

USER ACCEPTANCE OF A GOLD DINAR BASED ELECTRONIC PAYMENT SYSTEM

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Abstract

This study is intended to solve a few constraints existed in physical gold dinar when used as a form of payment. One dinar is equal to 4.25 gram of fine gold. Specifically, this work proposes the use of e-commerce technology to solve those constraints. But before the actual system can be implemented, this research seeks to find out whether or not the public would be ready to adopt the concept of an electronic dinar payment system. The research framework is based on Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003). It measures the user acceptance based on these constructs; *performance expectancy*, *effort expectancy*, *social influence*, *facilitating conditions*, *behavioral intention to use*. In addition, *anxiety* and *perceived credibility* are added as two new constructs. Data collection is based on a questionnaire survey. From the descriptive analysis results, it is discovered that most of the respondents participated in this survey generally agree with the idea of using the proposed dinar based payment system (mean rating of above 4.00).

Keywords: *Electronic Payment Systems, Inflation, Monetary Economics, Gold Dinar*

1. INTRODUCTION

With the prices of gold and silver having hit a new “all-time” high in April 2011, our society has begun to take notice and thus started to ponder on the importance of the two precious metals (gold and silver). Barisheff (2006) has reported that the US dollar has lost 82% of its purchasing power, as measured by the Consumer Price Index (CPI) since 1971. He further illustrated that if 100 widgets can be bought with \$1 in 1971, only 18 of such widgets can be bought for \$1 in 2006. Mathematics calculation will reveal something even more startling. Back then in 1971 the price of gold was \$35 per ounce (Lewis, 2007). At its highest price (21 April 2011), we need to fork out \$1,507 (Kitco Inc., 2011) to buy exactly the same one ounce of gold. Thus from 1971 to 2011 (in 40 years), in terms of US dollars, the inflation has gone up by 4205.71% i.e. $(1507-35)/35 \times 100\%$. Or equivalently, for the duration of 40

years, the US dollar has lost 4205.71% of its purchasing power. The strength of purchasing power in gold and silver has become known facts by now and it is widely discussed in many literatures (Lewis, 2007; Meera, 2002; Turk and Rubino, 2004).

2. ISSUES RELATED TO PHYSICAL DINAR COINS

But there is one obvious problem with gold (dinar) when compared to fiat currencies or paper money; it is physically heavier and thus difficult to be carried around for normal daily transactions. For instance, to carry around in one's pocket a 10 dinar (42.5 gram of gold) would be a reluctant experience for many people. Moreover, due to the softness (malleability) of the precious metal, dinar will also be subjected to continuing "wear and tear" process if it was to be used repeatedly among the masses; whether it is done intentionally or otherwise. It was reported in Paarlberg (1993) that during the civilization of the Roman Empire, their ordinary citizens would clip the precious metal from the empire's coins perimeter in order to steal some of the value stored in the coins. He further wrote that slaves during that time "sweated" the coins by jiggling them in woolen bags hour after hour in order to wear-off some of the gold. The bags were then burned to separate the gold from the ashes. Another issue that needs to be addressed would be how to identify the purities of dinar denominations in each transaction such that fraud and cheating cases would be minimized and if possible, totally prevented. Mechanisms to facilitate or possibly bypass the unnecessary checking of purities for each transaction should be included in the dinar based electronic payment system in order to make it realistically acceptable by users. The fourth issue is the divisibility limitation associated with the dinar. In today's price, the value of 1 dinar is in the range of RM700-RM740 a piece, thus making it impractical for buying of a small-priced item. The dirham (silver) denomination is supposed to cater these small-priced transactions. Nevertheless if users still insist on using the dinar still, then the proposed system must be able to offer that small-priced transactions in dinar. Last issue that needs addressing is the possible consumer losses due to the difference in selling and buying prices, which is known as "spread". In practice, the spread will be from 3% to 5% on average (for one dinar), charged by gold/dinar sellers to form a profit. In this case, it is not profitable for consumers to use the dinar based payment system immediately after buying it. This is because shop owners would only buy back the same dinar at the "buying price", which is always lower than the "selling price". Table 2.1 below illustrates this point:

Table 2.1

Customer would stand to lose out due to the practice of "spread" by shop owners.

Item	Selling price	Buying price	Spread
1 dinar	RM735	RM700	RM35 (or 5 %)
	Initially, customers buy dinar at this price.	For payment, shop owners would only accept the same dinar at this lower price.	Thus, if use immediately, customers will lose out RM35 in value because of this spread.

Obviously this "spread" issue needs to be solved or else it would be unprofitable and thus impractical for customers to use the proposed dinar based electronic payment system.

Therefore, those issues of portability, wear and tear, purity concern, divisibility and the dinar spread -- all of them must be properly addressed in order for gold dinar payment to be widely accepted by the public. In particular, this work would focus on using the e-commerce

technology in a form of an electronic payment system to solve a few physical limitations associated with gold dinar. The reason to introduce the electronic commerce technology in dinar is because it offers several advantages that the physical (brick-and-mortar) methods of dinar transactions simply could not offer.

3. REAL PRICES BASED ON SECONDARY DATA

In order to be as close to a practical situation as possible, this study uses actual data (from real Malaysian market) to show the superior performance of gold's purchasing power as compared to that of Ringgit Malaysia (RM). Prices of a few inflationary items are shown in RM as well as their corresponding prices in dinar (gold) or dirham (silver). In this case, the price performance (purchasing power) between these two competing currencies can be compared side by side. The readers can therefore make a straight-forward comparison on the performance of purchasing power between fiat currency and that of sound money (dinar and dirham).

Tables 3.1 to 3.4 below illustrate the performance of dinar as compared to the performance of fiat currency (i.e. RM) for various critical consumer items and services. It is to be noted that dinar is to be used for high-valued items whereas dirham is used for low-valued items. Table 3.5 shows salary comparison -- paid in dinar versus paid in Ringgit Malaysia (RM).

Table 3.1: Fuel price comparison (RM and Dinar)

Petrol (50 liter)	RM	Dinar
2000	60.00	0.428
2009	90.00	0.178
Price increase/decrease	+ 50%	- 58%

Diesel (50 liter)	RM	Dinar
2000	35.50	0.253
2009	85.00	0.168
Price increase/decrease	+ 139%	- 34%

Note:

- ❖ Prices of gold are USD270 and USD1050 respectively per ounce in Oct. 2000 and Oct. 2009 (London fix).
- ❖ Prices of petrol are RM1.20 and RM1.80 respectively per liter in 2000 and 2009.
- ❖ Prices of diesel are RM0.71 and RM1.70 respectively per liter in 2000 and 2009.

Table 3.2: Electricity price comparison (RM and Dinar)

Electricity (Domestic, 300kWh)	RM	Dinar
2000	69.40	0.495
2009	72.50	0.233
Price increase/decrease	+ 4%	- 53%

Electricity (Commercial, 3000kWh)	RM	Dinar
2000	864.00	6.163
2009	969.00	3.114
Price increase/decrease	+ 12%	- 49%

Note:

- ❖ Prices of gold are USD270 and USD1050 respectively per ounce in Oct. 2000 and Oct. 2009 (London fix).

Table 3.3: Construction items price comparison (RM and Dinar)

Cement (100 kg)	RM	Dinar
2005	25.00	0.115
2007	29.00	0.090
Price increase/decrease	+ 16%	- 21%

Steel (1 ton)	RM	Dinar
2005	1800.00	8.254
2007	2100.00	6.551
Price increase/decrease	+ 17%	- 21%

Note:

- ❖ Prices of gold are USD420 and USD690 respectively per ounce in 2005 and 2007 (London fix).

Table 3.4: Cost of Hajj in RM and Dinar

Cost of Hajj (lowest package)	RM	Dinar
2002	13,500	93.53
2009	19,990	39.53
Price increase/decrease	+ 48.1%	- 57.7%

Note:

- ❖ Prices of gold are USD278 and USD1050 respectively per ounce in 2002 and 2009 (London fix).
- ❖ Cost of Hajj is based on the lowest THTS package as per stated in TH Annual Report.
(TH: Tabung Haji, THTS: TH Travel & Services)

Table 3.5: Salary Comparison in RM and Dinar

Salary Paid (Malaysia)	Dinar	RM
Jan 1992	15.50	*1800
Jan 2007	15.50	4968
Feb 2009	15.50	6975
Oct 2009	15.50	7838

Note:

- ❖ Price of gold in Jan. 1992 is USD340 per ounce.
- ❖ Price of gold in Jan. 2007 is USD690 per ounce.
- ❖ Price of gold in Feb. 2009 is USD915 per ounce.
- ❖ Price of gold in Oct. 2009 is USD1050 per ounce.
- ❖ *RM1800 is a starting salary for a fresh engineer in Malaysia in 1992.
(All gold prices are based on London fix price)

It is to be noted that oil and electricity prices are two inflationary items whereby any price increase in these two items will subsequently give rise to prices of other daily food items (Barisheff, 2006; Leeb and Strathy, 2006). Similarly, construction items will give subsequent price rise to construction-related markets such as commercial (office) and residential (house) buildings. As for the case of salary, Table 3.5 clearly shows that dinar preserve the value of salaries over time. Apparently, salaries paid in dinar appreciate over time automatically, even without annual increments.

It should be noticed from the tables above that the performance of dinar is much superior as compared to that of RM (or other fiat money). Apparently in all tables, what appears to be a “price increase (inflation)” in RM is merely a “price decrease” in dinar. It becomes obvious from the above tables that dinar (gold) is able to preserve their “intrinsic value”; whereas the paper (fiat) money simply could not do that.

4. RESEARCH FRAMEWORK BASED ON UTAUT MODEL

An understanding of technology acceptance models is very important in order to fully appreciate why one model is chosen over the other. Researchers are always confronted with choosing the most appropriate model for their particular researches. Often times, they must “pick and choose” constructs among the various models available. Alternatively, they may choose one “favored model” and largely ignore the possible contributions from other models. Effort by Venkatesh et al. (2003) to solve this predicament is greatly welcomed among the information system (IS) research circles. His team has introduced and tested the new and unified model, known as Unified Theory of Acceptance and Use of Technology (UTAUT) which integrates the previous eight (8) models used in technology acceptance studies. Those eight models are: Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), Motivational Model (MM), Theory of Planned Behavior (TPB), a model which combines TAM and TPB (C-TAM-TPB), Model of PC Utilization (MPCU), Innovation Diffusion Theory (IDT), and Social Cognitive Theory (SCT).

With the objective of introducing a comprehensive model that considers all variables included in the previous eight prominent models, Venkatesh et al. (2003) developed a research to empirically compare and test each of the constructs in those models. Their research has found that the eight previous models were able to explain (between) 17 percent to 53 percent of the variance in user intentions (that is, to use information technology). Subsequently, a unified model (UTAUT) that integrates elements across the eight models are thereby formulated and empirically validated. With UTAUT, it is found the model had outperformed the previous eight individual models (adjusted R^2 of 69 percent). Later, UTAUT was validated with data from two new organizations; it still gave very similar results (adjusted R^2 of 70 percent). Having had this substantial improvement over its predecessors, UTAUT would thus provide a very useful tool in order to assess the likelihood acceptance factors of introducing a new technology.

Therefore, the research framework for this work is adapted from UTAUT with two additional variables added. This study intends to find out the consumer acceptance of electronic dinar payment system based on the four original constructs of UTAUT model. Those constructs are performance expectancy, effort expectancy, social influence, and facilitating conditions. This research also intends to find out how significant is the contributions of moderators in this case. Out of four moderators in the original UTAUT model, only three would be applied in this study. Those three moderators are gender, age, and experience while the fourth moderator (voluntariness of use) is not included since the proposed electronic dinar payment system would be purely voluntary in nature and therefore its purpose is irrelevant in this case. The two additional variables, ‘perceived credibility’ and ‘anxiety’, are hypothesized to be very relevant to this study and therefore their influence is expected to be significant in the proposed model. Anxiety is adapted from Compeau and Higgins (1995) as well as Venkatesh et al. (2003) while perceived credibility is adapted from

Wang et al. (2003). Table 4.1 explains all constructs included in this research framework. Figure 4.1 illustrates the model of research framework used for this study.

Table 4.1 Research framework core constructs used in this study

Core Constructs	Definitions
Performance Expectancy	<p>It is defined as the degree to which an individual believes that using the system will help him or her to attain gains in job performance (Venkatesh et al., 2003).</p> <p>(In this work) The perception that using electronic dinar payment system will benefit users in terms of purchasing power, asset preservation, and safe-haven capability.</p>
Effort Expectancy	<p>It is defined as the degree of ease associated with the use of the system (Venkatesh et al., 2003).</p> <p>(In this work) The ease of using electronic dinar payment system for purchasing.</p>
Social Influence	<p>It is defined as the degree to which an individual perceives others who are important to him or her believe he or she should use the new system (Venkatesh et al., 2003).</p> <p>(In this work) The social factors which influence the public to use electronic dinar payment system.</p>
Facilitating Conditions	<p>The degree to which an individual believes that an organizational and technical infrastructure exists to support the use of the system (Venkatesh et al., 2003).</p> <p>(In this work) External factors to accomplish adoption of electronic dinar payment system such as good ICT infrastructure, government initiatives and others.</p>
Anxiety	<p>This refers to evoking of anxious or emotional reactions (negative response) when it comes to performing a specific behavior (e.g. using computers) (Compeau and Higgins, 1995; Venkatesh et al., 2003).</p> <p>(In this work) To measure the fear of the public in using electronic dinar payment system i.e. fear of password/card stolen and fear of price fluctuation, and fear of gold investment scam.</p>
Perceived Credibility	<p>To measure the security and privacy concerns on usage of electronic commerce (Wang et al., 2003).</p> <p>(In this work)</p>

To measure the data security and privacy, misuse of data, the safety of electronic dinar payment system.

Independent Variables

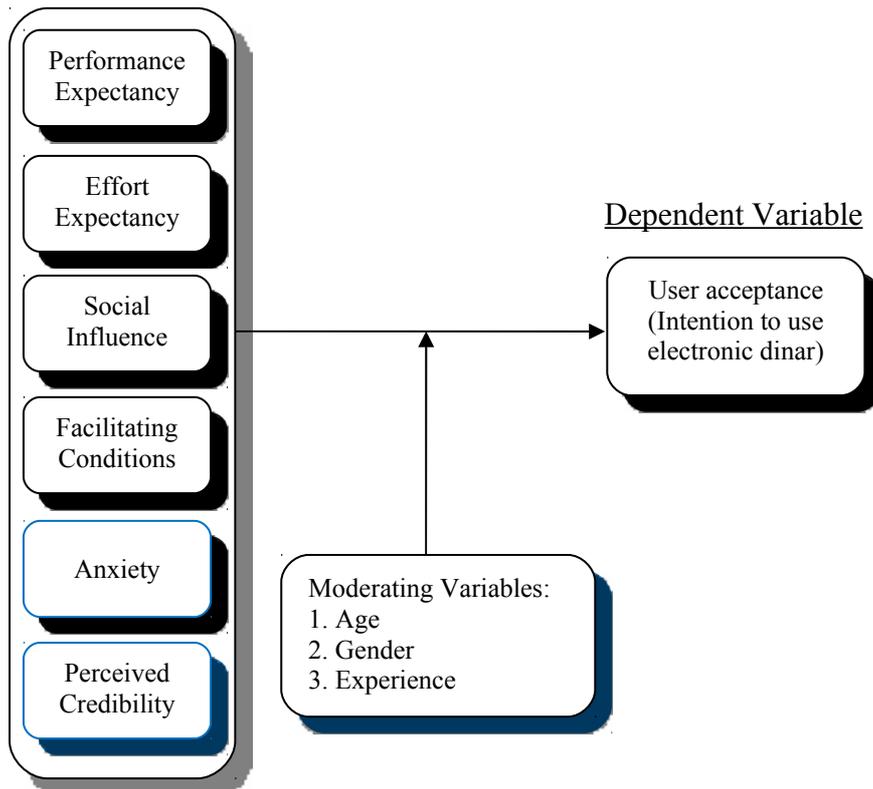


Figure 4.1: Research framework for user acceptance of electronic dinar payment system.

5. METHODOLOGY

This research is a quantitative research whereby an analysis and classification of numerical data will be collected from survey questionnaires. The questionnaires will be developed based on research frameworks which is adapted from the Unified Theory of Acceptance and Use of Technology (UTAUT) model -- with two extra variables added (anxiety, and perceived credibility). The introduction of two variables is specifically tailored to reflect the individual technology acceptance of electronic dinar payment system. All surveys consist of a closed-ended question. Respondents will only choose answers already provided with the questions.

This paper investigates the descriptive analysis results, of which the survey was distributed to 500 respondents in the Multimedia Super Corridor (MSC) area in Malaysia. The MSC area is selected because e-commerce applications are widely expected to be active

in those areas. The response rate was 87.2% (436 respondents had answered it completely). The first section of the survey contains questions related to respondents' experiences with e-commerce, gold, and dinar. Section A contains questions related to performance expectancy. Section B will have questions measuring effort expectancy. Section C will have questions related to social influence. Section D consists of questions investigating factors related to facilitating conditions. Section E investigates factors related to anxiety (concerns) of adopting the proposed electronic dinar payment system. Section F will measure perceived credibility (security and privacy concerns). Section G contains at least three questions measuring respondents' behavioural intention to use the electronic dinar payment system. The last section of the survey consists of questions related to respondents' information such as gender, race, age, monthly income, educational attainment, marital status, and employment status. A five-point Likert scale will be used to measure to what extent an individual agree or disagree to the questions being asked. Likert scale is measured as follows: '1' is for Strongly Disagree, '2' is for Disagree, '3' is for Neither agree nor disagree, '4' is for Agree, and '5' is for Strongly Agree. The SPSS software is used in this descriptive analysis of the collected data.

6. RESULTS

Table 6.1 shows the general profiles of the respondents participated in this study.

Table 6.1 Profiles of the respondents

		Frequency	Percent
Gender	Male	263	60.3
	Female	173	39.7
Age	Below 24	28	6.4
	25-39	334	76.6
	40 and above	74	17.0
Experience (buying dinar)	Yes	239	54.8
	No	197	45.2

Table 6.2 Ratings of BI and factors affecting respondents' intention to use

Performance Expectancy	Mean	SD
PE1: gold's appreciation	4.10	0.590
PE2: gold's purchasing power	4.06	0.594
PE3: protection against inflation	4.14	0.627
PE4: protection during currency crisis	4.12	0.633
PE5: accomplish payment quicker	4.00	0.678
PE6: payment efficiency	4.00	0.708
Effort Expectancy	Mean	SD
EE1: easy to use	4.02	0.509
EE2: easy to learn	3.98	0.529
EE3: easy to interact	3.97	0.558
EE4: compatibility	3.97	0.580
EE5: convenience	4.21	0.592
Facilitating Condition	Mean	SD
FC1: safe (to carry)	4.23	0.586
FC2: safety (banks keep it)	4.22	0.583

FC3: 'wear and tear' issue	4.24	0.567
FC4: protected from rubbing, clipping	4.23	0.611
FC5: purity issue	4.18	0.722
FC6: divisibility issue	4.14	0.754

Social Influence	Mean	SD
SI1: people who influence	3.90	0.542
SI2: people who are important	3.90	0.584
SI3: family factor	3.86	0.618
SI4: friends factor	3.85	0.620
SI5: people who understand gold's value	4.16	0.641
Perceived Credibility	Mean	SD
PCR1: personal information	4.17	0.743
PCR2: secured transactions	4.19	0.661
PCR3: companies should be trustworthy	4.51	0.641
PCR4: services own by owned by government	4.20	0.898
PCR5: services operated by major banks	4.35	0.707
PCR6: backed by physical dinar coins	4.47	0.589
PCR7: physical dinar coins withdrawal allowed	4.47	0.573
PCR7: widely accepted	4.52	0.561
Anxiety	Mean	SD
ANX1: gold investment scam	4.26	0.873
ANX2: computer hacking	4.27	0.768
ANX3: gold price fluctuation	3.86	1.027
ANX4: losing card or password	3.48	1.137
ANX5: lack of internet and computer skills	1.91	1.245
Behavioral Intention (BI)	Mean	SD
BI1: intend to use	4.02	0.507
BI2: predict to use	3.98	0.542
BI3: plan to use	4.03	0.556

7. DISCUSSION

Overall, most of the respondents in this pilot study would agree on the idea of using electronic dinar payment system. This is based on their ratings of behavioral intention to use which range from 3.98 to 4.03 (mean rating of 4.01). This is a positive result and in agreement with the ratings of independent variables that are supposed to influence it. The ratings of those independent variables will be discussed next.

Performance Expectancy

It can be concluded that the respondents agree with the performance expectancy construct (Table 6.2) with its ratings range from 4.00 to 4.14. The first four items with ratings greater than 4.00 show that most respondents agree with the advantage of electronic dinar in terms of appreciating values, purchasing power, inflation proof and "safe haven" capability. The last two factors in this construct carry slightly lower influence with ratings of only 4.00 for both of them. The two factors show that a few respondents are still not sure whether or not the system would be effective. This skepticism is understood since the actual electronic dinar

payment system is not there yet in the market and therefore they have no experience of using the system.

Effort Expectancy

Most of the respondents agree that electronic dinar payment system would be easy to use, learn, and interact if it is similar to existing electronic payment systems (ratings of 3.97 to 4.02). The 4.21 rating on the last factor in this construct (convenience) shows that they would agree using electronic dinar would be more convenient compared to using physical dinar coins.

Facilitating Condition

This construct has scores of >4.00 in all of their factors (six of them). The range is from 4.14 to 4.24. Those factors that can facilitate the effective usage of electronic dinar payment system are explored in this construct. So it is not surprising, this construct carries high ratings. Please refer to Table 6.2 for factors influencing this construct.

Social Influence

There appears to be a mixed perception from respondents whether factors from this construct could influence their acceptance of electronic dinar payment system. Among the first four factors, the 'people who influence' and 'people who are important' factors carry the highest rating (3.90). Family and friends items carry slightly lower influence (ratings 3.86 to 3.85 respectively). However, most of them agree with the perception that those who understand the true value of gold would likely use this system (rating 4.16).

Perceived Credibility

This is another construct which has scores >4.00 in all of their factors (ratings from 4.17 to 4.52). Most of the respondents agree that perceived credibility is an important construct that will determine whether or not they intend to accept the proposed electronic dinar payment system in the future.

Anxiety

Most of the respondents are sure that they would be afraid to use the proposed electronic dinar system due to the many cases of gold investment scam and also due to problems with hacking in computer/payment systems (ratings of 4.26 and 4.27 respectively). For factors 3 and 4 i.e. afraid of gold price going down and afraid of losing card or password, respondents are pretty much undecided in their opinions (mean 3.86/SD=1.027 and mean 3.48/SD=1.137 respectively). However, most of them disagree with factor 5 i.e. they are not afraid of lacking internet and computer skills (rating 1.91). The standard deviation of 1.245 in factor 5 indicates that respondents are quite dispersed in opinion with regards to this factor.

8. CONCLUSION AND LIMITATIONS

This research added a new research framework to an acceptance study of a dinar system in Malaysia, particularly in the study of the electronic version of dinar payment system. The framework for this research is adapted from UTAUT model with an addition of two new constructs; to suitably explore the 'intention to use' of an electronic dinar payment system. This study discovered that most of the respondents generally agree to accept the idea of using the proposed electronic dinar payment system. Apparently, it is found that certain factors are perceived to have stronger influence than the others. This is generally expected in

any information system (IS) acceptance studies whereby different factors do exert various degree of influence on different constructs. The performance expectancy, facilitating condition, and perceived credibility carry the most weight (4.00 and above) among all of the constructs. It is expected that researchers and practitioners in dinar and dirham institutions would benefit from this study. This result has given an early indication as to what would be the public's acceptance of dinar and dirham in the near future. This research is limited in its generalization due to the fact that the data were taken only in the Multimedia Super Corridor area. The results would have been more significant if the survey data is covered for the whole Malaysia. Furthermore, due to the constraints on the length of the paper, the multiple regression analysis and the effects of moderating variables (such as age, gender, experience) have not been examined in this descriptive study. These two limitations will be taken up in later stage of this research.

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