

# Chapter XIV

## Modeling Customer–Related IT Diffusion

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### ABSTRACT

*This study develops a diffusion model of customer-related IT (CRIT) based on stock market announcements of investments in those technologies. Customer-related IT investments are defined in this work as information technology investments made with the intention of improving or enhancing the customer experience. The diffusion model developed in our study is based on data for the companies of the S&P 500 and S&P MidCap 400 for the years of 1996-2001. We find empirical support for a sigmoid diffusion model. Further, we find that both the size and industry of the company affect the path of CRIT diffusion. Another contribution of this study is to illustrate how data collection techniques typically used for financial event studies can be used to study information technology diffusion. Finally, the data collected for this study can serve as a Bayesian prior for future diffusion forecasting studies of CRIT.*

### INTRODUCTION

Customer-Related IT (CRIT) investments are defined as information technology investments made with the intention of improving or enhancing the customer experience. CRIT investments

are specifically chosen because of the customer-focus employed by many companies, and the overwhelming need for companies in general to increase customer satisfaction. Technologies that make the customer's experience with the company better include among others CRM software, wire-

less technology, and data mining-enabled profiles for e-Commerce. Given that our intent is to study the broad phenomenon of investing IT dollars to improve the customer experience, we believe that, as found by Fichman (2001), studying an aggregated set of innovations would lead to more robust and generalizable results. Our reasoning is also consistent with other lines of research that have studied the diffusion of broad phenomena or aggregated technologies, such as IT outsourcing (e.g., Loh and Venkatraman, 1992; Hu et al., 1997) and telecommunication technologies (e.g., Grover and Goslar, 1993).

We propose that, as companies see for themselves how IT can benefit their relationship with their customers, they tend to invest more in IT-related technologies. Early adopters depend more heavily on the media, which is the communications channel for the external model (Rogers, 1995). Since we primarily studied the investment into “relatively” newer technologies for the period studied (e.g., Internet, CRM, etc), it is reasonable to deduce that firms investing into CRIT are early adopters. Therefore, this work hypothesizes that the diffusion of customer-related IT investments follows an external influence sigmoidal (or logistics) curve. This is consistent with recent work done by Ranganathan et al (2004), who used an external influence curve to model SCM adoption between companies.

According to Rogers (1995), the size of a company is also positively related to innovator characteristics and thus diffusion influence. Tornatzky and Fleisher (1990) further suggest that the size of a company is not a determinant for innovativeness, so much as it (size) is a proxy for other constructs that are positively related with innovativeness. These variables include wealth, specialization and slack resources. Indeed, according to Hunter (2003), larger firms tend to purchase innovative technologies earlier and “force” smaller companies to also invest in the technology for survival. If this is true, then characteristics such as size, innovativeness, and

financial stability should change the diffusion path for those companies. This research tested whether the investment in Customer-Related Information Technologies follows a diffusion path, and whether that path is affected by industry type and firm size.

The study has additional importance in that its data set can serve as a Bayesian prior longitudinal data set that will enable technology companies to better forecast how and when other investments would be made into customer-related information technologies (Sultan et al., 1990).

## **BACKGROUND**

Technology innovation and the investment into technologies by firms have been touted as a driving force in organizational competitiveness and even as the key driver of future competitive capability (Fichman, 1999). The diffusion of CRIT is affected both by the characteristics of the technology and by the characteristics of the firm using it (Rogers, 1995 and Fichman, 1999). Diffusion models are attitude change models, and the basis of these types of models is that consumers follow a rational decision-making or problem-solving approach in their actions that is not always linear (Robertson, 1970). Examples of diffusion models are the Sigmoidal Curve (or Logistics Curve), the Bass Model and the Survival Curve (Bass, 1969; Bauer, 1964; and Pindyck and Rubinfeld, 1998). Based on different assumptions about communication channels or influence sources, diffusion models have been classified into three fundamental types: internal, external, and mixed (Mahajan and Peterson, 1985).

Recent literature on technology diffusion and the effect of firm characteristics on that diffusion process has shown that technology investment follows a diffusion path and is affected by such things as market share, economic health, and consumer loyalty (Kreamer et al., 2002). E-commerce, for example, was found to follow a diffusion path

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