

Contents lists available at [ScienceDirect](http://www.sciencedirect.com)

Journal of High Technology Management Research



Analysing high technology adoption and impact within public supported high tech programs: An empirical case

José Albors-Garrigos^{a,*}, José Luis Hervás-Oliver^a, Antonio Hidalgo^b

^a Univ. Pol. Valencia, Dept. Org. Empresas, Spain

^b Univ. Pol. Madrid, Dept. Ing. Organización, Spain

ARTICLE INFO

Available online 22 October 2009

Keywords:

High tech

Public innovation policies

ABSTRACT

The aim of this paper is to contribute to the body of knowledge in relation to the diffusion and adoption process of high technology. It intends to analyse those mechanisms that influence advanced technology transference and marketing, and those features that improve the impact of public programs supporting the adoption of high technology. The paper proposes a contingent construct that explains how advanced technology is transferred, diffused and adopted by users in a firm. In relation to the impact of technology transference this paper follows a novel approach: value mapping methodology adapted to the case of advanced technology. The article provides empirical evidence on the variables which contribute to the technology transference and commercialization process, and especially in the case of SMES. Key variables such as technology complexity, relationships between researchers, developers and final users, as well as market barriers appear to be critical for the transference process. Moreover, technology absorption by incumbent firms becomes a necessary requirement for its subsequent transfer.

The paper has utilised the available experience from the GAME initiative, part of the European Commission IV Research Framework Programme, related to the promotion of microelectronics among Spanish firms. Using a representative sample and employing multivariable analysis methods, a model was developed in order to understand technology diffusion, absorption and transference knowledge flows. In addition, the model is useful for evaluating technology dissemination using the diffusion model to measure its social impact. The paper found that social impact can be explained by the creation of employment.

© 2009 Elsevier Inc. All rights reserved.

1. Introduction. State of the Art in Advanced Technology Diffusion

1.1. Objectives of the study

The objectives of this paper are to contribute to the analysis of the adoption process and social efficiency of high technology diffusion public programs and policies as well as to the understanding of the mechanisms that influence the process of high technology transference. To achieve this we have drawn on the theory of innovation and technology development in order to understand the context of high technology diffusion and its variables which influence the process. In order to evaluate the effectiveness of the diffusion we have followed the contingent model proposed by [Bozeman \(2000\)](#) and the methodology of value mapping as a means of measuring the program impact, i.e., how high tech products are developed and the process of technology adoption.

* Corresponding author.

E-mail addresses: jalbors@omp.upv.es (J. Albors-Garrigos), joherol1@omp.upv.es (J.L. Hervás-Oliver), a.hidalgo@ingor.upm.es (A. Hidalgo).

The specific objective of the paper is to develop a construct that facilitates the analysis of the diffusion of advanced technology programs and to identify those variables that have a significant impact in the process. There are a number of research questions to be answered: Is high tech product development different from conventional new product development? Which elements in the development and adoption processes are relevant? How can we measure the impact of public supported programs for the diffusion of advanced technology? Is this impact dependent on the development process?

In this case, advanced technology diffusion has to deal with three basic difficulties (Tatikonda & Rosenthal, 2000a,b). First its complexity makes it very difficult to communicate and transfer. Secondly, it is subject to drastic and frequent changes due to technology disruption and economic conditions. Finally, project development becomes complex due to task uncertainty.

In order to achieve the proposed objective the paper is organized as follows: following the introduction we review specific literature and the hypotheses are stated according to the theoretical framework. Then, we describe the field case (GAME program) and present the methodology and empirical design, with the model and variables used as well as the characteristics of the sample. Finally, the results of the empirical evidence are given. Conclusions and a discussion are provided in the last part of the article.

1.2. Conceptual approach. Technology diffusion theories and policies

1.2.1. Technology diffusion and adoption. Context and market conditions

The classical theory of innovation diffusion was based on sociology and was designed by Rogers in a seminal publication (Rogers, 1995). He proposed and confirmed the well-known S-shaped diffusion curves as well as the bell curve classifying the adopter's profiles. Since then adoption has been considered as part of the diffusion process and also a measure of its success. Other authors have studied the phenomena, applying the theory to technology diffusion. Bass (1969) provided a classical model which has received widespread attention. Roberts and Lattin (2000), Mahajan, Muller and Bass (1991) have studied and surveyed the technology literature which is mainly based on market data.

The sociological school explains diffusion as an epidemic model of learning by consumers. Some authors still support these effects in technology adoption models (Gourlay & Pentecost, 2002). Other alternative models consider consumer heterogeneity as the driving force which influences the diffusion process (Davies, 1979). The S-adoption curve was shaped by the values placed on the new product by potential adopters. More recently, the prevailing school of thought has supported *probit* models where the differences in adoption reflect the differences in the goals, needs and abilities of firms and final users (Geroski, 2000).

In the case of high or advanced technology, and in relation to the adoption process, some authors have pointed out the relevance of technology in the early diffusion stages versus the relevance of solutions and convergence in the later mature stages (Norman, 1998). However, some authors have pointed out the irrelevance of a competitive environment and technology versus the innovative drive of the firm (Yang & Liu, 2006). Others have highlighted the perception of active high tech users (Green, Collins, & Hevner, 2004). However, in relation to project development as far as high tech product development is concerned, the majority of authors take into account the relevance of technology complexity and uncertainty (Tatikonda & Rosenthal, 2000a,b). Here, since we are considering microelectronics, the technology complexity is associated with the service innovative capability provided, whether it means a radical innovation or a rather incremental innovation (Subramanian & Youndt, 2005; Chandy & Tellis, 2000).

From the point of view of technology adoption, Hall and Khan (2003) indicate how it is influenced by demand behaviour, network effects, supply behaviour, environmental factors as well as by government and regulations. Sirgy and Su (2000) have analysed how high tech contexts are increasingly responsible for changes in the opportunity, ability, and motivation of consumers to adopt innovations. Christensen (1997) has studied resistance by firms to adopt disruptive technologies because they are not well suited to their current customer's present needs. Decter, Bennett and Leseure (2007) have studied the perceived barriers of university research centres to business technology transfer and offered suggestions for possible improvements in the process. Greiner and Franza (2003) have considered key barriers and bridges in the case of the transfer of environmental technologies, including regulations, difficulty in clearly defining the end-user needs, and the need to demonstrate technologies to potential end-users. These authors provide recommendations for improving the technology transfer process.

The changes in a customer's drive in the technology diffusion process have been described by Moore (1991) from a marketing point of view, departing from the Rogers bell curves. This contribution relies on a detailed description of the final user's needs and profiles. A more integrative approach has been suggested by Malhotra (1999) considering the whole of the adoption processes in the case of IT adoption. Cooper and Bruno have analysed how high tech SMEs cope with technology diffusion in their markets, and Crick and Jones (2000) on their approach to international markets. Im and Workman (2004) have analysed how market orientation, creativity, and new product performance in high technology firms are key to the success of a firm when there is a necessity to respond to changing market needs.

Some authors (Venkatesh & Davis, 2000) have developed a technology acceptance model (TAM) where job relevance, output quality, result demonstrability, and perceived ease of use significantly influenced user acceptance.

In relation to the actors – research centres and firms – concerned in the process of technology and knowledge transfer, Sung and Gibson (2005) have outlined four key factors to accelerating knowledge and technology transfer: Communication, Distance, Equivocality, and Motivation. Arvanitis, Kubli and Worter (2005) explored the factors determining the propensity of Swiss firms to interact with public science institutions in Switzerland in the transfer of knowledge and technology through training, recruitment of R&D personnel, research, consulting, etc. The study outlined the transfer of “tacit” knowledge as well the relevant motivation of firms and research centres. Santoro and Gopalakrishnan (2001) have analysed relationship-oriented factors such as trust, geographic proximity, communication, and research centre policies and how these factors influence the technology transfer

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات