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Determinants of Locating R&D Activity in the Philippines: Policy Implications

Kathrina G. Gonzales, Mari-Len R. Macasaquit and Josef T. Yap

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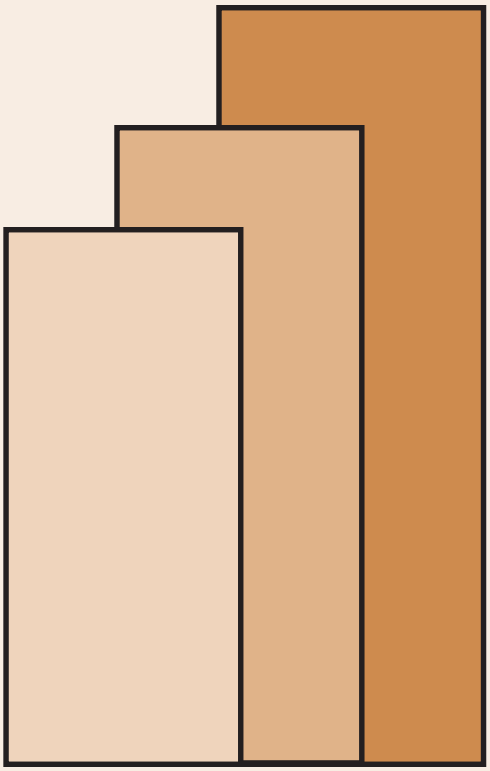

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Acknowledgement

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Executive Summary

Research and development is an important resource for sustained economic growth. New knowledge created by a firm has spillover effects that improve the productivity of other firms and even other sectors. This is the heart of endogenous growth theory. In this framework, government policies can affect the rate of long-term economic growth by impacting the accumulation of both physical and human capital and the effort dedicated to research and development and the creation of new knowledge. A country can supplement its R&D efforts by enticing R&D firms to locate in the country or encourage local firms and multinational corporations operating there to conduct R&D activities. Factors that affect these decisions can be classified into push factors, pull factors, policy factors and enabling factors. The last three are relevant for the host country while the first set of factors relate to the home country. A survey of firms operating in the Philippines was conducted to determine which factors are deemed important and areas where the Philippines is deemed inadequate. The findings have important policy implications. Push factors are found to be important, particularly the need to remain competitive. The pull factors that rate highly are (i) availability of talented skills at low cost and (ii) size of market. The main policy factors that encourage firms to locate in the Philippines are: (i) good quality of education; and (ii) protection of intellectual property rights. The enabling factors are: (i) low cost of doing business; (ii) good physical and communication infrastructure; (iii) legal system; and (iv) availability of R&D support services. Two aspects are prominent in terms of discouraging R&D activity in the Philippines: (i) the high cost of R&D equipment and technology; and (ii) lack of technical manpower/engineers. Policies can look into the host country factors that do not rate highly and address the areas that are evaluated poorly. Policymakers should also be aware of the source of outward R&D spending which are mainly firms from the US and Japan. Most R&D by these firms is conducted in the ICT, automotive and pharmaceutical industries. Meanwhile, interviews with associations of firms indicate that there is no cooperation among individual firms in terms of conducting R&D. The government can also initiate, strengthen and support joint R&D efforts among firms in a specific sector given that there will likely be significant spillover effects in this type of endeavor.

Chapter I

The Importance and Sources of R&D

Introduction

Research and Development, or R&D, refers to the efforts of an establishment or firm to improve existing products and processes in order to increase productivity or in some cases develop new products. Innovation is at the heart of R&D. The main focus of the study is to identify the factors that drive multinational companies or MNCs and technology-based companies to locate in the Philippines and invest in innovative activities.

According to the Presidential Coordinating Council on Research and Development (PCCRD), a body created under Executive Order No. 604 issued by President Gloria M. Arroyo in February 2007 and which the President chairs, the Philippines' R&D standing is below the average performance for developing countries as determined by the United Nations Educational, Scientific and Cultural Organization (UNESCO). The average spending for R&D should be equal to 1 percent of the country's Gross Domestic Product (GDP) and the average number of scientists and engineers per million of the population should total 380. Currently, the Philippines is spending an average of 0.12 percent of GDP for R&D and has a total average of only 125 engineers for every million population (Philippine Information Agency, 2009). Therefore, President Arroyo directed the PCCRD to conduct a study that would explore the possibility of "maximizing the country's potential as an attractive R&D location for R&D centers, units and organizations."This type of study can help obtain a better picture of the factors driving and affecting R&D activities and to identify key informants with whom to hold further discussions.

It is in this spirit that the current study is being conducted. Two sets of surveys of selected firms were conducted. Data obtained from the surveys are the basis for identifying the factors that attract investments in R&D in the Philippines as well as obstacles for innovative activities. The information will be used to identify areas for policy and reform. Specifically the study intends to: (i) examine the trends in R&D activities by firms located in the Philippines; (ii) determine the factors that attracted these firms to locate their R&D activities in the country; (iii) identify the barriers that hinder the conduct of innovative activities in the Philippines; and (iv) provide policy recommendations that would strengthen the factors that attract R&D investments and suggest measures that would minimize the obstacles to innovation.

Theoretical Framework

Why is R&D important?[1]

The traditional view of economic growth emphasized the role of capital accumulation. In this view, countries need to save and invest sufficiently so as to augment their total physical capital stock. A higher level of investment boosts the attainable level of income by increasing the productivity of each worker, who has more physical capital with which to work. However, the traditional view—which was embedded in the neoclassical framework—postulated an optimal

[1] The bulk of the discussion on endogenous growth theory is lifted from Chapter 8 of Cypher and Dietz (2009).

level of capital stock beyond which output would begin to decline. This was explained by diminishing marginal returns wherein more inputs to production would lead to greater output but at a slower rate. Ultimately inefficiencies will dominate and increasing inputs would actually lead to lower output.

Applying the neoclassical framework led to predictions of convergence of per capita income among economies and countries. Assuming the same accessibility to exogenous technology, the same population growth, and the same level of savings and investment rate, economies were expected to approach the same level of per capita income in the long run. The policy implications of the model were straightforward, centering on investment, access to technology and a population policy. The main concern, however, was ensuring an adequate level of investment by increasing domestic savings. If the latter was not enough, the economy must strive to increase foreign savings through inflows of foreign direct investment and foreign aid.

Empirical evidence, however, did not support the predictions of the neoclassical growth model. Incomes of developed and developing economies were shown to diverge even when investment rates and population growth were controlled for. The main exceptions were the economies of East Asia. Analysts then turned to endogenous growth models to explain the dilemma.

Endogenous growth models do not assume, nor do they find, physical capital accumulation to be the dominant factor in spurring economic growth or in explaining differences in income levels among nations. These models also discarded the assumption of diminishing returns for at least some of the inputs of production. Lastly, the rate of growth of per capita income is not constrained by exogenous technical change but is internally, that is, endogenously, determined by forces specific to each economy.

In endogenous growth models, a higher level of investment not only increases per capita income, but it can sustain high and even rising rates of income growth over the future. One reason is the consideration of the rate of accumulation of, as well as the initial stock of, human capital. Another key input is “research” capital, that is, research and development and the creation of knowledge. R&D is treated as a purposeful economic activity, pursued in the real world by profit-driven firms and individuals operating within a specific institutional context. The development of new technology and new products is an internally driven process that is endogenous to every economy, and it is this purposeful pursuit of profit within a particular institutional context that helps to explain how economic growth occurs over the long run and why there are differences in income levels and growth rates among economies.

The key to endogenous growth theory is the elimination of diminishing marginal returns. This is explained by the existence of positive externalities to human capital accumulation, research capital, and to some physical capital accumulation to the extent that investment embodies the latest knowledge. Diminishing marginal returns is avoided through the society-wide spillover effects. When the social benefits from, for example, human capital exceed the private benefits, there are positive secondary and tertiary effects from any increase in a country’s average education level or enrolment ratios that filter through the whole economy. More educated and presumably, more productive workers not only produce more at their own tasks, but they also interact synergistically with their workmates so that the productivity of other workers also rises, though their level of education remains unchanged.

A similar characterization applies to R&D. Many experts agree that R&D is subject to externalities and hence there is a tendency for under-spending in this area. Firms may be

reluctant to undertake R&D because the benefits that accrue readily spillover into other firms in the same sector (e.g. the automobile industry). Hence, these firms may pool their resources and agree to a joint project. Each firm will pay part of the cost, and the contributing firms will share the benefits. In this context economists say that the externalities are "internalized." R&D also has spillovers across sectors, a case in point being the rapid developments in information technology. This type of externality is what helps overcome diminishing marginal returns.

The endogenous growth model is contrasted with the neoclassical model in Figure 1. The traditional view is that $Y = A \cdot F(K)$ where output Y is a function of K which is the combined stock of human, physical, and research capital, and A is exogenous technological change. Diminishing marginal returns imply that there is an optimum K or K_N. Meanwhile, endogenous growth states that $Y = A(K) \cdot F(K)$. In other words technological change is 'endogenous' to the level of K. This then permits output to be increasing continuously in K. The endogenous growth framework suggests that government policies can affect the rate of long-term economic growth by impacting the accumulation of both physical and human capital and the effort dedicated to research and development and the creation of new knowledge.

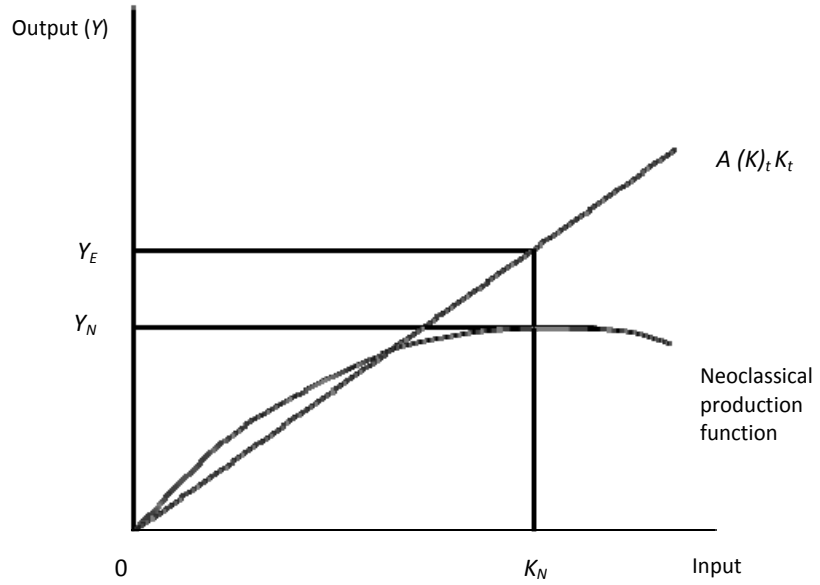

Figure 1: Graphical presentation of Endogenous Growth Framework

R&D in Developing Economies

To make government policy more effective, it would be useful to understand the determinants of R&D. In the past, technological innovation was dominated by firms in developed countries while developing economies carved a niche as production bases of MNCs. Technology transfer was also the norm as parent companies provide imported knowledge and train workers on expertise developed in home countries. The situation has markedly change in the middle of the 1990s when the combined share of developing economies in global R&D spending reached 7.7% in 1996 from 2.5% in 1991. By 2002, it had risen further to 8.4%. It was claimed that the bulk of these increases can be attributed mainly to countries in the South, East and Southeast Asia. In terms of total R&D spending in 1996 and 2002 among developing

countries, six of the top ten leading economies came from the sub-region, specifically China, Korea, Taiwan, India, Singapore, and Hong Kong.

From the perspective of gaining access to the global knowledge network, seizing opportunities for technological upgrading and positioning for higher value added production, becoming a recipient of foreign R&D investments is another attractive proposition. This could be in the form of locating R&D units or departments of MNCs, entry of high technology companies themselves, or serving as base for R&D activities. However, while there are factors driving R&D internationalization from home countries, there are expectations from the prospective host-countries. Indeed, basic level of innovative capabilities is needed to be possessed by host-countries. Hence, to become an attractive location for R&D investments, there are requisites that need to be present.

The literature identified the many factors that attract the internationalization of R&D, inducing investments in such activities to flow into developing countries, in particular. These evidences have empirical bases including country case studies as well as in depth examination of MNCs. For instance, the reasons why companies are setting up R&D in China can be summed up by its abundant supply of talented manpower, presence of high-technology parks and eagerness of local universities and institutes to partner with private firms. Meanwhile, India is said to have advantages for R&D flows due to the availability of qualified scientists and engineers, presence of internationally renowned research institutions and history of Indian firms to form strategic R&D alliances with MNCs. Thailand, on other hand, is an example of the earlier proposition that MNC activities in developing countries do evolve. When it shifted its trade and industry structure from import substitution to export orientation in the late 1980s to early 1990s, Thailand attracted FDIs from MNCs. Toyota for instance, set up its key base in the country, Toyota Motor Thailand. They eventually upgraded and expanded this production base under its Innovative Multi-Purpose Program due to the continued conducive environment in the country. In 2005, Thailand became part of Toyota's global R&D network with the setting up of the Toyota Technical Center Asia Pacific Thailand Co. Ltd, the first R&D center of the Japanese company in an emerging market.

Looking at these determinants of R&D investments, one can find commonalities while at the same time recognizing that the factors are quite complex and with some, may even be mutually reinforcing. The requisite factors may also vary depending on the industry and the R&D activity intended to be conducted. The current study would take these considerations into account, while concentrating the analysis of the Philippine case on four categories of determinants:[2] push factors, pull factors, policy factors, and enabling factors. These factors are represented in Figure 2.

[2] These are adopted from UNCTAD's World Investment Report 2005.

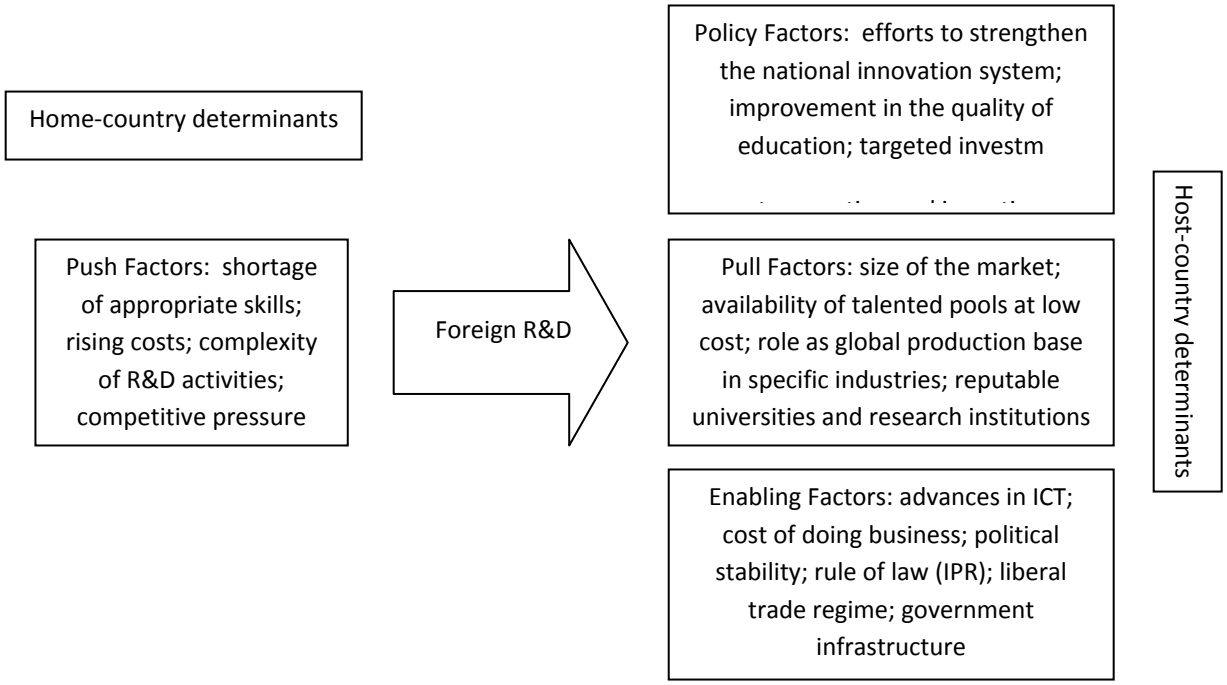

Figure 2: Factors Affecting Location of R&D Activities

Review of Literature Related to R&D

Firms carry out R&D for a variety of objectives but mostly it is aimed at developing either new or improved goods, services, and processes. R&D is a discretionary expense for most firms. R&D can be trimmed with little impact on revenue in the short term and does not directly generate revenue in the same way like production expenses do. Firms attempt to invest in R&D at a level that maximizes future profits. Therefore, R&D expenditures indicate the level of effort of the firms in producing their future products and in improving their processes. This may reflect firms' perceptions of the market's demand for new and improved technology.

In a recent study by London-based policy and advocacy outfit Legatum Institute (cited by Carreon, 2009), the Philippines has a low R&D expenditure equivalent to less than 0.2% of its GDP. However, it performs astonishingly well in producing technologically advanced goods: the proportions of ICT and high-tech exports as a share of total goods exported are the highest worldwide, at 56% and 68%, respectively. Also the study showed that foreign direct investment is a relatively low 2% of GDP, implying that the Philippines is not an attractive prospect for foreign investors. The capital and human factors may play important roles in the innovation efforts for firms to invest here in the Philippines.

In the study of Pamukcu and Ismihan (2009) in Turkey, the importance of capital and human factors in determining R&D varies according to whether the firm is domestically or internationally oriented and other aspects. In other words, the factors that affect the R&D investment decisions of firms can be directly determined by firm specific factors and general factors. Examples of firm specific factors are size, profit, wages paid to the employees, whereas general factors include market characteristics and government policies (e.g. tariffs

and subsidies). One of the highlights of their study is to demonstrate that developing countries would really need a strong technological base for rapid economic growth. However, such a technological base requires an important amount of R&D investment and involvement of both government and the private sector. Moreover, the results of their study indicate that a sectoral analysis at an aggregate level is not sufficient for the investigation of the factors contributing to the improvement of the R&D base in developing (as well as developed) countries. Instead the research should mainly focus on sub-sector (disaggregated) analysis since factors that influence the R&D expenditure decisions vary according to the sub-sector that is being analyzed.

Pamukcu and Ismihan also cited two studies done by Kumar and Aggarwal (2005) and by Lall (1983). The study of Kumar and Aggarwal investigated determinants of Indian R&D activity at firm level. Their analysis revealed that imported technology both in disembodied and in capital form has an impact on R&D investment. They also find positive impact of exports, trade liberalization (i.e. openness to the world), overseas investment and profit margin on R&D intensity. Meanwhile, MNC affiliation has a negative impact on R&D investment.

Lall's study of the 100 largest engineering firms in India found a positive relationship between size, age, foreign share of equity, foreign licensing agreements, royalties, and wages of high level managers on in-house R&D investments of firms. Contrary to the previous studies that have been mentioned previously, he found a negative relation between exports and general labor skills.

The study of Charoenporn (2005) in Thailand deals with the determinants of the firms' decision to carry out R&D activities, focusing on the role of firms' external factors and internal resources. Specific hypotheses about the factors affecting the probability of a firm to carry out R&D activities are derived and tested on a sample of 2,635 firms in the Thai manufacturing sector. The study found the following external factors significant: competitive market condition and the structure of industrial production. Meanwhile, the internal resources that were determined to be significant in influencing R&D activities are firms' size and the availability of physical resources, human resources and technology resources. The study also found differences between the determinants of firms' decision to carry out product and process R&D.

In addition, Charoenporn's study revealed that firms with sufficient financial resources may not carry out R&D activities because of other obstacles such as physical resources and economies of scale in R&D. The latter is related to the externalities described in the previous section. New machinery also increases the firms' probability to carry out R&D activities. The study found that high stock of qualified human capital measured by the number of workers who have a post graduate degree and the intensity of training increases the probability of that a firm will carry out R&D activities. In contrast, the availability of external technological resources discourages firms from carrying out R&D activities. Although the results of Charoenporn's study do not show the importance of financial resources, similar to the recommended response in the previous section, it suggested that the government still needs to provide financial support for R&D and other technology development activities. The government should promote cooperation among firms in technology developing activity to avoid the problem of scale in developing technological capabilities.

In a project commissioned by the Ministry of Economy, Trade and Industry to the Japan External Trade Organization (JETRO 2007) respondents were asked for their reasons for conducting R&D in Japan. A notably high 75 percent of companies replied -- "to strengthen development of products for the Japanese market". Other leading responses were "to engage

in R&D activities linked to Japan's superior production engineering capabilities" (41.3%), "to make use of Japan's superior research and intellectual achievements" (38.8%), and "to maintain and strengthen dealings with business partners (existing customers) in Japan" (37.5%). This study is composed of chemical and pharmaceutical industries, sectors boasting many R&D centers of commercialization that utilize research results from Japanese universities and/or from venture companies in Japan. The study also showed that the chemical, automotive, and IT industries are engaged in product development in connection with customers and users in Japan. One company explained that its worldwide R&D structure is determined by regional distribution (Americas, Europe, Asia, etc.), cost, and the availability for hire of high-caliber human resources. And to encourage foreign companies to establish R&D centers in Japan, the study recommends regional policies are needed for conducting in-depth analyses on universities and research institutions and on industrial structure, taking a thorough inventory of each region's strengths and like other countries, forming industrial clusters centered on "innovation hotspots" that offer a concentration of functions. When creating these innovation hotspots, the study proposed that a scheme be developed to promote collaboration with universities and research organizations and to facilitate the smooth transfer of superior technical knowledge to foreign corporations and other companies setting up local operations.

In late 2008, PIDS commissioned a survey of manufacturing firms located in CALABARZON. [3] The location was chosen since the region is an acknowledged prime area for industrial activities in the country. Simple evidence of this is the fact that most economic zones are located in the region. An essential component of this survey is the section that asked for R&D operations of the sample firms that has actually provided useful profile of firms with propensity to conduct such activities. Out of 205 sample respondents, 50 firms were found to have been undertaking R&D activities in the country. Of the 50, half are large firms while the other half are categorized as SMEs. Eight of the total firms are foreign owned, 17 are joint ventures and the rest are locally owned. In terms of types of industries, the 50 firms are engaged in food, textile, chemicals, paper products, metal, other non-metal, machinery, and other electronics manufacturing. A few fell under the category of other manufacturing industries since their classifications were not included in the selection. It was determined that food manufacturers do more R&D than the rest of the industries at 36% and majority of these firms are large enterprises. As to when these 50 firms started conducting R&D, 40% began in the early and middle of the 1990s, while a few in the 1970s, the 1980s and even before the 70s. Most of the 50 firms undertake both applied and basic R&D at 66% and 40 of the 50 firms has formal R&D departments.

On the average, these firms maintain 1 to 5 employees engaged in R&D operations. Among large firms, 38% have 6 to 10 employees while of the SMEs, 81% of their R&D manpower complement number 1 to 5. When it comes to R&D intensity measured by the ratio of R&D expenditures over sales, 53% of firms devote 0.01 to 0.5% of total sales to R&D. The results show evidence that indeed firms located in the country conduct R&D and find the manpower to do so. Majority of these firms have undergone product innovation—introduced new products to the market in the last 3 years—which are mostly for existing markets and using existing technologies. These activities resulted to increases in total sales as experienced by 66% of the firms. Process innovation was also found to be implemented by many of these firms.

[3]This so called Survey on Production and Logistic Networks of Philippine Manufacturing Industries in CALABARZON was part of the multi-country project under the auspices of the Economic Research Institute for ASEAN and East Asia (ERIA) and in which PIDS was the lead institution for the Philippines.

When asked about the most serious obstacles faced in their industrial upgrading/innovation efforts where R&D plays a primary role, the top 3 factors included lack of R&D supporting industry; high cost of R&D support services available; and high tariffs on equipment for innovation. These obstacles should be closely examined in order to turn them into enabling factors that could induce more firms to locate their R&D operations in the country, while those firms already here would have the support necessary to undertake or increase their R&D efforts.

The study of Paderanga (2009), which explored the various issues and dimensions of R&D in the Philippines, echoes some of the findings of the PIDS study. According to the former, the Philippines under-invests in R&D compared with regional and global standards. Moreover, the Philippines is among the countries with the least expenditure on R&D in ASEAN with a Gross domestic expenditure on R&D (GERD)-to-GDP ratio of only 0.14 percent. This figure has hardly moved since 2003 despite the government's efforts to promote R&D through incentives and other programs. Paderanga emphasized that low spending on R&D is due to a number of factors. Among the most crucial is the general weakness in the country's public institutions. The Philippines ranks among the countries with the weakest institutions that support or promote R&D and innovation, especially in terms of property rights and intellectual property protection.

Meanwhile, the Philippines' inadequate labor pool also limits the country's capacity for R&D and innovation and is behind its Asian neighbors in terms of R&D personnel capacity and density. Another major reason for under-investment is the lack of science and technology (S&T) awareness especially beyond the more progressive regions of the country. R&D awareness is sharpest in the NCR and the Region 4, which register GERD/GDP ratios of 0.14 percent and 0.41 percent, respectively. All other regions fall below the national average of 0.14 percent and the lack of awareness is most pronounced in the poorest regions of the country, particularly in the Region V (0.02%) and the ARMM (0.004%).

Overall, the study found that the country's S&T sector has great potential to flourish, although growth is hindered by the issues mentioned above. Among the strategies and recommendations presented in the study are the following: the need (1) to craft a national S&T policy or agenda, (2) to synchronize S&T priorities with the overall development agenda and (3) to identify each stakeholder's roles and responsibilities and ensure coordination among stakeholders.

A study by Sigurdson (1998) showed that the Philippines is lagging behind its neighboring countries in the area of science and technological R&D which is corroborated by the recent study of Paderanga (2009) and is at the tail end in global competitiveness. Although the study was conducted during the 1997-1998 financial crisis, at present, the Philippines is still behind in R&D with less than 0.2 percent share in total GDP. Sigurdson recommended the need for private sectors in the Philippines to participate more in R&D efforts, especially in priority areas like agriculture, in order to relieve the government's burden on R&D spending and be globally competitive. This recommendation seems to have been heeded as the share of private sector R&D has increased since 2002 and now accounts for 72 percent of total R&D expenditures.

The World Investment Report 2005 (UNCTAD, 2005) shows that over 80% of outsourced R&D investment from the 700 largest spending firms comes from only five countries, namely the US, Japan, Germany, United Kingdom and France (Table 1). These data should provide an idea to policy makers from developing countries on where to source R&D investments from abroad. Most R&D is conducted by firms in the ICT, automotive and pharmaceutical industries.

According to the report, the expansion of R&D into selected developing countries is a reaction to increased competition, which forces firms to innovate more at lower cost. Transnational Corporation (TNCs) are especially attracted to host countries that have the appealing combination of low wages and large pools of skilled workers. Also, the report highlighted that the growing trend towards R&D internationalization is expected to continue. Local enterprises and institutions in developing countries can take part in those R&D activities and they therefore should progressively enhance their abilities to attract more R&D investments.

Table 1: Home economies of the 700 largest R&D spending firms of the world, 2003

Economy	Number of Firms	Percentage of Largest 700 R&D spenders
United States	296	42.3
Japan	154	22.0
Germany	53	7.6
United Kingdom	39	5.6
France	35	5.0
Switzerland	20	2.9
Sweden	15	2.1
Republic of Korea	10	1.4
Denmark	8	1.1
Taiwan Province of China	8	1.1
Netherlands	8	1.1
Canada	7	1.0
Belgium	6	0.9
Finland	6	0.9
Italy	6	0.9
Spain	4	0.4
Bermuda	3	0.4
Norway	3	0.3
Austria	2	0.3

Australia	2	0.3
Brazil	2	0.3
China	2	0.3
Israel	2	0.3
Ireland	2	0.3
Luxembourg	2	0.3
Croatia	1	0.1
Greece	1	0.1
Hongkong, China	1	0.1
Liechtenstein	1	0.1
South Africa	1	0.1
Total	700	100.0

Source: World Investment Report 2005 (UNCTAD, 2005)

R&D's concentration and worldwide performance also provides useful information. According to National Science Foundation's (NSF) report entitled "Science and Engineering Indicators 2008 - Research and Development: National Trends and International Linkages," R&D activities are concentrated only in a few developed nations. In 2002, global R&D expenditures totaled at least $813 billion and one-third of this world total was accounted for by the United States, the largest country in terms of domestic R&D expenditures, and 45 percent of this total was accounted for by the two largest countries in terms of R&D performance, the United States and Japan.

The NSF's report also found that more than 95 percent of global R&D was conducted in North America, Asia, and Europe. Within each of these regions, a small number of countries dominate in terms of expenditures on R&D: the United States in North America; Japan and China in Asia; and Germany, France, and the United Kingdom in Europe. Therefore, we can conclude that wealthy, well-developed nations perform most of the world's R&D. At the same time, R&D expenditures have grown rapidly in several lesser-developed nations. The report showed that in 2004, Brazil invested an estimated $14 billion in R&D. Meanwhile, India invested an estimated $21 billion in 2000, making it the seventh largest country in terms of R&D in that year, ahead of South Korea. China had the fourth largest expenditures on R&D in 2000 ($45 billion), behind Germany's $52 billion. However, in 2005, it is estimated that $115 billion of R&D was invested by China, making it the third largest country in terms of R&D expenditures in that period.

Chapter II
Survey of Firms and Survey Results

Description of Sample and Survey Instrument

The two surveys that were conducted were: (i) a purposive sample which intended to cover 35 firms but was later pruned down to 15 due to non-response and time constraints; and (ii) two rider questions that were included in a survey of 203 firms. The small survey was more detailed and could be the basis of developing cases studies. It should be emphasized that the common questions in both surveys yielded consistent results. The more detailed survey is discussed in this section.

The purpose of the guide questions is to understand the behavior of a sample of firms conducting R&D in the country, affiliates of MNCs, technology-based or R&D companies themselves and companies with the capability to conduct R&D but choose not to. The surveyed firms are limited to those located in Greater Manila Area, which encompasses the National Capital Region and CALABARZON. The list of respondents is drawn from the Board of Investments through Department of Trade and Industries and also from the list of R&D sector found in Philippine Economic Zone Authority (PEZA) website. The population of firms is from manufacturing, chemical, pharmaceutical and food service sectors. The respondents of this study have been subdivided into groups - first group are local firms conducting R&D in the country, second group are affiliates of MNCs, third group are firms focusing solely on R&D and the fourth group are companies which can conduct R&D but opted not to. The guide questions are purposely brief and easily answered to ensure that respondents are not inconvenienced. The survey instrument is shown in the appendix. The guide questions were also used as a starting point which could be followed up with more in-depth interviews from selected respondents.

The questionnaire is divided into 7 parts:

1. Current Profile of Operations

This section includes general questions about the firm, such as its capital structure, classification, main business activity and status of the business. This information is essential to gain insights on the firms' background.

2. Factors that influenced the decision of the company to establish operation in the Philippines

This section shows the possible factors that influenced the decision of the company to locate in the Philippines. The respondents will have to rate the importance of these factors.

3. R&D Capabilities of the Firm

This section includes questions on the general R&D activity of the firm such as the kind of R&D activity that is being carried out, number of R&D personnel and R&D expenditures.

4. Factors that influence company/firm to establish R&D operations in the Philippines

This section deals with the analysis of four categories of determinants as shown in Figure 2: push factors, pull factors, policy factors and enabling factors. Looking at these determinants of R&D investments, one can find commonalities while at the same time recognizing that the factors are mutually reinforcing. These factors may also vary depending on the industry and the R&D activity intended to be conducted.

5. Philippines as location for R&D activity wherein it is rated on an aggregate level.

This section will focus on how the respondent firms will rate Philippines as a location for R&D activity. Specifically, this section will help answer the question -- is the Philippines an attractive location for R&D?

6. Innovations undertaken in the last three years and in the next three years

This section provides information from 2007 to present on what type of innovations and source of technology had the firms undertaken. These questions are important to understand how their past and future innovation fits into the overall innovation activity of the firm.

7. Obstacles and incentives/Motivations to innovation and business upgrading

The final section focuses on the obstacle of the firm in obtaining information and new technologies and the forms of government support in relation to the R&D activities. These questions can help provide policies on innovation activities.

Survey Methodology

The questionnaire was sent out electronically as an attachment to an email or used as a basis for personal interviews to those firms which agreed to have one. Follow up telephone calls were made to those who did not respond to the emails. Meanwhile, in the case of the personal interview, it was often difficult to locate the appropriate person to answer the questionnaire. One reason is that companies have different organization structures. In addition, some companies seemed not to have any designated person for R&D and it became obvious that those staff members who were interviewed are unaware about such matters. In some cases, the questionnaire was not answered by the person originally contacted from that firm.

Survey Results

The team was able to successfully interview a total of 15 respondents. Table 2 shows the distribution of respondents by area. Forty percent of the respondents came from Metro Manila, 33% came from Laguna and 27% came from Cavite.

Table 2: Distribution of respondents by area.

Area	Frequency	Percent
Metro Manila	6	40
Laguna	5	33.3
Cavite	4	26.7
Total	15	100

A. Current Profile of The Interviewed Firms

Table 3 shows the number of years that the firm has been actively operating in the Philippines. There were 7 firms which started during the 1990's and 8 firms from 1920s-1980s.

Table 3: When did the firm first started operation the Philippines?

Response	Frequency	Percent
1921	1	6.7
1931	1	6.7
1945	1	6.7
1946	1	6.7
1969	1	6.7
1971	1	6.7
1979	1	6.7
1985	1	6.7
1991	1	6.7
1992	1	6.7
1995	2	13.3
1997	1	6.7
2000	1	6.7
2003	1	6.7
Total	15	100

Since there are several science parks in Laguna, 27% of the firms interviewed started their operations in the province of Laguna followed by Cavite and Manila, both with 14% (Table 4). However, there were two respondents who did not know where their companies started their business.

Table 4: Where did the firm first started operation the Philippines?

Response	Frequency	Percent
Cavite	2	13.3
Laguna	4	26.7
Makati City	1	6.7
Manila	2	13.3
Pasig	1	6.7
Quezon City	1	6.7
Sta. Mesa, Manila	1	6.7
Zamboanga City	1	6.7
Do not know	2	13.3
Total	15	100

Slightly more than half of the respondents (53%) were 100% Filipino-owned, 20 % were 100% foreign-owned and 27% were joint venture (Table 5).

Table 5: What is the capital structure of the company?

Response	Frequency	Percent
100% Filipino-owned	8	53.3
100% Foreign-owned	3	20
Joint venture	4	26.7
Total	15	100

For the 100% foreign-owned and joint venture, the major investors are Filipinos (29%), followed by Chinese, Indonesian, Japanese, Singaporean and Spanish all with 14% each (Table 6). Foreign ownership is very important because it is a factor that can affect R&D investments.

Table 6: What is the nationality of the major investor?

Response	Frequency	Percent
Chinese	1	14.3
Filipino	2	28.6
Indonesian	1	14.3
Japanese	1	14.3
Singaporean	1	14.3
Spanish	1	14.3
Total	7	100

Among the four classifications mentioned earlier, the bulk of the interviewed firms (60%) are local companies conducting R&D, followed by two MNCs with R&D, and two local companies

without R&D (Table 7). Meanwhile, there is one MNC without R&D and one firm that focuses solely on R&D.

Table 7: What is the classification of the interviewee firm?

Response	Frequency	Percent
MNC with R&D unit	2	13.3
MNC without R&D unit	1	6.7
Local company with R&D	9	60
Local company w/o R&D	2	13.3
Pure R&D Firm	1	6.7
Total	15	100

There are 6 firms the size of which is 200 employees or less, 7 firms between 200 and 1000, and 1 firm with more than 1000 (Table 8). The 6 firms can be classified as small and medium enterprises. One disadvantage of a small firm size is lack of resources to invest in R&D activities.

Table 8: What is your company size?

Response	Frequency	Percent
15-20	1	6.7
22	1	6.7
34	1	6.7
60	1	6.7
61	1	6.7
200	1	6.7
250	2	13.3
370	1	6.7
600	1	6.7
700	1	6.7
1000	2	13.3
14680	1	6.7
Do not know	1	6.7
Total	15	100

Nine of the 15 firms or 60% listed manufacturing as its main business activity (Table 9). The other 6 firms were in construction, wholesale, retail, R&D and contract research.

Table 9: What is the main business activity of this firm?

Response	Frequency	Percent
Manufacturing	9	60
Construction	1	6.7
Wholesale Trade	1	6.7
R&D	2	13.3
Retail Trade	1	6.7
Others	1	6.7
Total	15	100

In terms of the respondent's status of business at their present location, there are 6 firms which are headquarters of multiple branches, 4 firms which are sole premises of the business and 3 which are branch operations of a larger business (Table 10). The other two are manufacturing sites/plants.

Table 10: What is the status of the business at your present location?

Response	Frequency	Percent
Sole premises of the business	4	26.7
Headquarter of a multiple branch	6	40
Branch operation of a larger business	3	20
Others	2	13.3
Total	15	100

B. Factors that influenced the decision of the company to establish operations in the Philippines

Unfortunately, not all respondents answered this section. Some felt that they were not the best person to ask and some really did not know the answer to the above question. For those who answered, availability of skilled labor and professionals and presence of other companies from the same country were thought to be very important factors and garnered the most number of responses with 5 each (Table 11). From their perspective, the absence of similar firms means that market share will not be a problem there is an opportunity to be the pioneer. Also with the availability of skilled labor and professionals the firm can expect to have more returns on investment and they will be more inclined and willing to invest in R&D.

Meanwhile, standard of living, liberal trade policies and investment incentives were factors that were thought to be not at all important in the establishment of their firms operations in the Philippines with 2 responses each. The investment incentive may not deemed important at the start of operation maybe because they know that they can avail of that later because government allows grants or tax incentives for specific qualified projects.

Table 11: What are the factors that influence the decision of the company to establish operations in the Philippines?

Response	Frequency				
	Not at all important	Not very important	Not sure	Somewhat important	Very important
Investment incentives including tax incentives	2	2	2	1	2
Liberal trade policy	2	1	2	3	
Customs procedures		1	3	1	3
Local content requirements, rules of origin		1	1	2	4
Physical Infrastructure (roads, highways, ports, airports, etc)		1	2	1	4
Infrastructure (telecommunications, IT)		1	1	2	3
Infrastructure (electricity, water supply, other utilities)		1	1	2	4
Government Institutional infrastructure	1	1	2	2	3
Financial structure/banking system		1	2	2	4
Legal System		1	2	2	3
Protection of intellectual property rights	1	1	3	1	2
Size of local markets		1	2	2	3
Access to export markets	1	1	1	1	4
Proximity to supplier/subcontractors			2	2	4
Request by large/related company	1	1	2	1	3
Availability of low cost labor			2	2	4
Availability of skilled labor and professionals		1		3	5
Presence of other companies from the same country as this company		2	1		5
Access to high value technology and information		4		3	2
Standard of living	2	3		2	1
Property/Land cost		2	2	1	1

C. R&D Capabilities of the firms

A majority (80%) of the surveyed firms carries out R&D activities in the country and only 20% do not (Table 12). Of the 12, 6 are local firms, 5 are MNCs, 1 is foreign firm that focuses on R&D (See also Table 7).

Table 12: Does this establishment carry R&D in the country?

Response	Frequency	Percent
Yes	12	80
No	3	20
Total	15	100

There were 60% of the respondents who said that they also have R&D in another country (Table 13). All of them also conduct R&D locally. This implies that some Filipino firms also invest in R&D abroad.[4] The respondents who said yes were also asked in what other country they conduct their R&D. Countries mentioned include Japan, Singapore, Taiwan, China, Malaysia and Australia.

Table 13: Do you conduct R&D in another country?

Response	Frequency	Percent
Yes	9	60
No	6	40
Total	15	100

Table 13a: In what other country?

Response	Frequency	Percent
Japan	1	11.1
Singapore	1	11.1
Taiwan, China	1	11.1
Thailand	1	11.1
Thailand, Singapore, Malaysia, Australia	1	11.1
Spain, USA, Korea, China, Cuba, Guatemala, Mexico, Panama, Portugal, Costa Rica, Dominican Republic, Venezuela	1	11.1
Do not know	3	33.3
Total	9	100

[4] These firms normally undertake simple R&D activities. One example is to adapt production process to local conditions. Another is to determine quality of equipment purchased locally.

Both basic research and applied research are the main R&D activity being carried out by the surveyed firms with 42% followed by applied research only with 33% (Table 14).

Table 14: What kind of R&D activities is carried out by this establishment?

Response	Frequency	Percent
Basic Research	2	16.7
Applied Research	4	33.3
Both	5	41.7
No answer	1	8.3
Total	12	100

Forty-two percent of the respondents started their R&D activities before the 90s and 33% during the 90s. Only 25% had started their R&D activities in 2000-2004 (Table 15).

Table 15. When did this establishment start R&D activity?

Response	Frequency	Percent
Before 1970	3	25
1980s	2	16.7
1990-1994	3	25
1995-1999	1	8.3
2000-2004	3	25
Total	12	100

100% of the respondents who conduct R&D have their own R&D department (Table 16).

Table 16: Does this establishment have an R&D department?

Response	Frequency	Percent
Yes	12	100
No	0	0
Total	12	100

Seventy-five percent of employees engaged in R&D activities are below 10 people and only 25% above 10 (Table 17). Usually the number of employees can affect what kind of R&D activities to undertake to seize more opportunities.

Table 17: How many employees (persons) are engaged in R&D activities?

Response	Frequency	Percent
1-5	5	41.7
6-10	4	33.3
11-15	2	16.7
26-50	1	8.3
Total	12	100

Only 17% of the surveyed firms had 5.01% and above percentage of R&D expenditure to their total sales and half of them has 0.01% - 1%1.0% (Table 18).

Table 18: What is the percentage of R&D Expenditures to Total Sales?

Response	Frequency	Percent
0.01-0.50%	3	25
0.51-1.0%	3	25
2.01-2.5%	1	8.3
4.01-5.0%	1	8.3
5.01% and above	2	16.7
Not sure	1	8.3
Do not know	1	8.3
Total	12	100

There were 2 respondents each who said that their main reason of not running R&D activities were – lack of skilled labor and professionals, unavailability of government grants/loans and inadequate size of domestic market (Table 19). The other response was high tariff rates.

Table 19: What is your reason of not running R&D/innovation activities in the country?

Response	Frequency	
	Yes	No
Lack of improve existing products/services	1	2
Lack of existing products/services to meet market demands	1	2
Lack of new products/services	1	2
Lack of good quality of education	1	2
High production costs	1	2
High cost of labor	1	2
Lack of skilled labor and professional	2	1
Unavailability of government grants/loans	2	1
Inadequate size of domestic market	2	1
Other	1	0

D. Factors that influence company/firm to establish R&D operations in the Philippines

The possible factors that influence the R&D operations of the surveyed firms are grouped into four. These are the push factors, pull factors, policy factors and the enabling factors (see Figure 2).

- Seven respondents said that competitive pressure is very important for them to continue with their R&D activities. Almost all the factors mentioned in the push factors—namely, the shortage of appropriate skills in own country, rising costs of R&D in own country and complexity of R&D—were considered to be very important factors with 5 respondents each.
- When asked what factors drew them in their present location, the size of market in the country and the availability of reputable universities and research institutions were thought to be somewhat important factor with 5 and 6 responses, respectively. The availability of talented skills at low cost with 4 responses was said to be a very important factor in this group.
- Six respondents stressed that it is very important for intellectual property rights to be protected, while 8 respondents said that it is somewhat important that there should be incentives for R&D activities.
- Presence of science/technology parks, advances in ICT and availability of R&D support services were said to be very important by 6 respondents each followed by local firms forming strategic R&D alliances with MNCs with 5 respondents. Surprisingly, political stability was thought to be a not very important factor by 3 respondents.

Table 20: Possible factors that influence company firm to locate their R&D here in the Philippines

Possible factors influencing the decision of the company	Frequency				
	Not at all important	Not very important	Not sure	Somewhat important	Very important
Push Factors					
Shortage of appropriate skills in own country	3		2	2	5
Rising costs of R&D in own country	2	1	1	3	5
Complexity of R&D activities	1	1	1	3	5
Competitive pressure	1		1	3	7
Pull Factors					
Size of market in RP		1	1	5	5
Availability of talented skills at low cost	1	1	2	4	4
Role as global production base in the industry	2	2	2	4	2
Reputable universities and research institutions	2	2		6	2
Active industry association providing R&D support	2	3	1	5	1
Policy Factors					
Good quality of education		1	3	2	6
Strong national innovation system	1	1	3	3	4
Incentives for R&D activities			2	8	2
Investment promotion programs	1	2	4	2	2
Intellectual property rights are protected	2	1	3		6
Enabling Factors					
Advances in ICT	1	1	1	6	3
Availability of R&D support services	1	2	1	6	2
Political Stability		3	3	3	3
Legal system		1	3	4	4
Good physical and communication infrastructure		2	2	4	4
Local firms are known to form strategic R&D alliances with MNCs	1	1	1	5	3
Presence of science/technology parks	2	1	2	6	1
Others					

E. Philippines as a location for R&D activity

The respondents were asked to rate Philippine as a location of R&D activities. Most of them rated Philippines as good in the following aspects: communication links, presence of other companies from the same country, availability of low cost labor and availability of skilled labor and professionals. However, respondents rated 'availability of government grants/loans and availability of other government support/advice' poorly. This confirms that the government lacks support efforts or the institutional structure that will enhance the technological capabilities of both local and multinational companies. Overall, 5 respondents each rated Philippines fair and good as a location for R&D activity.

Table 21: How would you rate Philippines as a location for R&D activity?

Response	Frequency				
	Very Good	Good	Fair	Poor	Very Poor
Communication electronic links	2	7		1	3
Presence of other companies from the same country	1	5	2	1	2
Availability of low cost labor	2	7	3		
Availability of skilled labor and professional	2	5	2	3	
Availability of government grants/loans	1	2	3	5	
Availability of other government support/advice	2	1	3	4	3
Other					
Overall assessment of Philippines as a location for R&D/innovation activities		5	5	2	

F. Innovation undertaken in the last three years and in the next three years

All respondents undertook innovation of new products and services in the last three years and would also undertake new products and services innovation in the next three years. Adoption of new method of production and opening of new market followed with 11 respondents each. There were only 3 respondents who said that they carried out and will carry out in-house major production activity that was previously or currently outsourced in the last and next three years.

Table 22: Innovation undertaken in the last three years and in the next three years

Type of Innovation	Frequency	
	Yes	No
Introduction of new products and services	12	0
Adoption of new method of production	11	1
Opening of new market	11	1
Acquisition of new source of supply of raw materials and supply	9	3
Outsourcing a major production activity that was previously conducted in-house	5	7
In-house major production activity that was previously or currently outsourced	3	9
Upgrading of machineries and equipment	10	2
Marketing of products and services/purchase of materials and supplies thru internet	8	4

One hundred percent of the respondents do not get any technical cooperation with (or assistance from) foreign universities or R&D institutes and almost all with 9 respondents said they do not also get any technical cooperation with (or assistance from) local government, technical cooperation (or assistance from) local business organization, technical cooperation (or assistance from) local university or R&D institutes and technology transfer from or cooperation with local companies (Table 23). Mostly, the technology they have is developed by their own companies.

Table 23: Companies source of new technologies and innovation

Source of New Technology	Frequency	
	Yes	No
Technology transfer from multinational companies	5	6
Technical assistance from foreign agencies (including other domestic agencies)	3	8
Technical cooperation with (or assistance from) foreign university or R&D institutes	0	11
Technical cooperation with (or assistance from) local government	1	9
Technical cooperation (or assistance from) local business organization	2	9
Technical cooperation (or assistance from) local university or R&D institutes	1	9
Technology transfer from or cooperation with local companies	2	9
Developed by own company	11	1
Joint venture	3	9
Others, specify	0	0

G. Obstacles and incentives/motivations to innovation and business upgrading

The following are the more serious obstacles according to the respondents (Table 24):

- High tariffs on equipment and materials necessary for innovation
- Price of R&D support services is high
- No tax break or accelerated depreciation system
- Protection of intellectual property right (IPR) not sufficient
- Technical skills of engineers, researchers and other appropriate manpower are weak

Table 24: Obstacles for obtaining information and new technology

Obstacles	Frequency				
	Very serious	Somewhat serious	Not sure	Not very serious	Not serious
No R&D supporting industry such as consulting, financing	2	4	3	1	2
Price of R&D support services is high	5	4	1		3
No university or public institute in the neighborhood		3	3	2	5
Technological capabilities of universities or public institutes located in the neighborhood too weak to collaborate		5	2	1	4
No business organization or chamber of commerce which can provide training courses, seminar or testing facilities in the neighborhood	2	2	4	1	3
Protection of intellectual property right (IPR) not sufficient	4	3	3	2	1
High tariffs on equipment and materials necessary for innovation	6	3	2		3
No tax break or accelerated depreciation system	5		6	1	2
Establishment not familiar with public support programs and procedures to apply for support measures	3	3	4	2	1
Public support programs are not designed appropriately for innovation	3	6	3		1
Labor mobility is too rigid for workers to bring with them technologies acquired from previous employer or from previous training	3	2	3	1	1
Technical skills of engineers, researchers and other appropriate	4	4	1	2	2

Lack of government grants and loans were the top 2 answers that the companies were not able to get. Respondents were able to avail advisory services, assistance in networking with other organizations and training courses (example the TESDA training facility).

Table 25: What forms of government support in relation to R&D activities did you get in the last three years?

Response	Frequency		
	Yes	No	Don't Know
Tax incentives	2	9	1
Grants		12	
Loans		12	
Information about new business opportunity	1	9	2
Advisory services	5	7	
Assistance in networking with other organizations	4	7	1
Encourage links with universities/Higher Education	3	9	
Training courses	4	7	1
No answer (there were 2 respondents who did not answer)		1	
Other			

Respondents came with the following as their highly effective methods by which the government can support companies undertaking R&D activities:

- Training courses
- Information about new business opportunity
- Tax Incentives

Table 26: What do you consider the most effective means by which the government and its agencies can support companies undertaking R&D activities?

Response	Frequency			
	Highly Effective	Moderately Effective	Limited Effectiveness	Not at all Effective
Tax incentives	9	3	1	
Grants	8	3		1
Loans	4	3	3	2
Information about new business opportunity	9	1		
Advisory services	8	2	2	
Assistance in networking with other organizations	7	3	2	
Encourage links with universities/Higher Education	8	4		
Training courses	11	1		1
Other, specify				

Some Key Findings from the Interviewed Firms

The findings are grouped based on the firm's classification. The first group is comprised of local firms conducting R&D in the country; second group affiliates of MNCs, third group are R&D companies; and the fourth group are companies with no R&D but can do R&D.

First group

- A local pharmaceutical firm resorted to imports of technologies from abroad. This pharmaceutical firm imported technological inputs like plant and machinery and acquired knowledge through technology and know-how agreements. The imports of foreign technology require further R&D on the part of importing entity to absorb, adapt and assimilate the imported knowledge to local conditions; it may stimulate local knowledge-creating activities.

- Two of the firms interviewed were from food manufacturing business. Their R&D mainly involves creating new varieties and new flavors for the product. They do not have patents on their products because they are confident that even though they got copied the customers will still buy them for their distinct taste. Apparently for these two food businesses, patent rights protection was not an obstacle.

Second group

- A respondent from a home appliance firm said that as an MNC they have technology transfer from their parent company. However, doing R&D here is very costly. Another problem they have is the smuggling of cheaper home appliances products. The anti-smuggling law here in the Philippines is too weak to protect large companies like them. Even though they always have new product innovations, people would still buy cheaper smuggled goods and as a result they incurred loss of profits.

Third group

- The firm interviewed is a contract research firm. The pharmaceutical companies contact them to conduct third party clinical trials for their new products. They conduct their studies on monkeys and said that one of the reasons their company invested here in the Philippines is the abundance of monkeys in the country. They have a monkey farm in Batangas.

Fourth group

- A clothing manufacturer under this category said that the closest research that they do is the kind of cut they will do and the current trends in clothing. That is why they do not have an R&D unit but they could establish one if necessary. Other companies interviewed under this category said that R&D really depends on the need of the company and as of now they can still operate without R&D.

Some Key Findings from Interviewed Associations

There were two associations involved: Pharmaceutical and Healthcare Association of the Philippines (PHAP) and Chemical Industries Association of the Philippines (or Samahan sa Pilipinas ng mga Industriyang Kimika, SPIK). The Associations were interviewed prior to the respondent firms. The purpose of this interview was to gain an overview of the R&D activities of

their member firms and if there was a collaboration between the association and firms in conducting its R&D. The guide questions used are shown in appendix one.

- PHAP
  According to the PHAP's Assistant Vice President Eufe M. Tantia, majority of its member pharmaceutical firms in the country do not conduct R&D activities except for clinical trials/studies and bioavailability studies. It may be necessary but it is very costly and can cost up to $800M to $1 billion annually. Mr. Tantia also emphasized that to be R&D investment friendly the government should start strengthening its efforts against counterfeiting and to provide more tax incentives. There should have a special law that penalizes counterfeiting medicine. He said generic labels can be easily copied and one cannot identify the difference between the real and fake medicine unless there is an adverse reaction on the part of the user. The government plays a very important role in upholding the development of the R&D activities in pharmaceutical industry; however, Mr. Tantia observed that the government's initiatives for both protection and promotion of intellectual property (IP) are not sufficient. Protection of IP is very crucial because of the widespread piracy and this is necessary for the firms to recover what they have invested. Between PHAP and its member firms, there was no collaboration in terms of R&D activity and there were also no PHAP-government tie ups to give protection to new innovations.

- SPIK
  Member firms of SPIK headed by President Roberto Batungbacal are not all from chemical industries. The members include producers of chemical producers here in the Philippines but which sell outside the country, traders/distributors and logistics and haulers providers. The top four global chemical companies namely BASF, Dow, Bayer and Du Pont are also members of SPIK. According to Mr. Batungbacal, there are no member firms that do pure R&D. There is no need to do R&D here because most member firms have R&D centers in the US and China and those R&D activities are not the priority of their member firms. The majority of their member firms conduct their R&D outside the country and only logistics and manufacturing are done here in the Philippines. Moreover, there is no reason to do R&D here because there are already existing global chemical products and the creation of R&D really depends on the need of the company. He said China has been rapidly rising in production of chemicals. However, he emphasized that we have a niche here for local products like coconut derivatives, agro technology and other local raw materials that other countries do not have which provides a good opportunity to conduct R&D locally. Another advantage that the Philippines has is that there is a reasonable number of talented chemists and chemical engineers and the expenditure costs are cheaper compared to other countries. As an association they do not have any R&D related activities or incentives for its members. Also no government support is given to them.

Chapter III
Supplemental Survey

Description and Results

The Philippine Institute for Development Studies is currently collaborating with the Economic Research Institute for ASEAN and East Asia on a study entitled "Fostering Production and Science & Technology Linkages to Stimulate Innovation in ASEAN." In general, the study aims to recommend policies that would promote region-wide industrial upgrading through the creation of a pan-East Asian industrial corridor. In particular, each country study would examine closely the pathways to or determinants of innovation, such as the linkages created by production relationships and through knowledge networks, and their relative impacts.

Two rider questions were included in the survey of 203 firms. The first is the same as Question 10, Section D of the survey for this study (see Appendix). The second is a combination of Questions 9.7 and 13. A profile of the 203 firms is shown in Tables 27 and 28.

Half of the respondents (101 out of 203) were 100% Filipino-owned (Table 27). Twenty-seven percent were 100% foreign-owned (MNC) and 23% belong to joint venture.

Table 27: Present capital structure of the Firms

Response	Frequency	Percent
100% Filipino-owned	101	49.75
100% Foreign-owned (MNC)	54	26.60
Joint Venture (JV, Locally and Foreign-owned)	48	23.65
Total	203	100

Food business was the most dominant main business activity with 17%, 11% from apparel leather and other electronics industries and 8% from plastic, rubber and metal products. Other main business activities include bulbs manufacturing, candle making, ceramics, cosmetics and fragrance, filter aid, handicraft décor, house fixtures, mfr amusement rides, optoelectronics device, shell craft products, shoes mfg, slaughter house and wire harness assembly (Table 28).

Table 28: Distribution of respondents by main business activity

Response	Frequency	Percent
Food, beverages, tobacco	34	17.1
Textiles	2	1.0
Apparel leather	22	11.1
Wood, wood products	11	5.5
Paper, paper products, printing	5	2.5
Coal, petroleum products	0	0

Chemicals, chemical products	11	5.5
Plastic, rubber products	15	7.5
Other non-metallic mineral products	8	4.0
Iron, steel	13	6.5
Non-ferrous metals	1	0.50
Metal products	15	7.5
Machinery, equipment, tools	5	2.5
Computer and computer parts	7	3.5
Other electronics and components	22	11.1
Precision instruments	2	1.0
Automobile, auto parts	14	7.0
Other transportation equipment and parts	2	1.0
Others	10	5.0

The results for the first rider question are shown in Table 29. Similar to the results for the 15 firms (Table 20), the need to respond to competitive pressure is considered as a very important push factor. Two pull factors remain prominent: availability of talented skills at low cost and the size of the market in the Philippines.[5] The same is true for policy factors where good quality of education and protection of intellectual property rights continue to rank highly. Surprisingly, respondents ranked "strong national innovation system" highly, too. Meanwhile, low cost of doing business has dislodged advances in ICT among the more important enabling factors. However, the latter is still considered as very important by a many of the respondents. The legal system and presence of good communication and physical infrastructure remain as important enabling factors.

The respondents' main business activities were grouped into industry sectors. This is shown in Table 30, which also summarizes the highest rated important factors influencing these sectors to locate their R&D here in the Philippines. The results indicate that these factors vary according to sectors, reflecting the kind of needs of these sectors. However, under the push factor category, almost all sectors agreed that competitive pressure is the most important. Availability of talented skills at low cost dominated as the sectors most important pull factor. Most important policy factors include protection of property rights and good quality of education. For the enabling factors, low cost of doing business and good physical and communication infrastructure had the highest response. Meanwhile, most sectors are concerned about having minimal cost in both doing their business and in acquiring their talents.

[5] The number of respondents who indicate 'somewhat important' and 'important' are combined and this is the basis for ranking the different factors.

Table 29: Possible factors that influence company firm to locate their R&D here in the Philippines (response from supplemental survey)

Possible factors influencing the decision of the company	Frequency				
	Not at all important	Not very important	Not sure	Somewhat important	Very important
Push Factors					
Shortage of appropriate skills in own country	16	13	5	26	16
Rising costs of R&D in own country	10	14	4	24	25
Complexity of R&D activities	9	14	2	27	25
Competitive pressure	6	10	5	19	37
Pull Factors					
Size of market in RP	8	7	2	32	27
Availability of talented skills at low cost	6	4	4	28	34
Role as global production base in the industry	8	7	6	22	33
Reputable universities and research institutions	8	19	8	25	16
Policy Factors					
Good quality of education	7	5	4	31	30
Strong national innovation system	8	9	7	27	25
Incentives for R&D activities	9	9	10	27	21
Investment promotion programs	8	11	10	27	20
Intellectual property rights are protected	9	11	9	20	28
Enabling Factors					
Advances in ICT	9	7	13	25	21
Availability of R&D support services	7	6	11	28	24
Low cost of doing business	5	4	4	35	28
Political Stability	6	7	14	26	23
Legal system	6	7	9	23	31
Good physical and communication infrastructure	6	3	6	28	33
Local firms are known to form strategic R&D alliances with MNCs	9	8	20	28	10
Active industry association providing R&D support	7	11	12	31	14
Presence of science/technology parks	7	9	13	29	17
Others	12		1	1	1

Table 30: Summary of the possible factors that influence industry sectors to locate their R&D here in the Philippines (response from supplemental survey)

Industry Sectors	Factors influencing the decision of the industry sectors			
	Push Factors	**Pull Factors**	**Policy Factors**	**Enabling Factors**
Food, beverages, tobacco	Competitive pressure	Availability of talented skills at low cost	Protection of Intellectual Property Rights	Good physical and communication infrastructure Legal system
Textiles	Competitive pressure	Availability of talented skills at low cost Role as production base in the industry	Good quality of education	Low cost of doing business
Apparel leather	Competitive pressure	Availability of talented skills at low cost Role as production base in the industry	Protection of Intellectual Property Rights Strong national innovation system	Low cost of doing business Availability of R&D support services
Wood, wood products	Competitive pressure	Availability of talented skills at low cost Role as production base in the industry	Protection of Intellectual Property Rights Strong national innovation system	Low cost of doing business Legal System
Chemicals, chemical products	Competitive pressure	Availability of talented skills at low cost Role as production base in the industry	Good quality of education	Good physical and communication infrastructure
Plastic, rubber products	Competitive pressure	Availability of talented skills at low cost Role as production base in the industry	Protection of Intellectual Property Rights	Good physical and communication infrastructure Low cost of doing business
Other non-metallic mineral products	Competitive pressure	Role as production base in the industry	Good quality of education	Legal System
Iron, steel	Shortage of appropriate skills in the country	Availability of talented skills at low cost	Good quality of education	Local firms are known to form strategic alliances R&D alliances with MNCs
Metal products	Competitive pressure	Size of market in RP	Incentives for R&D activities	Political Stability
Machinery, equipment, tools	Competitive pressure	Size of market in RP	Good quality of education Strong national innovation system	Good physical and communication infrastructure

Other electronics and components	Shortage of appropriate skills Rising costs of R&D in the country	Availability of talented skills at low cost Role as production base in the industry	Good quality of education	Active industry association providing R&D support Presence of science parks
Automobile, auto parts	Competitive pressure	Availability of talented skills at low cost Reputable universities and institutions	Protection of Intellectual Property Rights	Low cost of doing business Local firms are known to form strategic alliances R&D alliances with MNCs

The second rider question deals with factors that discouraged the firms to conduct R&D operations in the Philippines. The results are shown in Table 31. Two aspects are prominent in terms of discouraging R&D activity in the Philippines: (i) the high cost of R&D equipment and technology; and (ii) lack of technical manpower/engineers. The responses are consistent with the small survey as shown in Table 24.

Table 31: What factors discouraged your establishment to conduct R&D operations in the Philippines?

Response	Frequency
Lack of technical manpower/engineers	15
Low quality of education	3
Lack of reputable universities and research institutions	0
Weak national innovation system/lack of R&D support services	9
Size of market in the Philippines is too small	11
Risk aversion of local firms	2
High cost of R&D equipment and technology	23
Unattractive incentives for R&D activities	5
Unavailability of government grants/loans	5
Lack of attractive locations like science/technology parks	6
MNCs unwilling to transfer technology to affiliate firms	4

On a sectoral basis, there are 3 major responses to the factors that discourage R&D operations in the country (Table 32). These are lack of technical manpower/engineers, weak national innovation/lack of R&D support services and high cost of R&D equipment and technology.

Table 32: Summary of the factors that discouraged industry sectors to conduct R&D operations in the Philippines.

Industry Sector	Response
Food, beverages, tobacco	Lack of technical manpower/engineers
	Size of market in the Philippines is too small
Apparel leather	Lack of technical manpower/engineers
Plastic, rubber products	Lack of technical manpower/engineers
	Weak national innovation system/lack of R&D support services
Iron, steel	Lack of technical manpower/engineers
	Weak national innovation system/lack of R&D support services
Metal products	Lack of technical manpower/engineers
	Weak national innovation system/lack of R&D support services
Machinery, equipment, tools	High cost of R&D equipment and technology
Other electronics and components	Lack of technical manpower/engineers
	High cost of R&D equipment and technology
Automobile, auto parts	Size of market in the Philippines is too small
	Weak national innovation system/lack of R&D support services

Concluding Comments

These survey results showed that a significant number of respondents were aware of the importance of having R&D and identified the need to develop R&D activities. In general the firms are willing to do so provided there are adequate resources and government support. Policies like government's strengthening of IP protections can stimulate R&D, innovation, and ultimately productivity growth. IP rights encourage R&D by making it easier for firms to reap the rewards of their work.

Among the factors identified in influencing R&D to establish here in the Philippines are the following: availability of skilled labor and professionals and presence of other companies from the same country as this company. The major obstacles include high tariffs on equipment and materials necessary for innovation and the lack of technical manpower/engineers.

Policies can look into the host country factors that do not rate highly and also address the areas that are evaluated poorly. An example of the former is strategic alliances between local firms and MNCs. Policymakers should also be aware of the source of outward R&D spending which are mainly firms from the US and Japan. Most R&D by these firms is conducted in the ICT, automotive and pharmaceutical industries.

At present, the country does not have specific policy measures targeting the promotion of R&D from abroad. There is also need to do in-depth analysis of how to promote R&D collaboration among players in the national innovation system. However, the importance of R&D has been progressively taken into account by creating different policy measures and programs to

address R&D activities (Table 33). In the future, the government should focus more on the development of policy instruments that can offer a better support for R&D activities like how to incorporate local and indigenous materials to develop and improve new products. Parallel to this, other policies that the government can provide are to increase its spending on R&D which will motivate firms to boost their investment in R&D; to strengthen its cooperation with different research organizations; and to begin to look at R&D as a profitable investment.

The government can also initiate and support joint R&D efforts among firms in a specific sector given that there will be significant spillover effects in this type of endeavor. An example of such an endeavor is illustrated in Box 1.

Table 33: Summary of the existing policies and programs related to the factors that influence company firm to locate their R&D in the Philippines

Possible factors influencing the decision of the company	Existing Policies/Programs
I. PUSH Factors	
1. Need to remain competitive	National Competitiveness Council (NCC) was created to address this
II. PULL Factors	
2. Availability of talented skills at low cost	DOST's HRD Program/Scholarships in science and technology; TESDA manpower training in specific skills
3. Size of market in RP	NCC/DTI policies/programs
4. Role of global production base in the industry	NCC/DTI
III. POLICY Factors	

	5. Good quality education	S&T scholarship programs in the undergraduate and graduate courses in science and engineering
	6. Incentives for R&D	R&D incentives provided under the Investment Priorities Plan (IPP)*
	7. Protection of intellectual property rights	Addressed by IPO
	8. Strong national innovation system	DOST Filipinnovation Network initiatives
IV.	ENABLING Factors	
	9. Low cost of doing business	NCC/DTI policies/programs
	10. Good physical and communication infrastructure	Continuing physical and communication infrastructure development of the government; technology parks, PEZA, etc.
	11. Availability of R&D support services	RDIs from government and universities can be tapped for support services
	12. Advances in ICT	CICT policies/programs
	13. Presence of science/technology parks	DTI/PEZA policies/programs
	14. Legal system	

		DTI/DOJ policies/programs
V.	Aspects DISCOURAGING R&D Activity in the Philippines	
	15. High cost of R&D equipment and materials	Tax exemptions for importation of R&D equipment available under IPP; Philippine Coordinating Council for Research and Development (PCCTD) instructed DOST to study how to fast track importation of R&D raw materials and equipment
	16. Lack of technical manpower/engineers	Continuing S&T HRD programs in engineering and S&T courses by DOST-SEI and Councils; ERDT Program of UP. DOLE policies/programs
	17. Lack of technical/ R&D cooperation with local gov't, local business organizations and local universities & RDIs	DOST R&D Contract Program; Need to review policies to promote R&D collaboration
	18. Weak national innovation system	Filipinnovation advocates strengthening national

VI. Others 19. No cooperation among individual firms in R&D	innovation system through 4 strategies Need to review policies/programs to promote R&D collaboration
Note: *Detailed 2009 IPP can be found in Appendix 2 Source: DOST	

Box 1. Example of industrial cluster: Cooperation in the Chilean Woodworking Industry*

Supported by macro policies of export promotion after 1983 and specific export promotion activities undertaken by bodies such as ProChile and ASEXMA (the export manufacturers association in Chile), SMEs in the wood products sector began to try and export in the mid-1980s. At first, they were totally unprepared for the challenges they faced and made basic mistakes: 'the "new exporters" had neither enough export know-how (transport, marketing, international quality standards, protectionism) nor sufficient manufacturing competence (knowledge of technology and the organization of work, management, strategies, an adequately trained work force)' (Messner 1993, 41).

Firms tried to offer too broad a range of products, failed to guarantee quality, and did not appreciated the importance of reliable delivery. Exporting was a shock to these firms. They thought that their products were good enough for export markets until they tried to sell them (Messner 1993). Such mistakes are common when firms enter export markets. What is notable, however, is how these problems were rapidly overcome

ASIMAD, the association of small- and medium-sized enterprises provided assistance with learning about markets. It organized trade missions linked to international trade fairs and visits to overseas factories producing both furniture and machinery. It also established links with a number of higher education institutes to create technical and design courses and to promote entrepreneurship, and invited leading authorities on the sector from overseas to speak to its members. At the end of 1993, ASIMAD was preparing to sign a large contract with a leading Italian consultancy firm for training, standardization, and certification in an effort to achieve the international quality standard, ISO 9000. The Association sees itself as seeking to emulate the experience of the Italian furniture industry, improving its design, manufacturing capability and skills in order to increase its competitiveness in export markets. In other words, the entry to export markets pinpointed deficiencies and provided the impulse to try to overcome them.

The development of new inter-firm linkages has been a slower development. The leading firms began to develop links with other firms and local institutions, and the growth of joint action in marketing is leading to more exchanges of information about design and technical problems. The size of export orders (much larger than those in the internal market) also tends to promote specialization and cooperation (horizontal and vertical. In this way, new relationships are being constructed, but outside agencies, such as the Fundacion Chile have a role to play in establishing them.

A sector which had been almost entirely oriented to the domestic market was able to move into export markets and create the mechanisms needed to make this move a success. In the course of the second half of the 1980s, exports of non-traditional forestry products—veneers, packaging materials—grew rapidly. In the case of smaller manufacturers of wood products (furniture, processed construction materials, boards, laminates etc.), exports increased substantially from 1985 to 1992 (Messner 1993). Cooperation, promoted partly by the State and partly by sectoral associations, played an important role in this success. A long history of community or State action was not required to achieve this—only a desire to capture export markets and a framework of public support centered on private sector institutions.

*Lifted from Box 5, page 25 of John Humphrey and Hubert Schmitz. 1995. "Principles for Promoting Clusters and Networks of SMEs". UNIDO Small and Medium Enterprises Branch. Authors cited D. Messner. 1993. "Shaping industrial competitiveness in Chile: the case of the Chilean wood-processing industry" in K. Esser, et al. (eds.) *International Competitiveness in Latin America and East Asia*, London: Frank Cass.

References

Carreon, D.G.K. “RP Slips in World Prosperity Index.” BusinessWorld Online. October 28, 2009. Decemebr 01, 2009. (http://www.bworld.com.ph/BW102809/content.php?id=005).

Charoenporn, P. 2005. *“*The Determinants of the Firms’ Decision to Carry out of R&D Activities in Thai Manufacturing Sector: The Role of Innovation Types.” Thammasat Economic Journal (23) No.3, pp. 89-122.

Cypher, J. M. and J. L. Dietz (2009): *The Process of Economic Development (3rd Edition)*. New York: Routledge.

Japan External Trade Organization (JETRO). “Survey on R&D of Foreign-Affiliated Companies in Japan - Summary Report.” March 2007. November 9, 2009. (http://www.jetro.go.jp/invest/reference/reports/pdf/h18_summary_en.pdf)

Miller, K. “Preliminary report on practice-related research survey.” March 2007. November 24, 2009. (http://www.iriss.org.uk/files/PrelimPracticeResearchSurvey0704.pdf).

National Science Board. “Science and Engineering Indicators 2008*”* National Science Foundation. 2008. November 24, 2009. (http://www.nsf.gov/statistics/seind08/c4/c4h.htm).

Paderanga, C. W. 2009. “R&D Innovation in the Philippines: Issues and Strategies.” Manuscript (October).

Pamukcu, T. and F.M. Utku-Ismihan. 2009. *“*Determinants of R&D Decisions of Firms in Developing Countries the Case of Turkey.” Paper presented at EconAnadolu 2009: Anadolu International Conference in Economics June 17-19, 2009, Eskişehir, Turkey.

Philippine Information Agency Press Releases. “Feature: R&D practitioners, key ingredients in progress.” July 21, 2009. October 27, 2009. (http://www.pia.gov.ph/?m=12&fi=p090721.htm&no=53).

Salay, E., J.A. Caswell and T. Roberts. 2003. “Survey Instrument for Case Studies of Food Safety Innovation.” University of Massachusetts Amherst, Department of Resource Economics. Working Paper No. 2003-6.

Sigurdson, J. “Philippine R&D at the Tailend in Global Competitiveness.” September-October 1998. Decemebr 3, 2009. (http://dirp4.pids.gov.ph/ris/drn/pidsdrn98-5.pdf).

UNCTAD (2005). World Investment Report 2005. New York and Geneva: UNCTAD. November 26, 2009. (http://www.unctad.org/Templates/Download.asp?docid=6087(=1&intItemID=3489).

Appendix 1 : SURVEY INSTRUMENTS

- Cover letter
- Assurance of Confidentiality
- PIDS/DOST interview guide for the firms
- PIDS/DOST interview guide for the associations

PHILIPPINE INSTITUTE FOR DEVELOPMENT STUDIES
Surian sa mga Pag-aaral Pangkaunlaran ng Pilipinas
Service through policy research
NEDA sa Makati Building, 106 Amorsolo Street, Legaspi Village, 1229 Makati City, Philippines
Fax: (632) 816-1091 • Tel: 893-8350, 893-9573, 893-9578 • http://www.pids.gov.ph

Dear Sir/Madam:

The Philippine Institute for Development Studies (PIDS), the premier think tank of the Philippine government, is conducting a research study entitled "Determinants of R&D Investments in the Philippines: Implications for Policy." It intends to study the factors that attract investments in R&D in the Philippines as well as obstacles for innovative activities, in order to identify implications for policy and reform. Specifically the study would like to – (1) examine the trends in R&D activities by firms located in the Philippines, (2) determine the factors that attracted these firms to locate their R&D activities in the country, (3) identify the barriers that hinder the conduct of innovative activities in the Philippines, and (4) provide policy recommendations that would strengthen the factors that attract R&D investments and suggest measures that would minimize the obstacles to innovation.

To achieve these objectives and present the actual situation in the country, we would be conducting an in-depth interview of your firm to gather information to attain the objectives of our study. We hope to be able to draw up policy recommendations from the results of the study to maximize the country's potential as an attractive location for R&D investments.

In this regard, we would like to request for an audience with you or your representative/s for us to learn important information about your firm in line with our study. The interview will be conducted by our researchers Ms. Kathrina Gonzales, Ms. Leilani Bolong and Ms. Danica Ortiz. Rest assured that it would only take an hour for us to conduct the interview. Our staff will be calling your office soon to follow up on your response or you could reach us through our telephone number at 892.7385 and email addresses grina@pids.gov.ph and blhanee@pids.gov.ph.

Thank you and we are hoping for your cooperation in this endeavor.

Sincerely,

Josef T. Yap

President

Republic of the Philippines
PHILIPPINE INSTITUTE FOR DEVELOPMENT STUDIES (PIDS)
Makati, Metro Manila

ASSURANCE OF CONFIDENTIALITY

In accordance with all applicable laws and regulations, we, Kathrina Gonzales and Leilani Bolong, interviewers of PIDS' project entitled "2009 Determinants of R&D Investments in the Philippines: Implications for Policy Study" assure all respondents of the surveyed questionnaires that the confidentiality of their responses to all information requests will be maintained by the project staffs (Kathrina Gonzales, Leilani Bolong, Danica Ortiz and Mari-len Macasaquit), and that no information obtained in the course of this survey may be disclosed in a manner in which the surveyed firm or individual is identifiable, unless they consented to such disclosure, to anyone other than authorized staff or representatives of PIDS. All collected data e.g. electronic data shall be maintained in secure and protected data files. Any data released to the general public shall be appropriately masked such that linkages to the surveyed firms and individuals are not possible and individual identification cannot be disclosed.

We hereby affirm that we have carefully read this statement and fully understand the statement as well as the laws and regulations that pertain to the confidential nature of all records to be handled in regard to this project. As employees of PIDS and part of this project, we understand that we are prohibited from disclosing any confidential information to anyone other than our co-project members.

Kathrina Gonzales
Signature over Printed Name

Leilani Bolong
Signature over Printed Name

SUBSCRIBED AND SWORN TO BEFORE me this ____ day of _____ 2009, Affiant exhibiting to me their Community Tax Certificate Nos. _____, _____ issued on _____, _____at _____, _____.

NOTARY PUBLIC

Doc. No._____
Page No._____
Book No._____
Series of 2009

2009 PIDS/DOST R&D Study: Interview Guide

Respondent No. /__/__/__/

A. Current Profile of Operations in the Philippines

1. Year and Place First Started Operation

   When and where did this company first started operation in the Philippines?

   Year: Province:

2. What is the capital structure of the company?

   1 ☐ 100% Filipino-owned 2 ☐ 100% Foreign-owned 3 ☐ Joint venture

3. If 2 or 3, what is the nationality of the major investor? _____

4. Classification of the interviewee firm

   1 ☐ R&D Company 2 ☐ MNC with R&D unit 3 ☐ MNC without R&D unit

   4 ☐ Local company with R&D 5 ☐ Local company without R&D

5. Company size: (no of employees) _____

6. What is the main business activity of this company/product?

01 ☐ Manufacturing	06 ☐ Wholesale trade	10 ☐ Telecommunications
02 ☐ Utilities (electricity, gas, water supply)	07 ☐ Retail trade	11 ☐ Banking and finance
	08 ☐ Hotels &restaurants	12 ☐ Insurance
03 ☐ Construction	09 ☐ Transportation	13 ☐ Others,*specify:*
04 ☐ R&D		
05 ☐ Consulting		

7. What is the status of the business at your present location?

01 ☐ Sole premises of the business	03 ☐ Branch operation of a larger business
02 ☐ Headquarter of a multiple branch	04 ☐ Others, *specify*:_____

B. Factors that influenced the decision of this company to establish operations in the Philippines

8. At the time this company first started operation, how important were each of the following factors in its decision to locate its operations in the Philippines:

Possible factors influencing the decision of the company to locate its operations in the Philippines	Not at all important	Not very important	Not sure	Somewhat important	Very important
01 Investment incentives including tax incentives	1	2	3	4	5
02 Liberal trade policy	1	2	3	4	5
03 Customs procedures	1	2	3	4	5
04 Local content requirements, rules of origin	1	2	3	4	5
05 Physical Infrastructure (roads, highways, ports, airports, etc)	1	2	3	4	5
06 Infrastructure (telecommunications, IT)	1	2	3	4	5
07 Infrastructure (electricity, water supply, other utilities)	1	2	3	4	5
08 Government Institutional infrastructure	1	2	3	4	5
09 Financial structure/banking system	1	2	3	4	5
10 Legal System	1	2	3	4	5
11 Protection of intellectual property rights	1	2	3	4	5
12 Size of local markets	1	2	3	4	5
13 Access to export markets	1	2	3	4	5
14 Proximity to supplier/subcontractors	1	2	3	4	5
15 request by large/related company	1	2	3	4	5
16 Availability of low cost labor	1	2	3	4	5
17 Availability of skilled labor and professionals	1	2	3	4	5
18 Presence of other companies from the same	1	2	3	4	5
country as this company (synergy)	1	2	3	4	5
19 Access to high value technology and information	1	2	3	4	5
20 standard of living	1	2	3	4	5
21 Property/Land cost	1	2	3	4	5
22 Others, specify: _____					

C. Research and Development (R&D) Capabilities of this Firm

Research and development (R&D) refers to the efforts of the establishment to enhance existing and/or develop new ways of manufacturing/production methods and processes to increase productivity.

9. Does this establishment carry out R&D in the country? 1 ☐ Yes 2 ☐ No ***(go to 9.7,D,E,G except G14)***

9.1 Do you conduct R&D in other country? 1 ☐ Yes 2 ☐ No

If yes, specify _____

9.2. What kind of R&D activities is carried out by this establishment?

1 ☐ Basic research
2 ☐ Applied research
3 ☐ Both basic and applied research

9.3. When did this establishment start R&D activity?

1 ☐ Before 1970
2 ☐ 1970s
3 ☐ 1980s
4 ☐ 1990-1994
5 ☐ 1995-1999
6 ☐ 2000-2004
7 ☐ 2005 to present

9.4. Does this establishment have an R&D department?

1 ☐ Yes
2 ☐ No

9.5. How many employees (persons) are engaged in R&D activities?

1 ☐ 0
2 ☐ 1-5
3 ☐ 6-10
4 ☐ 11-15
5 ☐ 16-20
6 ☐ 21-25
7 ☐ 26-50
8 ☐ 51-75
9 ☐ 76-100
10 ☐ 101 and above

9.6. Percentage of R&D Expenditures to Total Sales = (R&D Expenditures/Total Sales) X 100

1 ☐ no expenditure
2 ☐ 0.01-0.50%
3 ☐ 0.51-1.0%
4 ☐ 1.01-1.5%
5 ☐ 1.51-2.0%
6 ☐ 2.01-2.5%
7 ☐ 2.51-3.0%
8 ☐ 3.01-4.0%
9 ☐ 4.01-5.0%
10 ☐ 5.01% and above

What is your reason of not running R&D/innovation activities in the country? (in the first column, select all of the reasons that apply; in the second column, select the **main** purpose)

	Tick **all** that apply	Tick **main** reason (select **one** only)
Lack of improve existing products/services	☐	☐
Lack of existing products/services to meet market demands	☐	☐
Lack of new products/services	☐	☐
Lack of good quality of education	☐	☐
High production costs	☐	☐
High cost of labor	☐	☐
Lack of skilled labor and professional	☐	☐
Unavailability of government grants/loans	☐	☐
Inadequate size of domestic market	☐	☐
Other – please state _____		

D. Factors that influence company/firm to establish R&D operations in the Philippines

10. How important do you think are the following factors in your decision to locate your R&D operations/conduct R&D in the Philippines?

Possible factors influencing the decision of the company	Not at all important	Not very important	Not sure	Somewhat important	Very important
Push Factors					
01 Shortage of appropriate skills in own country	1	2	3	4	5
02 Rising costs of R&D in own country	1	2	3	4	5
03 Complexity of R&D activities	1	2	3	4	5
04 Competitive pressure	1	2	3	4	5
Pull Factors					
05 Size of market in RP	1	2	3	4	5
06 Availability of talented skills at low cost	1	2	3	4	5
07 Role as global production base in the industry	1	2	3	4	5
08 Reputable universities and research institutions	1	2	3	4	5
09 Active industry association providing R&D support	1	2	3	4	5
Policy Factors					
10 Good quality of education	1	2	3	4	5
11 Strong national innovation system	1	2	3	4	5
12 Incentives for R&D activities	1	2	3	4	5
13 Investment promotion programs	1	2	3	4	5
14 Intellectual property rights are protected	1	2	3	4	5
Enabling Factors					
15 Advances in ICT	1	2	3	4	5
16 Availability of R&D support services	1	2	3	4	5
17 Political Stability	1	2	3	4	5

18 Legal system	1	2	3	4	5
19 Good physical and communication infrastructure	1	2	3	4	5
20 Local firms are known to form strategic alliances	1	2	3	4	5
R&D alliances with MNCs					
21 Presence of science/technology parks	1	2	3	4	5
22 Others, specify: _____					

E. Philippines as a location for R&D activity

11. Please indicate how you would rate **Philippines** as a location for R & D activity in relation to the following:

	Very Good	Good	Fair	Poor	Very Poor
Communication electronic links	1	2	3	4	5
Presence of other companies from the same country	1	2	3	4	5
Availability of low cost labor	1	2	3	4	5
Availability of skilled labor and professional	1	2	3	4	5
Availability of government grants/loans	1	2	3	4	5
Availability of other government support/advice	1	2	3	4	5
Other (please state)					
_____					
Overall assessment of Philippines as a location for R&D/innovation activities	1	2	3	4	5

F. Innovations undertaken in the last three (3) years and in the next three (3) years

12. In the last three years, that is, from 2007 to present, what innovations had this company undertaken?

	Type of Innovations	Last 3 years (1)	
1	Introduction of new products and services	1 Yes	2 No
2	Adoption of new method of production	1 Yes	2 No
3	Opening of a new market	1 Yes	2 No
4	Acquisition of a new source of supply of raw materials and supplies	1 Yes	2 No
5	Outsourcing a major production activity that was previously conducted in-house	1 Yes	2 No
6	In-house major production activity that was previously or currently outsourced	1 Yes	2 No

7	Upgrading of machineries and equipment	1 Yes	2 No
8	Marketing of products and services/ purchase of materials and supplies thru internet	1 Yes	2 No
9	Others, *specify:*	1 Yes	2 No

12.1. If "**1**"(Yes) is encircled in any of the type of innovations in column (1) or column (2) above, what is/are the company's source/s of new technologies or information?

Source of New Technology

1	Technology transfer from multinational companies	1 Yes	2 No
2	Technical assistance from foreign agencies (including Other Domestic Agencies)	1 Yes	2 No
3	Technical cooperation with (or assistance from) foreign university or R&D institutes	1 Yes	2 No
4	Technical cooperation with (or assistance from) local government	1 Yes	2 No
5	Technical cooperation with (or assistance from) local business organization	1 Yes	2 No
6	Technical cooperation with (or assistance from) local university or R&D institutes	1 Yes	2 No
7	Technology transfer from or cooperation with local companies	1 Yes	2 No
8	Developed by own company	1 Yes	2 No
9	Joint Venture	1 Yes	2 No
10	Others, *specify:*	1 Yes	2 No

G: OBSTACLES AND INCENTIVES/MOTIVATIONS TO INNOVATION AND BUSINESS UPGRADING

13. How serious do you think are the following obstacles for obtaining information and new technologies?

Obstacles for obtaining information and new technology	Very serious	Somewhat serious	Not sure	Not very serious	Not serious
01 No R&D supporting industry such as consulting, financing	5	4	3	2	1
02 Price of R&D support services is high	5	4	3	2	1
03 No university or public institute in the neighborhood	5	4	3	2	1
04 Technological capabilities of universities or public institutes located	5	4	3	2	1

in the neighborhood too weak to collaborate					
05 No business organization or chamber of commerce which can provide training courses, seminar or testing facilities in the neighborhood	5	4	3	2	1
06 Protection of intellectual property right (IPR) not sufficient	5	4	3	2	1
07 High tariffs on equipment and materials necessary for innovation	5	4	3	2	1
08 No tax break or accelerated depreciation system	5	4	3	2	1
09 Establishment not familiar with public support programs and procedures to apply for support measures	5	4	3	2	1
10 Public support programs are not designed appropriately for innovation	5	4	3	2	1
11 Labor mobility is too rigid for workers to bring with them technologies acquired from previous employer or from previous training	5	4	3	2	1
12 Technical skills of engineers, researchers and other appropriate manpower are weak	5	4	3	2	1

13.1 From those items marked 5 and 4 in Q13. Indicate the three most serious obstacles.

1. Most serious obstacle

2. Second serious obstacle

3. Third serious obstacle

14. In the last three years, has your business received any of the following forms of government support in relation to the R&D activities of your business? (Please tick all that apply)

	Yes	No	Don't Know
Tax incentives	☐	☐	☐
Grants	☐	☐	☐
Loans	☐	☐	☐
Information about new business opportunity	☐	☐	☐
Advisory services	☐	☐	☐
Assistance in networking with other organizations	☐	☐	☐
Encourage links with universities/Higher Education	☐	☐	☐
Training courses	☐	☐	☐
Other, specify _____			

15. What do you consider to be the most effective means by which the government and its agencies can support companies in undertaking R&D activities?

	Highly Effective	Moderately Effective	Limited Effectiveness	Not at all Effective
Tax incentives	☐	☐	☐	☐
Grants	☐	☐	☐	☐
Loans	☐	☐	☐	☐
Information about new business opportunity	☐	☐	☐	☐
Advisory services	☐	☐	☐	☐
Assistance in networking with other organizations	☐	☐	☐	☐
Encourage links with universities/Higher Education	☐	☐	☐	☐
Training courses	☐	☐	☐	☐

Other, specify _____

Guide questions for Pharmaceutical &Healthcare Association of the Philippines (PHAP)

Name of Interviewee: Eufe M. Tantia, Assistant VP Please provide a brief description of the primary functions of PHAP.

What types of firms become members of PHAP? How many members does PHAP now have?

Do all these members manufacture pharmaceutical products? How many of them are purely R&D companies catering to needs of pharmaceutical industry?

How many member companies are MNCs or affiliates of MNCs? Are there pharma R&D companies that are MNCs or affiliates of MNCs?

Do the member-manufacturing companies have their own R&D units?

Do you think it is necessary for a pharmaceutical company to have an R&D unit? Why?

Do you think it the environment in the country is conducive for R&D activities? What do you think are the factors that made these firms conduct R&D in the country/these R&D companies decide to locate in the country?

What do you think are the linkages that these firms have in relation to their R&D activities? Is there an industry association-government tie ups or even at the firm level?

What types of services or assistance does the PHAP offer its members in relation to R&D activities?

B. Does PHAP undertake R&D activities itself?

If yes, please answer yes or no to the following questions concerning the R&D facilities in your association

_____ the primary purpose is to conduct research and development into new processes and products

_____ it is under close supervision of technically trained personnel.

_____ it is not engaged in the manufacture of products for commercial sale

If any, how has the association's R&D agenda changed over time and why?

What proportion of the association's research activity is directed towards the needs of the local, regional, and national economy and society?

How do your member organizations influence your research priorities?

Does your association collaborate with other association/firms in planning and conducting its R&D engagement? With which other associations and how does it collaborate?

How successful is the association's R&D work? What are, or have been, its most effective R&D activities?

Guide question for Chemical Industries Association of the Philippines

Name of Interviewee: Roberto Batungbacal , President

A. Please provide a brief description of the primary functions of **Chemical Industries Association of the Philippines**

What types of firms become members of **Chemical Industries Association of the Philippines**?

How many members does **Chemical Industries Association of the Philippines** now have?

Do all these members manufacture chemical products?

How many of them are purely R&D companies catering to needs of chemical industry?

How many member companies are MNCs or affiliates of MNCs?

Are there chemical R&D companies that are MNCs or affiliates of MNCs?

Do the member-manufacturing companies have their own R&D units?

Do you think it is necessary for a chemical company to have an R&D unit? Why?

Do you think it the environment in the country is conducive for R&D activities?

What do you think are the factors that made these firms conduct R&D in the country/these R&D companies decide to locate in the country?

What do you think are the linkages that these firms have in relation to their R&D activities?

Is there an industry association-government tie ups or even at the firm level?

What types of services or assistance does the **Chemical Industries Association of the Philippines** offer its members in relation to R&D activities?

B. Does **Chemical Industries Association of the Philippines** undertake R&D activities itself?

If yes, please answer yes or no to the following questions concerning the R&D facilities in your association

_____ the primary purpose is to conduct research and development into new processes and products

_____ it is under close supervision of technically trained personnel

_____ it is not engaged in the manufacture of products for commercial sale

If any, how has the association's R&D agenda changed over time and why?

What proportion of the association's research activity is directed towards the needs of the local, regional, and national economy and society?

How do your member organizations influence your research priorities?

Does your association collaborate with other association/firms in planning and conducting its R&D engagement? With which other associations and how does it collaborate?

How successful is the association's R&D work? What are, or have been, its most effective R&D activities?

Appendix 2: The Philippine Investment Priorities Plan

Every year, the Investment Priorities Plan (IPP) presents a list of investment areas entitled to incentives. The 2009 Plan was formulated to mitigate the effects of the global economic slowdown, the following priority investment areas: agriculture/agribusiness and fisheries (including biotechnological products and services); infrastructure; engineered products; tourism; business process outsourcing; **research and development**; and, creative industries. Also covered are “strategic activities,” projects with a minimum investment of US $300 million that create at least 1,000 jobs or use advanced technology.

Screening for the legitimacy and regulatory compliance of companies seeking investment incentives appears to be nondiscriminatory, but the application process can be complicated since incentives granted by the BOI often depend on action by other agencies, such as the Department of Finance and the Bureau of Customs. The basic incentives offered to BOI-registered companies include:

- Income tax holiday: new projects with "pioneer" status receive a six-year income tax holiday, with the possibility of an extension to eight years. New projects with non-pioneer status receive a four-year holiday with a possible extension to six years. New or expansion projects in less-developed areas, regardless of status, receive a six-year income tax holiday. Expansion and modernization projects receive three years, limited to incremental sales revenue/volume. Enterprises located in less-developed areas may secure a bonus year if: the ratio of total imported and domestic capital equipment to number of workers for the project does not exceed $10,000 per worker; the net foreign exchange savings or earnings amount to at least $500,000 annually for the first three years of operation; or indigenous raw materials used are at least 50 percent of the total cost of raw materials for the years prior to the extension unless the BOI prescribes a higher percentage:
- For the first five years after registration, an additional deduction from taxable income equivalent to 50 percent of the wages of additional direct-hire workers, provided the enterprise meets a prescribed capital equipment-to-labor ratio set by the BOI. Firms that benefit from this incentive cannot simultaneously claim an income tax holiday;
- Additional deduction from taxable income for necessary and major infrastructure works for companies located in areas with deficient infrastructure, public utilities, and other facilities. A company may deduct from its taxable income an amount equivalent to expenses incurred in the development of necessary and major infrastructure works. This deduction is not applicable for mining and forestry-related projects;
- Tax and duty exemption on imported breeding stocks and genetic materials and/or tax credits on local purchases thereof, for purchases made within ten years from a company's registration with the BOI or from the start of its commercial operation;
- Exemption from wharf dues and any export tax, duty, impost, or fees on non-traditional export products made within ten years of a company's registration with the BOI;
- Tax and duty exemption on importation of required supplies/spare parts for consigned equipment by a registered enterprise with a bonded manufacturing warehouse;
- Importation of consigned equipment for ten years from date of registration with the BOI, subject to posting a re-export bond;
- Enterprises may employ foreign nationals in supervisory, technical, or advisory positions for a period not exceeding five years from registration (extendible for limited periods at the discretion of the BOI) under simplified visa requirements. The positions of president, general manager, and treasurer of foreign-owned registered enterprises are

not subject to this limitation. GRP regulations require the training of Filipino understudies for the positions held by foreigners;
- Simplification of customs procedures for the importation of equipment, spare parts, raw materials and supplies and exports of processed products;
- Access to a bonded manufacturing / trading warehouse subject to customs regulations.

To encourage the regional dispersal of industries, BOI-registered enterprises that locate in less- developed areas, and the thirty poorest provinces determined under the Investment Priorities Plan, are automatically entitled to pioneer incentives. Such enterprises can deduct from taxable income an amount equivalent to 100 percent of infrastructure outlays. They may also deduct 100 percent of incremental labor expenses for the first five years from registration, which is double the rate allowed for BOI-registered projects not located in less-developed areas.

Research and Development

This covers commercial and in-house R & D activities, establishment of Centers of Excellence (COE), innovation and skills development training institutions.

a. Commercial/Contract R & D
This covers R & D activities done for external clients. This also covers the establishment of bio-availability and bio-equivalence test laboratory for commercial purposes.
All applications for registration must be endorsed by the Department of Science and Technology (DOST) or appropriate government authority.

b. In-House R & D
This covers R & D activities for in-house use. This also covers R & D activities whose products are subsequently manufactured using the output of the R & D activities. These products, provided listed in the IPP, are qualified for registration.

c. Center of Excellence (COE) shall serve as venue for at least two (2) of the following activities:

(1) Innovation and skills development through the provision of training facilities and programs
The COE shall offer continuing education for purposes of acquiring new skills and/or providing advanced training in the area of excellence it is in. This may involve the establishment of specialized schools, finishing schools and schools offering bridging courses/programs. Only the courses/trainings/programs catering to the activities or created in support of the activities listed in the IPP, except those identified to be not applicable to COE, may qualify for registration and may be granted incentives.

The course offered by COE shall be accredited either by Commission on Higher Education (CHED) (for academic institutions) or by Technical Education and Skills Development Authority (TESDA) or other appropriate accrediting bodies (for occupational skills).

(2) Research and development and other productivity enhancement activities

(3) Technology scanning, selection and adoption

(4) Incubation program

(5) Common service facilities

d. Training/Learning Institutions cover those key employment generators (KEGs) identified by the Department of Labor and Employment (DOLE) and those specializing in developing skills for the manufacturing, agriculture/agribusiness, fishery, mining, tourism, infrastructure, creative industries, and service (including the training of maintenance personnel, seafarers complying with international standards and the development of environmental/sustainable disciplines – i.e., pollution control officers/managers, environmental management auditors) sectors.

The following are the requirements for registration:

The curriculum must be endorsed by the appropriate industry association and approved by either the TESDA for training courses or CHED for degree courses or other appropriate government agencies

The registered education/training/ learning institutions must provide training laboratories and equipment, if applicable

Source: Bureau of Economic, Energy and Business Affairs. "2010 Investment Climate Statement – The Philippines." March 2010. April 12, 2010. (http://www.state.gov/e/eeb/rls/othr/ics/2010/138129.htm).