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The impact of technological innovation and governance institution quality on Malaysia's sustainable growth: Evidence from a dynamic relationship

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ABSTRACT

Technological innovation integrated with strategic policies is vital for sustainable growth. This study aims to highlight the importance of technological innovation and governance institution quality on Malaysia's sustainable growth from 1985 through 2015. The dynamic relationships among gross domestic product, capital, employment, electricity consumption, technological innovation, governance institution quality, and the interaction of technological innovation and governance institution quality are examined. The augmented production function, F-bound, dynamic ordinary least squares, and Granger causality tests are utilized. The results confirm the dynamic relationship among the above variables. In the long run, unidirectional causality runs from governance institution quality and technological innovation-governance institution quality toward Malaysia's financial development. However, in the short run, there is bidirectional causality between financial development and economic growth. The interaction between technological innovation and governance institution quality has a significant positive impact on Malaysia's economy in the long run. Also, capital, employment, and electricity consumption have a positive significant impact on economic growth in the long run. These three variables are vital growth inputs and should be accompanied by technological innovation and governance institution quality. Well-planned and relevant policies can boost technological progress in Malaysia, slowly yet surely.

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1. Introduction

Sustainable growth and development remains a major challenge for all countries. Indeed, it has become a main agenda for all countries, both developed and developing. Stagnant growth, global economic volatility, and macroeconomic shocks have recently raised concerns in countries across the globe. Sustainability issues have been discussed since the Brundtland Report [1], with the aim to attempt sustainable long-term growth and development (social, economic, and environmental) while safeguarding future generations. In general, increases in the factors of production, improvements in efficiency in allocating the factors of production, and the rate of innovation are the major forces of growth [2,3]. Heavily depending on traditional production functions such as capital and labor to sustain economic growth and continued dependence on it

in the long term is not an option. Developed countries have long ago switched from using traditional sources of growth like capital and labor to technological innovation. For example, South Korea, Taiwan, and Singapore are progressively moving to technological innovation methods of production [4]. Endogenous growth theories point out that technological change has a significant impact on global growth patterns [5,6].

To date, the general consensus has been that new technology adoption is important to facilitate technology catch-up [7,8] and foster innovation in the 21st century [9–11]. New technology adoption may even resolve the uncertainty about the economic growth rate, environmental issues, and the depletion of energy resources. Studies have shown that technological innovation is the main driver of long-run growth [12,13]. This is because as producers add an additional input (i.e., capital or labor), the additional output obtained will eventually decline over time, according to the law of diminishing returns. Also, such innovation supports productivity through new or enhanced processes, technologies, and business models that create differentiated products and services. At the same time, it creates additional sources of revenue. However, a

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country cannot maintain long-run growth simply by adding more capital and labor. Thus, technological innovation is the alternative solution to achieve a continuously ascending growth rate for a country [14]. The growing concern about sustainable development, diminishing energy resources, and environmental issues drives policy makers to find solutions domestically and globally [15]. However, innovation is seen as a “double-edged sword” for achieving sustainable development in terms of both attempting long-term economic growth and resolving environmental issues.

The increasing number of scientific, technological, and innovation achievements, together with well-organized intellectual property laws, demonstrates how important technological innovation is to achieve a better economic outcome and sustain a country's growth rate [16]. Technological innovation can become reality with the help of quality governance institutions. The relationship between quality of governance and economic growth is rather complex [17]. Governance is actually a form of the “social technological” that facilitates economic activities, shapes the behavior of economic agents [18], and optimizes economic decisions, collectively and individually [17].

Over the last five decades, Malaysia has experienced rapid economic growth, as well as social and environmental transformation [19]. As a developing country, Malaysia is in the midst of a transition to attain sustainable growth and development to become a high-income nation and fulfil Vision 2020. A 6% annual gross domestic product (GDP) growth is targeted over the 11th Malaysia Plan [20]. However, achieving the targeted annual growth rate will involve input factors beyond capital and labor. Technological innovation offers by far the best solution; this has been recognized by many researchers, practitioners, and governments. Indeed, technological innovation is a main driver for a country to attain sustainable economic growth and competitive advantage [21]. The idea is that such innovation leads to new ideas and new methods, new production practices, and new management skills which become breakthroughs, so-called novelties. Schumpeter [22] highlights the term constructive disruption, which suggests that any obsolete technology will be put away and replaced with a new one. This is a continuous process and no country that avoids this process will flourish. Any governmental delay in decisions, commitment, progress, and efforts in the technological innovation process will affect the country as a whole, socially, economically, and environmentally. Moreover, catching up in terms of technological progress takes many years for countries that have been left behind. Indeed, innovation can allow countries to grow consistently at a sustained rate. Nevertheless, motivating and fostering the innovation process requires sustained, gradual, and continuous effort [23].

According to Fagerberg et al. [24], the 1990s onward show a twisted shift in development of research in technological innovation. Recent studies have focused on the role of innovation in the entire economy and how the quality of governance institutions and policies play a vital role which in turn benefits the country [25,26]. Thus, a society can enjoy the full benefits of innovation and its diffusion. Chang and Fang [27] infer that institutional, technological, and market-based approaches should be implemented to increase energy efficiency, improve energy equity, and secure sustainability. In pursuit of sustained growth and economic development, Malaysia has committed to provide institutional changes and a better regulatory environment to promote innovation [28].

Technological innovation is a catalyst for developing countries like Malaysia. It is a key influencer to drive long-term economic growth and sustainable development. The current 11th MP [20] highlights technological innovation as an important agenda for the Malaysian government [20]. Bekhet and Latif [2] point out that the

Malaysian economy still relies on capital and labor instead of multifactor productivity (MFP), which is contributing about 70% of GDP growth. Furthermore, MFP has been stagnant in terms of real growth; while, the share of MFP in growth decelerated in the 9th MP [29] and 10th MP [28]. This stagnation period for two MPs has indeed caused concern among policy makers. So, the government has made a rigorous effort to strengthen the MFP input factor during the 11th MP. The goal is for the ratio of MFP to GDP growth to increase to 40% (Fig. 1). The Malaysian government has targeted an emphasis on multifactor productivity input of up to 2.3% (real growth) with clear outcomes at all levels (national, industry, and enterprise) [20].

Therefore, it is a great challenge for Malaysia to formulate suitable strategies to increase the innovation rate and ensure that innovation implementation is a continuous effort. Fig. 2 shows that the economy maintained an average growth rate of approximately 5.72% from 1985 to 2015. The growth rate trend and performance change throughout the period depending on global and domestic factor variations. Economic growth averaged over 1970–1980 and 1980–1990 is 8% and 5.4%, respectively [30]. Furthermore, for 1999–2000 and 2000–2015, economic growth averaged 6.8% and 4.8%, respectively [31]. The growth rate steadily trends upward for 1985–2015, with two drops during the Asian financial crisis (AFC) (1997–1998) and global financial crisis (GFC) (2008–2009) [32]. Based on this changing performance – Malaysia's growth rate dropped from 8% (1970–1980) to 4.8% (2000–2015) – policy makers seek to increase the country's current growth rate, with a target of annual growth of 5%–6% during the 11th MP [20]. Meanwhile, technological innovation in Malaysia has displayed an upward trend throughout the years (1985–2015), with a growth rate of 5.68%. Growth in the number of patent applications fluctuates throughout the 1985–2015 period, with a low of 232 in 1987 and a high of 2372 in 2007 during the AFC and GFC, respectively. The trends have shared the same direction since 2008.

This study seeks to better understand the factors that determine sustainable growth, particularly in Malaysia, by integrating theoretical developments in the technological innovation (financial development) and governance institution quality literature. Technological innovation has received considerable attention from researchers and policy makers. Innovation is everywhere, but existing materialized and testable research that provides accurate measurements is a bit scarce, especially in developing countries like Malaysia. Thus, this paper makes a courageous effort to provide and materialize research regarding technological innovation and the importance of governance institutions in igniting technological innovation in Malaysia.

Therefore, this study aims to examine the long-run relationships among the variables of real gross domestic product (GDP), capital, employment, electricity consumption, financial development, governance institution quality, and interaction of finance-institutions in Malaysia. Furthermore, the intent is to investigate the elasticities of real GDP and its determinants and to confirm the direction of causality among the above variables. The contributions of this study are as follows: (1) This study contributes to both knowledge and the literature by focusing on technological innovation and the significance of governance institution quality in promoting innovation, (2) it attempts to capture the interaction of technological innovation and governance institution quality on economic growth in the case of Malaysia, and (3) it enhances past research [34] by investigating the interaction impact of finance-institutions on sustainable growth.

The rest of the paper is organized as follows: Section 2 reviews Malaysia's economy and technological innovation. Section 3 discusses the literature on technological innovation, governance institutions, and economic growth. Section 4 explains the data

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