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COUNTRY CASE STUDY SUBMITTED BY PHILIPPINES*

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* The attached country case study is circulated in the language and form in which it was received.

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TECHNOLOGICAL CAPABILITY UPGRADING: PHILIPPINE CASE STUDY

Dr. William G. Padolina
Department of Science and Technology
Bicutan, Tagig, Metro Manila
Philippines

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1.0 INTRODUCTION

1.1 Economic Growth and Sectoral Performance

Sometimes referred to as the sick man of Asia, the Philippine economy failed to break the "low growth" scenario that has characterized its performance since the turn of the decade. Yet President Fidel V. Ramos launched the Medium Term Philippine Development Plan (MTPDP) early this year to map the road for the transformation of the country to a NIC status by the turn of the century.

The optimism from his own words came because ... "for the first time in nearly a generation, there is a consensus for development in the country...". Indeed, while initial projections for GNP growth was reduced from a high range of 3.5% to 4.5% to only a low 3.5%, this is still a significant increase from the 0.6% actual GNP growth rate reported last year.

Gross domestic production (GDP) declined by 0.4% during the first semester of 1992 but this was still a lot better than the 1.2% contraction during the same period in 1991 (Annex 1). The picture is expected to improve further as structural reforms are instituted in the economy and the debilitating effects of power outages reduced considerably by the end of 1993.

Investments and exports posted notable growth rates during the first semester of 1992 primarily because of the lifting of the import levy and liberalization of regulations on foreign exchange holdings. Top earners were the semi-conductors and garments sectors which accounted for over 40% of total exports. Although the currency appreciation in 1992 pulled down exports, it still grew by 10.14% over the October 1991 level.

Annex 2 shows the balance of payments up to the third quarter of 1992. External transactions yielded a total surplus of US$251 million, a reversal of the US$407 million deficit recorded for 1991.

Admittedly, there was a general slowdown in the production side of the economy brought about by the onslaught of both man-made and natural disasters in 1992. The prolonged drought and frequent breakdown of existing power plants exacerbated the power crisis. Hence, except for the service sector, almost all sectors of the economy reported declines in the rate of growth.

The continuing destruction brought about by Mt. Pinatubo and the subsequent lahar flows which continue to

plague major areas of Central Luzon further compounded the problem.

The MTPDP however, envisions people empowerment by achieving the following aggregate targets:

1. increase in real per capita income at an average annual rate of 5.4% reaching US$1,356 in constant terms by 1998;

2. decline in poverty level from 40.7% in 1991 to 30% by 1998;

3. higher investments from 22.7% of GDP in 1993 to 30.4% with these investments driven largely by the private sector;

4. average yearly GNP to increase in real terms by 7.5% over the Plan period with growth generated by increases in exports and investments.

The dream and the vision however, do not really seem to be that impossible to attain. Despite the shaky performance of the economy in 1992, an encouraging employment scenario was observed for the period. Unemployment while still in the double digit registered a decline including that of underemployment implying an increase in the number of people with full time jobs.

Gross domestic capital formation grew by 8.6% compared with the 22.4% decline in 1991. Basically energy related, investments in fixed assets increased by 11.4% during the first semester of CY 1992. The investment picture is still expected to improve towards the goals set by the MTPDP with the revision of the constitutional regulations on land ownership and implementation of RA 6975 or the Build-Operate-Transfer law.

Total population is reported to be 64.3 million as of July 1992 and expected to grow at an annual rate of 2.3% still one of the highest rates in Asia compared with only 1.7% for Indonesia and 1.4% in Thailand. The World Bank in its 1988 review of the Philippine education noted a high ratio of enrollments in the 17-20 age group and the dominance of the private sector in the system. In fact the country boasts of an over 80% literacy with a majority of the population speaking English as a second language.

2.0 Scientific and Technical Manpower Development

2.1. Educational System and S & T Manpower

The Science and Technology Master Plan (STMP) and later the Science and Technology Agenda for National Development (STAND) emphasize the critical role of a qualified pool of technical manpower in any attempt to push massive technological change. Even if the country has a relatively extensive educational system, government investment in education as a proportion of GNP remain low compared with other neighboring countries.

In 1988, government expenditures for education accounted for 2.8% of GNP. While this is still relatively higher than actual government investment on R & D which is barely 0.1 %, the low investment resulted to poor quality of S & T education and an imbalanced enrollment structure.

World Bank (1988) noted that the relative strengths of the Philippine system of higher education namely: high enrollment ratio and the predominance of the private sector are paradoxically linked to its major weakness. The system, the report claimed is geared more to quantity than to quality as individuals express willingness to pay for educational credentials but not for the costly capital inputs both human and physical.

The study summarized the main problems associated with engineering and science education in the country:

1. enrollment structure

   - proliferation of relatively low cost undergraduate engineering programs resulting in an over supply of engineering graduates;

   - disproportionately low graduate enrollments severely limiting the number of qualified faculty and researchers;

2. quality

   - failure of current engineering and science education curricula to adequately reflect the emerging needs of the country's technology development;

   - serious underinvestment in the development of faculty, laboratories, and libraries;

- poor preparation in science and math of students entering engineering and science education;

3. internal efficiency

   - inefficiency in the use of faculty and facilities, retention of students and time needed for graduation;

4. regulations, incentives, and monitoring

   - inflexibility in deciding on academic matters and lack of incentives for quality improvement;

   - inflexibility in deciding on financial matters and lack of incentives for income generation;

   - lack of consistency in monitoring and enforcement of standards.

It is sad to note that while there is a relatively large number of students taking up engineering courses at the undergraduate level, the proportion continuing to graduate work is very small.

EDCOM (1991) reported that for 1987-1988 only 3.7% of total enrollment in the graduate level are in engineering and technology compared to 19.7% in commerce and business and 30.3% in arts and sciences.

The qualifications of teachers and faculty teaching science and technology at all levels similarly leave much to be desired. A national survey of high school teachers in 1992 showed that only 8% of teachers in physics are qualified [1] to teach the course. This was even a 100% increase over the number of qualified teachers in physics in 1986. Except for Mathematics where some 71% of teachers were found to be qualified, the rest (physics, chemistry, biology and general science) showed more unqualified teachers than qualified teachers.

Recognizing the crucial role of science teachers in generating an adequate pool of S & T manpower, in-service teacher education programs have increased considerably in recent years. The Department of Education, Culture and

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[1] Qualified means teachers are majors in subjects taught; not-qualified means teachers are non-majors in subjects taught.

Sports (DECS) and DOST have pooled resources to provide more training for teachers. Fourteen (14) Regional Science Teaching Centers have been established offering both summer and regular semester proficiency programs for teachers who are non-majors in science and mathematics.

In addition, DOST with support from the World Bank launched the Engineering and Science Education Program to:

1. Improve the institutional mechanisms and criteria for funding and monitoring the quality of engineering and science education;

2. Strengthen engineering and science education in priority fields at selected institutions by:

   - adjusting the enrollment structure to respond to the S & T manpower needs;

   - improving the curricula via expansion of the university-industry linkages, strengthening of environmental education and introduction of technology management programs;

   - upgrading educational quality through improvements in faculty, laboratories and libraries; and

   - strengthening financial and resource management by improving institutional capacities for income generation, resource utilization, and laboratory operation and maintenance;

3. Improve science and math education at selected secondary schools and the capacity of selected teacher training institutions to provide in-service teacher training;

4. Strengthen DOST's capacity in planning and coordinating S & T manpower development programs.

2.2. Technical and Vocational Education

Positive developments in the area of vocational and technical education indicate prospects for strengthening the country's foundation for craftsmen and technicians. Although there has been a traditional preference for white collar over blue collar jobs, legislative support may ultimately erase the stigma associated with vocational education.

Dualtech, one of the private technical training centers in the country adopted the Dual Training System which combines two venues of training: the school and the company. This directly addresses the common problem of mismatch between training received in schools and the needs of industry. Under the Dual System, implementation and monitoring of in-plant and in-school training are simultaneously undertaken. Following a 70-30 practice theory, students attend two days in-school training and four days in-plant training. At its best, the school provides the theory which are then applied and implemented in the company during the actual work process.

The National Manpower and Youth Council (NMYC) established in March 1969 on the other hand is dedicated to provide opportunities for skills development among industrial workers. Mandated to engage in planning for labor force development, NMYC provides development training services in both urban and rural areas.

NMYC offers three courses:

1. Basic skills training - involves the development of fundamental work attitudes, knowledge and skills, and behavior patterns according to specified standards;

2. Skills upgrading - which provides activities aimed at enhancing acquired skills to improve the versatility and occupational mobility of a worker or improve his performance standard to meet the next higher level of job classification; and

3. Supervisory training program which aims to develop middle level manpower and trainors.

In 1990 NMYC graduated 211,766 trainees. The trade testing and skills certification services on the other hand, benefited 51,044 workers and graduates of regional training programs. To effectively support the country's bid for a NIC status, NMYC has refocused itself along three basic roles: as overall manager of skills development, lead agency in the delivery of skills training services directly related to industrial activities and as catalyst in the development of skills training capabilities of industry through the provision of incentives and devolution of basic training services.

With its Training for Rural Enterprise Development (TREND) and Training for Rural Gainful Activities (TRUGA), a continuing focus on the countryside is ensured. Generally, the TREND programs have the following target clientele:

1. out of school youth

2. unemployed and underemployed

3. NMYC skills training graduates and

4. clients of the Department of Labor and Employment's Integrated Livelihood Program

2.3. High level Manpower Development and Incentives Program

In 1992, ESEP awarded a total of 403 graduate scholarship grants. Of these, 54 pursued Ph.D while 300 pursued MS degree. Some 292 scholars availed of the Certificate/Diploma Program at the undergraduate level.

In addition to ESEP, DOST supported 63 new MS and PhD scholars in addition to the 200 ongoing scholars. The Faculty and Institutional Development Program of the Science Education Institute (SEI), a service Institute of DOST provided support to 26 MS and 27 Ph.D students.

Financial assistance in terms of science equipment/kit were given to 68 secondary and grade schools to enhance the science learning process. Sixty elementary teachers were also trained on the trends in teaching elementary science and mathematics in 1992.

Similarly, DOST through the Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD) and the Philippine Council for Aquatic and Marine Research and Development (PCAMRD) provided graduate and non-degree trainings in agriculture, aquaculture and marine fisheries.

To attract and retain experts in the science career, DOST is also implementing the Scientific Career System which offers scientists similar if not higher salaries without necessarily aiming for administrative positions and simply maintaining active participation in R & D activities. The President has also signed recently the "Balik" Scientist Program providing incentives to Filipino expatriates to attract them to return to the country to join the R & D workforce.

Various forms of awards either or both in cash and honorary recognition are also provided to scientists young and old alike to establish a culture and identify role models for future scientists

Although most of the funds for S & T manpower training still come from the government sector, the Department has been successful in slowly attracting the private sector to support manpower training through scholarship grants.

Several S & T Foundations have provided financial support for both degree and non-degree programs in 1992. Funding from foreign sources likewise continue to be a major source of money to support further training of scientists both here and abroad. This broad base of international linkages has in fact resulted to a number of collaborative undertakings which even include infrastructure development.

3.0 S & T Capability

3.1. R & D Infrastructure

Early on the Department recognized that the bottomline for increased productivity is a well-coordinated and systematic S & T infrastructure, skilled and highly trained manpower and a responsive science culture. With the urgency of transforming the Philippines to a NIC by the turn of the century, the Department has taken it upon itself to orchestrate S & T development in the country.

Executive Order No. 128 passed in 1987 expanded the functions and responsibilities of DOST to enable it to effectively pursue the declared policy of supporting local scientific and technological efforts, developing local capability to achieve technological self reliance, and promoting public and private sector participation in S & T activities.

The Science and Technology Master Plan (STMP) developed by DOST in consultation with the private and public sectors laid out specific strategies, policy options, and implementing programs responsive to the times. With its three-pronged strategies of:

1. modernizing the production sectors through technology transfer and commercialization;

2. upgrading R & D capabilities;

3. developing S & T infrastructure, manpower resources, and science culture

the STMP led to the formulation of the Science and Technology Agenda for National Development (STAND) Philippines 2000.

In its attempt to modernize the production sectors, DOST with its various agencies established scientific and technical service centers all over the country. Services provided include: tests and standards, quality control, design and fabrication of equipment, chemical and physical

analysis, pilot testing, library services, publication and in-service trainings.

At present, DOST through the Industrial Research Foundation is finalizing arrangements to enable us access to INTERNET. Each of the councils [2] and institutes [3] have in one way or another started establishing their own information system.

In collaboration with the DOST Regional Offices, the Industrial Technology Development Institute similarly established calibration and testing Centers in selected parts of the country.

With a P150 million grant from the Japan International Cooperation Agency (JICA), the Agri-Industrial Chemical R & D Center was established in 1990. The Center aims to develop technologies for coco chemical products for food and industrial uses among others. With another grant from the Australian International Development Assistance Bureau (AIDAB), the Remote Sensing Project established archiving, processing and applications center and a satellite reception and processing facility.

Technology Information Service Centers are now being piloted in 4 regions of the country to provide packages of technology based information to existing and potential investors. Seismographs and flow sensors for lahar have also been installed primarily as part of the disaster mitigation program of the Department.

Two Science Parks and five Technology Business Incubators are also at various stages of development in various parts of the country to fast track technology transfer and commercialization. Several Commodity based R & D centers are also existing handling specific R & D activities in each respective commodity [4].

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[2] DOST has five sectoral Councils: Philippine Council for Health Research and Development (PCHRD), Philippine Council for Industry and Energy Research and Development (PCIERD), Philippine Council for Advanced Science and Technology Research and Development (PCASTRD), PCAMRD and PCARRD.

[3] DOST consists of 5 sectoral councils, 7 research and development institutes, 6 service institutes, 2 advisory bodies, 13 regional offices and 73 provincial science and technology centers.

[4] For example the Carabao Center for the R & D requirements of the carabao, the Philippine Rice Research Institute (PhilRice) for rice among others.

As mentioned earlier some of the Councils established their respective R & D Consortia to provide central direction and coordination of regional R & D activities and complement human and physical manpower available in the region. There are also in addition to this 9 industry related networks and institutions. DOST likewise accredited 29 S & T oriented Foundations in 1992 bringing the total to 97 since the program was launched.

These institutions and the corresponding relationships and synergism arising from these relationships may at the outset seem enough to address the needs of a dynamic S & T community. Unfortunately, much is yet to be desired in terms of the scope, quality and nature of services which these various institutions and Centers could provide. There is in fact some moves within the Department to privatize some of the R & D Institutes and upgrade the quality of services offered by the others.

3.2. R & D Investments

Government investments in R & D in the country remain very low. Barely 0.1% of GNP, average government investment is still way below the recommended rate. Figure 1 compares R & D expenditures of selected countries. Ironically, while returns to research investments have always been traditionally recorded to be high, appreciation of the impact of R & D has yet to be translated to actual increases in government appropriations.

The MTPDP attempts to correct the obvious neglect of the S & T sector by planning for a progressively increasing proportion of GNP being allocated to R & D. However, for CY 1994, funding allocation for DOST is only P2.84 billion perhaps one of the lowest if not the lowest among the various departments.

Annex 3 shows the total expenditures of the DOST system by function. Funding for R & D remains high but there is a massive increase in funds allocated for scientific and technological services as well as technology delivery. This came about as emphasis was placed on transferring and eventually commercializing R & D results in the country.

Unfortunately, investments in R & D from the private sector also remains very low. Despite budget constraints, government funded R & D still account for over 77% of total investment (Annex 4).

Several strategies were identified to encourage private sector investment in R & D. In addition to the R & D incentives program developed with the cooperation of the

Board of Investments, Department of Trade and Industry, DOST entered into several agreements with commercial financing institutions to provide private sector adequate access to financial assistance for R & D activities.

Contract research has also proven to be an attractive way of encouraging private sector participation. For 1992, 19 contract research projects were conducted by the DOST system. To further boost this program industry linkages were made to identify specific industry technological requirements which could be addressed by the research community. The demand driven type of technology identification and priority setting in fact set the pace for the private sector led, export oriented focus of STAND.

The Technology Investment Plan which is currently being finalized by DOST could further strengthen the focusing identified as crucial in a responsive technology development activity.

Understandably, with limited funding given to education and R & D, the Philippines lagged behind other countries in terms of trained R & D manpower. In 1984, the country has 90 R & D manpower for ever million population. This is a far cry from Singapore's 949, US' 3,111 and Japan's 4,436.

Annex 5 shows the distribution of R & D personnel by sector. Majority are still connected with government agencies with private industry barely accounting for 11% of the total.

4.0 POLICY ENVIRONMENT FOR TECHNOLOGY CAPABILITY UPGRADING

4.1. S & T Policy Directions

The Science and Technology Agenda for national Development or STAND Philippines 2000 spells out the areas which will be the focus of scientific and technological efforts within the next six years. STAND emphasizes the development and utilization of superior technologies to a level of competitive advantage. STAND is therefore, market oriented, private sector led, short to medium term action plan envisioned to pave the way for a NIC status by the turn of the century.

In the very short run, DOST will attempt to:

1. forge more active partnerships in technology development and utilization to encourage both the

public and private sectors involved to increase productivity and quality of products;

2. pursue more active partnerships in defining directions and priorities through active consultation and cooperation between the private and public sectors;

3. adopt a strong client orientation in research and development to increase the country's exports, accelerate countryside development, and promote sustainable development;

4. increase private sector participation in S & T activities by formulating appropriate laws and administrative policies which will encourage private sector investments in R & D;

5. aggressively acquire and adapt technology from domestic and foreign sources through adequate incentives and appropriate mechanisms;

6. upgrade S & T services and facilities to ensure that local products meet required standards in the world market;

7. develop and upgrade S & T manpower to increase the quality and quantity of scientists and at the same time encourage private sector investment in human resource development;

8. strengthen international linkages to expand scientific and technical cooperation and assistance programs;

9. promote a science and technology culture to increase awareness and appreciation of their usefulness especially among the youth;

10. improve the welfare of researchers, scientists, and technologists through an improved work environment, additional incentives, and appropriate rewards.

Given this scenario, DOST has embarked on a pro-active policy advocacy aimed primarily at bringing legal support to S & T activities. R. A. 7042 or the Foreign Investments Act of 1991 which allows foreign investors with paid-in equity of less than US$500,000 to invest in the country as long as the area of investment is considered advanced technology by DOST.

R. A. 7459 otherwise known as the Inventors Incentive Act of the Philippines was also passed in 1992 providing

incentives to inventors who have commercialized their invention. The purpose is to give inventors access to low interest financing through the Inventors Financing Fund established by the law.

Several other bills are pending both at the lower and upper houses seeking additional incentives and programs to promote S & T in the country.

Strictly speaking however, the various technology related issues confronting the private sector may be summarized into:

1. **need to modernize facilities** - technological obsolescence has perpetually constrained the competitiveness of the private sector. Industries are required to modernize their production facilities if they are to compete effectively in the world market. There is however, a prevailing wait and see attitude even among major exporters.

When the Manufacturing Productivity Extension Program for Export Modernization (MPEX) was launched by DOST through the Technology Application and Promotion Institute, there has been a lot of difficulty convincing exporters to accept the productivity consultancy services being offered even for free.

With significant improvements in productivity after the consultancy, word has spread around and more companies have started opening up. However, the cynicism and doubts remain especially during the early part of the consultancy exposure. What was glaring in the results of the studies however, is the need for major technological improvements even in companies which have been considered as pioneers in the area. At present, MPEX has become a major avenue for transferring technology and encouraging private sector investment in technology upgrading. Funding for such upgrading however, still needs to be supported by government at least at the early stage.

2. **Access to technology financing** - To enable companies to upgrade facilities at the level required and acquire superior technologies, an appropriate and responsive financing mechanism must be in place. For some MPEX beneficiaries, DOST's linkages with commercial financing institutions including TAPI's venture funds are enough. For smaller companies with tied up cash allowances however, regular banking requirements such as equity and collateral could not be met. This becomes a major stumbling block in efforts to improve the technological capability of the company.

3. **Need for local technology development efforts** - considering limited government funding available it is

imperative that private sector funding for R & D is increased. Priorities will naturally have to address general concerns and may not be able to focus on a particular firm or even industry problem in some cases.

4. **Development of technological manpower** - at the final reckoning no amount of infrastructure development will be effective if there are no trained manpower available to take advantage of these facilities for technology development.

4.2. Industrial Policy Environment

Prognosis for Philippine economy shows that there is light at the end of the tunnel. Determining how to get there, while opening the door to skepticism and debates must still be assessed and grasped. For the country, becoming a newly industrialized country by the year 2000 or so is no longer a dream. It has become a matter of survival. Definitely, for the Philippines to attain a tiger like performance a number of policy reforms which deals with short run issues must be implemented.

The liberalization of regulations concerning foreign exchange transactions is a step towards strengthening the economy. Moves to liberalize investments laws to allow foreign firms to own land and engage in retail trade, relax nationality requirement, prune the foreign investment negative list and provide adequate infrastructure especially power, transport and communications can complete the scenario needed for a robust growth.

Since the 1980s, the direction of Philippine trade policy has been towards liberalization. With the ASEAN Free Trade Area (AFTA), firms in the country will be faced with a number of issues:

1. firms/producers will be faced with a highly competitive market with high quality preferences for products;

2. technological innovation and adoption will be a driving force in the restructuring of the production process, in setting and capturing market advantage, and taking advantage of across border trade;

3. however, optimization of benefits from technological change will be dependent on how the private enterprise is able to develop, assimilate, and adopt technologies in the innovative process;

The Medium Term Philippine Export Development Plan (PEDP) sets forth the basic policies on exports:

1. exports shall be a major tool to propel the country's economic survival and sustain economic development;

2. promotion of exports shall be in tandem with the promotion of direct foreign investments. Trade will assume a more active role by shifting from labor intensive to skill-intensive goods, and from high volume standardized to high value customized products; It will therefore, provide means for acquiring the latest technologies;

3. basic industries such as steel, petrochemicals, machinery and equipment shall be established to spin off a self-sufficient raw material base for export industries.

The Department of Trade and Industry (DTI) formulated what it called the World Competitiveness Program consisting of four major components:

1. more value added through processing

2. higher growth and intensified world penetration

3. distinctive designs and continuous product development

4. subcontracting from original equipment manufacturers

A very important sub-component of the production aspect is on technology assistance which emphasize:

a. developing the capability to absorb technology through refocused science and engineering education as well as R & D;

b. improving idustry access to the latest technology/technological innovations through a balik scientist program;

c. collaboration with DOST in the development of local technology that improves competitiveness of export products;

d. institutionalizing standards and measurements in the areas of quality assurance, labor productivity, and cost effectiveness.

CONCLUSIONS

Man made and natural disasters have plagued the Philippines and seriously undermined efforts for sustained development. With persistence borne out of necessity and the resurgence of trust and confidence in the new government, the country will run the last race to development at least for this century. Structural and policy reforms coupled with a strong commitment for development offer some hope.

A number of issues both within and outside our control could affect the rate of technology development, adoption and commercialization. We are confident however, that while a lot remains to be desired as far as S & T innovations are ocncerned, various programs and policies are already in place to help us make the big dash. With continued assistance from concerned international agencies and increased collaboration with other scientist/innovators from other countries, the process of identification, assessment, transfer and assimilation can be facilitated.

We look forward to the output of the Ad Hoc Working Group and rest assure we will be very pleased to collaborate at our end for the common good.

Annex 1: Selected economic indicators for the Philippines, 1989-1994.

ITEM	1989	1990	1991	1992	1993	1994
POPULATION (Mn; as of July)a/	60.1	60.7	62.1	64.3	65.6	67
EMPLOYMENT (Thousand Persons)						
Total employed	21849	22532	23180	23886	24614	25445
Unemployed	2009	1993	2029	2080	2131	2101
Unemployment Rate	8.4	8.1	8	8	8	7.6
NATIONAL ACCOUNTS (Bn Pesos; cy)						
GDP by Industrial Origin	698.4	717.3	712.5	713.3	733.1	769.3
Agriculture	160	160.7	162.2	161.9	164.2	168.8
Industry	251.6	258.1	250.2	250.4	257.6	275.3
Services	286.8	298.4	300.1	301	311.2	325.2
GDP at current market prices (Bn Pesos; cy)	925.2	1070.9	1243.9	1357.1	1516.9	1715
GNP at current mp	913.8	1073.2	1257.9	1378.5	1534.9	1722.7
Expenditure on GDP (constant mp)	698.4	717.3	712.5	713.3	733.1	769.3
Total consumption	557.4	588.8	601.1	620.6	645.5	677.1
Total investment	153.9	162.6	140.4	149.6	161.8	181.9
Exports of goods & services	217	219.7	235.6	251.7	266.6	280.5
Less: Imports of gods & services	244.6	269.1	264	305.7	336.1	366.7
Expenditure on GDP (real growth rates)	6	2.7	-0.7	0.1	2.8	4.9
Total consumption	5.1	5.6	2.1	3.2	4	4.9
Total investment	23.6	5.7	-13.7	6.5	8.2	12.4
Exports of goods & services	10.7	1.3	7.2	6.8	5.9	5.2
Less: Imports of goods & services	15.2	10	-1.9	15.8	9.9	9.1
Investment Financing (current prices)						
Gross domestic capital formation	202.1	241.3	248.6	293.2	344.8	421.2
Per Capita GDP (Pesos)						
Current prices	15393.7	17642.5	20030.1	21099.1	23123.3	25597.6
Constant 1985 prices	11620	11816	11473	11089	11175	11481
BALANCE OF PAYMENTS (US$ Mn; cy) b/						
Merchandise exports, fob	7821	8186	8840	9710	10831	12039
Merchandise imports, fob	-10419	-12206	-12051	-13807	-15641	-17669
Trade balance	-2598	-4020	-3211	-4098	-4810	-5631

a/ Intercensal estimates except for the 1980 figure which is actual census results.
b/ 1989 data are only from January to November

Source:
Yap, Josef T., The Philippines: Recent Performance, Prospects for 1993-94, and Policy and Development Issues, PIDS Working Paper Series No. 93-01.

Annex 2: Balance of Payments
As of Dates Indicated
(In Million U.S. Dollars)

ITEM	1992 3rd Qtr*	1992 2nd Qtr	1992 1st Qtr	1991 4th Qtr	1991 3rd Qtr
Merchandise Trade	-1291	-1171	-972	-976	-682
Exports	2599	2289	2261	2334	2299
Imports	3890	3460	3233	3130	2981
Non-Merchandise Trade	694	363	770	576	116
Receipts	1880	1624	1862	1678	1243
Payments	1186	1261	1092	1102	1127
Transfers	198	235	204	210	133
Receipts	206	235	204	210	134
Payments	8	0	0	0	1
Current Account, Total	-399	-573	2	-10	-413
Medium and Long Term Loans	366	-961	299	1049	519
Inflow	938	1025	812	1152	613
Outflow	572	1986	513	103	94
Foreign Investments	177	238	288	116	103
Inflow	389	318	345	138	159
Outflow	212	80	57	42	56
Short Term Capital, Net	-79	-19	359	165	-82
Errors and Omissions	204	9	-253	-765	-662
Non-Monetary Capital, Total	668	-733	693	365	-122
Monetization of Gold	25	38	46	67	68
Revaluation Adjustments	-43	636	-35	125	60
of which: Debt Reduction	3	649	32	86	42
Overall BOP Position	251	-632	706	747	-407

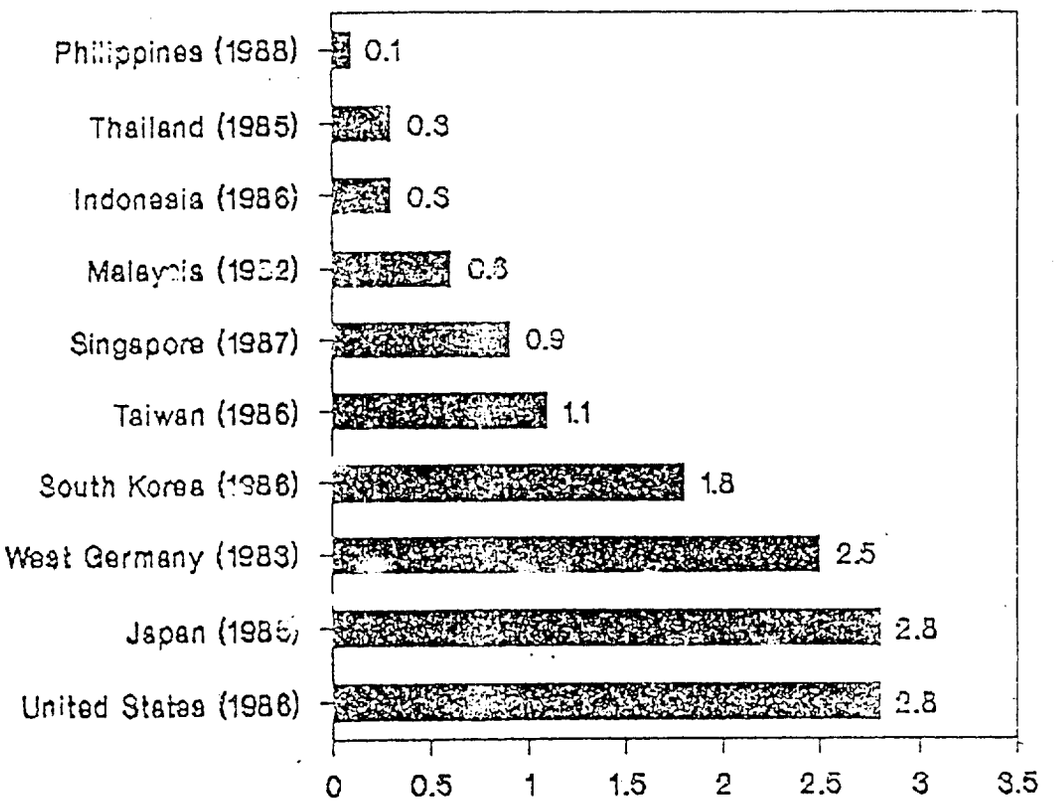
* Preliminary

Source:
Governor's Report, CB Review, November 1992

FIGURE 1

R & D Expenditures of Selected Countries

(As a Percentage of GNP)



Source: UNESCO Statistical Yearbook, 1988

Annex 3: Total Expenditures of the DOST System by Function, 1989-1991 (In Thousand Pesos)

MAJOR FUNCTION	1989	1990	1991	1992
TOTAL	585,885	696,114	853,775	1,761,541
Research and Experimental Development	144,319	164,171	178,713	246,029
Technology Delivery	24,753	27,727	38,990	115,078
Scientific and Technological Services	143,184	199,249	224,010	1,003,042
Scientific and Technical Education and Training	47,003	60,059	91,381	105,792
Development, Integration and Coordination of the National Research or S&T System	44,627	43,497	45,997	44,784
General Administration	181,999	201,411	274,684	246,816

Source: DOST Councils/Institutes/Agencies.

Annex 4: Sources of Funds for R & D Expenditures of Selected Countries (in Percent)

Country		Government Funds	Productive Enterprises Funds	Foreign and Other Funds
United States	(1986)	46.6	50.1	3.3
Japan	(1985)	21.0	78.9	-
West Germany	(1983)	37.7	59.1	3.2
South Korea	(1986)	19.0	80.9	0.1
Singapore	(1984)	49.0	43.0	8.0
Thailand	(1985)	69.6	13.8	16.6
Philippines	(1982)	76.8	14.9	8.2

Source: UNESCO Statistical Yearbook, 1988.

Annex 5: National R&D Manpower by Sector and By Category, 1979-1984

SECTOR / CATEGORY	1979	1980	1981	1982	1983	1984
ALL SECTORS	10,094	11,053	17,183	17,992	9,949	10,185
Scientists and Engineers	4,957	5,403	7,482	7,884	4,394	4,830
Technicians	2,237	2,447	3,306	3,500	1,867	1,855
Support Personnel	2,900	3,203	6,395	6,608	3,688	3,500
GOVERNMENT AGENCIES	7,371	7,793	11,048	11,631	6,449	6,678
Scientists and Engineers	4,011	4,266	4,886	5,179	2,710	2,940
Technicians	1,472	1,515	2,292	2,376	1,360	1,314
Support Personnel	1,888	2,012	3,870	4,076	2,379	2,424
PRIVATE INDUSTRY	2,723	3,260	2,368	2,416	1,244	1,148
Scientists and Engineers	946	1,137	661	731	641	645
Technicians	765	932	469	476	181	166
Support Personnel	1,012	1,191	1,238	1209	422	337
HIGHER EDUCATION	no data available		2,733	2,829	1,568	1,618
Scientists and Engineers			1,506	1,507	774	945
Technicians			416	508	166	207
Support Personnel			811	814	628	466
NON-PROFIT INSTITUTIONS	no data available		1,034	1,116	688	741
Scientists and Engineers			429	467	269	300
Technicians			129	140	160	168
Support Personnel			476	509	259	273

Source: NSTA Surveys on R&D Expenditures and Manpower, 1979-1980, 1981-1982, 1983-1984