



Chapter I

IT Industry Development and the Knowledge Economy: A Four Country Study

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ABSTRACT

It is generally accepted that knowledge has become a third major factor of production, in addition to the traditional factors — labor and capital. Information technology production is a significant factor in the knowledge economy both because it is a major enabler of that economy and because it is itself highly knowledge intensive. Many countries around the world are looking for ways to promote the development of the knowledge economy, and information technology industries in particular. An important question is to what extent — and how — small developed countries might succeed in this endeavor. This study suggests a modified and more comprehensive version of the Ein-Dor et al. (1997) model of IT (information technology) industry success in small developed countries. Whereas the earlier model of IT industry success was based solely on the macro-economic theory of Grossman and Helpman (1991), the revised model suggested here incorporates Romer's (1990) work in New Growth economics. A significant advance over earlier work in this area is the use of both longitudinal and time slice data. This article provides an in-depth analysis of the IT industry in four

countries over a five-year period: Finland, Israel, New Zealand and Singapore. It analyses some changes that occurred over the period 1994 through 1998 and thus provides a reasonably comprehensive picture of the factors affecting the production of IT in these small developed countries. Our study reveals that four of the five endogenous variables studied have a close relationship to the development of IT industries in small developed countries. These variables are research and development, technological infrastructure, firm strategies, and capital availability. On the other hand, domestic IT use does not seem to be a major factor in IT industry development. Our analysis thus largely supports the more comprehensive model of IT industry success. These findings should be of interest to both researchers and policy makers seeking to develop the knowledge economy and information technology industries in particular.

INTRODUCTION

For countries in the vanguard of the world economy, the balance between knowledge and resources has shifted so far towards the former that knowledge has become perhaps the most important factor determining the standard of living — more than land, than tools, than labor. Today's most technologically advanced economies are truly knowledge-based. (World Bank, 1999)

Some contemporary economists have suggested that knowledge has become a third factor of production in leading economies. Paul Romer, in particular, has proposed his “New Growth Theory” as an alternative to the neo-classical model of economics (Romer, 1990). Whereas neo-classical economics recognised just two factors of production (labor and capital), Romer has suggested that technology (and the knowledge on which it is based) is an intrinsic part of today's economic system.

Consequently, many governments around the world are looking for ways to promote the development of the knowledge economy, and information technology industries in particular. According to many New Growth economists, information technology is best regarded as the facilitator of knowledge creation in innovative societies (OECD, 1996). Information technologies do not by themselves create transformations in society, but they are the enablers of change. New information technologies are tools for releasing the creative potential and knowledge embodied in people. Particularly important from the perspective of this study is the fact that IT industries are themselves knowledge industries in the sense that they employ knowledge intensive research, design, and production processes.

Using the macro-economic work of Grossman and Helpman (1991) and Romer (1990) as a base, this study attempts to provide a comprehensive picture of the factors affecting the production of IT in small developed countries. It does so by providing an in-depth analysis of the IT industry in four countries — Finland, Israel, New Zealand and Singapore — the last three over a five-year period. These four countries were chosen because they are comparable in many ways, making it easier to identify the factors leading to differential development of their IT industries. Given that IT industries provide a technical platform for innovation and are a key component in fostering the development of the knowledge economy, we believe it is important to identify the key drivers in

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