Annex J: A Cost-Benefit Framework for Evaluating APTC

This annex has two objectives: (a) outline a cost-benefit framework for evaluating the APTC initiative, and (b) suggest additional information to be collected by APTC to facilitate such an evaluation. It is motivated by AusAID's interest (and that of countries in the PIF that benefit from APTC) in whether, and how, APTC is delivering value for money. Value for money is assessed by comparing the average per student costs of APTC training to the net present value of the benefits of training to students, co-workers, employers and the wider society. While only a sub-set of benefits can be measured, and the cost-benefit analysis done only on a sub-set of outcomes, the discipline of noting the costs and all the different benefits can still be beneficial for policy-making. This exercise also provides a lens through which to focus on whether the APTC's monitoring and evaluation strategy adequately collects the needed data on project outcomes – improved employment and individual and employer productivity gains – that could be assessed within a cost-benefit framework.

The first section outlines the cost-benefit analysis (CBA) framework. It is followed by an illustrative example of CBA of an education and training project, and a discussion of the challenges of implementing such a framework in the PIF countries. The annex concludes with suggestions on how APTC's planned tracer studies and employer surveys might be modified to better elicit information useful for a CBA of the APTC initiative.

A. Cost-Benefit Analysis Framework

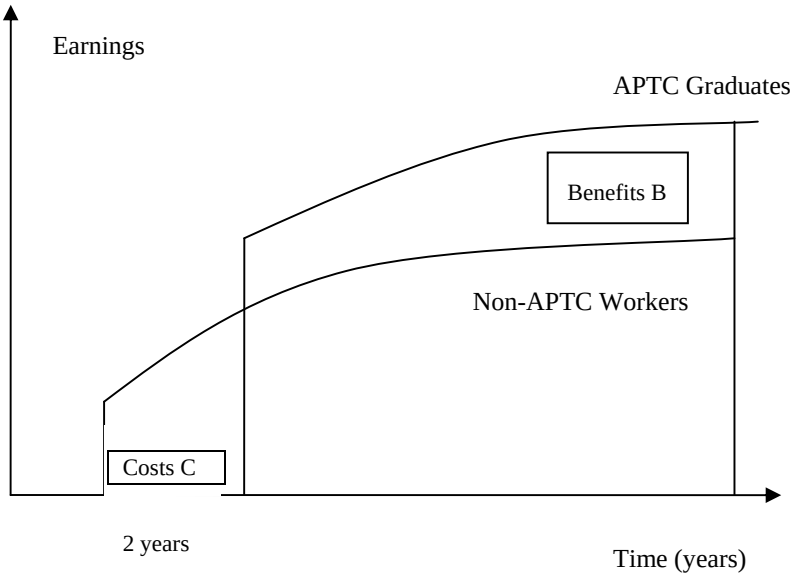
Cost-benefit analysis (CBA) is a well-established tool for making decisions about the amounts and types of investments, in infrastructure projects as well as in education and training (see Belli et al, 1998). Put simply, it involves a comparison of the costs of an investment against the sum of the future stream of its benefits discounted into present value terms so that meaningful comparisons can be made with costs. The investment is worthwhile if the present value of benefits exceed its costs such that it yields a reasonable rate of return on investment, or one investment option is preferred to another if it yielded a higher benefit-to-cost ratio.

Applying this framework to education and training decisions is straightforward. Most CBA of education and training projects rely on a human capital framework, and a schematic of the costs and benefits of investing in human capital are shown in Figure 1. The private benefit (B) for the individual of investing in (say) two years of training from APTC is the gain in earnings for the rest of that person's working life. These gains are computed relative to the incomes that he/she would have earned without training. The private cost (C) would include any tuition fees and direct costs that the individual pays plus the opportunity cost in terms of foregone income. As noted above, because these values occur over time, they must first be discounted to the present to be comparable.

When the training involves public monies, the appropriate guide for investments is the social rate of return. In this case, the comparisons in Figure 1 need to be adjusted to reflect the social costs and benefits to society of the training. Social costs (SB) are the costs to society of delivering the training, and include rental of buildings, purchase of equipment,

professional salaries, travel and scholarships. These costs would be added to the direct and opportunity costs of training for the individual.

Figure 1 Schematic of Costs and Benefits of APTC Training



Social benefits (SB) are the monetized value of the gains accruing not only to individuals who are trained but also to their co-workers, employers and the wider society. Others may benefit indirectly from the productivity-enhancing effects of training via external effects and spillovers, such as the training of co-workers, the diffusion to other employers of best industry practices through demonstration effects and job mobility, and improved organizational performance from an expansion of the supply of skilled workers (see 4.2 and 4.4 of the main report). Such indirect benefits are difficult to measure but the extant evidence suggests that they can be quite large. As such, when CBA omit these indirect benefits and rely only on individual earnings profiles (private benefits) to compare social costs, the estimates of social rates of return are typically understated.

The CBA rarely stops at the yes-no investment decision based on the benefit-cost ratio. Typically, the analyst also explores the robustness of the results to different assumptions about discount rates or scenarios in which key expected outcomes are realized or not realized. This kind of sensitivity analysis can also be used to address other key issues of interest to policymakers, such as the merits of alternative modalities of service delivery or targeting of different demographic groups, provided the necessary costs and benefits data are collected in sufficient detail to permit such comparative analyses.

B. Illustrative Example of Cost-Benefit Analysis

Implementation of the CBA framework to APTC may be illustrated by the example of a recent World Bank technical education project in India. The 2007 India Vocational Training and Improvement Project (VTIP) is a five year program of support to the GoI to upgrade and strengthen 400 Industrial Training Institutes (ITIs) out of about 1,800 ITIs in the country

spread across 23 states. The benefits expected from VTIP, as reflected in the project's key performance indicators, are: (a) improved internal efficiency of upgraded ITIs, in terms of proportion of enrolled students who successfully get trade certification; (b) enhanced labour market outcomes for ITI graduates, as measured by the reduction in time taken to find employment, and (c) by improved productivity, as measured by higher life-time earnings of ITI graduates.

To evaluate VTIP, two baseline surveys were undertaken: (i) an institutional survey of all ITIs in the country and (ii) a tracer study of graduates from a sample of ITIs. These two surveys were analysed to get baseline indicators (and their variation across states) of ITI performance, and the job search, employment and earnings prospects of ITI graduates so as to agree on key performance targets over the 5-year life of VTIP. Both surveys are to be repeated every two years so the institutional performance of ITIs and labour market experiences of successive cohorts of ITI graduates can be tracked over time as selected ITIs are upgraded. Data from a third source – the 2004 India National Statistical Survey (NSS) – were used to estimate lifetime wage profiles of ITI graduates and a comparison group of similar individuals that did not undergo ITI training. The two groups could be identified in the NSS from questions eliciting information on educational attainment and vocational training (including from ITIs).

The CBA proceeded in several steps. First, the unit cost of the project was calculated from the cost of the ITI upgrading component and the projected number of graduates of the 400 upgraded ITI that complete training with trade certification. Next, a statistical model was used to estimate the forecasted wage-experience profiles of ITI graduates and the comparison group from which net present values of lifetime earnings gains could be calculated. Assumptions about the three key performance indicators were then tested over a variety of scenarios, and the resulting impacts on net present values of earnings gains assessed. The CBA results from the sensitivity analysis suggested that rates of return in excess of 20 percent may be expected, using a discount rate of 5 percent and reasonable scenarios under which the internal efficiency of upgraded ITIs rises (from 61% in the baseline case to 75%), resulting in improved employment prospects and wage increases of 10 to 15% over the baseline.

The robustness of these CBA results can be evaluated at project-end using the data from repeated institutional surveys and tracer studies. The impact of the VTIP intervention on ITIs can be assessed by comparing the institutional performance of upgraded ITIs against their baseline indicators and against other similar ITIs in the same state that were not upgraded. Similarly, the impacts on improved employment and earnings can be identified by comparing the experiences of successive cohorts of ITI graduates from upgraded ITIs against those of other graduates. This ability to causally relate gains in the labour market outcomes of graduates to investments in ITI upgrading in all its different modalities should yield important lessons for policymakers on the design of TVET initiatives and permit a rigorous assessment of value for money.

C. Challenges Implementing CBA of APTC

The design of APTC – a green field initiative delivering higher-level technical training certificated to Australian standards in 4 countries and serving 13 PIF countries – poses special challenges for implementing a value for money assessment of APTC within a CBA framework:

First, there is a paucity of current labour market data in PIF countries (Voigt-Graf, 2007); only four countries have fielded labour force or household surveys with information on employment, earnings, and educational attainment needed to estimate wage-experience profiles for the comparison group with similar personal attributes as APTC graduates.[1]

Second, even if such surveys existed, the green field nature of APTC and the Australian qualifications provided by this training mean that these surveys would not be informative about the potential earnings streams of APTC graduates. This suggests that APTC has no recourse but to collect wage data from its graduates.

Third, the types of training provided and the demographic groups targeted by APTC imply that the earnings of graduates are unlikely to be a good measure of the productivity gains from APTC training,[2] either because some part of these gains are shared with employers or because of spillover benefits to other workers, employers and society. Unless some account is taken of the sharing of productivity gains and external effects, the benefits of APTC will be understated relative to its costs.

Acknowledging the difficulty of measuring the impact of APTC training in improving individual and employer productivity, the PAF has instead sought to measure impacts indirectly through qualitative rankings of key outcomes elicited from respondents of graduate tracer studies and employer surveys. The PAF will judge improved productivity outcomes to be realized if (a) 80% of graduates and their employers provide endorsement of APTC training on employment outcomes, and 80% of graduates find employment within one year of graduation; and (b) 80% of graduates and employers report increased productivity as a result of completing APTC training. While adequate for monitoring whether APTC training is meeting the targets identified by the PAF, these qualitative outcome measures fall short on eliciting data needed for a CBA of APTC.

D. Modifications to Surveys

With relatively minor modifications, the draft survey instruments for planned graduate tracer studies and employer surveys can be adapted to facilitate an assessment of APTC within a CBA framework.

Graduate Tracer Studies

First, given the goal of improving employment prospects for APTC trainees, the tracer survey should elicit labour market information on school-to-work transitions including date of first employment after completing APTC training, and job search if not currently employed. Job search is time-consuming and there is interest in knowing whether competency-based

1 Two of these countries include Vanuatu and Tonga, where technical assistance was provided to national statistics offices – as part of AusAID's bilateral TVET projects – to make Household Income and Expenditure Surveys (HIES) more useful for labour market analysis and project M&E.

2 In competitive markets, economic theory suggests that wages should equal (marginal) productivity. This assumption increasingly becomes untenable when employee training is financed (directly or indirectly) by employers who therefore share in the benefits through payment of wages lower than productivity levels; when markets are not competitive (as in the public sector); or when externalities are present. A case can be made for all three exceptions to the competitive assumptions: a sizeable share of APTC trainees are drawn from the public sector where pay scales may not fully reflect productivity; many APTC trainees are existing workers whose employers may directly or indirectly partially finance their participation in APTC training; and there appears to be important spillover benefits to other workers and employers, as emerged from the MTR team's focus group meetings with key stakeholders (see sections 4.1 and 4.2 of the main report).

training and Australian qualifications facilitates (reduces time taken to secure) employment, whether locally or abroad.

A related employment question that could be easily included is whether the graduate is currently with the same employer as when he/she first started APTC training. This would provide a measure of job mobility across employers, an indicator variable that is important for several reasons – as a measure of improved employment prospects from getting internationally-recognized qualifications, and as a well-recognized avenue for technology diffusion of best-practice skills and work practices to other employers and businesses.

Second, the tracer survey should ask graduates to estimate their monthly income levels (in local currency) if currently employed.[3] Notwithstanding concerns about potential non-response, such an income variable would yield hitherto unavailable information on incomes in key sectors of all the different PIF countries served by APTC. Ideally, one would like information on the post-training wage-experience profiles of graduates past the first year, especially if income gains associated with improved promotion prospects (and productivity) are only realized over time.[4]

Third, incomes of APTC graduates should be compared to those of a comparison group of individuals with similar attributes who did not participate in APTC training.[5] A comparison group could be drawn from the pool of qualified but unsuccessful applicants for APTC scholarships, and selected to be representative of APTC trainees in gender, sectoral interest and citizenship.[6] A modified tracer survey without the APTC-specific questions would be administered to this comparison group to provide baseline information on what the employment and incomes of APTC graduates would have been had they not participated in the training.

Finally, tracer studies should go beyond questions on own professional and personal development to begin getting at measures of potentially important external benefits to others from the new skills and knowledge provided by APTC training. Graduates, if currently employed, could be asked whether they have been responsible for, or contributed to (a) formal or informal training for colleagues and co-workers in their current organization, and (b) introduction of new and more efficient workplace practices to replace traditional ways used by their organization.

Employer Surveys

The employer survey instrument does not break new ground, eliciting from employers an assessment of the same professional and personal development measures of graduates as in the tracer studies. While they have a role to play in confirming self-assessments by graduates,

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3 The tracer study currently only asks graduates (a) whether their current incomes are higher or lower than pre-APTC incomes, and (b) to estimate the percentage by which current incomes have increased or decreased as compared to prior incomes. With information on current incomes, (b) provides an estimate of income levels prior to getting APTC training.

4 One remedy may be to resurvey all APTC alumni at project-end to get information on employment and earnings trajectories of different graduate cohorts over longer periods of time (up to 3 years after completing training).

5 One alternative is to simply compare current incomes to pre-training income information elicited in the tracer study, in effect using APTC trainees as their own comparison group.

6 The BLUE data base contains names, demographic, citizenship and contact information for all applicants including those that did not ultimately participate in APTC.

the employer surveys could benefit from including several additional questions on productivity and wages to complement those in the revised tracer studies.

First, the one question in the current survey on APTC's productivity impact is too broad to be useful for analytic purposes and should be amended. It asks: "What impact (if any) has APTC had on the productivity or overall performance of your business?" and allows employers to provide open-ended written responses. The survey team should provide better guidance to employers on how to respond, given the diverse nature of the organizations and sectors being served. For employers in the service industry or public sector, concepts of productivity and institutional performance are difficult to understand, let alone measure.

An alternative more useful approach is to ask employers to estimate the productivity difference (in percentage terms) between individual APTC graduates and similar workers that did not attend APTC training. This question might follow logically from questions on professional and personal development. In addition to being quantifiable, this question provides data on the relative productivity of graduates that can be used, in conjunction with relative wages to be elicited in a separate section (see below), to gain insights into how the productivity improvements from APTC training are shared between graduates (in the form of higher wages) and the employer (in the form of higher profits).

Another question – whether returning graduates have improved the productivity of other workers and the organization – could be used to provide a rough measure of the external effects of APTC. Like the tracer study, employers would be asked about whether graduates are sharing their new skills and knowledge from APTC training with others in the organization, through the formal and informal training of co-workers or the introduction of new and more efficient workplace practices and standards. Employers could also be asked to estimate the number of co-workers benefiting from these specific activities, and possibly their impacts on organizational performance.

Second, the employer survey could also include a limited set of questions on the organization's current and future wage structure for graduates and non-APTC workers. Like the above question on relative productivity, employers would be asked to provide information on the current average (monthly) incomes of graduates and a comparable group of non-APTC workers. In addition, they would be asked to estimate the future incomes of both groups (say) five years from now, accounting for the possibility of differential promotion speed over this time period. These latter estimates – of future (and possibly different) wage trajectories with work experience for the two groups of workers – remedy a shortcoming of the tracer studies that only elicited wage data for graduates one year after completing training.

E. Implementing CBA for APTC

The additional information proposed for collection through the revised tracer studies and employers should provide the basic data for a cost-benefit analysis of APTC. Following the example in Section B, implementation of the CBA would start with the simplest comparison of the cost of APTC training – estimated at $34,600 per graduate (see Section 4.4) – against the net present value of lifetime incomes of APTC graduates, and then progressively expanding the analysis to consider the impacts of alternative assumptions and scenarios.

The building blocks for this CBA are the projected wage-experience profiles of APTC graduates and a comparison group of like individuals that did no participate in training. These wage-experience profiles would be estimated from income data reported by graduates

in tracer studies and by the comparison group of non-APTC workers, and the net present value of income gains from training computed using alternative discount rates.

These estimates assume that the wage gains to APTC graduates are a constant proportion of those of the comparison group since tracer studies only measure wage differences one year after completing training. If wage gains of graduates are only realized over time, this is likely to understate estimates of the net present value of income gains of graduates. This assumption may be tested against information elicited in employer surveys about possibly different wage trajectories of the two groups.

One of the assumptions of competitive markets is that the productivity of workers is fully reflected in their wages. There is some evidence from the literature that suggests that employers and workers may share the productivity benefits from training. If this is the case, then the net present value of wages may underestimate the productivity impacts of APTC training. This possibility may be tested using information elicited from employer surveys on the relative productivity and relative incomes of APTC graduates. The ratio of relative incomes to productivity is an estimate of the share of productivity gains accruing to workers, and estimated net present values can then be adjusted upwards to reflect this sharing.

Thus far, the CBA has focused on a comparison of the social cost of APTC training and the private returns to individual APTC graduates. This assumes away the potentially important additional social benefits of APTC training that extend to other workers and employers through external effects. A sub-set of these external benefits to others – through APTC graduates training of co-workers and introduction of new workplace practices in the organization – is elicited in tracer studies and employer surveys. Reflecting these external effects into the CBA is likely to have multiplicative effects on estimates of net present values of income and productivity gains from APTC training.

E. References

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