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The role of technology development in national competitiveness — Evidence from Southeast Asian countries

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Abstract

Technology development (TD) plays a key role in national competitiveness (NC) by giving a country a competitive edge in our age of information. Lots of researchers have focused on specific areas of TD, such as technology transfer, technology acquisition, and technology management, in most of developed countries. To our knowledge, however, they have seldom discussed the influence of TD on other categories of NC and vice-versa in developing and less-developed countries. In this study, we examine the influences of each category of NC of TD. Southeast Asian countries are divided into three patterns by means of a cluster analysis. The results show that Singapore, Malaysia, Thailand, and Laos have the same rank on measures of TD and NC. Singapore, Thailand, the Philippines, and Laos have the same rank on measures of TD and Economic Performance. Malaysia and Thailand have the same rank on measures of TD and Management Capability. In contrast, the TD performance of Southeast Asian countries is worse than the human resources performance because of their insufficient human resources assigned to R&D. Furthermore, based on a strategic grid for comparing the relative performance, four types of country and their achievements are discussed. Singapore outperforms all Southeast Asian countries. Malaysia and Thailand have to leverage their TD resources in order to enhance their NC. The other countries are still hindered in developing the determinants of their NC. Finally, our study offers a path to the identification of how countries of each pattern should supplement their insufficient capabilities, and what are the most important issues that need to be addressed in retuning their TD policies in order to enhance their NC.

Keywords: Technology development; National competitiveness; Economic performance; Human resources; Management capability

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1. Introduction

Technology development (TD) is the basic means by which companies, industries, and countries can foster their competitive capabilities and increase their competitive advantage. Traditionally, the concept of competitiveness has been analyzed on three levels of aggregation [1] — the firm, the industry (or one sector of it), and the country. These organizations usually use technology as a reengineering tool to reform management disciplines at different levels. In this research, we focus on the macro-viewpoint because national competitiveness (NC) has become a major concern for both developed and developing countries. Thus, NC is defined as the competitive capabilities of a nation related to its economic environment.

The term "competitiveness" originally comes from several studies. One of these is the "Diamond" model developed by Porter [2]. He studied eight developed countries and two newly-industrialized countries and raised the basic question of international competitiveness: "why do some nations succeed and others fail in international competition?" Dunning [3] treated multinational activities as a third exogenous variable which should be added to Porter's model. Roessner, Porter, Newman, and Cauffiel [4] developed and implemented national indicators of competitiveness in high technology based on data on competitive activity in 28 countries from 1987 to 1995. These indicators include national orientation, socioeconomic infrastructure, technological infrastructure, and productive capacity. Hämäläinen's account of the determinants of NC is grounded in a systematic or holistic approach to economic performance encompassing a broad set of factors, such as resources, technologies, organizations, product markets, external business activities, institutional framework, and government [5]. These studies emphasize the importance of technology and the role of TD in a competitive environment.

There are two famous published rankings of competitiveness — the World Competitiveness Yearbook (WCY) [6], published by the International Institute for Management Development (IMD) and the Global Competitiveness Report (GCR) [7] issued by the World Economic Forum (WEF). These publications have been gaining popularity for presenting a core conceptual framework for analyzing competitive capabilities, which are considered to be the indispensable foundation of the long-term economic development of a nation. The WCY has been accumulating data from 60 countries since 1989, applying over 300 criteria for assessing competitiveness grouped into four main categories of competitiveness — economic performance, government efficiency, business efficiency and infrastructure. On the other hand, the GCR, which has created a database from the information on 104 economies using 33 indicators that reflect the economic performance and environment for the competitive development of nations. These indicators are organized into three categories — the technology index, the public institutions index, and the macroeconomic environment index. These indices are calculated based on both hard data and survey data (soft data). Although these models are commonly employed to evaluate NC, they remain controversial. For example, Lall [8] has argued that the competitiveness indices of the GCR are too broad, its approach biased, its methodology flawed, and many of its qualitative measures too vague. Nonetheless, these indices are of much interest to policy makers who wish to enhance TD and managerial activities.

Though many reports on NC can be found; they concentrate on analyzing the NC of developed countries. Studying the NC of developing and less-developed countries is still criticized for lacking reliable data or publishing questionable data. Developing and less-developed countries, however, are on the merge of moving on to a new stage of economic development. They typically rely on technical and innovative capabilities (developed internally or acquired in part or totally from foreign countries) to