Available online at www.sciencedirect.com
ScienceDirect
Research Policy 35 (2006) 1522–1537
research policy
www.elsevier.com/locate/respol

Knowledge economy measurement: Methods, results and insights from the Malaysian Knowledge Content Study

Philip Shapira [a,*], Jan Youtie [b], K. Yogeesvaran [c], Zakiah Jaafar [c]

[a] *School of Public Policy, Georgia Institute of Technology, Atlanta, GA 30332-0345, USA*
[b] *Georgia Tech Enterprise Innovation Institute, Atlanta, GA 30332-0640, USA*
[c] *Economic Planning Unit, Prime Minister's Department, 62502 Putrajaya, Malaysia*

Available online 9 November 2006

Abstract

Building on a conceptual model of knowledge content, we discuss the methodology and results of a project to develop sectoral knowledge content measures in Malaysia. Through a survey of over 1800 Malaysian firms in 18 manufacturing and services industries, levels of knowledge content are assessed by sector. Industries vary in their emphasis on specific knowledge content components. Positive associations between technological innovation and at least one knowledge content variable are evident across all but four industries, although generally the results suggest that knowledge-based innovation is modest in Malaysia. Further insights and opportunities for policy from tracking knowledge content are considered.

JEL classification: D83; O21; O32

Keywords: Knowledge measurement; Innovation; Development policy

1. Introduction

Many countries and regions are seeking to shift their economies to become more knowledge-intensive. However, there are no standard methods of describing the extent to which an economy is knowledge-intensive or, in particular, of measuring levels or changes in the 'knowledge content' of the various sectors that comprise an economic system. We define knowledge content as "the sum of human capabilities, leadership assets and experience, technology and information capital, collaborative relationships, intellectual property, information stocks, and capabilities for shared learning and utilization that can be used to create wealth and foster economic competitiveness". We then describe the results of a study that sought to operationalize and measure this definition of knowledge content.

The paper draws on the first attempt by the Malaysian Government to assess Malaysia's knowledge content in key economic sectors. The assessment was undertaken in a study of Knowledge Content in Key Economic Sectors in Malaysia[1] and an associated Malaysian Knowledge Content (MyKe) Survey. The MyKe survey was con-

* Corresponding author. Tel.: +1 404 894 7735; fax: +1 404 385 0504.
E-mail addresses: pshapira@gatech.edu (P. Shapira), jan.youtie@innovate.gatech.edu (J. Youtie), yogees@epu.jpm.my (K. Yogeesvaran), zakiahj@epu.jpm.my (Z. Jaafar).

0048-7333/$ – see front matter © 2006 Elsevier B.V. All rights reserved.
doi:10.1016/j.respol.2006.09.015

[1] The study on Knowledge Content in Key Economic Sectors in Malaysia was undertaken during the period 2002—2004 by the Technology Policy Assessment Center (TPAC) at Georgia Institute of Technology and Intelligent Information Services Corporation (IISC) in collaboration with the Malaysian Economic Planning Unit. Study sponsorship was provided by the United Nations Development Programme (UNDP).

ducted in 2002/2003 by the Malaysian Government,[2] in collaboration with a team led by researchers from Georgia Institute of Technology (USA). The objective of the MyKe survey was to assess the knowledge content characteristics and constraints of 18 key private industries in Malaysia towards enhancing policy making for the knowledge economy. This sectoral perspective is distinctive relative to the metrics typically used in national-level indicator studies of knowledge. All previous attempts at assessing Malaysia's progress towards a knowledge-based economy were at the macro-level.

Following sections describe the methodologies and results of this extensive project to develop knowledge content measures at the sectoral level in Malaysia. We discuss the development and use of a range of metrics of knowledge content, and discuss interrelationships and issues in their measurement and usage, particularly in the context of developing countries. Based on analyses of the MyKe survey, results and conclusions are then offered. Our aim is to offer insights related to developing knowledge measurement systems that can be helpful to public policy decision-makers when implementing and evaluating knowledge economy development policies.

2. Policy context

In recent decades, Malaysia has transformed itself from a country that long depended on agricultural commodities and mining to an industrializing economy where manufacturing and services now account for 32 percent and 57 percent of GDP, respectively (2005 data, Department of Statistics Malaysia, 2005a; see also Economist, 2004). Today, manufactured goods contribute more than four-fifths of Malaysia's exports, led by exports of electronic products (Department of Statistics Malaysia, 2005b).

However, transitioning to an industrialized production economy is not the end objective of policymakers. The Malaysian Government has established the goal of developing a knowledge-based economy to advance national economic growth and competitiveness. This goal was highlighted in Malaysia's Third Outline Perspective Plan, 2001–2010 (Economic Planning Unit, 2001). A Knowledge-Based Economy Master Plan was launched in 2002 and contains 136 recommendations to accelerate the transformation to a knowledge-based economy (ISIS, 2002). However, the foundation for the knowledge-based economy began in the mid-1990s in the areas of human resource, information and communications technology (ICT), science and technology (S&T), research and development (R&D), infostructure and financing (Mani, 2001). Malaysia has also initiated efforts to try to ensure that the development of a knowledge-based economy does not result in a knowledge divide (Sahibbudin, 2001).

The development of S&T and the promotion of R&D have been integrated into the overall national development plan since the First National Science and Technology Policy and the Industrial Technology Development Policy were drawn up in 1986. In 2003, the Malaysian Government launched the Second Science and Technology Policy (STEP2) to further strengthen S&T and to spur greater technological development as well as a more innovation-led growth. Several growth-enabling initiatives were also introduced to achieve these stated objectives, chief among them was to grow a stronger base of knowledge workers to meet the demands of the technological age.

To implement these plans, a series of strategic initiatives in human resource development (HRD) were initiated to intensify the growth and creation of a critical mass for S&T in Malaysia. These include increasing the proportion of students pursuing science, technical and engineering disciplines at high school, university undergraduate, and post-graduate levels; increasing support for science fellowships, training scientists and researchers in public research institutes and higher education; strengthening industry-led training programs; and establishing distinguished visiting scientist programs in research institutes and universities in collaboration with industry. STEP2 also aims to increase Malaysia's national R&D spending to at least 1.5 percent of GDP by the year 2010 through seven strategic thrusts. These are aimed at strengthening research and technological capacity and capability; research commercialization; developing human resources; promoting a culture of science, innovation and techno-entrepreneurship; strengthening institutional frameworks and S&T management while implementing a more market friendly S&T policy; accelerating the widespread diffusion and application of technology; and building competence in key emerging technologies.

To enhance private sector involvement and commitments in R&D activities, three grant schemes have been established by the Malaysian Government. The Industry Research and Development Grant Scheme provides risk-sharing between the Government and the private sector in R&D activities; the Multimedia Super Corridor (MSC) Research and Development Grant Scheme promotes the development of R&D clusters among MSC-status com-

[2] The MyKe Survey was implemented by the Malaysian Economic Planning Unit and the Malaysian Department of Statistics.