FACTORS INFLUENCING THE USE OF LAGAS SOFTWARE IN GOLD TRADING

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Abstract

The aim of the study is to investigate factors in the use of Lagas software in the Thai gold industry. Lagas is a software package designed for the Thai gold industry, offering trading assistance facilities such as inventory control and asset tracking, improving tracking and tracing of custom purchases and jewelry gold custom designs, and offering pricing and income estimation. The theoretical basis of the Technology Acceptance Model (TAM) was used to explain adoption of the software package, with external variables including computer self-efficacy and IS budget. A user survey was conducted of gold traders in Thailand using Lagas (n= 350). Structural equation modeling (SEM) was used to assess the TAM model in relation to the software adoption. Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) were influenced by self-efficacy, and influenced Attitude. Attitude and Information Systems (IS) Budget influenced Behavioral Intention (BI). This was consistent with the expectations of the theoretical framework and extended variables.

Keywords: Technology Acceptance Model (TAM); gold industry; business management software

Factors Influencing the Use of Lagas Software in Gold Trading

This research examines the use of the Lagas software product in the gold market of Thailand. It is a copyright software. Thailand's gold market has a mixed history. As recently as 2013, Thailand's investment gold market was one of the fastest-growing markets in the world, driven by a threatened devaluation of the Thai baht (World Gold Council, 2014). This resulted in a 32% increase in gold demand to 20.4 tonnes, almost all of which was demand for investment gold, for a total market value of USD$837 million (World Gold Council, 2014). However, the market has not held this level of demand. The total demand for gold in the Thai market at year-end 2015 was 90.2 tonnes (World Gold Council, 2016). However there is a downward trend in place now, with Q2 2016 demand down 5% year-on-year (World Gold Council, 2016). This reflects the volatile conditions that the gold business must deal with in Thailand. There are also a number of operational difficulties that gold traders may deal with. Informal interviews with gold traders and market operators indicates that they face problems such as loss of assets or shrinkage (including cash, gold, and old gold), difficulty managing made-to-order gold and tracking custom jobs, problems counting and controlling inventory, difficulty in predicting initial costs and real income due to the rapidly fluctuating gold price, inability to encourage trust for customers, and lack of artificial intelligence-based business tools that are common in other markets. These difficulties are not reflected in the academic literature, with most studies on gold trading focused on market conditions rather than trader operations. However, these problems are similar to other operational contexts, where introduction of operation management software has been effective (Beck and Peacock, 2009; Medal et al., 2009; Slack et al., 2010). The reason for conducting this research is to examine whether gold traders in Thailand have adopted tools for managing these issues.

Research Aims and Objectives

The aim of this research is to investigate factors influencing the use of Lagas Software in the gold business in Thailand. Lagas is one of a number of gold business management software packages available on the open market, which has been specifically designed for the Thai market. The objectives of the study include:

1. Examining the factors in gold business management software adoption using Lagas as a case study; and
2. Making recommendations for gold business practice.

Literature Review

Lagas software and competitors

Lagas Gold is a software and hardware bundle specifically designed for gold retail management (Lagas Gold, 2016). The Lagas system includes comprehensive asset and inventory management for different types of gold jewelry and investment-grade gold, including new gold, old gold (or scrap gold), custom order tracking and tracing (enabling the merchant to accept custom orders), and pricing algorithms designed to allow the merchant to accurately estimate price and profit (Lagas Gold, 2016). Features of the software also include extensive reports, which can be used by the store manager to track the firm's financial outcomes; a customer information system, enabling customer relationship management (CRM); and careful inventory and asset control rules that limit access to specific employees for security (Lagas Gold, 2016). The accompanying hardware system includes Radio frequency identification (RFID)-based inventory tagging systems, including hand-held readers and stock-check stations (enabling remote stock checking in a secure area from the sales locations), as well as biometric retina and facial recognition scanners to carefully control access (Lagas Gold, 2016). Thus, Lagas offers a comprehensive gold retail management package intended to improve inventory management and reduce costs as well as providing pricing, customer, and other information.

In addition to Lagas, there are a number of other gold business management software packages available in Thailand (Table 1). There is also the option of using a standard inventory control and sales management system from a company like Agency Genius (Agency Genius, 2016). These products have significant overlap with the Lagas software package, although some of the packages are not as comprehensively designed. Thus, Lagas does face competition in the market. However, as the comparison shows, none of the other software packages have as comprehensive a set of tools and utilities designed for gold traders.

Table 1: The Comparison of Software Package Features

Package	Features							
	Pricing	Stock Control	Inventory Management	CRM System	Stock Queries	Sales Management	Exchange Trading System	Gold Savings Accounts
Lagas Gold	✓	✓	✓	✓	✓	✓		
Quark301 Goldshop Management	✓	✓	✓	✓	✓			
Business Solution Soft (BSS) Gold System				✓		✓	✓	✓
Juzz Soft System			✓					

Technology Acceptance Model (TAM)

This research uses the Technology Acceptance Model (TAM) as the theoretical basis for explaining adoption of gold software. The TAM was proposed by Davis (1989), initially to explain the adoption of workplace computing technology (Davis, 1989). The TAM is an attitude-behavior theory of human action, in which the outcome or behavior (in this case adoption of a form of technology) is dependent on attitudes, or general predispositions related to the behavior (Venkatesh et al., 2012). Within the TAM, the attitudes that influence the adoption and use of technology are specific to the technology, including perceived usefulness (PU) and perceived ease of use (PEOU) (Chuttur, 2009). The original TAM (Figure 1) has been adapted and changed several times, with extended or evolved models including the TAM-2, TAM-3, and UTAUT models (Chuttur, 2009; Venkatesh et al., 2012). For this research, the basic TAM was used as the research framework, since this is the model that has most commonly been used (Chuttur, 2009). The basic components of the TAM include:

- External variables: Contextual variables that influence PU and PEOU;
- Perceived usefulness (PU): The extent to which the user believes the technology can help them accomplish a given task or job;
- Perceived ease of use (PEOU): the level of effort the user perceives will be required to learn and use the technology;
- Attitude toward using (A): The user's cognitive and affective dispositions regarding the technology and whether they should use the software;
- Behavioral intention to use (BI): the user's formed belief that they should use the technology; and
- Actual system use: Whether the user actually adopts the technology (Chuttur, 2009; Davis, 1989).

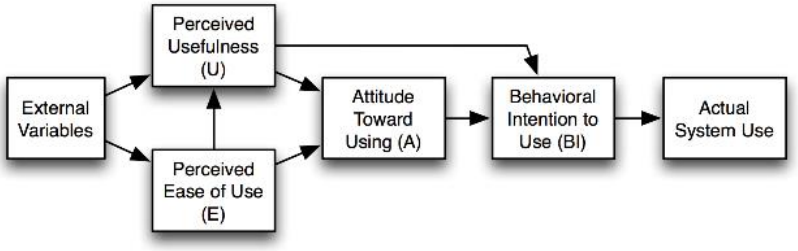

Figure 1: The Technology Acceptance Model (TAM) *(Source: Adapted from Davis (1989) and Chuttur (2009))*

TAM and software use in small firms

The TAM was initially designed to assess user willingness to adopt information systems in the workplace (Davis, 1989). Thus, it is well suited to this study, given that understanding the adoption of workplace technology is the goal of this study. Several previous studies have also supported the role of PU and PEOU in the use of occupational and business management studies. For example, one group of authors examined behavioral intention and actual use of an enterprise resource planning (ERP) system (Shih and Huang, 2009). These authors' study is unusual because it follows through to actual use, whereas most studies on technology acceptance stop at the BI stage (Chuttur, 2009). The authors surveyed a broad industrial group of ERP users (n = 165), including self-efficacy, top management support, anxiety, PU, PEOU, BI and Usage. They used Linear Structural Relations (LISREL) analysis to examine the data. They found that top management support affected computer self-efficacy, computer anxiety, PU and PEOU. However, while self-efficacy significantly influenced PEOU, there were no other significant effects of self-efficacy or anxiety. PEOU and PU both had significant relationships to BI, while BI had a significant relationship to actual usage (Shih and Huang, 2009). Thus, this study supported the basic research model of TAM and suggested some possible external variables that would influence computer technology adoption. Given the features of the Lagas software package (discussed below) a study on intention to use biometric devices is also relevant (James et al., 2006). These authors surveyed a sample of technology professionals, including

extended variables of perceived need for privacy, perceived need for security, and perceived physical invasiveness. Taken together with the original TAM variables, the authors noted that the outcome adequately predicted BI (James et al., 2006). Another study examined the organizational context of online transaction processing by small businesses, incorporating information systems maturity, formalization, and IS budget, finding that the core TAM factors and the extended factors explained technology adoption. (Dembla et al., 2007).

There are some critiques of TAM for predicting adoption of business software. One of these critiques is that the TAM is directed at the individual, and does not take into account the organizational complexity or demands of technology use (Parker and Castleman, 2009). For example, it does not take into account the factors that influence software adoption like supplier or customer demands or organizational resources and limitations (Ramdani et al., 2013). Furthermore, adoption may not be voluntary, and organizational conditions like available training may influence effective use (Marler et al., 2006). Thus, the TAM is *not* a complete model for understanding technology adoption, but it does provide insight into the utilitarian features of the technology itself and how this drives adoption, making it useful for the current study.

Conceptual Framework and Hypotheses

The conceptual framework (Figure 2) combines the original TAM framework (Chuttur, 2009; Davis, 1989) with one individual and one organizational external variable. These variables were selected given the context of most Thai gold businesses, which are relatively small and have few employees and a relatively small budget. The hypotheses of the research based on the core TAM (Chuttur, 2009; Davis, 1989) are:

- Hypothesis 1: PU will influence Attitude toward using Lagas software;
- Hypothesis 2: PEOU will influence Attitude toward using Lagas software;

- Hypothesis 3: Attitude toward using Lagas software will influence BI to use the software.

An additional hypothesis is based on Shih and Huang (2009):

- Hypothesis 4a: Computer self-efficacy will influence PU.
- Hypothesis 4b: Computer self-efficacy will influence PEOU.

Finally, Hypothesis 5 is based on Dembla et al. (2007):

- Hypothesis 5: IS budget will influence BI to use the software.

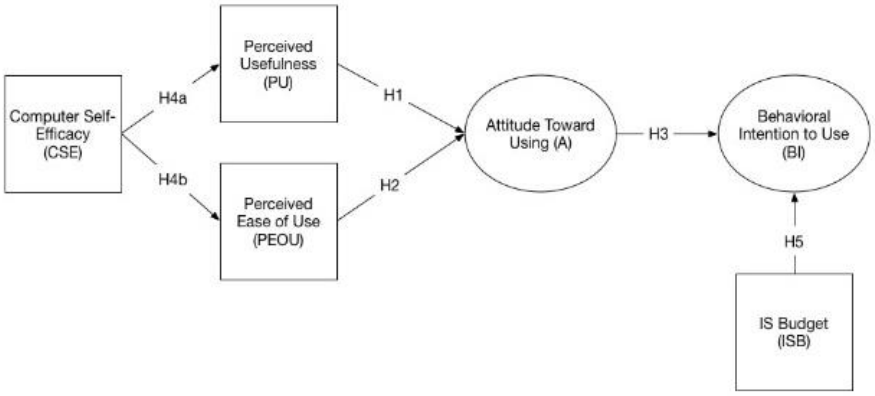

Figure 2: Theoretical Framework

Methodology

The target population of this study was Lagas customers. The sample size was n = 350 customers. The sample was selected by sending invitations to all Lagas customers (approximately 450 firms). The firm's customer group was emailed an invitation to participate in an online survey. The questionnaire included 26 items, including: Firm characteristics (3 items); IS Budget (3 items); Computer Self-efficacy (6 items); Perceived Usefulness (6 items); Perceived Ease of Use (5 items); Attitude Toward Using (3 items); and Behavioral Intention to Use (BI) (3 items). Analysis was conducted using structural equation modeling (SEM) in SPSS AMOS. SEM was selected because it is a reliable analysis technique intended for full-model estimation

and assessment, rather than the isolated estimations achieved through individual regression models (Schumacker and Lomax, 2016). SEM is a confirmatory technique, and as a result the structural model was tested as described above (Kline, 2016). Model fit criteria and outcomes (Table 2) demonstrate that the model as specified was adequate for the purposes of the study. Individual parameter estimates are assessed at $p < 0.05$ (Kline, 2016).

Table 1: Model Fit Criteria for SEM Process *(Source for acceptance levels: Kline, 2016; Schumacker and Lomax, 2016)*

Criterion	Acceptance Level	Model Outcome
Chi-squared (χ^2)	$p < 0.05$	7.125 ($p = 0.003$)
Goodness of fit index (GFI)	≥0.90	0.925
Adjusted goodness of fit index (AGFI)	≥0.90	0.933
Root-mean square error of approximation (RMSEA)	≤0.05	0.032
Standardized RMR (SRMR)	≤0.05	0.028
Normed fit index (NFI)	≥ 0.90	0.910

Results and Discussion

The standardized regression coefficients (Table 3) were used to build the SEM model and allow for comparison. All relationships tested were significant to at least $p = 0.05$. However, the coefficients show that there were significant differences in the extent of contribution of each of the factors based on the final outcomes.

Table 2: Standardized Regression Weights of Proposed Relationships

Predictor	Outcome Variable	Coefficient
CSE	PU	0.22551*
CSE	PEOU	0.52848**
PU	A	0.52932**
PEOU	A	0.46353**
A	BI	0.38566**
IS	BI	0.42382**

Note: * Significant at $p < 0.05$ ** Significant at $p < 0.01$

The path model (Figure 3) demonstrates the relationships proposed. The basis of the TAM (Hypotheses 1 through 3) are at the center of the model. The path coefficients of PU->A (0.53) and PEOU->A (0.46) were both significant, with a somewhat higher coefficient for PU->A. This is not unusual in TAM research, which has found inconsistent relationships between PEOU and A and BI, with the influence of PEOU depending on the nature of the technology, users and context (Parker and Castleman, 2009). There was also a significant positive coefficient for the A->BI path (0.39), indicating that attitude toward using Lagas software does have a positive influence on the consumer's decision to use the software. Thus, the first three hypotheses (H1, H2, and H3) were proved, demonstrating that the core of the TAM was effective here, as it has been in other studies of business-based software technology adoption (Chuttur, 2009; Dembla et al. 2007; James et al. 2006; Shih and Huang, 2009).

The influence of computer self-efficacy is also significant for both the CSE->PU path (0.23) and the CSE->PEOU path (0.53). While both had a positive relationship, CSE had a stronger influence on PEOU than it did on PU. This is consistent with the findings of Shih and Huang (2009), who found that CSE had a significant impact on PEOU (although not on PU). It is possible that CSE influences PEOU but not PU because PUis more determined by contextual

situations and demands, while PEOU relates to the individual's own efficacy (Marler et al. 2006). Based on these findings, H4a and H4b were both accepted.

The final relationship that was studied was IS->BI (0.43). This outcome shows that IS budget (IS) actually has a stronger effect on BI than A (the core TAM variable), although both were significant. Thus, H5 was accepted. This outcome can be explained through reference to the critiques of the TAM, which have pointed out that organizational and contextual factors can be just as important, if not more important, than individual attitudes toward software adoption in a business context (Marler et al. 2006; Ramdani et al. 2013). Consideration for the IS budget was taken from Dembla et al. (2007), who pointed out that particularly in small and medium enterprises (SMEs), the actual implementation of a software package was heavily dependent on whether the firm had the resources, including budget and internal expertise, to implement the change. Internal expertise was not included in this research because of the nature of Lagas, which is a supported software-hardware bundle not requiring extensive in-house IS expertise (Lagas Gold, 2016). However, it does have a significant implementation cost, and since most gold firms in Thailand are relatively small this could be a serious factor in adoption. Thus, it is surprising that the IS budget had a stronger effect than attitude to the software itself.

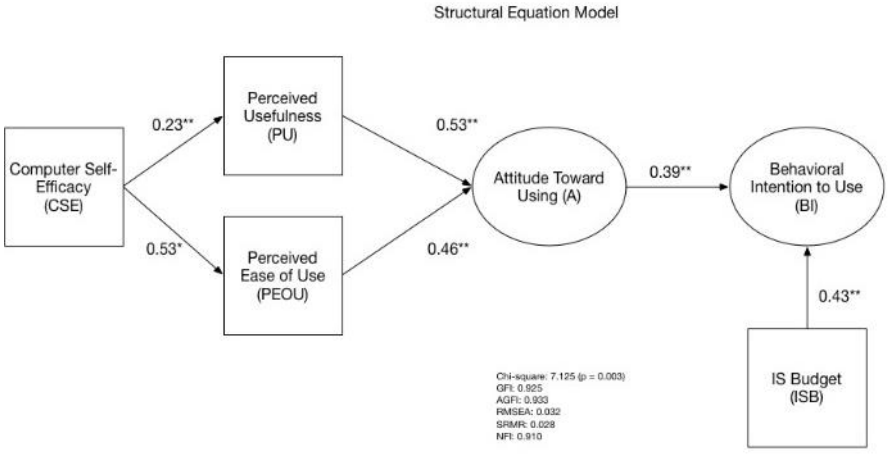

Figure 3: Structural Equation Model (Default Model)

Conclusions and Implications

This research has examined adoption of Lagas software, a specialty business management software and hardware package designed for Thai gold retailers and wholesalers. These businesses have unique operational issues, including strict inventory management and control requirements, the need to accept and manage special orders, and customer relationship and business management concerns. There are several potential software packages that could be used to meet these needs, but in many cases the alternatives do not meet all requirements. This research has shown that PU and PEOU do influence attitudes toward Lagas software, and consumer self-efficacy has an indirect effect on attitudes through PU and especially PEOU. However, while attitudes toward Lagas software influence BI to adopt the software, IS budget was a stronger influence. This strongly points to the issue of organizational context and constraints in the adoption of technology in a business environment, which has been pointed out by previous authors. This issue deserves to be taken into account more extensively in business research, particularly given that the choice of business software and its use is not without constraints. In particular, future research into technology adoption in the organization should focus less on individual preferences and perceptions of the tool and more on the organizational resources and constraints that facilitate or act as barriers to technology adoption. This type of extension would help balance the individual, organizational, and inter-organizational context of technology adoption.

This research was limited in some ways. In particular, it included only Lagas users, and did not include, for example, firms that chose a different software package, did not use management software, or rejected Lagas due to reasons of cost or attitudes. It is possible that these results may not apply because, as shown in the background of the study, competing software packages have different features and costs; thus, different factors could play a role in the selection of other packages. The study also did not address actual use of the software, in common with most studies using the TAM which do tend to stop at BI. However, since the study drew on a sample of Lagas customers, it can be presumed that the participants in the study did use the software. Future studies into the topic could extend the sample into these non-represented groups in order to improve model reliability and study outcomes.

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