



# S-curve trajectories of electronic money innovations



Jarunee Wonglimpiyarat \*

College of Innovation, Thammasat University, Anekprasong 3 Bldg., Prachan Rd., Bangkok 10200, Thailand

## ARTICLE INFO

Available online 20 April 2016

### Keywords:

S-curve  
ATM/cash cards  
Credit cards  
Electronic fund transfer at the point-of-sale (EFTPOS)/debit cards  
Smart cards  
Bitcoin

## ABSTRACT

This paper discusses the S-curve trajectories of electronic money innovations in today's payment system. It explores the development of ATM/cash cards, credit cards, electronic fund transfer at the point-of-sale (EFTPOS)/debit cards, smart cards and Bitcoin, the latest development of electronic money or digital money. The analysis is based on the technology S-curve and Schumpeter's model of economic development to understand the trajectories from physical money to virtual money—a path towards a cashless society. The results have shown parallel S-curve trajectories of electronic money innovations signifying a move from a cash-based economy towards a less cash society. The study sheds light on the future diffusion and adoption of Bitcoin innovation.

© 2016 Elsevier Inc. All rights reserved.

## 1. Introduction

This paper explores the S-curve trajectories of electronic money innovations in attempts to understand if the global payment system is ready for a cashless society. Given that limited research has been carried out in respect of the service innovation (Miles, 1993, 1994, 2003, 2005), this study thus attempts to fill this research gap by focusing on the financial innovations and in particular the electronic money innovations. The paper explores the development of the global payment system from cash, notes and cheques to electronic money or digital money like ATM/cash cards, credit cards, electronic fund transfer at the point-of-sale (EFTPOS)/debit cards, smart cards and Bitcoin—the latest development of electronic money that has been pushed by countries around the world in attempts to be a cashless society.

The structure of the paper is as follows. Section 2 reviews the theoretical framework on service innovation and systemic innovation, technology S-curve and innovation diffusion, and Schumpeter's model of economic development. Section 3 describes the research design and methodology. Section 4 analyzes the landscape of the global payment system development. Section 5 explores the S-curve trajectories of the electronic money innovations. Section 6 concludes the paper and provides useful implications on the trends of global payment systems.

## 2. Theoretical framework

### 2.1. Service innovation and systemic innovation

Innovation is a complex process whereby many scholars have developed several approaches to define its nature. In the context of technology management, the term 'innovation' is defined in several ways. The definition encompasses a process of enhancing existing technology (Dosi, 1982; Nelson & Winter, 1977, 1982; Rosenberg, 1976, 1982) or a process of turning opportunities into

\* Tel.: +66 2 623 5055 8; fax: +66 2 623 5060.  
E-mail address: [jarunee@tu.ac.th](mailto:jarunee@tu.ac.th).

practical use (Pavitt, 1984; Tidd & Bessant, 2009). In a more comprehensive approach, innovation is defined as an integrated process of enhancing the technology frontier, transforming this into the best commercial opportunities and delivering the commercialized product/process innovation in a competitive market with widespread use (Daft, 1982; Rothwell & Gardiner, 1985; Schott, 1981). The payment system is regarded as a service sector—a tertiary sector where the industries involve the transformation of material goods, people, or information (Freeman, 1991; Miles, 1993; Utterback, 1994; Voss, 1994).

Systemic innovation is another type of innovation which requires a number of complementary systems to realize the value of innovations. It is a set of interconnected innovations whereby an innovative coalition is necessary to achieve market acceptance. In other words, the systemic innovation is one where the benefits of an innovation increase disproportionately with the use and diffusion of the innovation among users and where most of the benefits are external to the particular innovator of the product or process and accrue to a wide range of users and uses (Chesbrough, 2003a, 2003b, 2011; Chesbrough & Teece, 1996). Many financial innovations are systemic innovations, for example, credit cards, international electronic fund transfer system, smart cards for financial applications (chip cards providing payment functionalities such as debits/credits, the smart card e-cash), travelers' cards (T&E cards) and cheque truncation (Wonglimpiyarat, 2006).

## 2.2. Technology S-curve and innovation diffusion

The innovation diffusion theory often deals with the innovation process. The innovation process characteristically exhibits an S-pattern. A review of various scholars' studies on the process of innovation diffusion is shown in Table 1. Utterback and Abernathy (1975) articulate the innovation process as S pattern. Vernon (1966)'s Product Life Cycle (PLC) is a classic model explaining the development as a pattern of product substitution (the S-curve pattern). The phases along the PLC reflect innovation diffusion—the progress of product/process innovations along the stages of introduction, growth, maturity and decline. Given the competitive environment of the innovation/diffusion process in the industry, Utterback and Abernathy (1975) developed a model of the dynamics of innovation—the innovation life cycle model—to describe the process of innovation and the degree of technological change. The innovation life cycle also provides a basis for technological forecasting. According to the study of the innovation process by Fisher and Pry (1971), they argued that when a new innovation reaches about 5% penetration of the potential application market, it provides a reasonable base for forecasting the speed and ultimate penetration achievable.

In the theories of economic growth and technological change, Abernathy, Clark, and Kantrow (1983) argued for the process of industrial de-maturity as the driving force of the industry evolution. They considered the nature of the innovation process as well as the competitive environment in which technology evolves to explain the progress of the industry. With respect to evolutionary theorizing on economic growth, they argued that technological change may alter the character of innovation and competition and over time affect the structure of the industry.

**Table 1**

Principal concepts of innovation diffusion.

Source: The author's design.

Scholars	Principal concepts of innovation diffusion
Utterback and Abernathy (1975)	The life cycle explains sources and directions of technological change. The life cycle explains the development of technology-related products and processes.
Fisher and Pry (1971)	Fisher and Pry offer a classical model for forecasting innovation diffusion. Their study is focused on the diffusion process of product innovations as well as the substitution rate of technological change.
Gort and Klepper (1982)	The study measures and analyzes the diffusion of product innovations. Their study divides the life cycle of the new product industries into five stages. The study provides a basis for the development of a theory of the evolution of industries.
Abernathy et al. (1983)	They view the innovation process as a process of industrial de-maturity. They argue, from the perspective of evolutionary theory on economic development, that technological change may alter the character of innovation and competition and over time affect the structure of the industry.
Rogers (1962, 1995, 2003)	The innovation development process comprises six stages: <ul style="list-style-type: none"> <li>• problem definition</li> <li>• research (basic and applied)</li> <li>• development</li> <li>• commercialization</li> <li>• adoption and diffusion</li> <li>• consequences</li> </ul>
Cooper and Kleinschmidt (1990)	The innovation development process of the manufacturing industry comprises: <ul style="list-style-type: none"> <li>• preliminary assessment</li> <li>• detailed investigation (problem definition)</li> <li>• development</li> <li>• testing and validation</li> <li>• commercialization</li> </ul>
Peres, Muller, and Mahajan (2010)	They study the diffusion processes of new products and services. They view the innovation diffusion as a process of market penetration whereby the launch of new products and services is driven by social influences.
Guseo and Guidolin (2015)	Their study is focused on the innovation diffusion—the new product life cycle. They propose a multimodal model to the life cycle of the compact cassette format for pre-recorded music in Italy.

Download English Version:

<https://daneshyari.com/en/article/1026496>

Download Persian Version:

<https://daneshyari.com/article/1026496>

[Daneshyari.com](https://daneshyari.com)