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E-Payment Strategies of Bank Card Innovations

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Abstract

This paper is concerned with the business strategy in managing payment innovations. Particularly, the study looks at the smart card - electronic cash (e-cash) innovation in the financial service industry. The smart card e-cash has yet to overcome obstacles to its diffusion. Given the e-commerce opportunity, banks and non-banks compete to deploy smart card technology for Internet use. A review of previous payment innovations is also carried out to provide suggesting direction on the innovation proliferation. The paper firstly examines the payment market on the whole (the global review). The subsequent section discusses the challenges in the e-payment world and the strategies to support the diffusion of the smart card innovations.

Keywords: e-payment, e-commerce, m-commerce, smart cards, competition, strategy, collaboration

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INTRODUCTION

Currently, technology is fundamentally re-aligning business relationships between banks and their customers. Competitive contention in the payment innovations moves from single delivery channel towards integrated delivery channels (Figure 1). This is because consumers no longer express the preference to any single channel. As banks face new challenges in the electronic payment (e-payment) world, they need to leverage their information technology (IT) strategy to be aligned with business strategy.

The traditional strategy of banks in the payment innovations is competitive strategy aiming to compete on the basis of size. Banks with extensive branch networks tend to capture more customers than those with fewer branches. Currently, the Internet and the world wide web have impacts on the way banks doing the business. The traditional brick and mortar banks are moving towards integrated delivery channels and the adoption of the click strategy (Pennathur, 2001; Hensmans, et al., 2001). The changing landscape of electronic payments requires banks to change their strategies to collaborative strategy in order to meet e-payment demands. Banks faced competitive pressures which forced them to migrate their branch network system towards the development of integrated service channels (from isolated channels to an integrated one) (Vishal, 1997). This is because the competitive alternatives in the bank's payment transmission system (e.g. Internet, mobile phones) mean that banks cannot use a network for clearing and settlements to achieve competitive advantage. The overall thrust is that banks realise the importance of having control over the payment networks so that banks have market power, and accordingly, competitive advantage over other competitors.

Following on the introductory review, this paper has 4 further sections. Section 2 discusses the concept of business strategies, the use of technology in providing the payment innovations, and the innovation diffusion theories. Section 3 reviews the e-cash initiatives by innovators in various industry sectors for the innovator's own advantage. Problems that need to be overcome for the widespread diffusion of electronic money are addressed. Section 4 discusses the challenges in the e-payment world and the strategies to support the diffusion of the smart card innovations. Finally, the conclusion section presents recommendations on the importance of industry linkages to promote the diffusion of smart card e-cash innovation.

ALIGNING IT WITH BUSINESS STRATEGIES

Porter's competitive strategy

Although business strategies predate Michael Porter, the concept of competitive strategy by Porter (1980) is relevant in a competitive context. Porter emphasised the use of competitive strategy as the way to achieve competitive advantage in the 1970s and 1980s. His notions are based on the resource-based approach by Barney (1986), Cool and Schendel (1988), Penrose (1959), and Wernerfelt (1984, 1989) who argue convincingly that strategies to cope with a changing competitive environment are associated with the firm's capabilities. The firm's capabilities have been described as

amalgam of resources – technology, organisational capabilities, experiences and relationships.

[Insert Figure 1 around here]

Porter emphasised the use of technology to empower the firm's capabilities. He argued that technology would enable the firm to excel in the competition. Bank is regarded as a vanguard in the use of information and communication technology (ICT) (Barras, 1986, 1990). In the context of banking, the advancement in technology presents a new opportunity to improve service quality in response to volatile economic environment and changing competitive conditions. At the firm level, apart from adopting technology to integrate delivery channels to develop a close relationship with customers, banks also adopt technology to enable the analysis of information about customer segmentation, demographics, product usage, transaction behaviour (Figure 2) which thereby help them to improve the profitability and increase market share. With the use of information technology (IT), the banks can use the cross-selling strategies to sell new banking innovations to their existing customer base. It can be seen that banks' adoption of technology changes from *improving efficiency of back office banking functions* towards *improving the service quality in servicing the customers*. Such changing strategy demonstrates the situation where banks compete to own the potential customers.

[Insert Figure 2 around here]

[Insert Figure 3 around here]

Electronic banking (E-banking), according to the Basel Committee report on the banking supervision (1998) refers to the provision of retail and small value banking products and services through electronic channels. E-banking services are seen by banks as a better e-banking system to increase their market share (Beans, 1999). Regarding an overall process of commercialisation taken place in the payment market, e-payments set to be a huge growth market over the next few years. This is because the advent of the Internet provides e-commerce opportunity with an instantaneous means of payment (Liao and Cheung, 2002; Simpson, 2002). Figure 3 shows the trend in the market development of payment innovations. The outside circle represents the total market of the banking industry. The inner circle represents the market share of each payment innovation. The left figure presents the market status of payment innovations at present. Whereas the innovation of ATM cards, Credit cards, and Debit cards dominates the banking industry, the smart card market is still in its infancy. The logic of the left figure is that banks generally use competitive strategy to capture each customer base (the current account customers, savings account customers and the credit card customers). The arrow

pointed from the left to the right reflects the trend where innovators competing to launch payment innovations finally enter into collaboration. To put it another way, collaboration is motivated by risk considerations. Innovators launching ATM/Cash cards, Credit cards and EFTPOS/Debit cards could pursue proprietary entry to the market but choose collaboration to lower the amount of dedicated capital investment required to provide wide service coverage. In the light of growing eBanking business, banks invest in multi-delivery channels to provide a substitute for traditional banking delivery channel with an aim to develop a close relationship with customers. This is because banks view that strong ownership of customers would provide preferential access to follow-on products and by the same token deny access to competitors even where they have significantly better products and services.

Porter's emphasis on competitive strategy is much criticised by the scholars in the 1990s. The concept of zero-sum game by Porter is only logical if a firm can provide capabilities to compete. However, in the complex environment, it is unlikely that any single innovator would have all capabilities to compete. And if this is the case, there is a need of collaborative strategy. Hamel and Prahalad (1994) challenged the idea of using collaborative strategy to compete for the future. They proposed a Managing Migration Paths Model arguing for integration of skills and capabilities when competing for the future market. This is because in the complex socio-economic environment, it is hard that any single innovators would have all capabilities in order to achieve competitive advantage without entering into collaboration.

On the future front payment innovations (Figure 3 - right Figure), banks need to try hard in order to maintain the market share while making the changes needed to win the customers' mind. The reason is because many industry analysts see the future of banking industry as a competitive challenge which requires an integration of delivery channels and, therefore, collaboration among industry players is important. In other words, as the customers demand more choice and more products to meet their individual needs, traditional access channels are insufficient. Innovator(s) who could offer the benefits in terms of extended service provision in various forms to customers would be the most likely innovator(s) to gain strong customer hold.

Innovation diffusion theory

Rogers (1962, 1983, 1995, 2003) used well-established theories in sociology, psychology, and communications to develop an approach to study the diffusion of innovations. The process of innovation diffusion is characterised by the progress of product/process innovations along the stages of introduction, growth, maturity and decline. The introduction stage represents the period of uncertainties which require problem-solving activities to make a saleable product or useable process. The growth stage reflects the situation where uncertainties are reduced (Hatfield, et al., 2001). This can be seen by the accelerating rate of innovation adoption after a period of relatively

slow growth (the introduction stage). The maturity and decline stage reflect the diffusion of innovation according to the impact of the adoption (Easingwood, 1988).

In the process of innovation/diffusion, the innovation characteristically exhibits an S pattern. The stages along the innovation process are characterised by the efforts of the innovator to adapt a technological development (invention) for transformation into an innovation (commercial product). The summary of studies on the innovation development process is shown in Table 1.

[Insert Table 1 around here]

According to Rogers' innovation diffusion theory, adopters of any new innovation or idea could be categorised as innovators (2.5%), early adopters (13.5%), early majority (34%), late majority (34%) and laggards (16%), based on Bell curve mathematic division. The S shaped curve typifying the diffusion of innovation model shows a cumulative percentage of adopters over time – slow at the start, more rapid as adoption increases, then leveling off until only a small percentage of laggards have not adopted.

[Insert Figure 4 around here]

Figure 4 shows the diffusion of innovation in the bank card industry. The innovation process progresses from the introduction of credit cards and ATM/Cash cards in 1960s, Debit cards (Electronic Fund Transfer at the Point of Sale) and Smart cards in 1970s. Currently, technological advances in the bank card industry are moving from mag-stripped card technology towards smart/chip card technology. The process of innovation diffusion represents the pattern of technology substitution (the substitution of smart card technology for magnetic stripe technology). Regarding the process of substituting technology, the magnetic stripe technology and smart card technology are not independent. The parallel S-curve shown in the figure indicates that the smart card technology has not taken over the existing magnetic stripe card technology. This is because at present both technologies are used at the same time, for example, ATM/Cash card uses magnetic stripe card technology as well as smart card technology.

The innovation diffusion theory has implications for bank card innovations in that the competitive contention is moving from mag-stripe technology towards smart card technology with increased competition from the bank and non-bank industry. The future bank card innovations would incorporate wide applications which require various industry backing to enable the use of bank cards in e-commerce and m-commerce.

ELECTRONIC CASH AS THE FUTURE PAYMENT MECHANISM

Electronic cash systems, such as MasterCard/Mondex – Multos, Visa Open Platform, Proton World –Proton, Microsoft Windows for smart cards, are based on smart card technology. The smart card contains a microprocessor, a miniature computer that can store monetary value, held in digital form for immediate exchange in payment transactions (Bright, 1988; Karen Lu, 2007). The concept of applying smart card technology for electronic cash (e-cash) began in 1990 with the Mondex cards (an e-cash application) developed by the National Westminster Bank in the UK. A major competitor responding to Mondex's initiative is Visa International who launched the competing smart card scheme – Visa Cash (Gandy, 1999, Vartanian, et al., 1998; Stalder, 2002). An important smart card pilot involving the use of Mondex and Visa Cash took place at the Upper West Side of Manhattan, New York. However, the trial results show low consumer and merchant acceptance to adopt smart cards (Clark, 1998; Plouffe, et al., 2001b; Van Hove, 2001).

For some time now, banks have been learning how to manage innovation in the payment industry. Traditionally, the financial services industry has always been dominated by banks. With the development of the Internet and electronic commerce (or e-commerce), the demand for new payment system grew considerably (Bernkopf, 1996, Stalder 2002). However, in the advent of Internet, competitors in the future payment system will come from various industry sectors. Electronic commerce will certainly change the competitive landscape in global markets in the sense that there are not only banks but also other actors on the supply-side who can lead the payment market and whose technology will be crucial for virtual competition. From the survey carried out by Visa and MasterCard Mondex, the competitors in the mobile telephony market would be a competitive threat to the traditional banks. It is seen that organisations in the mobile telephony market could offer convenient delivery channels ever innovated to customers (the channels closer to customers than ATMs). Also, the mobile phones could overcome the need of high investment in terminals (The cost of upgrading ATMs is approximately £1,300, and the cost of upgrading EFTPOS terminals is approximately £600) (Wonglimpiyarat, 2005b).

The challenge of the e-payment market is the development of relationship-based smart cards to offer consumers access to multiple accounts such as debits, credits, investments or stored value for e-cash on one card. The new landscape (the move towards channel integration) needs standards for the interworking of products and services (Wonglimpiyarat, 2005a). For the future of M-Commerce, a convergence of card payments and mobile telephony (Funk, 2007), industry analysts predict that the innovation will be poised for exponential growth over the next few years. The competition in the bank card industry at present represents the situation where competitors developing payment innovations come from not only inside but also outside traditional banking sector. Based on the increasing competition; therefore, it would be hard for innovators in the traditional banking sector to use competitive strategy for their own advantage.

In essence, the main challenge of electronic cash in payment systems is proliferation. When looking back at the traditional electronic payment strategy, banks compete to invest in the use of Electronic Funds Transfer (EFT) systems to provide a rapid and efficient transmission of payment value. The point-of-sale terminals e.g. ATMs, EFTPOS enables the innovator to expand the service in terms of availability and accessibility. In the electronic cash industry, the Roy Rothwell's concept of System Integration and Networking Model (Rothwell, 1992) (Table 2) is best able to explain the innovation process. Rothwell emphasised the use of networking relationships in the fifth generation of the innovation. He argued that collaboration among a number of different players needs to be involved if the widespread diffusion of the smart card technology is to be achieved. His networking model can be seen as a response to avoid the failure of innovation, particularly in commercialisation. As for smart card market, co-operative institutional relationships (e.g. Internet service providers, telecommunication companies, vendors, IT companies) are important to establish widespread adoption of the innovation. Innovators need to understand the needs and preferred customer applications to ensure commercial viability (Day, 1990; Plouffe, et al., 2001a; Wind and Mahajan, 1997). To provide smart card innovation with multifunction application also requires more industry backing and high levels of coverage to turn it into a product with wide applications.

[Insert Table 2 around here]

On the whole, banks have gained market share in the existing payment card market (ATM/Cash cards, Credit cards, EFTPOS/Debit cards) through network expansion. For example, in the ATM/Cash card market, banks linked up with the international network of Visa Plus and MasterCard Cirrus to speed up the widespread acceptability. In the Credit card market, banks linked up their merchant service network with Visa and MasterCard to extend the network of service provision. In the EFTPOS/Debit card market, banks also linked up their proprietary network with Visa Debit network, Switch or Maestro network which help diffuse the innovations. Taking into account the smart card e-payment market, there needs to be sufficient collaboration among organisations competing to launch smart cards. Otherwise, it would be hard for innovators to push smart cards to achieve a level of diffusion. From the perspective of marketing smart card innovation, convenience seems to be the dominant criterion for customers' use of smart cards. However, the customers are currently barred from using smart cards because of the lack of the facilities to facilitate their usage both in the local and international markets (Moeti et al., 2006).

The problem at present is that the diffusion of smart card innovation needs high investment for the upgrades of ATMs and EFTPOS terminals to be capable of accepting smart cards and presumably a substantial investment in adding smart card technology to mobile computers and telephony. The implementation of smart cards for the whole Europe, according to Visa figures, requires eight billion dollars investment. Although this

is an affordable amount for many of the potential players, most players would only pay the entire amount if it would give them some proprietary or lock in advantage. So far, no player has felt confident enough to take a committed first mover position (M'Chirgui, 2007; Wonglimpiyarat, 2005b).

The problem regarding the diffusion of smart card e-payment innovations signifies the need of collaboration (interworking of the industry) to extend the scope of service. Unless collaboration is involved, the diffusion of smart cards may fail to achieve the potential that the innovation could command. It is argued that interoperability is the key to smart card adoption on a global scale. However, agreement among competing organisations has not been achieved yet. The innovators still compete to develop their own proprietary Operating System technologies (Java, Multos, WfSC). There is now pressure for the smart card industry to have an interoperable system for the e-cash application.

Collaboration across the industries is important for the proliferation of smart card innovations since the provision of smart card-based services to allow consumers multiple access options at multiple locations needs the use of multiple device types such as Automatic Teller Machines (ATMs), screenphones, personal computers (PCs), Personal Digital Assistant (PDA), Internet, mobile phones, and interactive TVs. Under the pressures of increased channel integration, standards are important for the smart card diffusion. Therefore, it is challenging for innovators to create integrated delivery platform across all channels which would provide the basis of open competition (globally interoperable smart card systems).

In the e-payment world, the advent of the Internet provides e-commerce opportunity with an instantaneous means of payment. SET (Secure Electronic Transaction) was recently developed as a standard for secure payment over the Internet. Although interoperability is important for smart card innovations, the global smart card schemes are still struggling from lack of interoperability. Currently, there are many international standards for smart card e-purse application. EMV (Europay, MasterCard, Visa consortium) is a specification for integrated circuit cards which fixes the dimensions and communications protocols of the cards so that all cards and card readers produced can work together. EMV is the global standard for chip-based debit and credit transactions. Common Electronic Purse Specifications (CEPS) is another internationally accepted standard governing e-purse programs to offer a multiple-application smart card platform. Concerning the European e-purse system, there are increasing efforts to create interoperability among various European purse systems which rely on cross-industry collaboration. However, these standards are not so closely integrated to provide a basis for multi-functional financial smart cards. The challenges of creating a multi-application environment and interoperable standards have to be overcome before companies can compete on common capability products.

CHALLENGES IN THE E-PAYMENT WORLD

The government plays an important role in meeting the challenges in the e-payment world. In the context of overall financial policy management towards smart card innovation, the governments of some countries are afraid that that smart cards would bring about the problem of money laundering (since the transfer of payment value is in the form of the digital information). It is argued that this is precisely not a sound governmental policy nor the truly effective mechanism to promote the new payment innovations. The role of government is important in catalysing smart card diffusion. In other words, the government is important in introducing efficient market-driven mechanisms ('demand-pull' creation) by taking any initial step to promote the diffusion into the national economy. For example, in Australia and the Czech/Slovak Republic, the government has taken initiatives in experimenting the use of smart cards in the medical system, educational application, transport cards (Wonglimpiyarat, 2005b; Hui Min Lee, et al., 2003; Argy and Bollen, 1999). When these experiments were successfully carried out, the expanded implementation to the financial service industry were then be brought into play. In Korea, Hong Kong and Singapore, the government has taken many initiatives to support the development of e-cash schemes to open up to new challenges (Wonglimpiyarat, 2005b; Alder, 2002).

The challenges in overcoming the problems in the e-payment world are that there seems to be no consumer response to the e-cash as a revolutionary means of payment transmission. As a result, the players in the smart card industry are somewhat reluctant to join any e-cash system (whether the Mondex or Visa Cash system). The banks are not willing to invest in upgrading ATMs, point-of-sale terminals and other machines to be capable of accepting smart cards. One of the interesting issues in the development of electronic cash system is that technology is not a problem. The main problems revolve around the development of applications and the market acceptance. Currently, the market still lacks the application developers to induce the deployment of e-cash. This reflects a chicken and egg scenario that no innovator dares to take further steps into the unknown (the state of uncertainties in the market) (Clemons, et al., 1996; Van Hove, 1999, 2001).

[Insert Figure 5 around here]

Figure 5 shows the level of innovation adoption as a result of changing innovatory strategies from competitive strategy towards collaborative strategy. Within the payment innovations market, collaborative strategy brings about maximum benefit in terms of diffusion of innovation. Figure 3 and Figure 5 show the development of the payment industry. As for the players, there is a move from competition towards collaboration. For example, in the ATM (Automated Teller Machine) market, innovators developing proprietary ATM networks finally move towards collaborative ATM network and national ATM pool. In the credit card market, innovators developing proprietary credit system moves to larger credit card networks of Visa and MasterCard. Also, in the Debit card

market, innovators competing to launch proprietary debit card system moves towards MasterCard Maestro and Visa Debit system. The pattern of innovation development in the bank card industry shows that the diffusion of innovation is driven by industry linkages.

Currently, electronic cash employing the smart card technology has not yet become a revolutionary means of payment. Nor the electronic cash could achieve a level of diffusion because of insufficient collaboration among organisations competing to launch smart cards. The challenges to be considered are: Why innovators in the smart card industry do not reduce a degree of competition? Why do they waste financial resources in competition where they may finally enter into collaboration? The historical development of bank card innovations already suggests the importance of industry linkages. Of course, the strategic business reason is that the launch of e-cash using smart card technology will be based on the integration of separate customer base of the previous card innovations. To say it the other way round, the launch of e-cash will combine the current accounts customers of ATM/Cash Card and EFTPOS/Debit Card innovation; and the credit card customers of Credit Card innovation (Figure 6). Underlying the irreconciliation among innovators are that innovators would expect proprietary benefits rather than shared benefits. However, innovators seem to ignore the difficulties in market competition in the sense that the market size of e-cash is too large for any innovator to capture the market by going it alone.

[Insert Figure 6 around here]

The analysis in this paper suggests that the proliferation stage whereby business could compete in launching the smart card e-cash innovation can only occur through industry linkages. It is argued that the agreement on standards and collaboration to provide extensive network Point-of-Sale systems would be significant preliminary steps for innovators to compete further. Rather, it is a case that business strategies to launch the new payment innovation have to be aligned with IT strategy. For this paper, the previous payment innovations (ATM/Cash cards, Credit cards, EFTPOS/Debit cards) have already elucidated the factors needed to develop logically and commercially successful innovations (the potential of smart card innovation?)

CONCLUSION

This paper has demonstrated the importance of industry linkages, both past and present innovations, to the development and diffusion of innovations - ATM/Cash cards, Credit cards, EFTPOS/Debit cards and Smart cards. The diffusion of payment innovations in a competitive environment needs collaboration among players in the financial service industry. The Rothwell's 5th generation of innovation model is witnessed as a means towards widespread acceptance of innovation. There is an argument in the business

strategy literature which suggests that collaborative strategy offer the opportunity to exploit industry linkages to the full potential.

A common assumption has been that previous payment innovations are successful in diffusing into the economy by the innovators' integrating technology strategy to the overall corporate strategy. The smart e-cash innovation may follow the same pattern of the innovations: the changes from proprietary innovative strategy towards the collaborative strategy. The main problems for the smart card e-cash industry is whether, the industry agreement to achieve standardisation, the regulatory issues, the high investment in upgrading terminals can be resolved. In a smart card e-cash market which is not yet developed, the first mover advantage may not be clear due to less consumer response. In this respect, the government should extend its role in supporting the technology adoption and creating demand of innovation.

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Figure 1 Integrated delivery channels

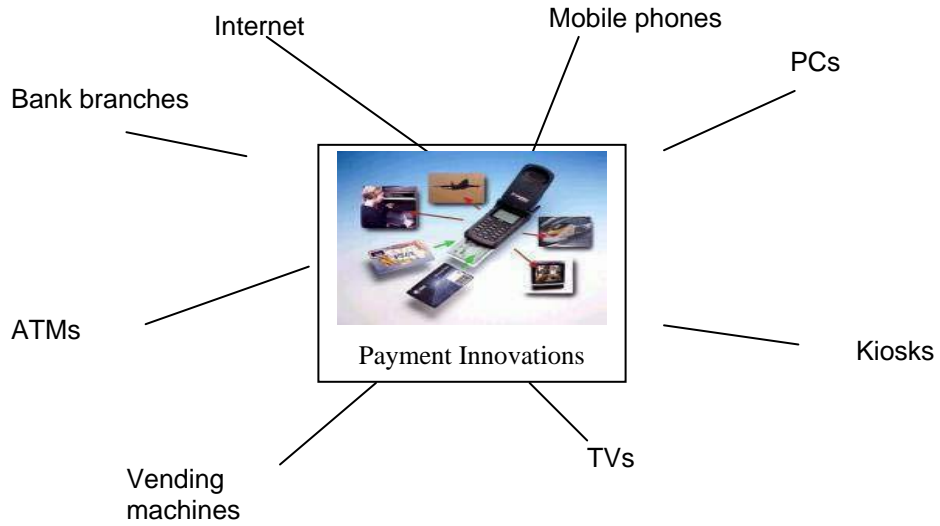


Figure 2 The use of technology to enable cross-selling strategies.

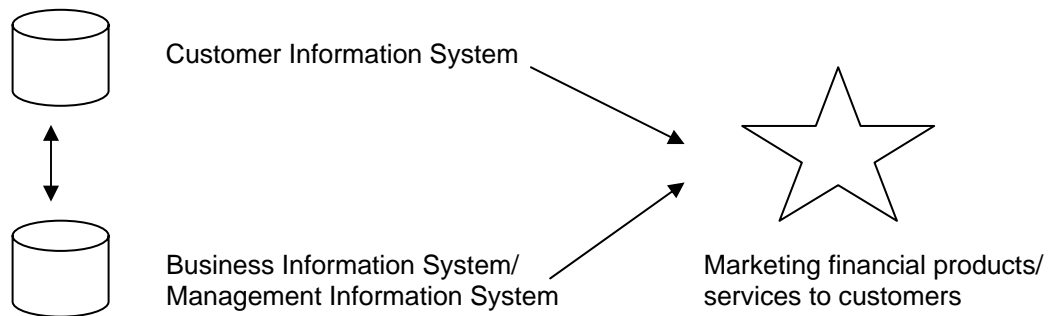


Figure 3 The development of payment innovations

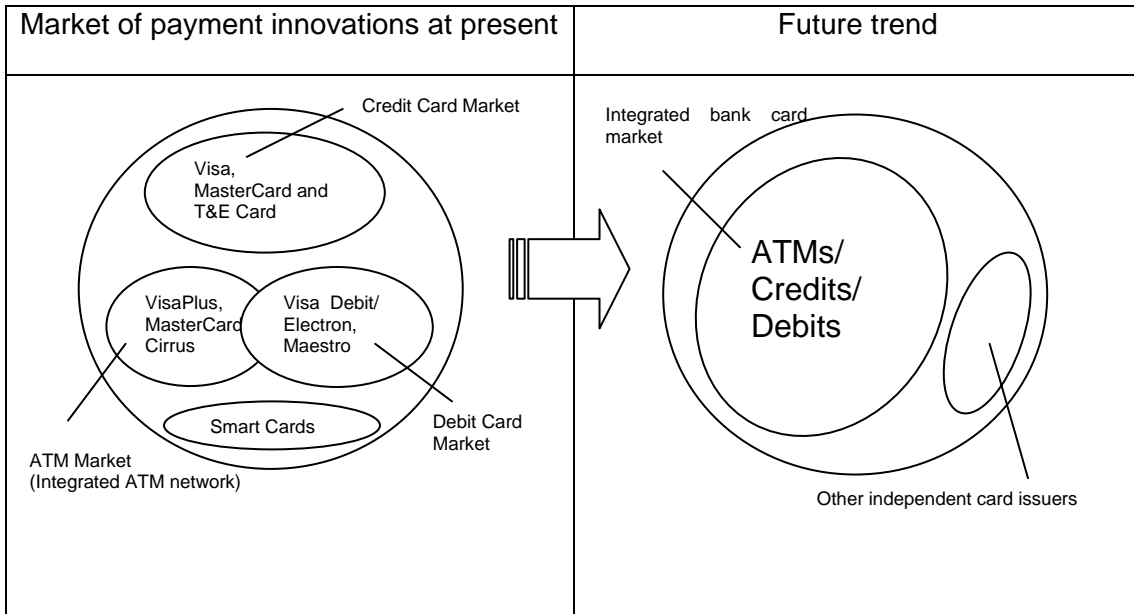
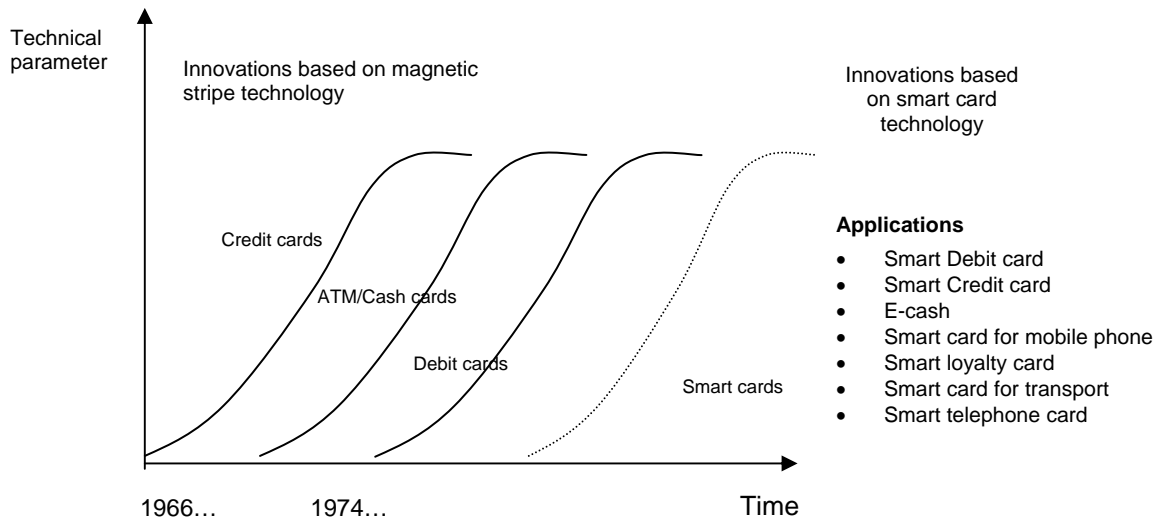


Figure 4 Diffusion of innovation in the bank card industry



Source: Wonglimpiyarat (2006)

Figure 5 The diffusion of innovation

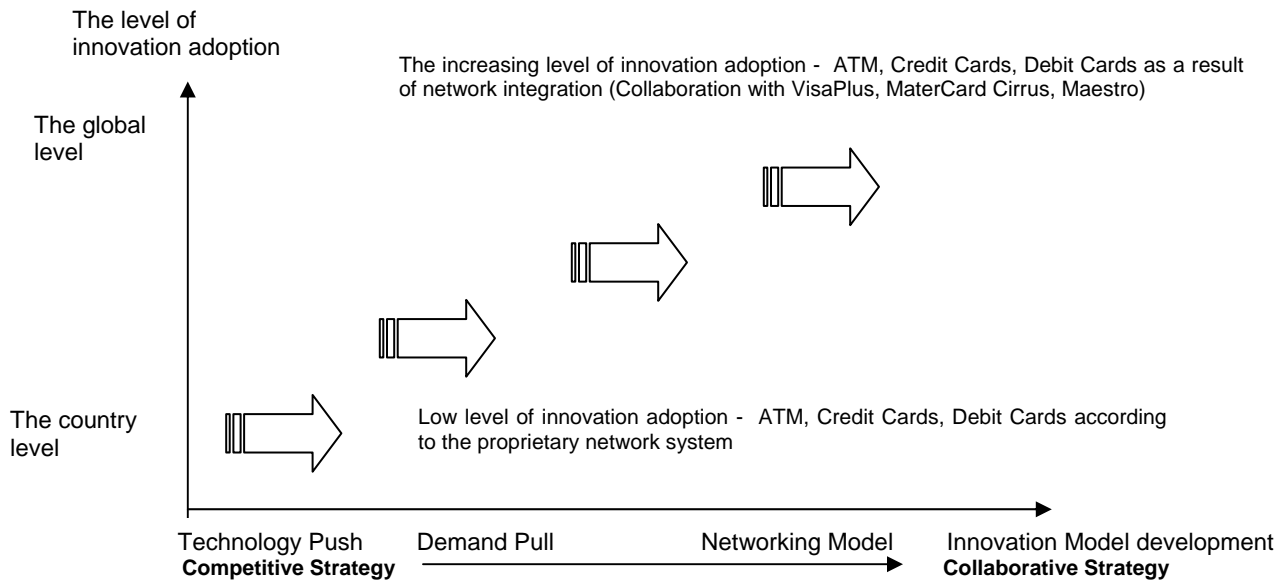


Figure 6 The customer base of Smart Cards as an integration of other card payment customer bases

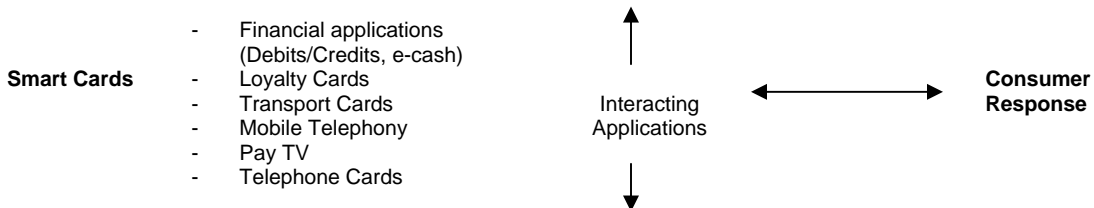
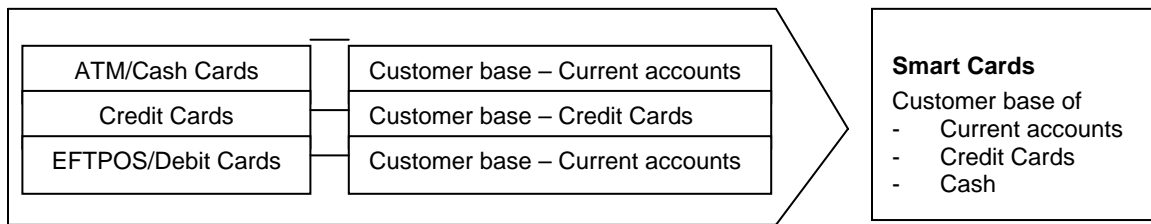


Table 1 Major studies on the innovation development process

Scholars	Principal Concepts
1 Rogers (1962, 1983, 1995, 2003)	The innovation development process comprises of 6 stages: (i) problem definition, (ii) research (basic and applied), (iii) development, (iv) commercialisation, (v) adoption and diffusion, (vi) consequences.
2 Cooper & Kleinschmidt (1990)	The innovation development process of the manufacturing industry comprises of: (i) preliminary assessment, (ii) detailed investigation (problem definition), (iii) development, (iv) testing and validation, and (v) commercialisation.
3 Kline and Rosenberg (1986)	The Chain-Link model represents the process of innovation - a set of linked activities which may occur in a variety of sequences. A model includes the innovative activities as well as the elements of research, knowledge, and market.
4 Schmookler (1966)	The development of technological innovation depends on the evolution of the market demand. The pull from the demand side influences the development of the product life cycle in technological innovation.

Table 2 Rothwell's five generations of innovation models

Generation	Key features
First	Technology push: simple linear sequential process
Second	Need pull: simple linear sequential process
Third	Coupling model: recognising interaction between different elements and feedback loops between them
Fourth	Integrated model: integration within the firm, upstream with key suppliers and downstream with demanding and active customers, emphasis on linkages and alliances
Fifth	Systems integration and extensive networking model: flexible and customized response, continuous innovation

Source: Rothwell (1992)