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Strengthening Private Sector Participation in Philippine Technical and Vocational Education and Training

Specialist Report No 5:

Firms, Technological Development and HRD in the Philippines

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Section 1. Research Framework and methodology

1.1 Industrial Policies

1. The Philippines have followed an import substitution model up to the 1960s. Although export promotion was initiated in the 1970s through establishment of export processing zones under Presidential Decree no. 66 in 1972, most trade and investment policies still favoured domestic industries until the late 1980s (Orbeta Jr, 1995). Since the late 1980s, a series of trade liberalization programmes have been introduced, although there have been postponement periods as a result of current account problems.

2. The import substitution model has been seen as a major factor in the lack of growth in the Philippines (Medalla et al, 1994). The industrial policies followed were characterized by high tariff barriers and fiscal incentives which strongly protected domestic industry. Trade liberalization and restructuring of incentives have been stepped up after 1986, and the recent accession to the GATT-Uruguay round of agreements.

3. The current structural adjustment programme is defined in Executive Order 470, and runs from 1991 through 1995. The programme has reduced the maximum tariff rate to 50 percent, and reduced the number of tariff tiers to 4. Among the three major economic sectors, the largest reduction in average tariffs is in manufacturing, which declines from 20% to 14% in 1995 (a 27% drop)[1] (ILO, 1995). A recently approved E.O. (204) further reduces tariffs beyond the GATT commitments in the textile industry, in exchange for which the Philippines obtained tariff concessions from its trading partners. In industrial products, Japan, the US, and the European Union have respectively agreed to reduce tariffs by 56%, 35%, and 34% (I-LO,1995).

4. In 1991 the Foreign Investment Act granted 100 foreign ownership to export-oriented enterprises (and reduced the qualifying percent of output to 60) and to industries allowed by the Constitution and defense (with no moral or health risks, and not affecting small and medium enterprises). The foreign exchange market was liberalized in 1992 by increasing retention of export receipts by commodity up to 40%, increasing access of exporters to foreign currency deposit systems, and liberalizing non-trade foreign exchange regulations. This was followed in 1993 by removal of mandatory surrender requirements for exporters. Since 1994 foreign banks have allowed to establish branches in the country and buy into existing local banks.

5. The government has also been privatizing government-owned and controlled large corporations in several sectors, including oil, shipbuilding, and mining. It has also dismantled barriers to entry in long-protected industries such as telecommunications, transport, and cement (Orbeta Jr., 1995). Finally, the government has been privatising the costs of building infrastructural facilities for industry growth, through its programme of privately sponsored industrial estates.

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[1] In agriculture, the average tariff declined by 22%, down from 36 to 28% in 1995

1.2. Effects of the GATT-UR agreements

6. The recent GATT-UR agreements ratified by the Philippine government are expected to have a overall positive effect on output and employment (ILO, 1995)[2]. Projections indicate that the tariff changes have very little effect on sectoral output and employment. The effects under export expansion are much greater. All except two sectors register significant output increases. In the manufacturing sector, the most substantial increases are in garments (more than 590%), textile knitting (214%) and semi-conductors (114%) (ILO,1995:20).

7. Thirty-three out of 50 sub-sectors registered substantial increases in employment. In the manufacturing industry, the main growth sector was garments (> 32,000)[3]. Of the seventeen sub-sectors which registered negative employment growth, the majority suffered from factor substitution, as output did grow. These sub-sectors include a number of agricultural areas; in manufacturing, they include paper products, metal products and non-electrical machineries, and construction[4]. The major shift in manufacturing employment is from import-oriented light manufacturing towards export-oriented light manufacturing (ILO,1995).

8. Although there is displacement in some sectors, the overall employment effect is positive. The expected net increase in employment is 115,000, or about 0.5% of total employment in 1993. (These effects are annual average effects during the ten-year adjustment period) (ILO, 1995:20).

1.3 Structure of manufacturing sector

9. In 1993, the manufacturing sector consisted of 11,000 establishments[5] employing 908,686 people. Major sectors of employment are wearing apparel (PSIC 322) with 161,609 people employed in 1722 firms, manufacture of electrical machinery and appliances (PSIC 383) with 98,645 people employed in 265 firms, and food manufacturing (PSIC 312) with 93,500 people employed in 1924 firms (NSO, 1993).

10. Average size of firm by employment varies between the industry groups as follows: wearing apparel 94 people, electrical machinery and appliances 372 people, and food

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[2] A recent ILO Technical Paper discusses three types of changes and realignments that can be expected in the world economy which can affect the Philippine economy from 1995 - 2005. These are: (a) changes in the tariff structure of the economy as a result of Philippine commitments to GATT-UR; (b) the expected expansion of volume of world trade as countries adjust their respective trade protection structures: and (c) expected changes in world export and import prices as a result of the realignment of trade and non-trade barriers (ILO, 1995).

[3] Other sectors with large growth in employment include: other commercial crops(>23,000), marine fishing (9,000), transport and commercial services (>17,000) (ILO, 1995).

[4] The paper products sector employs almost 2% of manufacturing employment; the metal products slightly more than 3%, and the non-electrical machines sector 2%. This implies that less than 10% of manufacturing employment will b abe affected.

[5] Establishments with on average ten or more employees are covered by the National Statistical Office.

manufacturing 49 people. The other two sectors covered in the study are machinery manufacturing except electrical, with 19,873 people employed in firms of average size 41, and the manufacturing of transport equipment, with 23,920 people employed in firms of an average employment size of 93.

1.4. Employment trends

11. The 1993 labour force comprises almost 65% of the working age population, and totalled around 23 million people. 63% were men and 37% women in both rural and urban areas. In urban areas, however, the rate of employment was somewhat lower than in rural areas. Almost half of all employment is still found in agriculture. Slightly more than twenty percent of the labour force are employed in industry as a whole, and half of that are in manufacturing. The tertiary sector absorbs the remaining third of the employed labour force.

12. Employment trends over the past fifteen years have shown a pattern in which industrial employment has remained quite stagnant in the eighties, despite the growth of industrial production to a share of 35% in gross domestic product in 1994 (Orbeta,1995). The tertiary sector was relatively stable at around 40%, and its contribution to employment has increased steadily up to 34% in 1994.

1.5 The Research Issues

13. This specialist report explores several research issues.
    * The first issue concerns employers' hiring and training practices, the qualifications they expect at various occupational levels, and what types of training firms are willing to sponsor.
    * The second issue concerns employers' expectations concerning the relative contribution of private and public sector training and the purpose of public sector training provision in an ideal world.
    * The third issue concerns the incentives and impediments to training and the role of intermediate organisations in training provision.
    * The fourth issue concerns trends in technological development and organisational change at the firm level.
    * The fifth concerns employers' views on the desirability of and the willingness to pay for branch-specific training centres.

1.6 Field Survey Methodology

14. The study is limited to the manufacturing sector. It is also confined to establishments employing more than 9 employees, mainly because the National Statistics Office list of establishments from which the sample was drawn only covers such firms.

15. Selecting the firms for the field survey involved making two choices; a choice of industries and a choice of regions.

Choice of Industries for the Survey

16. The industries chosen for the study are essentially of two types:
    * industries which are likely to experience future growth
    * industries whose development and improved competitiveness is important for future manufacturing performance.

    The following industries have been selected; electronics (semi-conductors and appliances), engineering (light engineering and automotive) and garments. The rationale for this choice is as follows.

Electronics

17. In electronics, two sub-sectors were chosen: semi-conductors and appliances.
    The semiconductor industry is almost wholly export-oriented and constitutes the top export of the country. The output of this sub-sector has grown at around 14% per annum between 1990 and 1995 (CRC 1995). A high proportion of new investment (in particular, foreign investment) in recent years (1993-1995) has been in this sector. The industry is marked by a high proportion of foreign ownership. Semiconductor firms are generally large and medium-sized.

18. Increasing the value-added content of this sub-sector require increased backward and forward integration. Moving into the wafer fabrication process requires large capital inputs and is therefore not a feasible strategy for most firms. However, developing circuit and mask design appears to be a more appropriate route to increasing the local content in production. Moving to higher value-added production processes requires (among other inputs) upgrading technical skill levels in the country. In particular, expertise in the area of design technology, metrology, surface mounted technology etc. needs to be improved.

19. The appliance industry mainly supplies the domestic market. This sub-sector has been 're-emerging' in recent years, with output increasing in response to rapidly growing demand. If high rates of economic growth are maintained, demand for appliances will continue to expand for some years. If domestic appliance manufacturers are to benefit from this growth in demand, they need to maintain their competitiveness vis-à-vis imports. Import competition is likely to increase with further trade liberalisation. There is some evidence of declining levels of technical efficiency in the appliance industry (Lapid 1994). If this trend persists, domestic manufacturers may fail to compete effectively with imports. Upgrading skills and improving the effectiveness of training could therefore be important for improving both technical efficiency and competitiveness. Therefore, it is important to identify existing training patterns as well as future skill and training requirements of this industry.

Engineering

20. In general terms, the engineering industry has been selected due to the generic nature of its skills. Upgrading engineering skills can have longer-term dynamic effects on various industrial sub-sectors (through the transfer of labour and so on). Given the heterogeneous nature of the industry, our choice is limited to a few sub-sectors.

21. The Agricultural Machinery and Equipment sector is an almost wholly inward-oriented sector. This sub-sector has a potentially large domestic market due to recent drives to increase mechanisation in agriculture. While there are a few large producers, small and medium-sized firms predominate. The industry is also dispersed across most regions.

22. The growth of this sector has not been impressive in recent years (Trabajo, 1994). Both industry value-added and labour productivity appears to have decreased (data to support this is only available up to 1991). While this is partly due to low demand, other factors have also played a role. Important among these are poor maintenance and of production machinery (Trabajo 1994). Improving technical/ vocational skills in these areas may therefore be beneficial to the economic performance of the industry. If increased domestic demand leads to future growth, the demand for these types of skills (as well as general mechanical skills among users) can also be expected to increase.

23. Automotive parts and components; The transport industry has displayed a healthy economic performance in recent years. Output expanded by 22% in 1993, while exports also showed a considerable increase (CRC 1994). If increased economic growth is maintained, demand for the products of this sub-sector can be expected to increase.

24. It is therefore necessary to arrive at some estimations of future manpower and skill requirements as well as training needs of the automotive sub-sector. In particular, it is necessary to identify both the specific types of skill which need to be improved and the training institutions and training methods by which such skills can be generated. Preliminary field interviews have indicated the importance of improving technical skills and training for suppliers of parts and components to the domestic passenger car industry. The low levels of technological capabilities of these suppliers currently militate against efficient production by car assemblers (by limiting the effectiveness of just-in-time production techniques and so on). A detailed study of this sub-sector, therefore, would be necessary for developing and substantiating such insights.

Garments

25. Garments is the second largest export industry in the country. The annual average growth of exports has been around 11% between 1990 and 1994 (DTI 1994). The local market for garments can also be expected to increase with growing consumer incomes. Export-oriented garment production is mainly done on the basis of export quotas. Quota countries accounted for 80% of exports in 1993. Export production also mainly consists of "Cut, Make and Trim" production of low and medium quality garments for the international market. It is therefore marked by low levels of skill as well as value-added. Productivity increase is necessary given increased levels of international competition which can be expected with the phasing out of the Multi-Fibre Arrangement, which currently provides a 'guaranteed market' of sorts to developing country clothing exporters.

26. It appears to be necessary therefore to increase both productivity in existing product ranges and to move into the production of higher value-added products. Upgrading skills and training in this industry could make an important contribution to achieving both high productivity and higher product quality. Training in computer-aided grading and marker making, quality control, and operating numerically controlled machines appears to be important.

The Choice of Regions

27. Regions were chosen using three criteria:
    * high presence of manufacturing firms
    * high level of employment in manufacturing
    * good representation of TVET institutions.

In addition, the growth potential of the region in terms in recent investment policy was also considered. A ranking of regions was made according the above criteria. Regions NCR, III and IV ranked highest on all counts. For the purpose of the study, NCR and in region IV the Calarbazon growth area were chosen. Regions III was excluded due to difficulties in undertaking fieldwork. The second region chosen was VII including Cebu and Bohol province. This region ranked high on manufacturing employment and low on TVET institutions indicating interesting implications for research. The third region chosen was XI, Southern Mindanao. This is based on its high ranking on all three criteria.

28. The conclusions of this survey mainly apply at the industry level. Due to data limitations the regional level cannot be analysed separately. Given the fact that TESDA, firms and training institutions have to work with the results of this study, preference has been given to the industry branch analysis, where increased participation of the private sector can be made operational.

29. The survey results come from 142 firms in the industries and regions selected out of the 180 originally in the sample framework[6]. The response rate to the survey was high, mainly due to the fact that it was carried out by experienced researchers from the National Statistics Office (NSO), an organisation familiar to the commercial sector.

[6] Actual response was from 162 firms; however, time constraints in the whole project led to only 142 questionnaires being available for the international team to analyze in Europe.

SECTION 2. SURVEY RESULTS

2.1 Firm Characteristics

30. This section focuses on the nature of training and skill development undertaken by firms in each industry and on the relationship between vocational training, technological change and firm performance. While the survey was undertaken for the clothing, electronics, automotive and machinery sub-sectors, much of this discussion is organised in terms of three sectors; garments, electronics and engineering (in which automotives and machinery are subsumed together).

31. Table 1 gives some summary statistics of the entire sample. The average firm employed 378 employees and was around 20 years old. 30 per cent of the sample engaged in some degree of exporting. 36 per cent of firms had some degree of foreign ownership. A substantial proportion of firms (45 per cent) had experienced a growth in employment in recent years, indicating an expansion of their production activities.

Table 1: Firms' characteristics

	mean size (employees)	mean age (no of years)	% exporters	% foreign	% increased employment
total sample	378	20	30	36	45

32. There are notable differences in firm characteristics between the various industries (Table 2). Firms in the electronics industry sample are, on average, larger, younger, more export-oriented and have a higher degree of foreign ownership than those in the other two industries. The engineering industry has the smallest firms and lowest extent of foreign ownership. The clothing industry has the oldest firms, reflecting the fact that it is a light industry set up in the early stages of industrialisation.

33. There also appears to be a general expansion of firms in all three industries. 47 per cent of clothing firms, 40 per cent of engineering firms and 48 per cent of electronics firms experienced an increase in employment in recent years. This was larger than the proportion of firms which contracted; on average around 30 per cent in the three industries (Annex 1). Firm dynamics in these industries suggest a level of activity which is likely to encourage greater skill acquisition and technology development.

Table 2: Firm characteristics by industry sub-sector (averages)

	electronics	engineering	clothing
mean size	737	229	263
mean age	9	22	28
% firms with foreign funding	60	11	39
% exporters	52	15	40
% employment growth	48	40	47
% employment decline	30	21	39
% static employment	12	33	18

34. The size distribution of firms also differs across industries. In Table 3 firms are classified as small, medium and large using the following definition which is in accordance with usage in the Philippines; small - betwween 10 and 50 employees, medium - 51-500 employees and large - more than 501 employees. Thus, 53 per cent of clothing firms are medium sized, 31 per cent small and 16 per cent large. The electronics industry has a markedly higher proportion of large firms (34%) and fewer small firms (15%).

Table 3: No. of firms by industry sub-sector and size

	small	medium	large
electronics	15	51	34
engineering	22	58	20
clothing	31	53	16

2.2. Skill Intensity

35. Given the industry-specific nature of skill requirements, it is useful to examine the skill profiles across industries rather than for the sample as a whole. Skill levels across industries can be compared using indicators of skill intensity. In Table 4, various 'high skill' categories of employees are expressed as a proportion of the total workforce, with the proportion of engineers, technicians and skilled workers being the most relevant indicators of skill intensity.

36. As expected, the proportion of engineers is higher in the electronics and engineering industries, than in the clothing industry. This is not a reflection of the lack of relevance of engineering skills to clothing production. The higher proportion of engineers in the electronics industry than in the engineering industry must be noted. This is likely to reflect the higher export-orientation of electronics firms. Production for export markets is likely to require higher levels of efficiency and quality and is therefore likely to be more skill intensive.

Table 4: Skill profiles of firms by industry sub-sector

	electronics	engineering	clothing
% graduate engineers	3.8	2.7	0.4
% technicians	8.3	3.5	1.8
% skilled prod. workers	51.2	57.8	73.5
% non-prod.workers	12.6	12.6	14.5
% un-skilled	24.1	24.4	9.9

SECTION 3. RESEARCH EVIDENCE: FIRMS AND HRD

3.1. Provision of HRD by firms

37. Firms provide HRD by both in-house training and assisting external training centres. Table 5 provides some summary data on the provision of HRD in the three industrial sectors.

38. There are substantial differences in the provision of HRD across industries. On most indicators, the internal provision of HRD is highest among electronics firms. Thus, 28 per cent of electronics firms have in-house facilities and equipment for off-the-job training. The corresponding figures for the engineering and clothing industries are lower, 20 and 10 per cent respectively.

39. Around half the electronics and engineering firms accept students for on-the-job training. The corresponding figure for the clothing industry was lower, 23 per cent. For the sample as a whole, large firms showed a greater tendency to provide such OJT. Thus, 75 per cent of large firms accepted students for OJT, while this was only true of 40 per cent of medium firms and 32 per cent of small ones.

Table 5: HRD Provision within firms by industry sub-sector (average % of firms)

	electronics	engineering	clothing
HRD unit	48	23	32
HRD budget	33	21	13
HRD plan	46	21	28
HRD expenditure as % of payroll	1.8	0.6	0.26
Training facilities	28	20	10
Apprenticeship scheme	50	39	26
Students on OJT	46	54	23
In Training Contracts Scheme	23	28	10
Financial assistance to external instns	5.1	7.7	7.9
equipment assistance	2.6	3.1	5.3
teaching assistance	10.6	7.7	5.3

40. 48 per cent of electronics firms also have an HRD unit. This is only true of 23 per cent of engineering firms and 32 of clothing firms. HRD expenditure as a proportion of the total payroll is also highest in the electronics industry. The tendency for formal allocation of resources for HRD is also greater among large firms. For the sample as a whole, almost half the large firms have an acknowledged training budget. This is only true of 20 per cent of medium firms and 10 per cent of small ones.

41. Electronics firms also show the highest tendency to train apprentices under the formal apprenticeship scheme. The average cost of apprentices also differs by industry. The electronics industry had the highest average costs (P 8049 per yr/apprentice), followed by the engineering (P 4300 per yr/apprentice) and clothing (P 3000 per yr/apprentice). There are also differences in apprenticeship costs by size of firm, with large and medium firms investing more in apprentices than small firms.

42. The provision of assistance to external training institutions is limited in all industries. Engineering and clothing firms show a greater tendency to provide financial assistance, while electronics firms are more likely to provide teaching and curriculum assistance to external training institutions.

3.2 The Use of Externally Provided HRD

43. Firms use externally provided HRD when hiring new employees and when providing external training to existing employees. Where do firms in each industry hire from? Table 6 show the various sources of recruitment. The sources of hiring differs across industries, partly indicating the industry-specific nature of many training institutions. Clothing firms show a higher reliance of TESDA, probably due to its greater relevance to the clothing industry. The high reliance of the electronics industries on institutions such as Don Bosco and Meralco is expected, given the industry-specific nature of their training programmes. The high proportion of electronics firms which use the state university colleges is indicative of higher levels of skills in this industry.

Table 6: Sources of Hiring (% of firms using each source)

	electronics	engineering	clothing
TESDA	25	26	34
Meralco	31	3	2.6
Technical Education Inst.	31	18	7.9
Don Bosco	33	37	7.9
Schools of Arts /Trades	33	56	23
State University Colleges	30	12	13

44. The use of external training institutions for training existing employees is low for the sample as a whole and in each industry. Table 7 shows the various sources of external training used by firms. In-house training is the most common form of training undertaken. This can be due to the lack of suitable training centres, lack of information about existing centres or the relatively greater usefulness of firm-specific and tacit skills. The fairly high reliance of electronics firms on foreign training centres may be indicative of the relative complexity of training requirements and the lack of suitable facilities. There is little difference in the extent to which electronics and engineering firms use private and state training centres. The greater tendency for clothing firms to use government centres is likely to reflect the absence of private industry-specific training centres.

45. The heavy reliance on in-house training is also evident when we examine sources of training for particular categories of employees. In-house training is the most common form of training for higher skill categories such as engineers, technicians and skilled production workers.

Table 7: Sources of Training (% of firms using each source)

	electronics	engineering	clothing
in-house	25	28	36
govt. vocational centres	4.2	6	17
private voc. centres	4.2	8	5.3
foreign training centres	17	2.7	0
foreign buyers	4.2	0	0

3.3 High and Low Training-focused firms

46. Altogether 60 firms (42% of the sample surveyed) indicated that they undertook significant expenditure on training their employees or approached that training systematically. The survey included 12 indicators of training involvement by size of firm - they are listed in Annex 2. These 60 firms responded positively to at least two indicators and are identified as *'training-focused firms'-TFFs*[7]. Their distribution in terms of numbers of those indicators per firm is shown in Figure 1, while Table 8 indicates their distribution by industry sector. Table 9 indicates their distribution by size of firm.

47. Within this group 13 firms, identified as responding positively to at least six indicators, would seem to have a commitment to training which characterises them as *'super-TFFs'*. These firms' characteristics can be distinguished from other firms. They have higher sales levels per worker, a higher percentage of foreign equity and are concentrated in the electronics and automotive sectors (all but one of these super-TFFs are in these two sectors.)

48. The 12 training indicators point particularly to the establishment of training policies in the TFFs which distinguish them from the other firms. Training practice, arising from these policies, is also distinctive. 92% of the 26 firms providing training for engineers are TFFs; 78% of the 37 firms which trained their technicians in 1994 are TFFs, as are 61% of those 46 firms who trained their skilled production workers. The patterns of training are also significant. TFFs train their engineers and technicians in-house, but, although many have their own training centres, the 'super-TFFs' are virtually the only firms to use government and private training institutions. And, at least in the electronics and metals (automotive and machinery) sectors, they take advantage of a wider variety of training opportunities than do other firms.

49. In addition, 85% of firms who make use of or are at least familiar with government financial initiatives to support training - the Training Contract Scheme, the provisions of the Dual Training Act and the Productivity Incentive Act - are TFFs; and over half of these are electronics firms.

Table 8: Training-focused firms and 'super-training focused firms', by sector

Industrial sub-sector	TFFs	% of all firms in sector	Super-TFFs	as % of TFFs
Garments	14	40	0	0
Non electrcal machinery	13	46	1	8
Electronics	21	57	7	33
Automotive	13	42	9	69

[7] It is rather surprising that 19 firms claim to provide systematic training without demonstrating any of the other indicators.

Table 9: Training-focused firms by size

	High training (% firms)	Low training (% firms)
small firms	20	80
medium firms	39	61
large firms	70	30

50. Further analysis of the enterprises which systematically invest in training reveals that they have some significantly different opinions about training, their own investment policies and the role of government than the 82 firms which do not meet at least two of these indicators. For example, the TFFs are significantly more willing to contribute towards the cost of sector-specific training centre than other firms, and hold to the view that general taxation should support training, but they are much less willing than other firms to support levy grants, tax incentive and rebate schemes. They are more willing than other firms to pay for labour market information, but less willing to pay for guidance to educational and training institutions and much less willing than others to provide financial support for government training institutions.

SECTION 4. TECHNOLOGY UPGRADING AND SKILL ACQUISITION

51. In recent years a large body of empirical research has highlighted the positive effects of technological change on the economic performance of manufacturing firms (Caves and Barton 1990; Page 1992). Similarly, cross-country growth comparisons point to a close association between technological change and economic growth at the macro-level (Barro 1994). Factors which promote technological change are, therefore, key determinants manufacturing competitiveness.

52. Investment in human capital is closely linked to technology upgrading. The introduction of new technology often involves upgrading existing skills or 're-skilling'. In addition, high skill levels and a commitment to training promote technological dynamism at the firm level. In this section, we outline patterns of technology upgrading evident among our sample firms in the electronics, engineering and clothing industries and examine the links between technological change, skill levels and training.

4.1 Patterns of Technological Change; High and Low Technology Firms

53. Technological change in countries such as the Philippines rarely involves innovation at the global technology frontier. Technology upgrading in these countries mainly involves the adoption and adaptation of technology developed elsewhere. Below, we examine the extent to which firms in each industry introduced new machinery and equipment, production processes or products in recent years.

The Electronics Industry

54. Electronics firms in our sample consists of manufacturers of appliances and semiconductors. Semiconductor firms in the Philippines are mainly engaged in the labour intensive tasks of assembly and testing. The more skill and technology intensive tasks such as wafer fabrication, back-end wafer probe and mask or circuit design are rarely undertaken. Technological dynamism in this product group can be assessed in terms of a move into these advanced production tasks as well as in terms of the use of relatively sophisticated machinery and equipment. Investment in advanced capital goods and improvements in product quality are suitable indicators of technological dynamism among appliance producers.

55. Overall, technology upgrading is evident among both appliance and semiconductor manufacturers in our sample. However, there are substantial inter-firm variations in the extent of upgrading undertaken. As Table 10 indicates, few semiconductor firms carry out advanced, high-value production tasks, with the proportion of firms involved in wafer fabrication, mask or circuit design and back-end wafer probe being less than 10 per cent. Only 25 per cent of electronics firms use CAD/CAM technology. Investment in CNC machine tools is also limited.

Table 10: Technology Profile - Electronics

Type of technology upgrading	% of firms using new technology/upgrading
mask/circuit design	10.0
back end wafer probe	7.7
wafer fabrication	2.6
CNC machine tools	7.7
CAD/CAM equipment	25.0

56. These inter-firm differences in technological dynamism among electronics firms can summarised by grouping firms into two categories; high technology firms and low technology ones. High technology firms use sophisticated capital goods and undertake advanced production tasks, while low technology ones show little evidence of this. According to this criteria, 35 per cent of firms in the industry are high technology firms and 65 per cent low technology ones. Overall, therefore, technological dynamism is confined to a fairly substantial minority of sample firms.

The Engineering Industry

57. Technological dynamism in the engineering industry can be assessed in terms of investment in new technologies such as CAD/CAM, CNC machine tools, EDMs and robotics. As in the electronics industry, there is substantial inter-firm variation in technology upgrading. As Table 11 indicates, the proportion of firms introducing various types of advanced technology is small.

Table 11: Technology Profile - Engineering

Type of technology Upgrading	% of firms upgrading
NC machine tools	19
CAD design and manufacture	10
Wire cut EDMS	38
Robotics	3

58. Once again, firms can be categorised into two groups on the basis of the selected technological indicators in Table 11. High technology firms in this industry comprise 30 per cent of sample firms and low technology firms 70 per cent. Thus, as in the electronics industry, technologically dynamism is fairly skewed with high technology firms constituting a small proportion of the total.

The Garment Industry

59. The garment industry is a relatively low technology, low skill industry which is usually the 'first step' in the industrialisation process of newly industrialising countries. However, technological advancements in the industry in recent times mean that investment in new technology is essential for improving and maintaining competitiveness, especially in export markets.

60. The production process in clothing consists of 3 distinct stages; pre-assembly, assembly and finishing, with technological change being mainly confined to the first two. Computer-aided grading and marker-making as well as computerised cutting has led to efficiency gains through fabric saving. The use of operator programmable machines, work-aids and dedicated

machines has increased the efficiency of small production runs and reduced 'waiting time' between operations.

61. To what extent have clothing firms in the Philippines introduced these new technologies? Our survey indicates that technology upgrading is limited to a fairly small proportion of firms. As Table 12 shows, less than 25 per cent of firms use Computer-aided grading and marker making or operator programmable machines. Only 5 per cent of firms undertake computerised cutting. 27 per cent of firms have undertaken product-centred technological change directed at improving product quality.

Table 12: Technology Profile - Clothing

Type of Technology Upgrading	% of firms upgrading
CAD grading and marker making	23
Computerised Cutting	5
Operator Programmable machine tools	21
Computerised Embroidery	21
Flexible Manufacturing Systems	37

62. As in the case of the other industries these patterns of intra-industry technological change can be summarised by categorising firms high and low technology firms. High technology firms in the clothing industry comprise 40 per cent of the total sample, with low technology firms comprising 60 per cent.

4.2 Technology differences and other firm characteristics

63. Do high and low technology firms differ in terms of their basic characteristics? Table 13 presents some summary statistics relating to the high and low technology groups in the electronics industry.

Table 13: Differences between high and low technology firms in electronics

	High Technology	Low Technology
Mean Size (employees)	1396	228
Mean Age (years)	8	10
% firms with foreign funding	70	52
% exporters	56	37

64. High technology firms are larger and slightly younger than low technology ones. Large firms can be expected to have several technological advantages such as access to financial and human capital as well as the ability to realise economies of scale from introducing new technology. The negative association between technological dynamism and firm age may reflect the greater flexibility of younger firms in responding to new trends in technology.

65. The extent of foreign ownership and export-orientation is also greater among high technology firms. Foreign firms generally benefit from the same technological advantages as large firms. In addition, they have access to 'intangible assets', such as group R&D and technological information, which promote technological change. The positive association between exporting and technology upgrading could indicate a two-way causality. Technology upgrading which improves productive efficiency and product quality is often necessary for

competitiveness in export markets. In addition, exporting promotes technological dynamism by exposing firms to new techniques and new ideas.

66. Data on employment trends provide some insights into firms dynamics in the high and low technology groups. There is little difference between the two groups in terms of expansion, with the proportion of firms to have experienced an increase in employment in recent years being similar in both groups (see Annex 1). However, low technology firms show a markedly greater tendency to contract. This may reflect the uncompetitiveness of firms which fail to invest in new technology. Overall, this pattern of firm dynamics could also be seen as indicating an increase in the relative market share of high technology firms.

67. The engineering industry shows a similar pattern to the electronics industry, with high technology firms being larger, more export-oriented and having a higher degree of foreign ownership than low technology ones. High technology firms in the engineering industry are markedly younger than low technology ones, a difference that was not so evident in the electronics industry. Given that the engineering industry in the Philippines is considerably older than the electronics industry, this may reflect the existence of fairly old firms who are 'locked in' to technological backwardness.

68. Employment dynamics indicate a greater expansion of high technology firms than low technology ones. A large proportion of low technology firms are stagnant in terms of employment growth.

Table 14: Differences between firms with high and low technology in engineering

	High Technology	Low Technology
Mean Size (no. of employees)	724	93
Mean Age (no. of years)	14	24
% Firms with foreign funding	30	12
% Exporters	30	12

69. As in engineering and electronics, technological dynamism is positively associated with firm size and export-orientation in the clothing industry. However, there is little difference in the extent of foreign ownership in the two groups. This can be explained in terms of the relatively low levels of technological complexity in this industry. Foreign firms are therefore less likely to possess technological advantages in terms of 'intangible assets' arising out of group R&D and so on.

Table 15: Differences between firms with high and low technology in clothing industry

	High Technology	Low Technology
Mean size (employees)	381	194
% Firms with foreign funding	36	38
% exporters	39	36

4.3 Technology, Skills and Training

70. How does technological change relate to skill levels and patterns of skill acquisition at the firm level? We focus on three relationships; skill intensity, the provision of HRD and the use of externally provided HRD in high and low technology firms.

Electronics

71. Table 16 provides some summary statistics on differnces in skill intensity between high and low technology groups of firms. High technology firms have higher levels of skill intensity, measured in terms of the proportion of engineers, technicians and skilled production workers in the total workforce.

Table 16: Skill Intensity in Electronics - Average levels in high and low technology firms

Electronics	High Technology	Low Technology
Engineers as % of workforce	3.9	3.7
Technicians as % workforce	12.7	5.1
Skilled prod. workers as %	58.0	47.0
non-production workers as %	8.4	15.7
unskilled as % workforce	12.8	28.1

72. Firms use externally provided HRD when hiring new employees and when training existing employees. High and low technology firms differ in their hiring practices. High technology firms show a greater tendency to hire workers from institutions such as Meralco, TEIs, the Don Bosco school and state university colleges, indicating a greater emphasis on formal

skills and training at entry level (Table 18) .There is no difference in the extent to which high and low technology firms used TESDA training schemes as a source of recruitment, reflecting the fact that such schemes generally do not provide the types of skills relevant to technologically advanced electronics firms.

73. Both high and low technology firms rely mainly on in-house training of employees and linkages with external training institutions are limited. There is also greater tendency for high-technology firms to use in-house training for high skill categories such as engineers. This again may indicate the lack of suitable external training facilities for such groups. There is no difference in the extent to which high and low technology firms use private and public training institutions.

Table 17: Sources of Recruitment in Electronics - % of high and low technology firms using each source

	TESDA	Meralco	Technical Education Institutes	Don Bosco	Schools of Arts & Trades	State Univ. Colleges
High Technology	23	23	41	47	23	42
Low Technology	27	13	22	22	40	22

74. Do electronics firms use external HRD to upgrade skills when introducing new technology? Overall, around 60 per cent of high technology firms indicated some skill upgrading, especially in the high skill categories of engineers, technicians and skilled production workers. The use of external HRD for this purpose however is limited. A small minority use public and private institutions for training technicians and skilled production workers. 17 per cent of firms used private training institutions for training engineers. Government institutions were not used at all for this purpose, probably reflecting the lack of relevant training provided. Informal training by capital goods suppliers is important in this industry, reflecting the specialised nature of technology in this industry.

75. Electronics firms provide HRD both by in-house training and by providing assistance to external training institutions. As noted above, in-house training provision is widely prevalent in the industry. Again, high technology firms also display a greater commitment to in-house skill development. Thus the proportion of firms with a systematic training policy is greater in the high technology group. Similarly, high technology firms are more likely to have in-house HRD units, HRD plans as well as formal HRD budgets. Differences between high and low technology firms are also starkly captured by data on HRD expenditure. High technology firms, on average, spend 3 per cent of their total payroll in HRD; the corresponding figure for low technology firms is 0.6 per cent.

76. Few electronics firms provide any assistance to external training institutions. However, the limited extent of assistance provided is largely by high technology firms. This assistance is rarely financial and mainly involves the provision of equipment and teaching assistance.

Engineering

77. High technology firms display higher levels of skill intensity, especially in terms of the proportions of engineers and technicians employed (Table 18).

Table 18: Skill Intensity in Engineering: Average Levels in High and Low technology Firms

	High Technology	Low Technology
Engineers as % of workforce	3.9	2.4
Technicians as % workforce	5.0	3.0
Skilled prod. workers as % workforce	59.7	37.0

78. High technology firms in the engineering industry are more likely to use external institutions such as TEIs, SATs and Don Bosco for recruitment. The proportion of high technology firms hiring from Don Bosco and SATs is markedly higher than in the electronics industry, reflecting the fact that these institutions provide generic skills for the metal engineering industry.

79. While linkages with external training institutions for in-service training are limited among all firms, high technology firms in engineering are more likely to provide external training for their workers. In the case of technicians and skilled production workers a preference for government training institutions over private ones is evident. This contrasts with the electronics industry where no clear preference was evident for any skill category.

80. Do high technology firms use external HRD for acquiring new skills necessary for the introduction of new technology ? Again, while there was evidence of human capital upgrading for the specific purpose of introducing new technology, this was mainly done in-house. While private training institutions were an occasional source of training, government institutions were rarely used. Awareness of existing training initiatives and incentives is also greater among high technology firms. Low levels of information regarding these issues among low technology firms, again indicates a market failure in information provision.

Table 19: Sources of Recruitment - % of High and Low Technology Firms using each Source in Engineering

	TESDA	Meralco	Technical Education Institutes	Don Bosco	Schools of Arts & Trades	State Univ. Colleges
High Technology	28	7	28	78	64	21
Low Technology	25	2	15	25	54	9.8

81. High technology firms in engineering show a greater commitment to and strategies for systematic, longer term in-house skill acquisition as indicated by the existence of HRD units, HRD plans and formal HRD budgets. HRD expenditure as a proportion of the total payroll is also higher in high technology firms.

Clothing

82. In the clothing industry, high technology firms show higher levels of skill intensity (Table 20). However, these differences are considerably smaller than in the other two industries, reflecting the relatively low level of technological complexity in this industry.

Table 20: Skill Intensity in Clothing: Average levels in High and Low technology Firms

Clothing	High Technology	Low Technology
Engineers as % of workforce	0.61	0.26
Technicians as % workforce	1.8	1.1
Skilled prod. workers as % workforce	71.4	70.
non-production workers as % workforce	14.1	14
unskilled as % workforce	16	8

83. As in the electronics and engineering industries, high technology firms in the clothing industry show a greater tendency to employ workers with pre-employment training from external institutions (Table 21). The use of external training institutions for skill acquisition when introducing new technology was even more limited than in the other two industries. Knowledge of existing training schemes is also higher among these firms, again indicating information failures in relation to smaller, low technology ones.

Table 21: Sources of Recruitment in Clothing: % of High and Low technology firms using each source

	TESDA	Meralco	Technical Education Institutes	DonBosco	Schools of Arts & Trades	State Univ. Colleges
High Technology	46	0	10	6.7	20	20
Low Technology	22	0	0	3.5	33	4.5

84. The commitment to provision of longer term in-house skill provision is relatively higher in the high technology group of clothing firms. High technology firms spend, on average, 0.66 per cent of their total payroll on HRD. Low technology clothing firms, in contrast, do not undertake any formal HRD expenditure.

85. The discussion above indicates that firm-level technological dynamism in all three industries is positively related to levels of skill intensity as well as to the use of external HRD and the in-house provision of HRD. This leads us to argue that training and skill acquisition is both a determinant of as well as a joint product of technology upgrading. Unfortunately, data limitations do not permit us to separate these factors or to establish the causality from training to technology in a statistically rigorous manner.

86. The discussion above can be summarised by using the training index which ranks firms according to the extent of HRD provision and use undertaken (see Section 3.3) and comparing it with levels of technology in firms. As expected there was a close relationship

between high technology firms and high training firms. In all three industries more than 80 per cent of high technology firms are also high training ones. The table below indicates the differences in average scores on the training index between low and high technology firms in each industry. The difference in the electronics industry is particularly striking.

Table 22: Correlation between firm level of technology and average training index scores

	low technology	high technology
clothing	3.6	4.8
engineering	4.5	5.7
electronics	3.7	7.2

4.4 The Economic Gains from Training and Technology Upgrading

87. The above discussion has indicated that high skill levels as well as external and in-firm training are closely linked to technological dynamism in all three industries. Policies directed at improving the effectiveness of training can therefore be expected to promote technological dynamism at the firm level. In order to strengthen the case for effective training provision, it is necessary to demonstrate a positive link between technological dynamism and the economic performance of firms.

88. This can be done by comparing average productivity levels by high and low technology firms in each industry. Productivity is defined here as sales per employee in 1994. This simple measure of labour productivity is used due to the lack of value added and input data required to compute a more sophisticated measure of total factor productivity . As Table 23 indicates high technology firms have higher levels of productivity than low technology ones in all three industries. High technology firms also have a greater propensity to export, which can be considered as an indicator of greater competitiveness.

89. Once again, data limitations do not permit a multivariate estimation of the impact of technology on firm performance. However, our analysis leads us to posit a causal relationship running from training and HRD to technological dynamism and eventually to better economic performance.

Table 23: Average Level of Labour Productivity by High and Low Technology Firms (sales per employee P'000s)

	High Technology	Low Technology
Electronics	399	348
Engineering	114	71
Clothing	255	248

SECTION 5. HIGH AND LOW TECHNOLOGY FIRMS: FUTURE DYNAMICS

90. Given the positive relationship between training, technology and firm performance, it is important to gain some insights into likely future dynamics relating to training and technology. This will also highlight future training needs in the industries surveyed. The focus is on two issues; plans for investment in technology and human capital and emerging skill bottlenecks.

5.1. Plans for Investment in Technology and Human Capital

91. Although a large proportion of the electronics industry consists of low technology firms with relatively low investment in human capital, there are indications of future dynamism among this group. Two points are especially pertinent. Firstly, a high proportion of low technology firms have plans to upgrade technology in the near future. Thus, 31 per cent of low technology firms had future plans to upgrade technology, as opposed to of high technology firms. If such plans materialise the overall level of technological dynamism in the industry is likely to increase. Limited plans for upgrading among high technology firms is also noteworthy. This may partly reflect the fact that high technology firms already use relatively advanced technology. However, it may also reflect the fact that these firms operate at a technological threshold, moving beyond which requires a considerable leap in terms of skills and capabilities.

92. Secondly, although low technology firms are less likely to have systematic training strategies, there is evidence of greater attention to training among this group, especially in recent years. Thus, low technology firms trained a greater proportion of their workforce in 1994 in almost all skill categories. As skill upgrading often precedes the introduction of new technology, this again points to future technological dynamism among this group.

93. In engineering, low technology firms show signs of future technological dynamism, although to a lesser extent than in the electronics industry. 44 per cent of low technology firms expressed plans to upgrade technology in the near future, compared with 52 percentage of high technology firms.

94. Recent trends in training also provide evidence of limited technology upgrading among low technology firms in engineering. While high technology firms showed a greater tendency to train engineers and technicians in the last year, training of skilled production workers was markedly higher in low technology firms. This may indicate technology upgrading at the intermediate level.

95. In the clothing industry plans to upgrade technology in the future is limited among both high and low technology firms. Recent training trends also do not point to future dynamism among low technology firms.

5.2 Skill Bottlenecks

96. Future technological dynamism is likely to be a function of the availability of human capital. We therefore examined for signs of emerging skill shortages in each of three industries by asking firms whether they faced difficulties in filling vacancies for various skill categories. As Table 22 indicates, firms in general do not face a labour supply constraint of any serious proportions. However, some signs of a tightening labour market in the higher skill categories is evident, especially in electronics. This constraint is also more sharply felt among high technology groups. Overall, therefore, there are early indications that future technology

upgrading may be constrained by the availability of skilled technical workers. This raises policy issues which are addressed in the next Section.

Table 24: Percentage of firms facing labour shortages in each skill category

Electronics	engineers	technicians	skilled prod. workers	non-prod workers	unskilled
High Tech	35	17	0	12	0
Low Tech	14	18	13	4.5	0

Engineering					
High Tech	21	28	0	0	0
Low Tech	11	2.8	19	6	0

Clothing					
High Tech	6.7	13	13	14	0
Low Tech	0	0	13	0	0

5.3 Areas of potential linkages between government and private industry

97. Firms were asked their opinions about the possibilities of increaseing linkages between the government TVET system and themselves. They were asked to indicate three areas in which they felt that:
    (a) government would be most likely to intervene,
    (b) government intervention would be most useful to the firm,
    (c) the firm would be most likely to contribute towards the costs, and
    (d) the industry association would be most anxious to contribute.

98. From the answers (Annex 3: Q 27), it is clear that industry sees complementary roles for itself and government. Firm representatives feel that government is most likely to intervene in the following three areas:
    (a) reinforcement of labour market information systems;
    (b) guidance to education and training institutions; and
    (c) improving level of general education.

99. These activities do not quite accord with what firms feel would be most useful for themselves. Although they agree with the priority given in 'guidance to education and training institutions', firms would rather see more attention given to the 'establishment of training centers for their specific sector', and 'general financial support to training through taxation'. Their fourth and fifth priorities, however, are the same (a) and (c) which they think the government is most likely to do.

100. The areas where firms are most likely to contribute towards the costs of training lie in different areas:
    * 'identification of critical skills likely to be in demand' is given top priority by firms;
    * 'establishment of sector-specific training centers' is given second priority; and
    * contributing towards costs in 'delivery of skills training at government training institutions in response to skills shortages' is given third priority.

101. The industry associations would be most likely to contribute to the same three activities, identified by the firms as the ones in which they would be most likely to contribute towards the costs of training. This suggests that firms and industry associations are interested in participating more fully in the areas of training system **inspection, monitoring and evaluation** and **training delivery**.

102. Firms were also asked their opinions about the areaas in which the various actors in the TVET system should take priority action. The firms indicated that they make clear differences between what kinds of actions private training institutions and government technical education institutions, trade schools and training centers should undertake (Annex 3: Q28).

Private institutions should:

(a) should supervise OJT training more effectively;
(b) give more emphasis to positive trainees' attitudes and work discipline; and
(c) deliver consultancy services to private industry.

Government technical education institutes as well as government trade schools and training centers should:

(a) upgrade curriculum to meet industry needs;
(b) prepare more short courses for specific industries; and
(c) give more emphasis to positive trainees attitudes and work discipline.

Universities and state colleges should:

(a) upgrade curriculum to meet industry needs;
(b) give more emphasis to general education, literacy and numeracy; and
(c) also give more emphasis to positive trainees attitudes and work discipline.

103. These findings indicate that firms have higher expectations of private institutions than of government technical education as well as trade schools and training centers. Firms have much more general expectations in relation to their own requirements from universities and state colleges.

SECTION 6. CONCLUSIONS AND RECOMMENDATIONS

104. Responsibility for training of employees is a matter for firms themselves, individually or collectively. The questions here are how government, through TESDA, can contribute to the quality and efficiency of middle-level training by industrial employers, and how, conversely, employers can contribute to improvements in the pre-employment technical education and training which remains the responsibility of the public sector.

105. Training for its own sake, in isolation from other inputs, or without external objectives, is of very limited use. Training must make a contribution to corporate performance improvement (even if the "corporation" is very small) and it must be allied to other inputs such as management development, organisational change, investment in new technology, product development, market development, and quality requirements.

106. A recommendation that firms should do more training should take account of cost. Expenditure on training is an investment, and investment in training does not bring immediate returns. So working capital is in effect a necessity, and if a firm does not have a sufficiency of this expensive commodity, either it cannot invest in training, or it must be helped to so do. At an equal level of profitability smaller firms are more likely to lack working capital for any purpose, but it is of course possible for a less profitable, or unprofitable, large firm to be unable to afford training or any other expenditure.

107. The managers of smaller firms are more likely to have a mix of functions in which training rarely reaches the head of the agenda in competition with more pressing, day-to-day concerns. These managers probably lack not only time to give weight to training questions but also specialised knowledge of the various techniques of training, their potential benefit, their applicability to various kinds of person and situation, the facilities available, or the costs involved.

108. Even in very large firms with specialist HRD departments and a full range of training staff and apparatus it is rare for HRD to have direct representation at board level, with the result that HRD policies and plans, including training plans, have to be formulated in consequence of board decisions rather than as an integral part of them.

109. Training focus of firms. Even with all these background considerations firms should still, in general, be encouraged to devote more attention and resources to training; larger firms being more likely than smaller firms to be "training focused" already, the emphasis of this encouragement should be on smaller firms.

110. A two-fold strategy for intensifying the training focus of firms is indicated. One part of this strategy is for what may be called larger firms and the other part for smaller firms. The word "larger" is shorthand for firms with financial resources for training, and with specialised training knowledge and facilities and they are called larger here because they are likely to be larger in terms of number of employees, turnover and assets[1]. Conversely smaller firms lack resources and expertise and are likely to be smaller by the same measures. The distinction is of course crude and a great variety and many exceptions are to be expected, but it provides a device for setting out two kinds of action.

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[1] "Knowledge" or "people" firms can have very large sales on a small asset base; but here we are dealing only with manufacturing.

111. Action by government.

(a) smaller firms should be offered assistance in developing their knowledge of training planning, management and execution as a complement to other kinds of development. This assistance can take several forms: including information, as well as positive financial assistance such as tax rebates, subsidised consultancy and management seminars on training matters. It can be offered directly to individual firms or to groups of firms in particular areas or sub-sectors, or it can be offered through intermediate organisations. The first object of such assistance is, where necessary, to break through resistance and to create initial awareness, and the second object is to create sustained attention to training matters. Where appropriate it can lead to participation in the Training Contract Scheme. Assistance should be strictly cost-limited and time-limited in respect of any one firm.

The "information" referred to as the first component of assistance would comprise facts and figures on training courses and costs in the area or for the industry concerned, training methods, descriptions and evaluations of the benefits of training, other companies' training practices, the activities of chambers of commerce and other intermediate organisations, other development activities which complement training. It can take the form of a special TESDA newsletter, or of contributions to newspapers, journals or newsletters read by managers, about which appropriate research would be required. (Limited free or subsidised subscriptions could be offered.) If it is found that managers do not read much text the material can be put into graphic or tabular form; or on the other hand national or local television or radio could serve the purpose. (These media are also good for the dissemination of certain types of labour market information to managers and others in or joining the labour market.)

(b) larger firms should be brought into a reciprocal partnership with government. Through such a partnership they will gain enhanced knowledge of HRD matters and more satisfactory response to their HRD needs from the government. It is likely that the most practical mechanism for this kind of interaction will be through local chambers, industry associations or boards, or sometimes professional associations; the choice of channel will depend on various circumstances and there is no reason why practice should be harmonised.

112. The subjects which can usefully be discussed by TESDA and larger firms, and converted into policy and programmes, will include:
(1) job design and competence definition,
(2) certification,
(3) national secondary and post-secondary curricula, especially basic, generic subject-matter such as literacy, numeracy, computer familiarity, personal attributes and interpersonal skills, and
(4) methods of designing and proposing training investment projects,
(5) assistance to smaller firms in intensifying their training focus,
(6) the collection, analysis and application of labour market information.
These subjects emerge from the present studies but the list is not by any means exhaustive.

(c) TESDA itself will have to ensure that its professional knowledge and capacity is adequate to fulfil these functions. In particular TESDA should ensure that it maintains its own training focus, or in other words becomes a "learning organisation". There are three components in this learning process. One is continuous acquisition of coherent knowledge of industrial, technological and organisational development in the Philippines and the world at large; the second concerns TESDA's internal interactions, the diffusion of knowledge and understanding within the secretariat, and agreement on organisational priorities and positions;

and the third is the continuous development of a knowledgeable and responsive interface with its clients in industry, the TVET sector and the general public.

113. Action by larger firms.

a) The counterpart contribution of larger firms will be to enhance government's own knowledge and understanding of the subject, to assume a leadership role in manpower development in their sub-sector or geographical area, and to contribute directly to good training practice in smaller firms.

b) Government policy formation and the ensuing programme formulation in the area of industrial training will be given more accurate and cost-effective direction if it is fully informed of industry's intentions, preoccupations and requirements. These intentions and preoccupations should be formulated clearly, positively and professionally and with all the detail necessary for decision-making. There will always be a natural tendency for private industry to try to have the public sector assume responsibility and (especially) the cost of industrial training, and the public sector will equally naturally try to resist; but in the end a common position must be reached so that repeated and pro forma discussion is avoided. Cost-sharing proposals should be formulated with due attention to the expected social benefits which would justify public expenditure or international assistance. Curriculum proposals must be drawn up with an eye to a practical division of labour between the generic responsibility of the public TVET system and the sub-sector specific TVET which is the province of industry itself. The implication here is that individually or collectively firms should ensure that they are themselves professionally capable of expressing themselves to government and that they devote the necessary resources to this capacity; and as suggested above they should enter into dialogue with TESDA (in TESDA's area of interest) in order to learn, if necessary, and to establish mutually agreed modes of discussion and operation.

(c) Larger firms, as many already do, should look beyond their own immediate interests and should take on the role of industry leaders in training matters as much as in other areas such a product or market development. Leadership entails the encouragement of smaller firms, especially through intermediate organisations, demonstration to them of effective action through such organisations, and demonstration of the nature and benefits of a "training focus". A leadership role can also be assumed in the development of public and private TVET provision and in this case will take the form of active and informed participation in area and sub-sector TVET planning, teacher training, properly designed and executed OJT, and institutional governance. Lastly the leadership role can be directed to firms' potential human assets while they are still at school or in pre-employment training.

(d) larger firms can and should render direct assistance to smaller firms in the latters' effort to intensify and professionalise their training focus. Examples of such assistance are already to be found when firms provide training (and other services such as quality control) to their sub-contractors; but it can be extended to non-contracted firms to the mutual benefit of the whole area or sub-sector concerned. It can again be rendered either directly to individual firms or through intermediate organisations, and will take the form of intermittent consultancy or less formal advice from larger firms' practitioners, seminars or single lectures, study-visits to larger firms, and even such simple matters as showing a smaller firm some basic procedures and forms, in order to give a procedural entry-point to the whole conceptual area.

Action by smaller firms

114. Smaller firms in this scenario are by definition recipients, willing or otherwise, of "launch aid" in developing or intensifying their training focus, and their action is necessarily reactive. At least in the first instance. But they should, as far as they have the resources, take on some of the activities and responsibilities of larger firms as soon as they are able to do so, and aim to become larger industry leaders themselves. This will take place in the context of sustained overall performance improvement.

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ANNEX 1. DESCRIPTIVES OF FIRMS: EMPLOYMENT AND ACCORDING TO SIZE

Table A1: Employment trends in low and high technology firms by industry sub-sector

Clothing	Low technology	High technology
UP	50	46
down	23	46
static	27	6.7

Electronics	Low technology	High technology
UP	50	47
down	36	23
static	13	11

Engineering	Low technology	High technology
UP	38	64
down	19	28
static	41	7

Table A2: Average levels of training indicators for firms by size

	small	medium	large
% with HRD unit	9	36	74
% with HRD budget	12.3	32	70
% with HRD plan	8.8	19	52
HRD exp.as % of payroll	.52	.20	2.9
% with training facilities	10.5	15	48
% apprenticeship scheme	30	44	52
% with students on OJT	35	40	70
% in TESDA/training contracts scheme	21	15	37
Financial assistance to external institutions (%)	8.8	3.4	11
equipment assistance(%)	3.5	1.7	7.4
teaching assistance(%)	5.3	5.2	18.5

Table A3: Skill intensity by size

	% engineers in workforce	%technicians	% skilled prod.workers	%non-prod workers	%unskilled
small	2.1	3.6	62.0	16.1	16.9
medium	2.2	3.2	58.1	13	22
large	3.2	8.3	61.4	10	17.7

Table A4: Sources of Recruitment by size; % of firms using each source

	TESDA	Meralco	Technical Education Institutes	DonBosco	Schools of Arts & Trades	State Univ. Colleges
small	26.3	5.3	12	23	47.4	10.5
medium	29	6.9	15.5	24.1	36.2	15.5
large	29.6	11.1	40.7	48.1	40.7	37

Table A5: Descriptives by size

	small	medium	large
mean size	22	210	1486
mean age	26	17	12
% foreign	14	52	70
% exporters	24	51	70
% employment growth	24	28	40
% employment decline	28	34	11
% static employment	40	13	11

ANNEX 2 INDICATORS OF ENTERPRISES' TRAINING POLICIES

INDICATORS (n = 60)	Small (n = 13)	Medium (n = 28)	Large (n = 19)	Total	Total as % age of all firms with this indicator
Provide systematic training	10	17	14	41	85
In-house HRD or training unit	1	19	18	39	97
HRD plan	2	19	17	38	100
HRD budget	4	10	12	26	96
Full-time trainer(s) employed	4	11	9	24	75
Own training centre	0	8	7	15	94
On-the-job training	2	8	11	21	88
Use external training institutions	1	11	10	22	100
Assist external institutions	0	4	4	8	73
Apprentices sent for off-the-job training	2	4	1	7	100
Students given OJT	10	16	16	42	75
Work with local colleges	5	3	1	9	100
TOTAL	13	28	19	60	43*

* = %age of all establishments

Annex 3. Opinions of firms on cooperation between government and private sector in TVET, and areas of action by various actors

Q. 27 Cooperation between government and the private sector (for all firms):

Areas (3) listed by firms where:
a: they think the government is most likely to intervene
b: government intervention would be most useful to the firm
c: the firm would be most likely to contribute towards the costs
d: the industry association would be most anxious to contribute.

	All Firms	A	B	C	D
1.	Reinforcement of labour market info. systems	54	52	23	18
2.	Provision of information to young people	44	47	25	23
3.	Guidance to education and training institutions	53	61	25	20
4.	Priority to improvement of general education	51	52	22	23
5.	Delivery of skill training at govt. training institutions in response to skill shortages	42	49	30	25
6.	Establishment of training centers for your sector spec.	36	53	38	36
7.	Identification of critical skills likely to be in demand	22	34	40	42
8.	General financial support to training through taxation	27	53	21	9
9.	Levy-grant system	33	34	9	9
10.	Tax incentives and rebates to firms to encourage investment in training	40	46	16	11
11.	Tax rebates to employees to encourage them to train	30	33	10	19

COOPERATION BETWEEN GOVERNMENT AND PRIVATE SECTOR BY SIZE OF FIRM

Areas (3) listed by firms where:
a: they think the government is most likely to intervene
b: government intervention would be most useful to the firm
c: the firm would be most likely to contribute towards the costs
d: the industry association would be most anxious to contribute.

	Small firms	A	B	C	D
1.	Reinforcement of labour market info. systems	21	18	10	4
2.	Provision of information to young people	17	16	11	8
3.	Guidance to education and training institutions	20	23	10	5
4.	Priority to improvement of general education	22	17	9	9
5.	Delivery of skill training at govt. training institutions in response to skill shortages	14	17	12	11
6.	Establishment of training centers for your sector spec.	18	19	11	11
7.	Identification of critical skills likely to be in demand	8	8	12	16
8.	General financial support to training through taxation	13	16	8	2
9.	Levy-grant system	10	10	3	2
10.	Tax incentives and rebates to firms to encourage investment in training	11	16	4	2
11.	Tax rebates to employees to encourage them to train	9	14	6	7

	Medium-sized firms	A	B	C	D
1.	Reinforcement of labour market info. systems	23	23	9	7
2.	Provision of information to young people	18	21	7	11
3.	Guidance to education and training institutions	25	25	9	9
4.	Priority to improvement of general education	19	25	9	8
5.	Delivery of skill training at govt. training institutions in response to skill shortages	17	22	13	11
6.	Establishment of training centers for your sector spec.	12	22	16	16
7.	Identification of critical skills likely to be in demand	8	19	16	15
8.	General financial support to training through taxation	9	21	9	5
9.	Levy-grant system	15	15	6	5
10.	Tax incentives and rebates to firms to encourage investment in training	18	21	9	7
11.	Tax rebates to employees to encourage them to train	14	14	2	8

	Large firms	A	B	C	D
1.	Reinforcement of labour market info. systems	10	11	4	6
2.	Provision of information to young people	8	10	7	4
3.	Guidance to education and training institutions	8	12	6	6
4.	Priority to improvement of general education	10	10	4	6
5.	Delivery of skill training at govt. training institutions in response to skill shortages	10	10	5	3
6.	Establishment of training centers for your sector spec.	6	12	10	8
7.	Identification of critical skills likely to be in demand	6	7	11	10
8.	General financial support to training through taxation	5	15	4	2
9.	Levy-grant system	7	9	0	2
10.	Tax incentives and rebates to firms to encourage investment in training	11	8	3	2
11.	Tax rebates to employees to encourage them to train	7	5	1	4

Views of firms about government and private industry activities in HRD by industry sub-sector (Q27)

	Garments	A	B	C	D
1.	Reinforcement of labour market info. systems	14	18	0	1
2.	Provision of information to young people	11	16	6	5
3.	Guidance to education and training institutions	18	17	6	5
4.	Priority to improvement of general education	13	16	3	4
5.	Delivery of skill training at govt. training institutions in response to skill shortages	11	15	5	7
6.	Establishment of training centers for your sector spec.	10	16	11	10
7.	Identification of critical skills likely to be in demand	6	13	8	12
8.	General financial support to training through taxation	6	13	4	2
9.	Levy-grant system	12	9	3	3
10.	Tax incentives and rebates to firms to encourage investment in training	14	12	5	1
11.	Tax rebates to employees to encourage them to train	12	10	4	5

Q.27

	Non-electrial machineries	A	B	C	D
1.	Reinforcement of labour market info. systems	14	9	6	5
2.	Provision of information to young people	9	9	5	10
3.	Guidance to education and training institutions	9	8	7	3
4.	Priority to improvement of general education	12	8	6	9
5.	Delivery of skill training at govt. training institutions in response to skill shortages	10	9	7	5
6.	Establishment of training centers for your sector spec.	9	10	9	4
7.	Identification of critical skills likely to be in demand	4	3	9	8
8.	General financial support to training through taxation	7	10	7	1
9.	Levy-grant system	3	6	2	1
10.	Tax incentives and rebates to firms to encourage investment in training	6	9	2	2
11.	Tax rebates to employees to encourage them to train	7	5	0	5

Q.27

	Elektronics	A	B	C	D
1.	Reinforcement of labour market info. systems	13	15	4	7
2.	Provision of information to young people	10	15	7	5
3.	Guidance to education and training institutions	14	23	7	7
4.	Priority to improvement of general education	16	14	8	2
5.	Delivery of skill training at govt. training institutions in response to skill shortages	14	13	9	8
6.	Establishment of training centers for your sector spec.	10	12	13	15
7.	Identification of critical skills likely to be in demand	7	11	14	12
8.	General financial support to training through taxation	6	18	5	3
9.	Levy-grant system	10	12	2	3
10.	Tax incentives and rebates to firms to encourage investment in training	10	14	5	7
11.	Tax rebates to employees to encourage them to train	2	12	3	4

Q.27

	Automotive Industry	A	B	C	D
1.	Reinforcement of labour market info. systems	13	10	8	5
2.	Provision of information to young people	14	7	7	3
3.	Guidance to education and training institutions	12	13	5	5
4.	Priority to improvement of general education	10	14	5	8
5.	Delivery of skill training at govt. training institutions in response to skill shortages	7	12	9	5
6.	Establishment of training centers for your sector spec.	7	15	5	7
7.	Identification of critical skills likely to be in demand	5	7	9	10
8.	General financial support to training through taxation	8	12	5	3
9.	Levy-grant system	8	7	2	2
10.	Tax incentives and rebates to firms to encourage investment in training	10	11	4	1
11.	Tax rebates to employees to encourage them to train	9	6	3	5

Annex 4. Opinions of firms on priority actions by various actors in TVET system

Q28. In following list of activities in technical education and training, indicate the 3 priority areas for action (for all firms) by:

a: private institutions
b: government technical education institutions
c: govt, trade schools and training centers
d: universities and state colleges.

	All firms	A	B	C	D
1.	Upgrade curriculum to meet industry needs	40	74	67	62
2.	Giver more emphasis to positive trainees attitudes and work discipline.	55	50	54	41
3.	Involve industry more in planning courses.	44	47	41	35
4.	Involve industry more in delivering courses.	31	31	39	31
5.	Prepare more short courses for specific industries.	29	59	56	37
6.	Supervise on-the-job training more effectively.	57	33	46	32
7.	Deliver consultancy services to industry.	54	35	38	35
8.	Undertake trade testing for industry.	32	49	52	25
9.	Make better use of industry boards and advisory committees.	41	31	23	24
10.	Give more emphasis to general education, literacy and numeracy.	26	31	31	61