

# Towards a Theoretical Framework of Determinants for the Adoption and Diffusion of Buyer Authenticated Credit Card Payment Programs: The Online Merchant's Perspective

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## Abstract

*This study employs Rogers' framework of **perceived innovation attributes** augmented by **environmental influences** and **marketing initiatives** and a new factor developed for this study, namely, **risk mitigation measures**, to examine the case of merchant adoption of buyer authenticated credit card payment programs (BACCPPs). Recently introduced by the major credit card associations as replacements for the decommissioned SET and 3DSET protocols, the new payment models, 3D Secure and UCAF/SPA, have been designed to provide an added level of security for merchants and consumers. Using data gleaned from preliminary interviews, discussion forums and promotional material, we present a critical analysis of the potential barriers and facilitators that will impact on the widespread diffusion of these programs. This is used as the basis for developing a preliminary theoretical framework of the potential determinants of adoption of BACCPP from the perspective of online merchants, as well as a survey instrument to demonstrate the empirical validity of our theoretical formulation.*

## 1. Introduction

A secure, efficient payment system is considered to be one of the key drivers of e-Commerce. The need for a secure card payment solution for e-commerce is increasing in the light of the rise in online fraud. "Over half of online sellers avoid multinational sales, mainly due to fear of fraud in cross-border e-commerce, according to Gartner research," said Avivah Litan, Vice President and research director at Gartner Inc. "Further, over 10% of retailers who once engaged in cross-border online sales stopped last year, mainly because of high fraud losses." [1].

To further exacerbate the situation, fraud screening tools and strategies used to combat online fraud have shown to be less than completely effective with studies

showing that merchants are also rejecting a significant number of valid orders due to suspicion of fraud [2].

One of the important issues payment system developers face is how to obtain critical mass, firstly with the merchants who will implement their systems, and secondly with consumers who will make use of them. Many payment systems have failed in the past because of their inability to fulfill the needs of either merchants, merchant customers or both, or the relative superiority of traditional and established systems. Thus, in order for a payment system to succeed in the market, payment system developers need a thorough understanding of their potential users (merchants and merchant customers). They also need a means of analyzing both the process and the factors influencing their decision to adopt, reject or discontinue use of the payment system.

In this respect, research on the adoption and diffusion of innovations offers significant contributions to the payment system domain. This study attempts to analyze these attributes and potential influences within the context of the recent initiatives by the credit card organizations (Visa and MasterCard) to introduce the 3D Secure ("Verified by Visa") and UCAF/SPA ("SecureCode") buyer authentication programs respectively.

With the failure of earlier versions of buyer authenticated credit card payment programs (BACCPPs), a study of these new initiatives provides fertile ground for validating established factors and identifying new ones that are likely to influence their adoption. Like SET, 3D Secure/UCAF-SPA will require adoption by all participants to a transaction, but there are important changes that should increase adoption and motivate merchants and issuing financial institutions to comply with the new protocol.

This study investigates the factors that could influence market acceptance of BACCPPs by online Australian merchants. The following section is a review of the established theories of innovation diffusion that help inform this study. From this we propose a conceptual model of the potential determinants of adoption of a BACCPP (see Figure 1).

## 2. Theoretical Perspectives on Innovation Adoption and Diffusion

Innovation is defined here as a socially constructed process involving the development and implementation of new ideas [3]. The launch of new products and services is an important area for both academics and practitioners given the increasing rate of change in technology, competition and consumers' needs. However, a large number of innovations fail at considerable cost [4] and loss of reputation to the various stakeholders. To this end, we examine theories of adoption and diffusion which seek to explore and explain why particular new technologies and processes do diffuse quickly and widely, while others do not.

### 2.1 Perceived Innovation Characteristics

The characteristics of an innovation, as perceived by potential adopters, are fundamental to the adoption model. An increasing body of research has demonstrated that it is the perceived attributes of an innovation itself rather than the characteristics of the adopters that are the stronger predictors of the adoption decision [5]. The Diffusion of Innovation Theory posited by Rogers [6] suggests that the characteristics of an innovation (namely its relative advantage, compatibility, complexity, trialability and observability) will help to persuade potential adopters to embrace or reject an innovation. Rogers defines the diffusion of innovation as the process by which an innovation is communicated, spread and adopted through certain channels over time among social communities. This supplier-focused perspective is aimed at helping central technology suppliers promote rapid diffusion of predefined best practice innovations to communities of potential adopters [7].

### 2.2 Marketing Initiatives

Supplier marketing activity can significantly influence the probability that an innovation will be adopted by organizations [8]. An important role is played by the launch strategy and launch tactics that are applied by the suppliers [9]. Although different marketing variables may stimulate or facilitate adoption, two main factors of import from these studies can be expected to significantly affect adoption probability, that is, the communication of the innovation, and the activities the supplier undertakes to reduce the risk of adoption for the potential customer. Institutions that supply and actively market innovations can affect the spread of innovations, and determine to some degree who adopts the innovation and when. Innovations are communicated directly to potential users via various communication channels linking technology

suppliers and users – a process of 'supply push' [7] or "signaling" [10]. This core concept in diffusion theory emphasizes the importance of this contact. By reducing risks associated with early adoption of an innovation, such as implementation risk, financial risk and operational risk, the adoption of an innovation can be stimulated. It is often difficult to evaluate certain innovations in advance of implementing them first, particularly where credence qualities dominate. In such contexts, the higher levels of uncertainty and risk that confront consumers may serve to highlight the importance of effective marketing activity to influence and support a merchant's decision to adopt [5]. It is for this reason that Robertson and Gatignon [11] argue that research should go beyond the individualistic perspective which stresses the innovativeness of potential adopters, and should examine instead the institutional and market structures that channel new technologies to users.

### 2.3 Environmental Influences

Organizations may adopt an innovation based on the number of other interrelated organizations in the market environment that have adopted the focal innovation [12]. Referred to network externalities or critical mass [13], the theory claims that the value of the focal innovation and hence, its adoption probability, is intrinsically determined by the number of other users. In the case of organizational innovation adoption, positive network externalities exist when the benefit (cost, increased security, etc) to a firm of using the innovation increases when its suppliers, customers or other organizations (e.g. government) also use the innovation. The ability of a company to identify and develop IT applications that can neutralize the threat of entrenched competition (i.e., competitive pressure) has long been argued to be a key component of its IT strategy [14]. In highly competitive markets, innovation adoption may be necessary to maintain one's market position. Non-adoption of an innovation that is adopted by others in such an environment may result in competitive disadvantage by the focal firm [15]. Adoption can also be fuelled by the fear of falling behind in the technology environment. Gatignon & Robertson [16] report support for their hypothesis that higher levels of competition stimulate innovation adoption. Competitive necessity allows a firm to keep its customers but generates no tangible benefits for the firm itself.

## 3. Proposed Model for BACCPP adoption

An extension of the traditional adoption-diffusion models is needed to reflect the complexity and diversity found in a payment system. Adoption of a payment system necessitates adoption of new processes and technologies and requires new thinking on how and why organizations

adopt innovations. Payment systems are interactive and inter-organizational, necessitating the concurrent participation of different stakeholders (financial institutions, payment system providers, consumers, etc). Studies thus far have mainly focused at the individual customer and behavioural level of adoption. Such theories (for example, the Technology Acceptance Model [17]), exclude the possibility of influence from institutional, social and marketing control factors.

Based on the theoretical studies discussed in the previous section we can identify a set of factors that are likely to influence the acceptance of a BACCPP by online merchants. Variables that have generally been found to affect innovation adoption at the organizational level are mapped into a conceptual model of BACCPP adoption in Figure 1. Using the generic model developed and justified by Frambach and Schillewaert [12] we place the perceived innovation characteristics at the heart of the model. Rosenberg & Hovland [18] argued that the *perceived innovation characteristics* can be considered as cognitive indices (or beliefs) of an attitude towards the innovation. Given that these attributes are under the control of marketers, then arguably an understanding of the impact of product or service attributes on the adoption of an innovation becomes an interesting and valuable research question. Not only do these factors drive the adoption process but they are, in turn, influenced by the external variables (environmental, marketing initiatives and risk mitigation measures).

There is conceptual and empirical evidence to believe that, in organizational settings, attitudinal components mediate the influence of external variables on behavioural intentions. The marketing literature on adoption of IS innovations identifies competitive necessity or competitive pressure to be an important external variable in influencing adoption.

We introduce into the model the influence of *risk mitigation measures* on merchants' perceptions of the BACCPPs, and their potential (direct) impact on the adoption decision in view of their concerns over fraud, chargebacks and security issues.

The following section identifies the extent to which our model and the established approaches that have been used to study the adoption of new services and products may prove relevant to merchants and other stakeholders in the adoption of BACCPPs.

#### 4. Empirical Validation of Proposed Model

To test the influence of the above factors on merchant adoption of BACCPPs, a preliminary research instrument was developed to assess merchant perceptions. A questionnaire has been developed using data from interviews with individuals with knowledge and expertise

in the field of online credit card payment processing and academics with interest in the subject area, as well as secondary sources (promotional material, discussion groups, etc.). The questionnaire has been refined several times to ensure that all the questions and terms would be clearly understood by the potential respondents. Because their attitude towards BACCPPs is likely to be influenced by their level of exposure to the implementation and use of credit card payment systems, respondents will be categorized as online merchants who do not offer any payment options (C1); online merchants who do not offer any credit card payment options (C2); online merchants who process credit card payments offline only (C3); online merchants who process credit card payments online only (C4); online merchants who process credit card payments online and offline (C5); and online merchants who process credit card payments online and are also enrolled in one or both of the BACCPPs (C6).

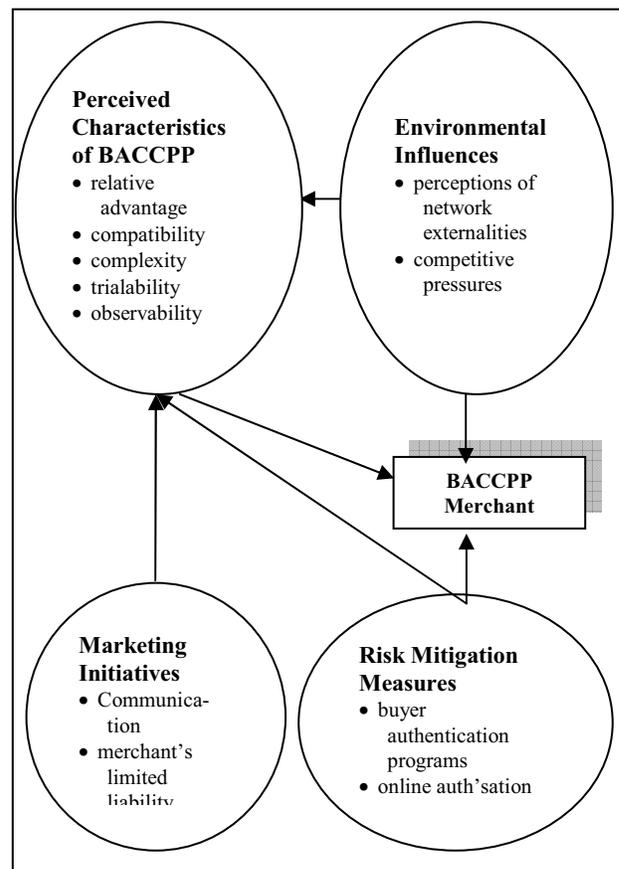


Figure 1 A Conceptual Framework of BACCPP adoption by Merchants

Category C1 to C5 merchants are potential adopters of BACCPPs and C6 merchants are currently enrolled in the programs. Two largely similar questionnaires have been developed with the second one adapted for current users of the program. Those merchants who are not aware of the existence of the new BACCPPs will be provided

appropriate literature on the subject matter and encouraged to view the demonstration sites of the credit card organizations before submitting to us their perceptions on them. The survey data will be used to address the following broad research questions:

**RQ1:** What are the most significant factors that influence the adoption of BACCPPs by Australian online merchants?

**RQ2:** What is the influence of risk mitigation measures on the adoption of BACCPPs adoption by online merchants?

**RQ3:** What is the influence of marketing initiatives by the financial institutions on the adoption of BACCPPs by online merchants?

**RQ4:** What influence do environmental factors have on the adoption of BACCPPs by online merchants?

## 5. Conclusion

The aim of this phase of the research was to integrate various studies that addressed the topic of innovation adoption in the context of a payment system model. Based on studies of innovation adoption in different disciplines, factors that have been found to influence the acceptance of new products by organizations have been identified. The theoretical model described in this study should enhance our understanding of merchant adoption of buyer authenticated credit card payment programs. By identifying the relevant determinants of innovation adoption and their interdependencies, and applying them to the payment system domain of e-Commerce, such models should serve practitioners, such as financial institutions, payment system developers and payment system providers, in developing new payment systems, marketing them to merchants and implementing them within e-Commerce organizations more effectively.

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