International Management Journals

www.managementjournals.com

International Journal of Applied Institutional Governance

Volume 1 Issue 2

Industrial Policy and Governmental Facilitation: Developing a Knowledge Economy

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ISSN 1747-6259

Abstract

Industrial development constitutes a major objective of economic strategy and government policy. Through industrial developmental efforts, developing countries aspire to attain higher levels of economic performance. However, despite having enacted industrial policies to stimulate economic growth, it remains doubtful whether the approach of industrial policy-making in these countries has indeed succeeded in transforming their economies. Although policy critics, industrial economists and technocrats are in support of government-facilitated industrial development, the debate on effective industrial policy remains largely confined to issues pertaining to improving costs of production and factors of efficiency. Yet, several lessons can be drawn from the experience of the developed world. This paper argues that industrial policy, to be truly effective in the new global world, must address the pursuit of innovation in transiting into a knowledge economy. It further outlines the role of governmental facilitation in implementing an innovation-driven industrial policy as a prime mover for economic development. Finally, it provides a context of Singapore's industrial policy in relation to how it has helped build the nation's economy centred on innovation.

Keywords: Industrial policy, policy-making, knowledge economy, innovation, industrial growth, innovation-driven knowledge economy and economic competitiveness

The Significance of Industrial Policy

Rising Optimism in Industrial Policy-Making

Since industrial revolution, the objective of industrial policy is characterised by a primary emphasis on attaining the desired macro-economic environment for industrial development to achieve an intended level of economic performance for a nation. As far as the bureaucrats are concerned, it appears that the market economies of most developing nations are not, in general, optimally efficient and that there was a role for governments to play in any industrial policy (Adler, 1989; Padmanabhan, 1993). The implementation of industrial policy may come in the form of a wide range of government actions involving preferential treatment and incentives designed to promote industrial growth of a particular sector or sectors in an economy. But as many would advocate, one of the many virtues of a free-market economy is that it rewards businesses that are efficient in serving their markets and penalises those that are not. Industrial policy instruments like tax policies, government procurement rules, export assistance, and foreign trade and investment policies have a specific role in any economy. But in many instances, the very existence of these policy instruments – for example, state subsidies for failing businesses may actually be inefficient, unproductive and may even pose a hindrance to fostering industrial growth. Very often, government's direct involvement to prop up businesses only slows down the efficient market allocation of resources that must take place in order to maintain the robustness of a market economy

For more than four decades, the rapid economic growth of Asia's four tigers: Hong Kong SAR, Singapore, South Korea and Taiwan, which had pursued government-

initiated industrial policy, gave rise to optimism that industrial policy-making, if executed correctly, could make a major contribution to industrial growth (Rodrik, 1995; Pack and Westphal, 1986). While politicians, industrialists and businessmen share the same opinion that appropriate industrial policy would bolster economic development, past solutions centred on fiscal incentives that help industries to improve the costs of production and factors of efficiency have become less effective (Legge, 1993; Adler, 1989; Rosenberg and Birzell, 1986). This was because it was generally felt that with fiscal incentives and government subsidies comes state control, which had been repeatedly found to be detrimental to market transactions. Yet, governments are anxious to maximise economic opportunities, through granting state subsidies for society's benefits to increase employment, to raise living standards and to fund public services.

Contrasting Approaches to Industrial Policy

The debate on effective industrial policy-making has largely revolved around how the total factor productivity of industries may be improved; or how changes in industry structure(s) can be implemented efficiently. The burning question remains - what constitutes an effective approach to industrial policy-making? Two contrasting approaches are identified. One policy approach is for governments to actively participate in country-wide industrialisation projects to accelerate economic progress through a series of industrial policy measures that provide state subsidies to firms so that they could directly benefit from these projects. Another policy approach is for governments to focus on the privatisation of industries and fostering a functional framework for private sector-led industrial development, leaving all dynamics of these developments to market forces. Both approaches have their fair share of benefits and pitfalls as arguments abound amongst policy thinkers on what constitutes the better approach. Nevertheless, one must be realistic with what industrial policy could achieve. Empirical studies on the contribution of aggregate economic growth attributable to industrial policy seem to place things in the correct perspective - according to a World Bank's study on the manufacturing sectors of developing nations, it was reported that the increase in GDP growth rates induced by industrial policy may have reached about 0.5 percent annually and assessed to be "hardly trivial", but also not the "secret of success" (Stiglitz, 1996).

Throughout the history of post-war industrial policy-making amongst developed nations, governments have demonstrated strong tendencies of refraining to play the role of a "central actor", but rather that of a "facilitator" (Hall, 1986). This stems from the viewpoint that any form of industrial development, which involves complex activities in the efficient market allocation of resources, basically originates from societal demands and should therefore rightly be derived from the society rather than from the state. Any industrial policy that intervenes by dispensing government subsidies is basically a policy of picking "winners" and concerns the decision about which firms the government wishes to support, nurture and develop. Yet, picking "winners" – in the sense of spotting them ahead of market outcome – is the best result advocates of industrial policy could hope for; as other alternatives for any state subsidy may be propping up losers or worse still, a random distribution of taxpayers' money. Because there exists a gap between "market's way" of picking winners and that envisioned by the subsidy-granting agency, it is not difficult to identify an industrialisation project whose government's participation was active but only to find that the project failed in spite of state support.

The Stance of Selective Intervention

Due to the widely-hailed success of the industrialised world, some policy makers and central planners have argued fervently for a greater role of interventionist industrial policies as models of economic development for developing nations. While many schools of thought in economic planning agree in general that some form of intervention may be necessary, the actual substance of its supporting industrial policy is still subject to debate. To cite an example - although an interventionist role may aid in the initial pre-competitive phase of an industrialisation project, in some instances, there may be no compelling reason for state intervention in a particular project, where governmental actions are neither efficient nor needful. One case in point was the US government's US$1 billion involvement to help defence contractors develop high-speed integrated circuits (ICs) for military equipment only to find out later that Intel got there first on their own without any federal funding. For this reason, some critics oppose industrial policy intervention in the domain of private business and have strongly discredited its relevance because it is viewed as unnecessary, since firms are themselves jumping on the bandwagon of joint ventures, mergers and strategic alliances to initiate large-scale industrialisation projects on their own.

Now, with the ever-changing global economic environment swept by uncertainty and upheaval, what should an effective stance of industrial policy be? In this article, it is argued that, though a more "neutral" industrial policy has its benefits, "selective intervention" which strives for a "middle way" stance to policy management seems more appropriate. Being neither a completely "hands-off" stance of industrial policy nor one of *laissez faire*, it intervenes "selectively" only in instances where special or unexpected needs of industrialisation have to be met. Fundamentally, it reasons that, while the state should refrain from being directly involved in every detailed implementation aspect of industrial development, what the government should do is to facilitate. In other words, the state puts in place an institutional approach of broad initiatives based on two elements: (1) a directional goal and (2) a primary focus. In today's global environment, these two elements of industrial policy need to be addressed. One, industrial development should direct the economy to the goal of transiting into a knowledge economy with increased market orientation and private sector-led development. Two, the process of industrial development should place a strong focus on attaining industrial growth rooted on the primary pursuit of innovation. These two elements of industrial policy-making are further described below.

Transiting Into A Knowledge Economy

Emergence of the Knowledge Revolution

Compared to several decades ago, the world's economies are now far more interconnected and interdependent than before. As globalisation speeds up and cross-border barriers between nations are dismantled, economic development will depend lesser on physical resources but more on intangible resources such as knowledge assets. Economists are arguing that all economies, as well as advocates of centralised planning, should attribute their economic challenges to knowledge utilisation and not on resource allocation alone. Coupled with the rapid pace of technological advancements, most economies not only have to be global to stay competitive but also be ready to embrace the demands of knowledge creation and commercialisation (Goh, 2002, Giget, 1997; Grossman & Helpman, 1992). Indeed,

the world has gone through several stages of economic transformation: first from agricultural economy to industrial economy, then to information economy, and now, to the knowledge economy. This emergence of the "knowledge economy" – defined as one in which the production, distribution and use of knowledge are the main drivers of growth, wealth creation and employment for all industries (OECD, 1996) – the "knowledge revolution" has now arrived at the doorstep of developing nations.

Evidence has become overwhelmingly convincing to show that economies, which may be poor in natural resources but skilled in knowledge creation and utilisation, generally outperform those economies that have abundant natural resources but are lacking in knowledge competence and skills. Knowledge has now emerged as the primary resource for economic development; and land, labour and capital – the economist's traditional factors of production have become secondary (Miller & Morris, 1999; Drucker, 1988). This is because traditional factors of production are limited by a threshold of scale and scope as every marginal increase in land, labour or financial capital results in diminishing returns on additional investment. In contrast, a different law of economic returns seems to govern the returns arising from knowledge, and investment in every additional unit of knowledge created and utilised results in a much higher returns. Overall, this has inadvertently placed immense pressure on economies to accelerate the process of knowledge acquisition, assimilation and utilisation with a global outlook. Based on the experience of developed nations that had undergone a similar wave of economic transformation, a sea change of employment trends, industrial restructuring and economic revolution would be expected amongst developing nations in the coming years.

Importance of Managing Knowledge for Industrialisation

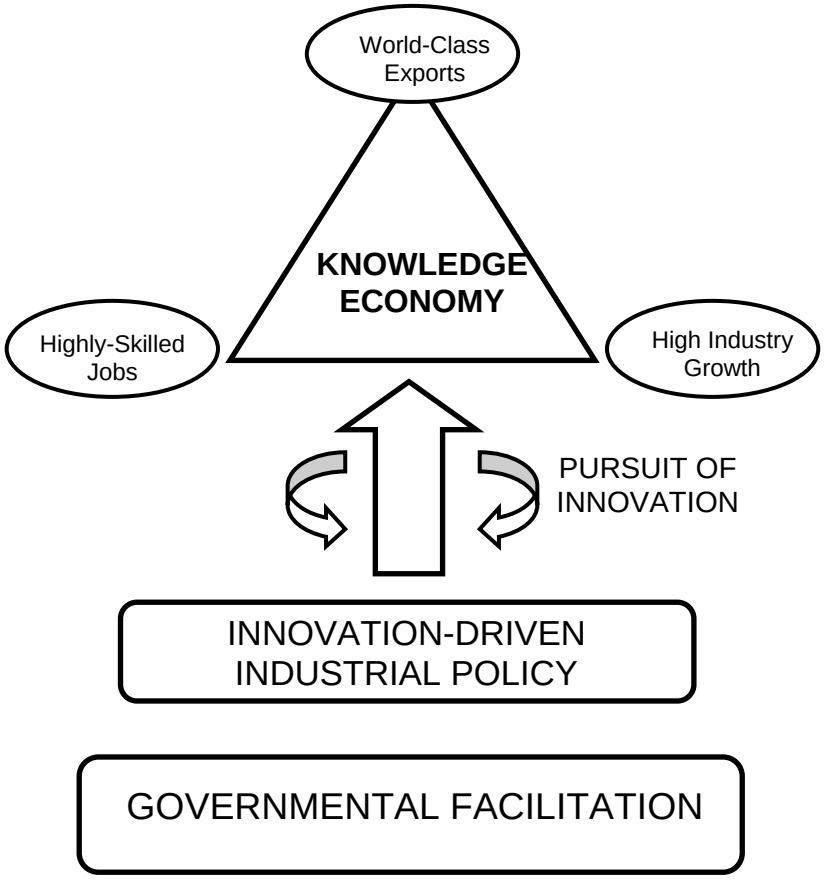
To function effectively in a knowledge economy, organisations have to be knowledge-centred in their approach to business activities. As advanced technologies proliferate and new products become obsolete faster than before, organisations that are able to capitalise on opportunities arising from the availability of knowledge assets and derive the most value from them will be the industry winners, while those who cannot will be left behind as industry losers. Given that today's products and services constitute the embodiment of knowledge assets which are being introduced incessantly, organisations are challenged on how they leverage the value of knowledge to improve corporate performance. Corporate leaders are thus taking a keen interest on identifying "effective means" of harvesting all sorts of knowledge assets and are differentiating themselves from competitors based on new management initiatives (Malhotra, 2001; Nonaka, 1991; Skyrme, 1991). This has become so pervasive in knowledge-intensive enterprises that it will soon be mandatory for organisational survival.

Before the 1980s, the acquisition of data management tools was the raison d'être for business growth. Then, from 1980s to 1990s, the focus shifted from data management to information management. Now, the use of knowledge and its management, termed "knowledge management (KM)" and defined as the systematic leveraging of data, information, skills, expertise, and various forms of assets to improve organisational innovation, productivity and competence, has emerged as a critical area of management (Barth, 2000; Davenport, 1996). Increasingly, a crucial aspect of corporate strategy is the use of knowledge management practices to speed up the innovation process; and its centrality in corporate strategies bears testimony that adopting the best KM practices would result in better, higher quality and cost-effective innovations. It is thus not surprising that managers are employing KM techniques in innovation programmes; and it seems that failure to do so may impede

innovation performance and thus undermine corporate competitiveness (Lindgren & Henfridsson, 2002; Storey & Barnett, 2000; Fahey & Prusak, 1998). However, the importance of managing knowledge is still far from being fully understood. For instance, the "apparent confusion" between what constitutes "knowledge" and "information" has caused some organisations to sink huge investments in information technology (IT) infrastructure that yielded marginal corporate performance (Malhotra, 2000; 1997; Strassmann, 1997). This is because IT expenditures are not directly related to corporate performance and this noticeable lack of understanding is attributed to the transition from an economic era based primarily on information to one dependent on knowledge.

In summary, industry policy-makers must realise that the solutions of past decades based on the old economy paradigm of efficient resource accumulation only will not suffice and may even fail miserably. Instead, intangible assets like intellectual capital and knowledge assets are far outstripping traditional assets such as land and labour as the main drivers of industrial growth. Put simply, industrial development must support the transition into a knowledge economy. Given this scenario, the commercialisation of knowledge, which concerns the utilisation and application of scientific, technical, organisational and managerial assets and skills, becomes the dominant force behind maximising entrepreneurial opportunities and fuelling economic growth.

Figure 1: Attributes of a Knowledge Economy



Pursuing Innovation-Driven Industrial Policy

The Relentless Pursuit of Innovation

While the considerations of industrial policy may be country-specific, valuable lessons from the experience of the developed world may be learnt. In today's competitive global economic environment, value creation of new products and services has migrated towards innovation, since it promotes a climate of embracing continuous change that drives economic development (Buckler, 1997; Giget, 1997). It is thus vital that industrial policy-making must aid developing nations to incessantly braze new trails of innovations, as what the Americans, Europeans and Japanese have succeeded in doing for several decades. Studies have found that the underlying theme of industrial policies across most developed nations seek to nurture innovation-driven industries. Besides being critical to value creation and sustaining competitive advantage, the benefits induced by innovation not only address the demand side of economic development, but also typify the very essence of economic competition (Geroski, Machin and Van Reenan, 1993; Rothwell, 1992; Grossman and Helpman, 1992; Abernathy and Clark, 1985). Industrial policies should therefore aim to leverage on a relentless pursuit of innovation as a means of generating new business ideas that in turn lead to better performance in industrial development (Arora and Gambardella, 1994; Jameson and Soule, 1991; Pavitt, 1991).

Developing nations can ill-afford to neglect this underpinning of industrial policy thinking in economic management (Goh, 2002). Three compelling reasons may be stated. One, to compete with established incumbents in the global marketplace, the pursuit of innovation provides an impetus for firms to introduce new products and services and thereby strengthen their foothold in international competition. Two, innovation creates prospective opportunities for industrial growth by constantly enabling firms to move beyond mere production and manufacturing into the realm of being the "innovator" of new products and services. It also invigorates the potential of traditional industries and rewrites the "rules of the games" in industrial competition. Three, industrial development oriented towards innovation fuels the economic vibrancy of an enterprise ecosystem and enriches cross-fertilisation, inter-firm collaboration and sharing of business ideas, which in turn help build competitive industries. In sum, the pursuit of innovation breeds an environment favourable to continual upgrading of enterprises through reinvigoration, adaptation and transformation.

Fostering Innovation-Driven Industrialisation

Industrial policies should also strengthen the strategic role of intellectual capital to aid economic development. Because indigenous innovations enhance the economic performance of developing nations and enable them to respond more effectively to the challenges of increased globalisation, sustainable industrial growth could be achieved by improving the knowledge-generating and innovation capacities of industrial firms. Once innovation pursuits become the lifeblood of firms and the mainstay of firms' activities, economic upgrading can then be sustained continuously by: creating highly-skilled jobs, producing world-class exports and fuelling high industry growth – which are the main attributes of a knowledge economy as shown in figure 1. Initiatives may include: (1) Shifting existing industries to higher value-added, technology-based and knowledge-intensive industry sectors instead of merely focusing on production and manufacturing of foreign goods. (2) Building efficient

leading-edge infrastructures that encourage knowledge transfer as a lever to increase the economic value of existing goods and services. (3) Investing on a good education system, scientific and applied research and development (R&D) infrastructure; and promoting lifelong learning to enhance the quality of knowledge-based initiatives.

Currently, with innovations now being accountable for the world's highest growth areas (information and communication technologies, and biomedical technologies, for example) in the most competitive global markets (such as the United States and Japan), three groups of individuals seemed to offer viewpoints that appear ostensibly convergent. Firstly, policy critics have constantly championed the proposal that a pro-innovation theme should dominate the industrial policy ecosystem. Despite prompting a rethink of industrial policy-making, public policy researchers are intensely in support of innovation-driven industrial policy (Koschatzky, 1998; Porter, 1998; Padmanabhan, 1993; Rothwell, 1992; Peters, 1991). Secondly, industrial macro-economists have consistently backed opinions that the economic growth of developing nations should increasingly depend on firms' ability to innovate in business endeavours. As many studies have shown, the primary focus of any industrial policy should strive for a conducive climate that enables all forms of innovations to flourish (Giget, 1997; Branscomb, 1992). Thirdly, technocrats deem that innovation is central to economic competitiveness and constitutes a principal determinant of industry growth for both the manufacturing and services sectors, which form the two largest engines of economic growth in most developing countries (Goh, 2004).

Lessons from the Developed World

Based on the experience drawn from the industrialised world, the eventual attainment of an innovation-driven knowledge economy can be achieved by effective industrial policy. Even as emerging economies aspire to become more proactive, responsive and adaptive in industrial policy-making, much can be learned from the industrial policy experience of the developed world – which for decades has supported an innovation-driven industrial policy. For instance, at the Lisbon Summit in 2000, the European Union (EU) has unanimously placed innovation-driven industrial policy as the top macro-economic strategy. The developing world should do likewise.

The United States (US), the United Kingdom (UK), Sweden, the Netherlands, Japan, Germany, France and Canada are amongst the first developed nations that enacted innovation-driven industrial policies to replace the more general industrial policies of earlier years. Of these eight countries, however, some differences in industrial policy thinking were discerned. The UK predominantly adopted industrial policies and legislation directed toward the institution of taxes and financial measures.

In comparison, about half of the measures enacted by the US related to the regulation of innovation activities or were laws enacted to establish the legal limits of these activities. In contrast, the industrial policies of Japan, Canada, Sweden and the Netherlands were more concerned with the impact of innovation pursuits on national interests; and as a result, policies were oriented toward addressing innovation inputs. France and Japan viewed state involvement in large-scale innovation programmes undertaken by the private sector as essential to producing effective results aligned to national economic plans.

Though the successes of industrial policies in developed nations to transit into a knowledge economy are commendable, imitating blindly their much-credited

industrial policies would be foolhardy. Each developing country would still need to formulate their own industrial policy tailored to its unique socio-economic conditions.

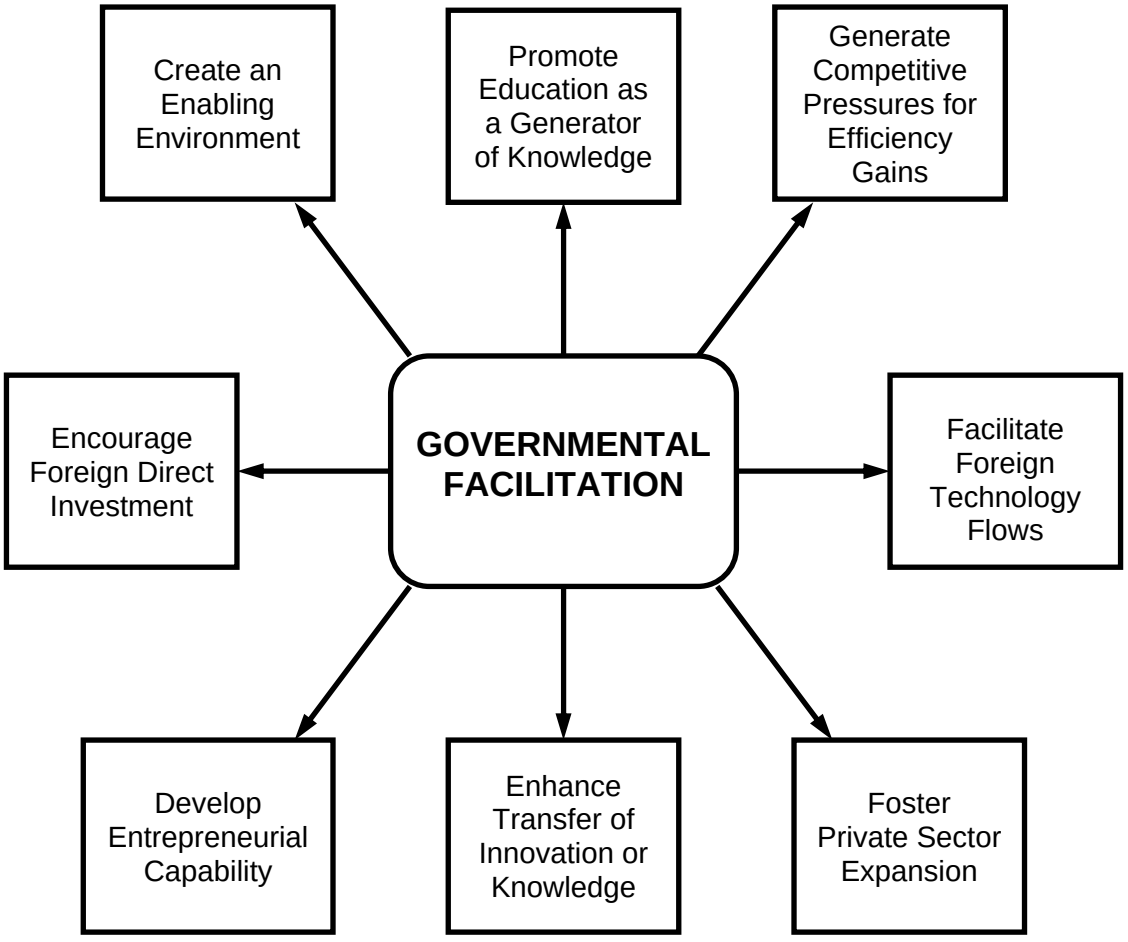
The Role of Governmental Facilitation

On the debate about effective industrial policy-making, no topic engenders more arguments than the role of government facilitation. But even if a governmental role is essential, a plethora of perspectives exists concerning which industrial policy is more suited to the economic developmental patterns of developing nations. Whatever they may be, it must be noted that two objectives have to be attained. Firstly, it should create the right business climate suitable for a transition into a knowledge economy; and secondly, it should enable firms to move to higher levels of innovation performance. To extract the full benefits of any industrial policy by means of governmental facilitation, one must recognise that governments cannot create innovations; ultimately only firms can and should. Indeed, the best form of governmental facilitation in industrial developmental is to dismantle, reduce and minimise barriers, obstacles and restriction. At the very least, the government has a public obligation to remove impediments which firms encounter and to address firms' concerns in the pursuit of innovation as stated below (Koschatzky, 1998; Porter, 1998; Padmanabhan, 1993; Grossman and Helpman, 1992):

> *"Governmental institutions must play a catalytic function to develop an innovation-driven economy. The experience of developed countries has evidently demonstrated that a shift of government's industrial policy-making towards an innovation-driven economic strategy is absolutely critical. Allegedly successful industrial policy performs an important function in fostering firms to inculcate a culture-based spirit of innovation and addresses firms' concerns in the realm of innovation pursuits."*

But what are the impediments to innovation in developing nations? To illustrate the types of impediments encountered by firms, a few examples are cited here. One, developing countries with low literacy rates and weak higher educational systems often face a great deal of difficulties assimilating new technologies for innovation development as they lack the essential human capital to leverage on technological developments, scientific knowledge and technical skills. Two, inadequate intellectual property rights protection often create a disincentive for firms to engage in innovation development through research and development (R&D), as the economic spin-offs associated with their innovation efforts are diminished very quickly once made available in the public domain. Three, innovation projects often involve high risks, long gestation periods and therefore require huge amounts of financial resources to share risks and costs, and hence restrictive ownership policies on direct investments often hamper private sector or foreign participation in innovation projects. Nevertheless, even if a government possesses a highly efficient bureaucracy to implement effective industrial policies, policy-making is basically pre-emptive in nature. In other words, what really works may not be so explicitly known to the policy-maker at the outset. Rather, it is more appropriate that developing nations adopt broad initiatives that constitute the principal tenets of good industrial policy-making. From the experience of developed nations, the role of governmental facilitation towards the implementation of innovation-driven economic strategy should give due attention to eight broad initiatives as shown in figure 2.

Figure 2: The Role of Governmental Facilitation



While it may be true to say that firms drive innovation, they also depend on the government to perform specific roles. Take for instance, investing in basic scientific research programmes for information technology (e.g. the Internet) or genetic engineering (e.g. DNA sequencing) - which are all critical to the understanding of new methods, techniques, processes in product development. Thus, the government has a significant role to identify and support strategic research programmes to promote innovations essential for long-term industrial development. It is therefore more crucial that the government adopts an industrial policy stance that allows innovation-centred value creation to thrive through firms' activities, rather than being overly involved in any particular private sector-led innovation project. Thus, the role of government towards facilitating an innovation-driven industrial development should give special attention only to priority areas where private sector involvement is absent, inappropriate or simply lacking. In these instances, it is also important that the criteria for initiating public sector innovation projects to aid industrial development must be transparent and be able to withstand public scrutiny. The eight broad initiatives are as follows:

- Creating an Enabling Environment
- Fostering Private Sector Expansion
- Developing Entrepreneurial Capability
- Enhancing Global Trade and Export Capability
- Encouraging Foreign Direct Investment
- Facilitating Foreign Technology Flows
- Promoting Education as a Generator of Knowledge
- Enhancing the Transfer of Innovation or Knowledge

The Industrialisation of Singapore

The need for a transition to a knowledge economy is now occupying the minds of industrial policy-makers in most developing countries. As a small nation with no natural resources, Singapore's aspiration to eventually become a developed nation could only be achieved by transforming itself into a knowledge economy. Singapore hopes, in 30 to 40 years' time, to be a first league developed nation. Based on current estimates in economic projection, the country's per capita GNP might match the Netherlands by 2020 and the United States by 2030. While industrial policy-making is unique in its own right, it is often difficult to fully understand the prescriptions of a country's industrial policy without the presence of a specific context – whose understanding could explain how it has addressed the country's industrialisation needs. Take Singapore for example, which attained independence from the British in 1965, only started industrialisation around the mid-sixties. Over a four-decade period, the country's industrial policy built its economy to its current state as characterised by the macro-economic indicators in Table 1.

Singapore's industrialisation took into account the prevailing country's socio-economic situations, focused on attracting foreign direct investments through the multinational corporations (MNCs) from the developed world, and pursued a cost-competitive and export-oriented economic strategy. In the nineties, the country decided to concentrate on enterprise development to maximise its industrial growth potential by increasing the total value-added output of business activities and services. The government thus intensified its investments in the public sector, while at the same time, promoted spending in the private sector. On the international front, Singapore's firms are encouraged to engage the global economy, with the strategic intent of raising the level of indigenous expertise in selective industry sectors to international standards, so that the economy could compete in the world stage. As Singapore's domestic market was too small and over-saturated to sustain long-term industrial growth, it embarked on programmes to develop an "external economy". The government mounted an aggressive regionalisation drive to export products and services to other parts of Asia. To champion the regionalisation drive, the government also jointly developed Singapore-modelled industrial parks with local authorities in parts of China, India, Indonesia and Vietnam. These efforts were timely, as regional economies had begun to adopt open-door economic policies.

By the early 2000s, Singapore was already one of the world's largest manufacturers of disk drives, tape drives, refrigerator compressors and proprietary pharmaceuticals with about 6000 multinational corporations (MNCs) having key operations in the country. Other leading industry sectors include computer peripherals, shipbuilding, and petroleum refinery. These MNCs, through their branches and subsidiaries located in Singapore, have expanded the scope of their business activities beyond

mere off-shore manufacturing to areas such as logistics management, merchandising, customer support services, financial management and regional procurement. Because industrial development should be equally dependent on both indigenous firms and MNCs to sustain the country's long-term economic growth, the former was also nurtured to be global leaders in their fields.

Table 1: Macro-Economic Indicators for Singapore

INDICATOR	IN US$
Gross Domestic Producta (GDP)	84.9 billion
GDP Per Capita	21,814
Real GDP Growthb	5.35%
Real Growth in Industrial Productionc	8.8%
Export of Goods	114.6 billion
Growth in Export of Goodsd	4.28%
Direct Investment Flows Inward	7.22 billion
Overall Productivity Growth	4.448%
R&D Expenditure Per Capita	384.8

a: The figure is estimated at prices and exchange rates in 2000.
b: The percentage change is computed on a local currency at constant price basis.
c: The figure is estimated based on average annual percentage rate of growth from 1990 to 2000.
d: The figure is computed based on percentage change of export values in US$.
(Source: Adapted from The World Competitiveness Year Book)

Internationally, Singapore's economic growth has been hailed as "remarkable". As highlighted in Table 2, for the decade between 1960 and 1970, Singapore's per capita income doubled and more than trebled for the decade from 1970 to 1980. In the following decade from 1980 to 1990, the country's per capita income rose four-fold to almost US$25,000.

Table 2: Economic Gorowth in Singapore 1960 to 2000

	1960-1970	1970-1980	1980-1990	1990-2000
GDP Average Annual Real Growth (%)	8.7	9.4	7.5	8.4
	1960	1970	1980	1990
GNP Per Capita (current prices in S$)	1,330	2,825	9,941	42,212

Source: Yearbook of Statistics Singapore

In recent years, Singapore has gradually focused on developing indigenous high value-added activities in the manufacturing sector, and expanding the knowledge and skill intensive activities. Since its GDP has already reached US$93 billion in 2003, the country is now able to provide a domestic business environment for pursuing innovation development as a source of industrial growth. It has thus begun to establish the services sector such as accounting service, legal services and management consultancy. With the global opportunities offered by freer trade since early 1990s, the new challenge faced by Singapore is to develop and nurture knowledge-intensive and innovation-driven industries (e.g. wafer fabrication and pharmaceutical manufacturing). Having concluded the Free Trade Agreements (FTAs) with the United States, Japan, Australia, New Zealand and the European

Free Trade Association, and with better protection of intellectual property rights (IPR), Singapore's industrialisation is dedicating her efforts at developing a knowledge economy. With a portfolio of FTAs keeping its trading activity buzzing; and given the increasing FTA portfolio, Singapore's direct investments overseas have risen from US$13 billion in 1992 to US$86 billion in the past decade. In all, these investments accounted for more than 27 percent of Singapore's domestic trade (Soh, 2004). As more FTAs are established, industries not only derive cost savings from lower tariffs and reduced technical barriers but stand to gain from better market accessibility, enhanced investment opportunities and more knowledge-intensive commercial activities. More importantly, these FTAs have the significant benefit of promoting technology and knowledge transfers, domestic reforms, productivity gains and improved development prospects. Through a host of innovation-driven industrial policies, the government hopes that more economic opportunities could be created for Singapore's firms to build an international network of industrial assets and thus increase their industrial growth potential.

New Challenges for Industrial Policy-Making

With increased globalisation, developing economies would naturally depend less on natural resources and more on intellectual capital. However, as far as industrial policy-making is concerned, most developing nations are now undergoing a trying time due to the new challenges of economic development arising from changes in labour productivity, industry structuring and international trade. While numerous studies were undertaken on industrial development, most of the literature continues to offer limited guidance to effective industrial policy-making. This article has thus taken a closer look at the rationale behind industrial policy formulation to better address the issues surrounding economic objectives, governmental roles and the underlying challenges of industrialisation. These issues collectively constitute a normative quest to extend further understanding on effective industrial policy-making, in particular, as to how government facilitation can aid in developing a knowledge economy.

In the case of developing economies, this article has proposed both a directional goal and a primary focus. Given that the new global economic paradigm is fast becoming more knowledge-intensive and innovation-driven - which dictates the way businesses compete, it seems convincing that the directional goal rests on finding the path towards a transition into a knowledge economy; and the primary focus lies nowhere but within the innovation landscape. Both offer immense opportunities for developing nations to enhance their global competitiveness and hence secure their economic future. Yet, we all know that the most demanding challenge posed to industrial policy-makers is how to accommodate between a set of industrial system ideas that constitute the currency of contemporary debate and the formulation based on the reality of concerns in industrialisation.

In conclusion, even in the best of circumstances, industrial policy is a tricky business, let alone the pressure to be knowledge-intensive and innovation-driven that must produce positive results to economic development. Like any form of policy, industrial policy management, too, is often reasoned without a "perfect understanding" of everything in its detailed sense, on what will work and what will not. There exists an element of "approximation" – meaning that an effective industrial policy is never really "final" but always subject to "modification" arising from continuous debate. It is thus acknowledged that the objective of formulating an effective industrial policy is

somewhat a never-ending task and perhaps never to be fully accomplished, but should be approached with well-reasoned intervention, tailored to a country's context.

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