

## Challenges in Electronic Payment System- A Review

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### ABSTRACT

This paper examines factors which lead to the failure of electronic payment systems (EPS). In order to understand these factors a single case study of a failed Australian EPS was conducted. The findings confirm the influence of EPS adoption factors identified from the literature, which include cooperation with established entities, simplicity, trust, security and mutuality of neutral edges. Furthermore, this study has specifically demonstrated the importance of large partners in the adoption of EPS. These partners are able to provide EPS with access to a large installed base of customers, association with their brand name and marketing resources in order to achieve public awareness. This paper contributes to theory and practice through examining a failed case from the system provider's perspective, which is rare in the study of EPS.

**Keywords--** EPS, Payment, Trust

### I. INTRODUCTION

The commercialisation of the Internet and the subsequent evolution of electronic commerce have resulted in a dynamic business environment where transactions are able to take place without face-to-face interaction. As the popularity of electronic commerce continues to increase, numerous payment systems have been created, attempting to make the process of exchanging money over the Internet easier for consumers. Electronic payment systems (EPS) can be defined here as any payment system that facilitates secure electronic commerce transactions between organisations or individuals. These include systems such as electronic cash, electronic cheques, smart cards and micropayment solutions such as PayPal. EPS provide users with an array of functionalities including person-to-person (P2P) payments and electronic bill presentment and payment (EBPP). These new EPS are also able to facilitate financial transactions over the Internet which are significantly more efficient, faster and less expensive than using credit cards (Abrazhevich, 2001). Yu et al (2002) argues that EPS which help avoid the use of credit cards are important to the development of electronic commerce. A significant number of EPS have failed within a

relatively short period of time. These include companies such as Beenz, CyberCash, Cybercent, Digicash, eCharge, FirstVirtual, Flooz and Micromint (Hurwicz, 2001; Kniberg, 2002). In fact, the use of credit cards still remains the most widely used payment method for electronic commerce transactions despite the criticism from the literature for its lack of efficiency and security as well as high transaction fees (Simpson 2004; Shon and Swatman, 1998). The majority of research into the area of EPS has focused on successful cases such as Hong Kong's Octopus smart card system and PayPal (Liao and Wong, 2004; Schwartz, 2001). However, there have been relatively fewer studies into failed EPS (Kniberg, 2002; Truman et al, 2003). This is most likely due to the difficulty in gaining access to failure cases. In this study, we explore factors that lead to the failure of EPS. For this purpose, a single in-depth case study of a failed Australian EPS was conducted in 2005. This study is also differentiated from existing studies of EPS by its approach. Recent studies in this area can be grouped into two general streams. One stream examines adoption of an EPS from the users' perspective or user acceptance (Abrazhevich, 2001; Chau and Poon, 2003; Liao and Wong, 2004; Yu et al, 2002). The other stream of studies proposes new payment schemes from the technological perspective. They develop new payment protocols in order to address some limitations with current solutions (Camenisch et al, 1996; Dai and Grundy, 2006; Herzberg, 2003; Juang, 2006; Peha and Khamitov, 2004). This study takes a system provider's perspective, through the examination of a business case. This perspective is able to provide coverage of a wider range of issues and factors surrounding EPS not only user acceptance and technology, but also collaboration and competition in industry and market, and firm-related management issues. The findings demonstrate that cooperation with established organisations, simplicity, trust, security and mutuality of stakeholder benefits are all of importance to the adoption of EPS. These factors are consistent with the adoption factors found during our literature-based analysis. In particular, this study highlights the significance of establishing partnerships with large organisations in the adoption of EPS because they are able to provide access to a large installed base of customers, association with their brand and marketing

resources in order to achieve public awareness. In the next section, a literature review on factors affecting the adoption of EPS is presented. The research method used for this study is then described. This is followed by a short description of the case. Then findings are presented and discussed. In the conclusion, we highlight contributions made

## II. ELECTRONIC PAYMENT SYSTEMS (EPS) ADOPTION

Factors that influence the adoption of EPS are multifaceted. They include cooperation with established entities (Badderley, 2004), trust (Chau and Poon, 2003), security (Ba et al, 1999) and simplicity (Weiler, 1995). Recently, the concept of mutuality of stakeholder benefits has also been used to explain the adoption of EPS (Oh et al, 2006). These factors are discussed below.

Universal acceptability. This acceptability can be achieved through cooperation with institutions such as recognised businesses, governments and banks. Oh et al (2006) assert that a precondition for success in the EPS market is the involvement of a partner who is able to provide a critical mass of users. Rogers (1991) defines critical mass as the point where “enough individuals have adopted an interactive innovation to cause the perceived cost benefit of adopting the innovation to shift from negative to positive for the individuals in the system” (p.250). Therefore, once this critical mass is provided by the partner, both the benefits of the system and consequently system use will increase. This can be seen in the case of the successful PayPal system. Rosen (2001) argues that the main contributor to the widespread acceptability of PayPal was its cooperation with large entities with an installed base of users, especially online auction site eBay. This is consistent with the principle of network externalities which stipulates that the value of unit product/service increases as the number of sold products/services, or the number of consumers, increases (Shapiro and Varian, 1999; Hanseth, 1999). Network externality has positive feedback mechanism in itself which makes the stronger.

### **TRUST**

The literature identifies that a high level of user confidence or trust in an EPS is an important factor contributing to their successful adoption (Dekleva, 2000; Lanford and Hubscher, 2004; Panurach, 1996; Schwartz, 2001; Yeung et al, 2003). In investigating Hong Kong’s successful Octopus payment system, Chau and Poon (2003) identified trust in the system and its provider as a primary contributor to its success. Liao and Wong (2004) also examined the Octopus system, surveying users and identifying factors which influence the use of the smartcard. The authors also found that users are willing to use the Octopus system because they perceive it to be trustworthy. These two investigations of the Octopus system are pertinent as they identify elements which lead to the successful adoption of an EPS. These findings are

supported by a user survey conducted by Abrazhevich (2001) who found that users would refrain from using a system which they feel is not trustworthy. Kniberg (2002) associates the credibility of an EPS with adoption, arguing that a credible, recognised and trusted system will be more likely to be adopted by both users and merchants.

### **SECURITY**

In the context of EPS security refers to the capacity of a system to reduce fraud and protect the user from the theft of their funds and personal information (Shon and Swatman, 1998). Security has been a longstanding issue for customers, which can be traced back to the origins of electronic commerce (Ford and Baum, 1997; Garfinkel and Spafford, 1997). The literature widely recognises the security concerns of users and the effect it has on the adoption of electronic payment systems (Ba et al, 1999; Mann, 2003; Schwartz, 2001). Taking a technological view of security, Rose et al (1999) contend that inadequacies associated with security are the primary impediment to the acceptance of electronic commerce. Rose et al (1999) strongly recommend that organisations engaged in electronic transactions employ security measures such as encryption and firewalls. In the aforementioned study of the Octopus system, Liao and Wong (2004) concluded that the employment of security mechanisms by the payment provider had a positive effect on customers’ willingness to use the system.

### **MUTUALITY OF STAKEHOLDER BENEFITS**

The concept of stakeholder mutuality has also been applied to the adoption of EPS (Oh et al, 2006). The authors contend that mutuality of benefits and costs among stakeholders is a necessary condition for the diffusion of an EPS. In the context of EPS, the main stakeholders include consumers and merchants who want to use the system. Mutuality of neutral edges stipulates that the edges for every individual neutral should exceed the value these stakeholders incur once they select to adopt a system. When adopting an EPS, consumers incur certain costs including transaction fees, the time taken to sign up and occasionally, subscription costs. For merchants who wish to use an electronic payment system as a means for collecting money from customers (for example, through their company web page), an EPS must be integrated with organisational processes and this may also incur certain investments. Applying mutuality of stakeholder benefits to the adoption of EPS would imply that a consumer would be more likely to adopt an EPS if the aforementioned costs were outweighed by the benefits of the payment system, namely, convenience, cost advantages, rewards, etc. Similarly, merchants would be attracted to adopt an EPS if their integration costs were compensated by benefits such as increased revenue, lower fees, less paperwork, etc. The concept of mutuality of stakeholder benefits assumes stakeholder independence and rationality. In the case of EPS, stakeholders are able to act independently of each other due to the absence of regulation by an overarching governance structure (Oh et al, 2006).

### III. RESEARCH METHOD

For this study of a failed EPS, we conducted a case study. As EPS are influenced by multiple factors such as individual consumers, internal management, merchants and alliance partners as seen in the literature review, the case study is an appropriate approach in that it allows researchers to deal with those factors in a comprehensive manner (Lee, 1989). The case study is an appropriate approach because it allows to answer 'why' and 'how' questions (Yin, 1994), that is, why and how the EPS under study failed to attract a sizable user base. Data were collected using semi-structured interviews and document analysis. In selecting participants within the organisation, the roles and positions of staff members were considered with the objective of attaining all appropriate perspectives of the organisation.

The interview process involved three participants, each from a different area of the organisation. These participants included the heads of the Operations department and the Research and Development team as well as the Product Manager. The participants and their roles within the organisation. Three interviews were conducted with the Product Manager while the Operations Manager and the Research and Development Manager were interviewed once at the company's headquarters in Canberra, Australia. Interviews were recorded with a tape recorder and were then transcribed for analysis. To corroborate data collected during the interviews and to enhance the findings, relevant organizational documentation was also requested and analysed. Correspondence via email was maintained with participants and each of them reviewed the findings. Transcribed interview data and organisational documentation were analysed using a process similar to the data analysis approach outlined by Miles and Huberman (1984). The initial stage of information analysis concerned the identification of key themes ('open coding'). Eight themes were initially found with interview and documents, yielding five themes previously identified from the literature and three unique themes.

#### **CASE: OZPAY**

The company under study, OzPay (pseudonym), was created by a Canberra based software development firm which specialised in electronic commerce solutions. OzPay was a part of a Government sponsored information technology development initiative which also involved research organisations and local universities. This program provided both funding and support to technology organisations, offering a myriad of management services including advisory panels, market research and avenues of locating additional funding. The development of OzPay began in 1999 with the system being released to the public via the company's web page in 2002. The system operated publicly from 2002 through to 2005 and cost approximately AU\$2 million (US\$1.5 million). OzPay was a browser based system and failed to require users to put in any additional software. Customers were simply required to open an OzPay account then deposit

money into it from an existing Australian bank account. Like the majority of online payment systems, registering for an account was done through online forms. OzPay users could choose to sign up for either an unauthenticated account or a merchant account. Unauthenticated accounts did not need users to give data concerning their identity. However, these accounts had a daily transfer limit of \$1000. Merchant accounts were designed for users and organisations who wished to sell goods online. OzPay instituted a 100 point identity check for merchants in accordance with the Financial Transaction Reports Act 1988. The one hundred purpose identity check needed merchants to give documentation of their identity such as a driver's licence and passport.

Both these types of accounts were free and there were no subscription fees. OzPay began initially as a system for the collection of payments. The idea of a single, integrated account based system was based on the premise that credit card payments over the Internet were inefficient. The system enabled users to transfer money to others with an OzPay account within a secure environment. Customers could also pay bills and purchase goods from organisations listed in OzPay's business directory. Finally, towards the end of the project, customers with an OzPay account could purchase prepaid mobile phone credit from their phones. OzPay provided organisations with an electronic commerce solution which enabled them to invoice and accept payments from their customers online, avoiding the use of credit cards. OzPay was aimed at reducing manual transaction processing through the maintenance of records, initially catering especially to Small-to-Medium Enterprises (SMEs).

#### **FINDINGS:**

Factors Leading to the OZPay Failure Eight reasons for the failure of OzPay were identified from the case analysis, which are summarised below. The initial four factors square measure consistent with the literature analysis mentioned above; the latter 3 square measure a lot of involved with the specifics of the system underneath study. Lack of Cooperation with Well-Established Entities An electronic payment system (EPS) will not be able to survive without forming an alliance with a well-known partner with an installed base of customers. This may include organisations such as banks, Internet stores, and portals. OzPay attempted to engage a substantial number of organisations including search engines, airlines and a number of financial institutions. The organisation devoted the last six months of the project purely to locating a partner. OzPay's Product Manager remarked:

#### **LACK OF TRUST**

The findings also suggest that trust is more important than security. Even though OzPay instituted many of the standard security protocols, it was operated by a company which was unfamiliar to many customers. This is consistent with the findings of Kniberg (2002, p.60) who argued that "users and merchants are more likely to use an insecure payment system from a trusted company than a secure payment system from an untrusted company". Thus, the issues of security and

trust were found to be very important in the success of EPS adoption. Without adequate security features and a system that users trust, it would be extremely difficult for an EPS to achieve widespread usage.

### COMPLEXITY

Complexity, as a mirror image of simplicity in the literature review, is a significant factor affecting the adoption of EPS. The complexity of the OzPay system was a major barrier to its acceptance. OzPay's R&D Manager identified that the system was "very, very complicated". While the system was "feature rich", offering a substantial number of services such as P2P payments, EBPP, invoicing and automatic payments, OzPay "never had a simple offering" and "people didn't even get the original concept and it sort of can get lost when you've got all this other stuff built in". A focus group study of the OzPay system found that its large range of features diluted its product definition. The Operations Manager argued that one of the major reasons PayPal had succeeded was its ability to present their service in a simple manner. In contrast, OzPay struggled with however to gift their system such that it looked easy to individuals. This downside was exacerbated by the registration method, which was described by staff as "pretty bad", "complicated" and "long". OzPay's R&D Manager recalls:

### LACK OF MUTUALITY OF BENEFITS

The case illustrates that a lack of mutuality of stakeholder benefits has a negative effect on the adoption of EPS. OzPay's facilities offered a sizable number of benefits to users but these were outweighed by the costs incurred when adopting the system. P2P payments had a speed advantage over banking systems as transactions were all processed on the OzPay system. However, the Operations Manager noted that this only meant that the recipient got the money sooner and that there was no advantage for the sender. The OzPay system offered cost advantages, especially for SMEs who often suffered from the high costs associated with credit card payments.

## IV. DISCUSSION

Employing a single case study on a failed EPS, this study has identified a number of factors that are critical to a successful adoption of an EPS. These factors and their influence on each other are summarised in Figure 1. No single factor explains the successful adoption of an EPS. However, the case study implies that cooperation with existing entities appears to be the most significant factor. This is due to the fact that through cooperation with well known institutions electronic payments providers are able to simultaneously address a number of issues associated with the adoption of EPS. Firstly, a large partner is able to provide an EPS with marketing clout and exposure to the public. A small company like OzPay was only able to reach local businesses through its limited marketing campaigns. A well well-known establishment would be in a position to give resources for promoting and thus produce public awareness. Gaining the trust of consumers is challenging

without a partner who is able to provide an EPS with association with trusted and credible brand names. Thus, establishing an alliance with a large partner is crucial in gaining what Kniberg (2002) calls credibility in the eyes of users. Most importantly, the massive partner can provide a critical mass of users. If this critical mass of users is achieved through the partnership, the benefits of the system as well as usage of the system will increase (Rogers, 1991; Shapiro and Varian, 1999). For example, if a popular online store adopted a particular electronic payment system, the imperative to use that system for customers of that store would increase.

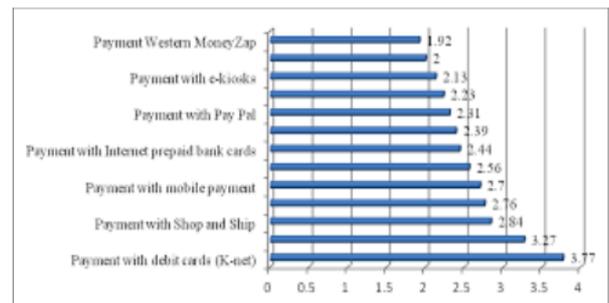


Fig:-1 Factors Affecting the Adoption Electronic Payment Systems

However, partnering with an established organisation does not necessarily ensure sustained usage of the system. An EPS is assessed on factors such as simplicity, security and mutuality of stakeholder benefits when customers know about the system and interact with it in some manner. An EPS needs to be presented in a clear and simple manner. If a consumer is unable to understand the underlying concept behind an EPS, the chance of them adopting such a system is low. In addition, electronic payment providers need to assure users that their system is secure. The findings of this study show that when the security of an EPS fails to adequately address user concerns, consumers will not adopt it. The data shows that a degree of differentiation is required in relation to security and that the security mechanisms employed must be promoted to customers. Trust plays a role in this process as users tend to perceive credible and established organisations as trustworthy. Finally, mutuality of stakeholder benefits, where the benefits associated with adopting an EPS for consumers and merchants exceed the costs incurred when adopting the system, will also increase the likelihood of adoption.

## V. CONCLUSION

This study has used a single case study to demonstrate the major factors affecting the adoption of electronic payment systems. Factors identified in the literature have been found to influence the adoption of OzPay. Well known institutions are able to aid in EPS adoption through the provision of a large installed base of customers. This study has additionally found that these establishments play different crucial roles in EPS adoption. Large partners are able to provide EPS with association with trusted brand names and marketing

clout. These result in the system gaining credibility and public awareness. Once this has been achieved the system is assessed by users on factors such as simplicity, security and mutuality of stakeholder benefits. The study additionally found extra – social control – factors like inadequate promoting initiatives and a scarcity of a cohesive direction contributed to the death of OzPay. Furthermore, the findings also that the system did not address significant user problems. The system was established in order to make transactions, especially micropayments, more efficient. However, it was found that consumers did not seem to consider the issue of micropayments as significant as initially expected. This study has made two major contributions among others. First, by examining a failed case of an EPS, it offers a balanced view of factors affecting the life of EPS in the area dominated by success stories. Second, by taking the system provider's perspective, the paper highlights a wide range of relevant issues from management to collaboration in markets compared to existing studies focusing on individual consumers' perspective or technological aspects. These contributions were made possible by adopting the case study approach. Apart from enriching the existing literature on EPS adoption, the findings of this study will be valuable for practitioners as they address some critical issues that need to be considered in developing an EPS. Since the importance of engaging a well known partner has been established as an imperative for electronic payment providers, strategies need to be identified to help these providers effectively negotiate with these organisations. Further research should also focus on elaborating mutuality of stakeholder benefits in relation to the adoption of EPS. Specifically, the role of incentives and rewards in order to encourage the adoption of EPS need to be examined. Finally, in light of the success of the iTunes music store and the emergence of micropayments via mobile phones, the issue of micropayments needs to be revisited.

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