha
- Model validity using loading factor and Kaiser-Mayer-Olkin (KMO)
- **Descriptive statistic:** Frequencies, means and standard deviations have been determined and used to identify the characteristics of study sample
- t-test to examine the study hypotheses

RESULTS AND DISCUSSION

Questionnaire reliability using Cronbach's alpha:

For the purpose of testing and validating the questionnaire reliability Cronbach's alpha is performed and executed, Table 1 shows that the values of Cronbach's Alpha for each variable exceeded the recommended value which is 0.6 according to Cortina (1993) and Thompson and Davis (2000). Cronbach's Alpha value shows good internal consistency among scales and good reliability of the entire questionnaire.

Model validity using loading factor and Kaiser-Mayer-Olkin (KMO):

To find whether the model is valid or not, we used the factor Analysis by applying Varimax procedure in this study, Varimax procedure depends on three values, the loading factor which recommended to be more than 0.4 (Heck, 2004). The KMO is the second value; which is used to measure the fitness of using factor analysis for our data, KMO is recommended to be more than 0.5 (Heck, 2004). And finally the Eigen value which recommended to be more than 1 (Heck, 2004). Table 2 shows that the three values satisfy the three recommended values, which means that the proposed model is a valid model for this study.

Study sample characteristics: By analyzing the answers of the first section of the questionnaire and based on Table 3, the study sample is appropriately qualified in term of academic level, where 76.5% of the sample individuals are holders of bachelor and high studies degree.

Hypothesis testing: Table 4 shows the statistical analysis for the nine factors (Perceived Usefulness (PU), Perceived Ease of use (PEOU), privacy, compatibility, Government policy, legal protection, risk, cost and social-culture values). It is obvious that the mean ranged between 3.665 and 4.064, which implies that the respondents were positively directed toward the study questions.

First hypothesis testing:

H1: Perceived Usefulness (PU) has no direct significant effect on the intention to adopt m-commerce in Jordanian Telecommunication Company.

As the decision base indicates the rejection of null hypothesis if the value significant is >0.05 and the acceptance of alternate hypothesis if the value significant is <0.05 since $0.001 < 0.05$ the alternate hypothesis is accepted, which means that Perceived Usefulness (PU) has a significant effect on the adoption of m-commerce by Jordanian telecommunication companies. Table 5 and based on R^2 value shows that

Table 1: Cronbach's alpha

Variable	Cronbach's alpha
PU	0.813
PEOU	0.768
Privacy	0.674
Compatibility	0.651
Government policy	0.770
Legal protection	0.767
Risk	0.761
Cost	0.806
Social-culture values	0.716
M-C use	0.603

Table 2: Loading factor and KMO

Variable	Loading factor	KMO	Eigen value
PU	0.710	0.678	2.563
	0.888		
	0.824		
PEOU	0.770	0.754	2.371
	0.768		
	0.734		
	0.832		
Privacy	0.743	0.660	1.824
	0.790		
	0.749		
Compatibility	0.799	0.632	1.772
	0.725		
	0.822		
	0.755		
Government policy	0.797	0.629	2.371
	0.741		
	0.781		
	0.760		
Legal protection	0.775	0.710	2.360
	0.809		
	0.698		
	0.786		
Risk	0.712	0.620	2.342
	0.761		
	0.772		
	0.758		
Cost	0.826	0.706	2.168
	0.872		
	0.852		
Social-culture values	0.856	0.613	1.843
	0.798		
	0.689		
M-C use	0.700	0.647	2.528
	0.637		
	0.907		
	0.900		

Table 3: Respondents education

	Answer alternatives	Frequency	(%)
Academic Qualification	Diploma	36	23.5
	Bachelor	98	64
	High studies	19	12.5
Total		153	100

Table 4: Statistical analysis for the variables

Variable	Mean	S.D.
PU	3.655	0.567
PEOU	3.849	0.548
Privacy	3.947	0.581
Compatibility	3.860	0.603
Government policy	3.670	0.701
Legal protection	3.957	0.606
Risk	4.064	0.603
Cost	3.870	0.708
Social-culture values	3.633	0.572
M-C use	4.019	0.625

S.D.: Standard deviation

PU explains 35.3% of the effect on the intention to adopt m-commerce and the increase of PU by one unit will improve the intention of adopt m-commerce by 0.629. This means that there is a positive relationship between PU and the intention to adopt m-commerce.

Second hypothesis testing:

H2: Perceived Ease of Use (PEOU) has no direct significant effect on the intention to adopt m-commerce in Jordanian Telecommunication Company.

As shown in Table 5 the value of significant is 0.000. Since 0.000 is <0.05 the alternate hypothesis is accepted which means that perceived ease of use has a significant effect on the adoption of m-commerce by Jordanian telecommunication companies. Table 5 also shows that PEOU explain 40.1% of the effect on the intention to adopt m-commerce and the increase of PEOU by one unit will improve the intention of adopt m-commerce by 0.693. This means that there is a positive relationship between PU and the intention to adopt m-commerce.

Third hypothesis testing:

H3: Privacy has no direct significant effect on the intention to adopt m-commerce in Jordanian Telecommunication Company.

As shown in Table 5 the value of significant is 0.000 which is less than 0.05 so the null hypothesis is rejected. So we can say that privacy has a significant effect on the adoption of M-commerce by Jordanian telecommunication companies. Also the privacy explain 75.8% of the effect on the intention to adopt m-commerce. Finally we can see positive relationship between privacy and the intention to adopt M-commerce.

Fourth hypothesis testing:

H4: Compatibility of E-Commerce adoption has no direct significant effect on the intention to adopt m-commerce in Jordanian Telecommunication Company.

As shown in Table 5 the value of significant is 0.022 which is less than 0.05. So alternate hypothesis is accepted, which means that compatibility has a significant effect on the adoption of m-commerce by Jordanian telecommunication companies. R² value shows that compatibility explain 44.4% of the effect on the intention to adopt m-commerce and the increase of compatibility by one unit will improve the intention of adopt m-commerce by 0.667. This means that there is a positive relationship between compatibility and the intention to adopt m-commerce.

Table 5: Results of testing hypothesis according to t-test

Variable	t-calculated	Significance*	Degrees of freedom	R ²	Regression equation
PU	3.860	0.001	152	0.353	Y = 1.765 + 0.629X
PEOU	7.880	0.000	152	0.401	Y = 1.396 + 0.693X
Privacy	9.751	0.000	152	0.758	Y = 0.494 + 0.694X
Compatibility	2.315	0.022	152	0.444	Y = 1.490 + 0.667X
Government policy	2.521	0.013	152	0.534	Y = 1.383 + 0.731X
Legal protection	8.502	0.000	152	0.827	Y = 0.485 + 0.802X
Risk	13.603	0.000	152	0.527	Y = 01.444 - 0.7142X
Cost	5.729	0.000	152	0.545	Y = 01.630 - 0.609X
Social-culture values	2.488	0.014	152	0.611	Y = 1.044 + 0.825X

Fifth hypothesis testing:

H5: Government policy has no direct significant effect on the intention to adopt M-commerce in Jordanian Telecommunication Company.

As shown in Table 5 the value of significant is 0.013 which is less than 0.05 so alternate hypothesis is accepted. So government policy has a significant effect on the adoption of m-commerce by Jordanian telecommunication companies. Table 5 also shows that government policy explain 53.4% of the effect on the intention to adopt m-commerce and the increase of government policy by one unit will improve the intention of adopt m-commerce by 0.731. This means that there is a positive relationship between government policy and the intention to adopt m-commerce.

Sixth hypothesis testing:

H6: Legal protection has no direct significant effect on the intention to adopt M-commerce in Jordanian Telecommunication Company.

As shown in Table 5 the value of significant is 0.000 which is <0.05 so the null hypothesis is rejected, so legal protection has a significant effect on the adoption of M-commerce by Jordanian Telecommunication Companies. Table 5 and based on R² value shows that legal protection explain 82.7% of the effect on the intention to adopt M-commerce and the increase of legal protection by one unit will improve the intention of adopt M-commerce by 0.802. This means that there is a positive relationship between legal protection and the intention to adopt M-commerce.

Seventh hypothesis testing:

H7: Risk has no direct significant effect on the intention to adopt m-commerce in Jordanian Telecommunication Company.

The value of significant is 0.000 which is less than 0.05 so the null hypothesis is rejected. This means that risk has a significant effect on the adoption of m-commerce by Jordanian telecommunication companies. Risk explains 52.7% of the effect on the intention to adopt M-commerce and the increase of risk by one unit

will decrease the intention of adopt m-commerce by 0.714. This means that there is a negative relationship between risk and the intention to adopt M-commerce.

Eight hypothesis testing:

H8: Cost has no direct significant effect on the intention to adopt m-commerce in Jordanian Telecommunication Company.

The value of significant is 0.000 which is less than 0.05 so the null hypothesis is rejected. So cost has a significant effect on the adoption of M-commerce by Jordanian telecommunication companies. Table 5 also shows that cost explain 54.5% of the effect on the intention to adopt M-commerce and the increase of cost by one unit will decrease the intention of adopt M-commerce by 0.629. This means that there is a negative relationship between cost and the intention to adopt M-commerce.

Ninth hypothesis testing:

H9: Social and culture values has no direct significant effect on the intention to adopt M-commerce in Jordanian telecommunication company.

As shown in Table 5 the value of significant is 0.014 which is less than 0.05 so the null hypothesis is rejected. So social and culture values has a significant effect on the adoption of M-commerce by Jordanian telecommunication companies. R² value means that social and culture values explain 61.1% of the of the effect on the intention to adopt m-commerce and the increase of social and culture values by one unit will improve the intention of adopt m-commerce by 0.825. This means that there is a positive relationship between social and culture values and the intention to adopt M-commerce.

CONCLUSION

This research purposed new revised and extended mobile commerce technology adaption model, the model is valid, the validation was confirmed using Loading Factor and Kaiser-Mayer-Olkin (KMO). The empirical results significantly shows that Perceived Usefulness (PU), Perceived Ease of Use (PEOU), privacy, compatibility, Government policy, legal protection, risk, cost and social-culture values factors

have a direct effect on the adoption of mobile commerce by Jordanian telecommunication companies. This research also find that those factors are different in their effect in the mobile commerce adoption decision where Legal protection factor has the highest impact in mobile commerce adoption decision while Perceived Usefulness (PU) factor has the lowest impact in making such decision. The result also shows that there is a positive relationship between all study factors and the intention to adapt mobile commerce except for risk and cost factors.

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