DOCUMENT RESUME

ED 387 646 CE 070 025

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TITLE The Changing Role of Vocational and Technical Education and Training (VOTEC). Vocational Education and Training for the 21st Century: Opening Pathways and Strengthening Professionalism. VOTEC as an Investment and the Mobilisation of Human and Financial Resources. Issues and Questions for Working Group III.
INSTITUTION Organisation for Economic Cooperation and Development, Paris (France).
REPORT NO DEELSA/ED/WD(94)29
PUB DATE Nov 94
NOTE 24p.; Discussion paper presented at a Meeting of the Organisation for Economic Cooperation and Development (Paris, France, November 28-30, 1994). For related documents, see CE 070 024-034.
PUB TYPE Viewpoints (Opinion/Position Papers, Essays, etc.) (120) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Cost Effectiveness; Developed Nations; Educational Finance; Educational Needs; *Educational Practices; *Education Work Relationship; Enrollment Trends; Foreign Countries; Futures (of Society); *Job Skills; Labor Market; Postsecondary Education; Public Policy; Secondary Education; *Skill Development; Technical Education; *Vocational Education
IDENTIFIERS Europe; *Organisation for Economic Cooperation Development

ABSTRACT

In preparation for a conference held in Paris, France, in November 1994, the Organisation for Economic Cooperation and Development launched a 5-year program that involved 20 countries studying the changing role of vocational and technical education and training (VOTEC). A synthesis of national studies was prepared on three related issues: (1) the implications and information requirements of viewing VOTEC within an investment framework; (2) the main features of existing institutional and other incentive structures for investing in VOTEC; and (3) using public policies to improve existing incentive structures to ensure a maximum of efficiency and effectiveness in the financing and provision of VOTEC. The study suggested that, despite the massive and increasing amounts of public and private expenditure on education and training in highly industrialized and also in industrializing and developing countries, there is a scarcity of clear evidence balancing the costs of and returns to such investment. To a large degree, this lack of evidence of returns to human capital is due to the very heterogeneous nature of the societal and private benefits derived from education and training and the long time periods over which the benefits accrue. Additionally, the study noted that the job market requires increasingly higher-level and less job-specific skills (more professionalism) and questions who should pay for these skills: the employer as formerly the case in job training, or the individual and society as is the case in traditional education? (KC)

ORGANISATION FOR ECONOMIC
CO-OPERATION AND DEVELOPMENT

DIRECTORATE FOR EDUCATION, EMPLOYMENT
LABOUR AND SOCIAL AFFAIRS

RESTRICTED

Paris, drafted: 21-Nov-1994
OLIS: 22-Nov-1994
dist.: 23-Nov-1994

DEELSA/ED/WD(94)29

Or. Eng.

THE CHANGING ROLE OF VOCATIONAL AND TECHNICAL EDUCATION AND TRAINING (VOTEC)

VOCATIONAL EDUCATION AND TRAINING FOR THE 21ST CENTURY OPENING PATHWAYS AND STRENGTHENING PROFESSIONALISM VOTEC AS AN INVESTMENT AND THE MOBILISATION OF HUMAN AND FINANCIAL RESOURCES ISSUES AND QUESTIONS FOR WORKING GROUP III

FOR TECHNICAL REASONS, GRAPHS, TABLES & FACSIMILES ARE NOT AVAILABLE ON OLIS

(Note by the Secretariat)

1. The attached document was prepared for the high level conference on "Vocational education and training for the 21st century - opening pathways and strengthening professionalism" which will take place on 28 - 30 November 1994 at the OECD in Paris. The paper presents **ISSUES AND QUESTIONS FOR DEBATE** in **Working Group III** on "VOTEC as an investment and the mobilisation of human and financial resources".

2. The author of the document is Dr. Christoph F. Buechtemann, RAND, Santa Monica, California, United States.

3. The document is circulated **for DISCUSSION.**

Introduction

1. The invitation to this conference states three very ambitious tasks and objectives for this working group: first, the agenda suggests that we discuss the determinants of investments in VOTEC and the ways in which the effectiveness of such investments can be measured. The latter certainly requires that we generate some kind of consensus about what the goals of VOTEC should be, how economic efficiency considerations and private returns to VOTEC are to be balanced against social equity considerations and the wider social returns to VOTEC investments. Secondly, the agenda asks us to consider the impact of young people's choices and preferences on VOTEC investments in the private and public sectors and vice versa. Phrased somewhat differently, this seems to relate to the question of whether existing incentive structures for individual education decisions by youngsters ensure an efficient use of the human and financial resources employed in human capital generation. And, as a third task of this working group, the agenda mentions that we should generate notions of how human and financial resources could be more fully and more effectively mobilised and in particular, what kinds of cost-sharing arrangements between public authorities, private business, and individuals are likely to improve VOTEC's efficiency and effectiveness.

2. The issues to be addressed by the working group can, therefore, be summarized under three main headings or questions:

i) What are the implications and information requirements of viewing VOTEC within an investment framework?

ii) What are the main features of existing institutional and other incentive structures for investing in VOTEC?

iii) How can public policies improve existing incentive structures to ensure a maximum of efficiency and effectiveness in the financing and provision of VOTEC?

3. The massive and increasing amounts of public and private expenditure on education and training in highly industrialized, but also industrializing and developing countries is contrasted by the pervading scarcity of clear evidence balancing the costs of and returns to such investment. Although studies in the tradition of the growth accounting approach have repeatedly shown that the pay-offs to human capital investments may exceed those of other (tangible) investments from an ex-post societal perspective, for those making investment decisions today, i.e., governments, firms, and individuals, investing in education and skills development still largely remains an act of faith. To a large degree this seeming paradox of substantial investments in the absence of clear evidence in the returns to human capital is owed to both the very heterogeneous nature of the (societal and private) benefits derived from education and training (ranging from the uncontested societal benefits of enhanced social cohesion, an informed electorate, and a critical consumer mass, all the way to private benefits, such as the mere enjoyment of learning, social prestige and status, and access to particular jobs and future income flows) and to the fact that in most cases these benefits or returns accrue over long time-periods and disperse across many different actors and societal contexts.

4. Regarding the financing of education and training investments, until recently there existed a clear-cut division between publicly and privately borne costs given its undeniable societal benefits (as well as its compulsory nature) basic general education has always been viewed as a public task and therefore to be financed entirely out of general tax revenue. Likewise the financing and provision of higher education (including the preparation through upper secondary general education), in so far as it used to be primarily concerned with educating individuals bound for public service careers or for 'public good' professions (doctors; lawyers; etc.), was largely left to the responsibility of the state. Vocational education and technical training (VOTEC), by contrast, which are geared primarily towards producing immediately work-related skills and competencies and enabling individuals to productively perform in mostly private sector jobs, were historically treated as a private responsibility, to be determined through the market, and financed by firms and individuals themselves, with the state's role being restricted (at best) to ensuring 'trainability' of school-leavers and to creating favourable conditions for the establishment of private training markets.

5. Only in recent decades, this classical division of responsibilities in the financing of education and training investments has increasingly eroded as most countries have witnessed a rapidly growing public involvement in the provision and financing of VOTEC in response to several trends common to most OECD countries:

-- first of all, widespread perception of underinvestment in human capital by the private sector in the face of rising vocational and technical skill requirements resulting from accelerated technological change, new forms of production and work organisation, and increasing competitive pressures from lowerwage countries. This perception has led to demands for increased public investments in VOTEC to ensure a sufficient supply of skilled labor required for shifting towards more 'knowledge-intensive' economic activities and thus contribute to sustaining competitiveness without forsaking high living standards through engaging in a low-wage strategy;

-- second, persisting high (youth) unemployment, which, due to its strong concentration among less educated workers, has been seen as partly resulting from inadequate skills to participate in a high-wage economy. This has induced increased public efforts to facilitate the transition to work through subsidising training and work experience programs for both youth and adult workers;

-- third, the pervasive quest for a democratisation of public education, to which policy - makers in most OECD countries have responded by creating and expanding vocational secondary and postsecondary schooling tracks and by widening access to higher education for those with vocational schooling credentials. Thus, a large part of the past decades' increase in formal education participation in industrialized countries has been accounted for by rising enrolments in vocational or technical public schooling

programs at vocational or 'diversified' high schools and technical colleges. Moreover, in line with the policy promise, a growing number of students have been using the new vocational schooling tracks as an avenue to higher general education, reflecting persisting disparities in social esteem attached to vocational versus academic education and credentials. This trend towards longer formal education participation has been reinforced by a parallel strong increase in primarily firm-sponsored career training for employed workers, which has focused on those with higher initial schooling credentials.

-- finally, rising higher education enrolments and an increasing heterogeneity in the ability profiles of students in most OECD countries have resulted in a transformation of the higher education sector towards a mass education track incorporating a growing number of more applied technical programs and increasingly catering to students bound for jobs in the private sector. As a consequence, both students and employers have voiced demands for higher education curricula to become more 'applied' and geared towards the specific skill requirements in the private sector.

6. This institutional blurring of the boundaries between general education as a public responsibility and vocational and technical education as a private responsibility has been supported by changes in the nature of vocational skill requirements themselves: with the large-scale diffusion of information technologies and the rationalisation or 'export' of jobs requiring merely operative skills, vocational skill requirements have shifted away from concrete job-specific work techniques and dexterities towards more general conceptual competences and organisational abilities that can be applied across a variety of different work settings and work tasks. In other words: the nature of vocational and technical skills has moved closer to (but has by no means become identical with) the type of competences commonly acquired within (most publicly financed) general education, which in turn raises a series of questions not only with regard to the most effective learning setting for teaching modern vocational skills, the Classical mode of 'on-job-training being ill-suited to provide such competences, but also with regard to the financing of vocational education and training, given the increasing importance of general and hence transferable components in modern skill profiles.

7. With growing public involvement in the financing and provision of vocational and technical education, the issue of the costs of and returns to VOTEC becomes a matter of public policy concern. This is all the more so since most OECD governments are facing mounting fiscal and budgetary constraints due to slow economic growth, persisting high unemployment, and a proliferation of competing demands on the State to assist business in meeting competitive challenges facing high wage economies (e.g., through industrial policies, R&D support, public infrastructure improvements, etc.). Optimising public resource allocation, therefore, has become a high-priority item in most governments' political agendas.

8. These general concerns about the greater state involvement in VOTEC and the proper allocation of scarce public funds are reinforced by recent evidence indicating increasing inefficiencies inherent in publicly organised (and financed) VOTEC. Such inefficiencies are indicated by evidence that formal credentials obtained through public education institutions are more and more frequently used as mere screening devices in the labour market, initiating a process of downward substitution and progressive devaluation of competencies acquired before labor market entry. This process of downward substitution seems to be particularly pronounced in those countries where skills acquisition and workforce preparation have been largely school-based and the private sector plays only a minor role in the financing and provision of vocational and technical education and training. This is consistent with the findings of several studies which have shown the returns to publicly-provided, school-based vocational education to be significantly lower than the returns to employer-sponsored, firm-based training. The assumption of increasing inefficiencies in education provision is finally also supported by macro-economic evidence which has shown a tendency of declining returns (in terms of per-capita income) to additional years of formal schooling in most highly industrialized countries during the 1970s and 1980s.

9. These results raise the questions of the relevance of the skills produced through publicly provided VOTEC and of whether vocational and technical skills are not provided more effectively and efficiently through the private sector. This is particularly so since publicly provided, school-based vocational education in most cases fail, to forge a direct link between the acquisition of vocational/technical skills and employment, and thereby ignores the fact that the societal as well as private returns to VOTEC investments crucially depend on the extent to which acquired vocational and technical skills are actually utilized in the production of goods and services and thus contribute to productivity and overall economic growth.

10. The above certainly does not preclude that the state assumes a role in (co-) financing VOTEC investments, in particular, if there are indications that VOTEC produces societal gains or benefits which are not fully captured by the labour market parties themselves and that leaving VOTEC to the market alone could therefore result in an underprovision of vocational skills. Determining whether the state should play a major role in financing VOTEC, therefore, requires not only a careful assessment of the actual costs of and returns to VOTEC investments, but also of where these costs and benefits accrue. Providing answers to these questions presumes that VOTEC be viewed within a more rigorous investment framework.

11. Viewing VOTEC as an investment within a cost-benefit accounting framework, however, presents a series of unresolved substantive and methodological problems. A first obstacle results from the very scattered structure of national VOTEC systems, the diversity of skills and competences acquired through VOTEC, and the corresponding large diversity of institutional settings in which it is provided. In most modern economies, VOTEC covers a broad spectrum of partly publicly and partly privately organized and/or financed activities involving many different actors with heterogeneous missions

(e.g., public schools, training centers, firms, and other private providers) and including activities ranging from formalized school-based education (which in many cases is difficult to separate from general/academic education) all the way to highly informal training on the job.

12. Moreover, even if these difficulties could be partly overcome by focusing analysis on individual VOTEC programs, a further obstacle results from the lack of consensus regarding how and by which criteria the outcomes of VOTEC investments should be valued, reflecting the heterogeneous goals attached to VOTEC activities by the different actors involved. From a social policy perspective, which regards VOTEC as an extension of the welfare state, for instance, it might be argued that employing disadvantaged youth in a one-year training program may be worth the public expenditures involved just for the sake of getting participants off of the street, independent of whether these youngsters subsequently find suitable jobs in which they can actually employ their acquired skills. An evaluation of such an assertion would have to consider not only the potential side-effects of such a program (e.g., a program-induced stigmatisation of participants), but also whether the same objective (e.g., keeping youngsters off of the street, raising their morale, etc.) could not be achieved through other ways at a lower cost or with additional positive returns (e.g. through publicly subsidised employment in regular jobs). Likewise, from an equity standpoint, the costs of creating equal educational opportunities through opening access to postsecondary/higher education to a larger number of secondary school-leavers may be fully justified even if the resulting increase in the number of students and graduates is not matched by a corresponding increase in the number of jobs for highly skilled workers and, therefore, does not necessarily have a positive impact on total economic output. From a more business-oriented perspective, it may be objected that providing equal access to formalized postsecondary education diverts talents and resources from the more pressing concern of bridging short-term skill shortages through other, less costly forms of workforce training. From a macro-economic perspective, by contrast, VOTEC would be viewed and valued primarily in terms of the extent to which it contributes to maintaining long-term competitiveness by facilitating adjustment to changes in the technological and competitive environment. The latter examples make clear that any analysis of VOTEC investments in cost-benefit terms must be based on a clear notion about the adequate time horizons underlying public or private investment decisions.

13. Last, but not least, even if consensus could be reached about the goals to be pursued by different VOTEC activities and the values to be attached to their various outcomes, the evaluator would still face massive problems in measuring the exact costs of and returns to VOTEC investments. First of all, although most countries produce relatively detailed data about public education expenditures (which for the most part cover outlays for general education, but in most cases fail to neatly separate out expenditures for vocational education, unless the latter are handled by a distinct administrative agency), information about private sector VOTEC expenditures, particularly firm-based training as its presumedly largest component, tends to be very scarce and unreliable, all the more so where such training is little formalized. Indeed, although firms increasingly view training as an investment rather than as a mere cost, company surveys conducted in several countries found that the

overwhelming majority of private sector firms fail to adequately account for their own training expenditures, especially if one takes into consideration that these expenditures not only include direct outlays, such as trainee wages, costs of training personnel, course fees, and training materials, but also the more hidden costs of supervisors' and managers' time for overseeing training activities and trainee selection, etc.. Thus estimates of US firms' training expenditures range from $ 30 bn. (or roughly 1% of the wage bill) to $ 300 bn. (or over 10% of the wage bill in 1987), depending on whether only formal training is considered, whether costs of informal on-the-job training are included in the estimate, or whether time spent by trainers and supervisors on training-related activities is also accounted for. In (West) Germany, i.e. a country known for its highly skilled workforce, private sector firms in 1991 spent altogether DM 60 to 65 bn. (roughly US$ 40 bn.) on initial and further workforce training, equaling some 4.5 percent of the wage bill. In France, despite a legal mandate to spend a certain percentage of the wage bill (1993: 1.4%) on workforce training, firms' reported expenditures were much lower than in Germany, which, however, may be accounted for by the fact that expenditures beyond the legally required minimum may not be adequately counted in firms' expenditure accounts. To both public expenditures and firms' training expenses one would have to add the direct training costs borne by individuals undergoing training, but here the data situation is even more unsatisfactory than in the case of firm expenditures, although some evidence suggests that the individuals' expenditures are by no means negligible: for example, a recent survey in Germany showed that participants in work-related further training alone in 1992 spent an estimated DM 10 bn. (roughly US$ 6.s bn. or 0.33 percent of West German GDP) on course fees, learning materials etc., (not counting costs that were reimbursed by their employers or public agencies). Set against public education expenditures (including those for general education), Germany and the US thus show significant private sector contributions to overall education and training expenditure, whereas in France the overwhelming part of the direct costs seems to be borne by the public.

14. Aside from direct costs and expenditures, any more rigorous accounting framework would also have to consider the opportunity costs of investments in VOTEC, that is the forgone (hypothetical) benefits from investing the same amounts in alternative activities or opportunities. The notion of opportunity costs highlights the fact that the different actors involved in VOTEC, when making investment decisions, face an array of alternative options with varying private and social pay-offs. In the case of individuals the opportunity costs of engaging in VOTEC activities are commonly measured in terms of the wages VOTEC participants would have received had they engaged in regular employment instead. Depending on the total time devoted to skills acquisition, the opportunity costs of VOTEC as measured in forgone wages may indeed be large, although measuring opportunity costs in terms of forgone wages presumes that VOTEC participants alternatively would have actually found employment opportunities, an assumption which in many cases may not be realistic. Thus in Germany, for instance, participants in work-related further training courses in 1992 spent on average 225 non-working hours per person on course work which, multiplied by a median net wage rate of DM 15.50 amounts to almost DM 3,500 (or US$ 2,250) per person. Assuming training durations to be distributed randomly and that 70 percent of all participants would have otherwise worked at a median wage rate, the total costs (non-reimbursed course fees, learning expenses,

etc., plus opportunity costs) incurred by individuals for further training in 1992 amounted to no less than DM 30 to 35 bn., closely matching German firms' total further training expenditures. Measuring the opportunity costs of VOTEC participation in terms of forgone leisure time raises the even more difficult problem of adequately valuing leisure time in monetary terms, given that the value attached to leisure (as compared to the direct benefits and enjoyment derived from learning activities) tends to vary strongly across individuals.

15. At the level of firms, opportunity costs of training workers basically consist in the alternative costs of hiring skilled workers from the external labour market or incorporating skills in technology, i.e. substituting capital for labor. The costs of hiring skilled workers from outside (or alternatively subcontracting skilled tasks to supplier firms) very much depend on (a) the overall availability of skilled labor in the external labour market (which is likely to be affected negatively if many firms decide to hire skills from outside), (b) the degree to which the skills needed are firm-specific in nature (and therefore cannot be 'bought' from outside), and (c) the wage premia to be paid for attracting trained workers from other firms (which are all the higher, the more demand for skills exceeds supply). Two recent studies for Germany indeed found the higher costs of selection, recruitment and initial training in specific skills as well as higher starting wages firms must pay when hiring skilled workers from outside to partly or even fully offset the substantial net costs (in the amount of some DM 60,000 for technical occupations and DM 20,000 for clerical/sales occupations) of training workers through the apprenticeship scheme. The alternative costs of capital-labor substitution primarily depend on the availability and cost of capital, but also on the fact that, unlike tangible capital (equipment; structures; land), intangible assets, including the skills embodied in the workforce, in most cases fail to be included in firms' balance sheets and therefore (unjustly, as many authors have argued) cannot be used as collateral for raising external capital.

16. At the level of public policy, finally, the opportunity costs of public expenditures on VOTEC in particular essentially consist in the forgone benefits from alternative uses of public funding, for instance, for expanding general education, improving public infrastructure, or supporting R&D and technology development. In fact, the relatively modest individual returns to publicly funded, school-based vocational education as compared to higher general (or academic) education might be taken as an indication that public investments in academic education tracks or else in public infrastructure promoting private , firm-sponsored training activities may be more 'profitable' than directly investing in (publicly provided) vocational schooling. Moreover, results of studies in the growth-accounting tradition have found that in highly industrialized countries the economic growth impact of increases in private (though not public) R&D expenditures and in the share of engineers and scientists in the population may in fact be larger than the impact of increases in mere educational attainment levels of the labour force (as measured in mean years of schooling). This would suggest that public funds spent on encouraging and supporting private sector R&D investments and on ensuring a sufficient supply of highly qualified R&D personnel may have higher social pay-off rates (in terms of increases in per capita incomes) than increases in public education expenditures at large.

17. However, rather than implying a direct trade-off between education and other public investments, these findings draw attention to the manifold interdependencies and complementarities of alternative uses of public funds and to the importance of determining the adequate mix of different public policy investments. Thus large public investments in (secondary) general education and a high level of basic skills embodied in school-leavers may significantly reduce the costs of subsequent vocational education and technical training, thereby affecting the ratio of costs to expected benefits from training investments. Likewise, a sufficient supply of engineers and R&D specialists, through the design of better products and superior production equipment, may greatly enhance the productivity of other skilled workers, thereby boosting the pay-offs to training investments in the latter.

18. The above makes clear that developing notions about the opportunity costs of investments in VOTEC presumes that the different actors involved in VOTEC decisions have reliable information about the expected future returns or pay-offs to both VOTEC and its strategic alternatives. However, due to the very nature of human capital investments in general and VOTEC in particular, these returns are in most cases difficult to assess and to quantify. First, returns to human capital investments tend to accrue over longer time periods and are affected by many variables (such as overall economic growth or the rate of technological change, but also the health of the person who 'owns' the skills) that cannot be predicted ex-ante and, therefore, involve a considerable degree of uncertainty. Furthermore, vocational skills and competences as the immediate outcomes of vocational and technical training do not have any intrinsic value of their own; rather the returns to VOTEC essentially depend on whether, how, and for how long the particular skills and competences acquired are productively employed in the actual production of goods and services, involving many of the above-mentioned complementarities (e.g., concomitant investments in product and process innovation, but also the organisational capabilities of firms in general); this renders an assessment of the genuine contribution of acquired skins to measurable outcomes extremely difficult. More importantly even, the returns to investments be borne by the public if an underinvestment in vocational and technical skills is to be avoided.

19. The total (or societal) returns to human capital investments (frequently approximated by income per capita, although this captures only the monetary components) are defined as the sum of the private and social returns to such investment. It is important to note, however, that this sum is not necessary larger, but may in fact be smaller, than the overall private returns accruing to firms and employers: the latter is the case, for instance, when, due to an excess supply of skills, more highly educated/trained workers (e.g., higher education graduates) are hired into positions of less skilled workers (substitution), thus causing wage cuts and/or rising unemployment for less skilled workers, but not inducing any increase in real output or GNP (or, in other words: although highly-skilled workers receive positive rates of return in terms of access to employment and higher wages, the overall societal returns are zero).

20. Most empirical studies have measured the returns to education and training primarily in terms of wage differentials across workers with varying

years of formal schooling and subsequent work experience (to capture more informal skills acquisition on the job). This approach is problematic not only because years of schooling and experience may be highly inappropriate proxies for denoting a person's acquired work-related skills (due to its many different forms, VOTEC investments and the particular skills and competences acquired through VOTEC are particularly difficult to measure), but also because it is based on the assumption that relative wages reliably reflect productivity differentials between workers attributable to different amounts of human capital. using a more sophisticated approach including direct productivity measures of individual workers, recent U.S. studies have shown that only part of the productivity increases attributable to on-the-job training are reflected in workers' wages and that a substantial part of the returns to training investments is captured by their employers in the form of non-compensated higher output. Likewise, research has shown that employers hiring workers with relevant experience and/or training from other firms also tend to reap substantial gains from the enhanced productivity of these workers, thus suggesting that 'poaching' skilled workers does in fact occur and produces significant pay-offs for the poaching firms, thereby, of course, reducing firms' willingness to invest in training in the first VOTEC tend to accrue in different places and to different actors, such as individuals (e.g., in terms of higher wages and/or more favourable employment conditions), firms (e.g., in terms of higher profitability), and the public (e.g., in the form of higher tax revenues and/or lower unemployment).

21. It has, therefore, and despite the serious measurement problems i volved, become common to analytically distinguish between private and social returns to VOTEC investments. Private returns are those pay-offs that are directly captured either by individuals, in the form of access to higher paying and/or more attractive jobs, social prestige, and higher life-time incomes, but also in the form of the mere enjoyment of learning and its social complements (an aspect which seems to be gaining in importance, as suggested by, for example, rising higher education enrolments and enrolment times despite declining monetary returns for higher education degrees) or by their employers, in the form of (uncompensated) higher productivity, lower transaction costs involved in implementing technological change, more social cohesion of the workforce, and eventually higher corporate profits. In this context it is important to note that such private returns may also accrue to parties which have not shared in the initial investment, for instance when an increase in the number of skilled workers also raises the productivity and wages of their unskilled fellow workers, or when non-training employers reap benefits from 'poaching' skilled workers away from training firms. The social returns to human capital investments, by contrast, are those that are not captured by private labour market parties, for example higher tax revenues due to higher wages and accelerated economic growth, stronger employment growth and lower unemployment, tax returns from increased trade activities and foreign direct investment, lower crime rates due to lower youth unemployment rates, etc.. The fact that in most cases investments in VOTEC produce both private and social returns has far-reaching implications with regard to the financing of VOTEC, i.e. the question of who should bear the costs of VOTEC: given social returns which are not captured by the private market parties (i.e. firms and workers)

themselves, leaving the financing VOTEC solely to the market will inevitably result in a suboptimal level of VOTEC investment from the societal point of view. Put differently: the very existence of social returns to VOTEC investments, even if these returns may be difficult to measure and exactly quantify, justifies and necessitates that part of the costs of VOTEC place and, without adequate public policy interventions, eventually leading to skill shortages.

22. From the above we can conclude that - from an economic perspective efficient VOTEC systems strongly depend on whether the costs of VOTEC investments are allocated among the different actors involved in accordance with the patterns along which the returns to such investments accrue over time. Put differently: suboptimal investments in VOTEC are likely to emerge when there are incongruencies in the distribution of the costs and benefits of VOTEC investments. Moreover, given the (empirical) fact that the returns to VOTEC investments tend to accrue not only to workers, but also to employers as well as to society at large, it follows that efficient VOTEC arrangements will involve some kind of cost sharing between workers, firms, and the state. However, given the information and methodological difficulties inherent in assessing both costs and benefits of VOTEC investments, it is extremely difficult, if not impossible to determine the exact share to be borne by each party involved. Whereas in the case of workers and their employers this could, on principle, be determined through decentralised market bargaining and negotiations, the very elusive character of the various social returns renders an exact assessment and quantification of their magnitude and therefore any prescription of the appropriate amount of public funding to be allocated to VOTEC impossible. In the presence of sizeable private returns and the absence of clear notions of the social returns to investments in human capital in general and VOTEC in particular, there is, therefore, an inherent risk of a costly over-subsidization of human capital generation by elected public policy makers eager to meet the demands of their constituencies.

23. Last, but not least, efficient VOTEC systems also require contractual or institutional safeguards effectively preventing third parties, who have not shared in the investment costs, from reaping benefits from these investments. Whereas in the case of tangible capital assets, this can be satisfactorily accomplished through the assignment and enforcement of exclusive property rights, human capital, due to its being embodied in and inseparably tied to the person of the worker, once again poses particular problems in this respect: other investors, i.e., firms or the state, although they could on principle enter contracts with workers regarding the use of their human capital, nonetheless face the risk of not being is able to reap the returns to their investments, for instance if the worker decided to work for a different employer or to retire from the labour force altogether. This enhanced appropriability risk may indeed be another factor leading to an underinvestment in human capital, particularly so when it is difficult to clearly distinguish between firm-specific and non-specific, transferable skills.

24. The costs of and expected returns to VOTEC investments and their distribution across the different actors involved describe the basic corner-stones of the incentive structure for skills development. Another way

of determining the components of effective VOTEC systems, therefore, is to carefully analyse the existing incentive structures for VOTEC investments from a micro-economic perspective. Such an analysis shows that functioning VOTEC markets are highly complicated and delicate arrangements resting on a carefully calibrated system of economic and institutional incentives.

25. The willingness of workers to invest in VOTEC first of all depends on their ability to draw on personal resources or to borrow the financial capital needed to make such investments. However, particularly at the beginning of their work lives when they face the longest pay-off periods, workers usually lack the necessary means and credit in regular capital markets. Their ability to invest in skills development, therefore, depends on the availability of financing from other sources, such the state (in the form of grants or loans) or from firms (e.g., in the form of cost-sharing). Moreover, in order to invest in skills development, the worker further needs to know not only the value of the expected returns from investing in a particular set of skills, but also that by undergoing training (s)he will actually acquire these skills and have a reasonable chance of gaining access to jobs that allow a productive utilisation of these skills. This requires (a) information about the relative wage levels attached to different sets of skills or skill bundles, (b) information and safeguards, regarding the curricular contents and quality of training, and (c) an adequate system of skills credentials or signals that ensure that future employers will actually recognize (and reward) the skills acquired through VOTEC.

26. The willingness of firms on the other side, first of all depends on the expected direct costs and outcomes of training investments. The costs of training are (among other things) influenced by the trainability of workers, which in turn is to a large extent determined by both the quality of the general education system and the reliability of the signals firms receive about the trainability of individual applicants. Moreover, in order to invest in skill development of their workers, firms will need to know the likely effect of VOTEC on the future productivity of trainees (which includes the firm's ability to adequately employ skills generated) as well as the probability that it can actually reap the returns to training investments for an adequate period of time to offset the costs incurred in the first place. The latter requires (a) that either the skills are strictly specific to the particular investing firm, thus providing a strong incentive to the worker not to quit or (b) specific contractual or institutional safeguards creating disincentives to the worker to leave the firm for higher wages elsewhere before the firm has recuperated its training costs.

27. The willingness of firms on the other side, first of all depends on the expected direct costs and outcomes of training investments. The costs of training are (among other things) influenced by the trainability of workers, which in turn is to a large extent determined by both the quality of the general education system and the reliability of the signals firms receive about the trainability of individual applicants. Moreover, in order to invest in skills development of their workers, firms will need to know the likely effects of VOTEC on the future productivity of trainees (which includes the firm's ability to adequately employ skills generated) as well as the probability that

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28. Aside from these very basic institutional requirements for establishing functioning training markets, we can diagnose several economic and institutional factors which, by influencing the costs and expected returns to VOTEC investments and thereby affecting the incentive structures prevailing in VOTEC markets, may have significant impacts on their outcomes. A first set of such factors relates to the structure and institutional configuration of labour markets

-- Most importantly, the incentives and disincentives to VOTEC investments are strongly influenced by the signals and incentives emanating from the given wage structure and its movements over time: generally, large and stable wage differentials across different skill levels tend to provide strong incentives for both firms and workers to invest in skills development: in the case of workers

-- large differentials signal high returns for higher-level skills, whereas for employers such differentials commonly imply that they can hire trainees at a relatively low (training) wage. The latter is an explicit feature of the German 'dual system' of apprenticeship which, in exchange for the provision of standardized and certificated transferable workforce skills, involves a strong cost-sharing component in the form of collectively bargained training wages at about 25% to 35% of skilled workers' starting wages. Wage compression, by contrast, may have contradictory effects on firms' propensity to invest in VOTEC- while high minimum wages create disincentives for both sides (unless they result in high unemployment of unskilled workers, which in turn creates a positive incentive to acquire skills), narrow wage differentials at the upper end of the wage scale may indeed create incentives for firms (though not for workers) to invest in skills development, since they guarantee firms that they can capture a significant share of the enhanced productivity potential resulting from training.

-- the prevalence of internal labour market structures tends to discourage VOTEC investments by workers (unless VOTEC credentials are required for access to internal markets, for instance when vocational/technical credentials function as a screening device for sorting job applicants) and to encourage training investments by firms, since internal career paths and promotion schemes ensure that workers stay with the firm to share in the returns from training. External (including professional) labour market structures, in reverse, tend to create disincentives to firm investments in training, since workers have a higher propensity to quit. External (or professional) labour market structures therefore require that workers (or alternatively the state) bear all or at least a substantial part of the costs of skills development.

-- employment security regulations (e.g., legal dismissal and layoff restraints) have an ambivalent effect on firms' and workers' incentives to invest in skills development: on the one hand dismissal protection may enhance workers' willingness to invest in acquiring firm-specific skills or skills with an uncertain value in the external labour market (as, for instance, in the case of modular skill bundles, the exact configurations and skills mix of which may be of less value outside the training firm). On the other hand, employment security regulations, aside from encouraging capital-labour substitution at the lower end of the skills spectrum, tend to create an incentive for firms to invest in higher-level skills development, since they reduce firms' access to the external labour market for upgrading the skins level of the workforce.

-- furthermore, institutional arrangements regarding firm-level worker representation may have an impact on firms' and workers' training behavior, for instance in as far as they prevent apprentices from being used as 'cheap labor' instead of being properly trained, thus encouraging young people to engage in low-paid apprenticeship training and motivating skilled incumbent workers to assist in the training process.

29. Another set of factors affecting the incentive structures in VOTEC markets is given by the structure and functioning of capital markets. Due to the difficulties involved in measuring human capital assets and due to the appropriability problem inherent in firm investments in worker skills, capital markets generally fail to treat human capital in the same way as tangible assets, the collateral value of which can be easier assessed, thereby shifting the balance of firms' incentives from human capital investments towards investments in tangible assets. Moreover, since the pay-offs to VOTEC investments tend to accrue over long time periods in the future, incentives to invest in skills development are strongly influenced by the time horizons prevailing in capital markets. Thus recent research has shown that cross-national differences in the organisation and relative 'myopia' of capital markets do have a sizeable impact on firms' human capital investment behaviour,

with the relatively 'myopic' capital markets in the U.S. and Great Britain clearly discouraging longer-term investments in skills generation and forcing firms to procyclically adjust their training behavior; the longer-term time horizons prevailing in Germany's and Japan's capital markets, by contrast, have been seen as an important factor supporting the overall favourable training 'climate' in these countries.

30. Finally, one needs to mention a series of institutional or policy factors that have an immediate bearing on the incentive structures in VOTEC markets:

-- Given the cumulative nature of human capital acquisition, both the quality of basic general education, particularly the degree to which general education provides young people not only with 'classic' literacy skills but also basic technological literacy as well as social behaviors and attitudes required in the world of work, and the sorting of students by different ability profiles through the education system, has significant impacts not only on the costs, but also on the expected outcomes of training and thus on firms' propensity to invest in skills development. The relatively low quality of the comprehensive high-school system in the United States, which is documented in the relatively low academic achievement levels of U.S. school-leavers as compared to their counterparts in other industrialized countries, and its failure to signal different levels of competencies and acquired skills to prospective employers in the form of standardized credentials and school-leaving certificates has been frequently cited as an important source of U.S. firms' reluctance to invest in the training of young workers. Put differently: improving the quality of (secondary) general education and the signalling of the skills and competences acquired in high-school may be one of the most effective public policy options for promoting subsequent investments in VOTEC.

-- More immediate impacts on workers' and firms incentives to invest in VOTEC emanate from fiscal policies that directly affect the costs and returns to skills development: for instance, the fact that income tax laws allow workers to deduct training outlays (though not foregone earnings) as cost when they are incurred and workers tend to have low taxable incomes, but progressively tax the future returns to such investments when workers receive higher wages due to prior training, may in fact create a disincentive for workers to invest in human capital development (luckily, workers find out about this, if at all, only after they have acquired enough human capital to understand the intricacies of income tax laws). Moreover, most income and corporate tax systems tend to ignore the (undeniable, though hardly quantifiable) social returns to VOTEC investments, which would, from an economic perspective at least, justify special tax breaks for both workers and firms who invest in human capital generation.

-- A further source of (politically intended) distorted incentives may be seen in the heavy public subsidization of school-based, particularly (technical and general) higher education as compared to vocational/technical training provided by firms: whereas higher education students can apply for an array of student grants and (publicly endorsed) loans covering tuition and/or subsistence, no such programs exist in most countries for school-leavers willing to undergo vocational/technical training through an employer and to bear or share the costs of such training. This may in fact be one of the reasons underlying the unbroken tend towards rising higher education enrolments despite declining wage premia for higher education graduates.

31. Shifting the balance of incentives towards more market-driven VOTEC investments would, therefore, first of all require the abolition of existing institutional disincentives and the creation of the institutional prerequisites for establishing functioning VOTEC markets. If the former is not possible for political reasons or social resistance, then public policy is left with the second best solution of compensating for existing inefficiencies and incentive distortions through specially designed financial incentives to spur VOTEC investments.

32. Some of the above theoretical notions can be concretised by looking at some of the basic components and institutional corner-stones of the VOTEC systems in those two countries which are widely renowned and regarded as 'models' for the high vocational and technical skill level of their labour force: Germany and Japan Without elaborating all the relevant details, it may be useful in the present context to glance at some of the common elements of these two otherwise highly different VOTEC systems: first, both countries are known for the good quality of and high level of general competences produced by their secondary education systems At the same time both Japan's and Germany's secondary education systems involve a strong sorting of students by individual ability profiles and academic achievements, and in each country the latter are clearly signalled to prospective employers either by the very high-school and its entry requirements school-leavers have attended (japan) or by the secondary education track (lower, intermediate or higher) school-leavers have passed and the grades they have achieved in core subjects (Germany). Moreover, both countries exhibit the largest share of private in all education and training expenditures among OECD countries, indicating the existence of well functioning private VOTEC markets. The mostly private funding of skills acquisition in Germany and Japan (which in both countries is assumed to amount to over 2% of GDP as compared to a to roughly 4% of GDP devoted to the ensemble of public education) ensures that skills development is closely tied to employment and geared to the specific skill needs of private enterprise, with firm-based training playing a major role in both countries. Thereby both countries have not only avoided costly mismatches between skills acquired and those required in the workplace, but also, at least until very recently, successfully prevented the emergence of major social status differentials between academic education on the one hand and vocational skills development on the other, as they tend to be particularly pronounced when vocational and technical education is incorporated in the public education system. The substantial private

investments in VOTEC by both workers and firms in both countries can be seen as the outcome of a carefully calibrated system of incentives and clearly signalled rewards for skills development, in the case of Japan through the specific promotion rules characterising larger Japanese corporations' internal labour markets, and in the case of Germany through close links between formally acquired and certificated skills on the one hand and access to skilled positions and centrally bargained wage levels on the other. Last, but not least, in both countries workers enjoy a high degree of employment security, as evidenced by the longest mean tenures among all OECD countries, which must be seen both as the outcome of firms' and workers' large mutual sunk investments in skills development and as the prerequisite for firms and workers to be willing to make and share the costs of VOTEC investments in the future.

33. A core lesson emanating from the examples of Germany and Japan seems to be that, given the very nature of nature of vocational and technical (as opposed to general or academic) skills, namely their being geared towards immediate practical application in mostly private work settings and their primarily privately accruing returns, the optimal role for public VOTEC policy consists in creating the necessary institutional prerequisites for effective private VOTEC markets. This takes into account that private VOTEC markets involving investments from both workers and firms as the two parties who reap most of the returns from these investments tend to be superior to public arrangements in ensuring the relevance and actual productive utilization of the skills acquired through VOTEC; the latter are at the same time the necessary conditions for generating the social returns resulting from a highly trained workforce and a more efficient school-to-work transition of youth. To achieve this, public policies aimed at creating favourable conditions for private VOTEC investments first of all must address the particularities of human (versus tangible) capital investments and counter-balance the enhanced risk of 'market failures' resulting from them, through establishing signals (in the form of standards, curricula, and credentials) and assisting the labour market parties in devising and implementing rules ensuring that they can reap the returns from their investments. A second role of public policy must consist in correcting or compensating for distorted incentive structures in private VOTEC markets as a result of other government interventions (e.g., minimum wage policies) and other factors. This would include not only the creation of tax incentives for investments in skills development which take into account the social returns to such investments, but also the provision of training subsidies to firms or workers where minimum wage laws (or personal resource constraints) prohibit the emergence of effective cost-sharing arrangements between the labour market parties. Such compensatory public policies would also have to tackle the fact that due to market imperfections small firms, for example, tend to have less access to external capital or suffer other size-related disadvantages (e.g., their inability to exploit economies of scale in training provision) and, consequently, may face higher training costs than larger firms. In this context, however, it should be mentioned that compensatory public policies targeting special disadvantaged individuals in the labour markets, such as high-school dropouts or youth from minority groups and disadvantaged areas, have commonly failed to improve these groups' access to training and skilled employment, but rather contributed to their further stigmatisation and have frequently impaired the social esteem of 'vocational education' at large. Put differently: social equity targets may be reached far more effectively by

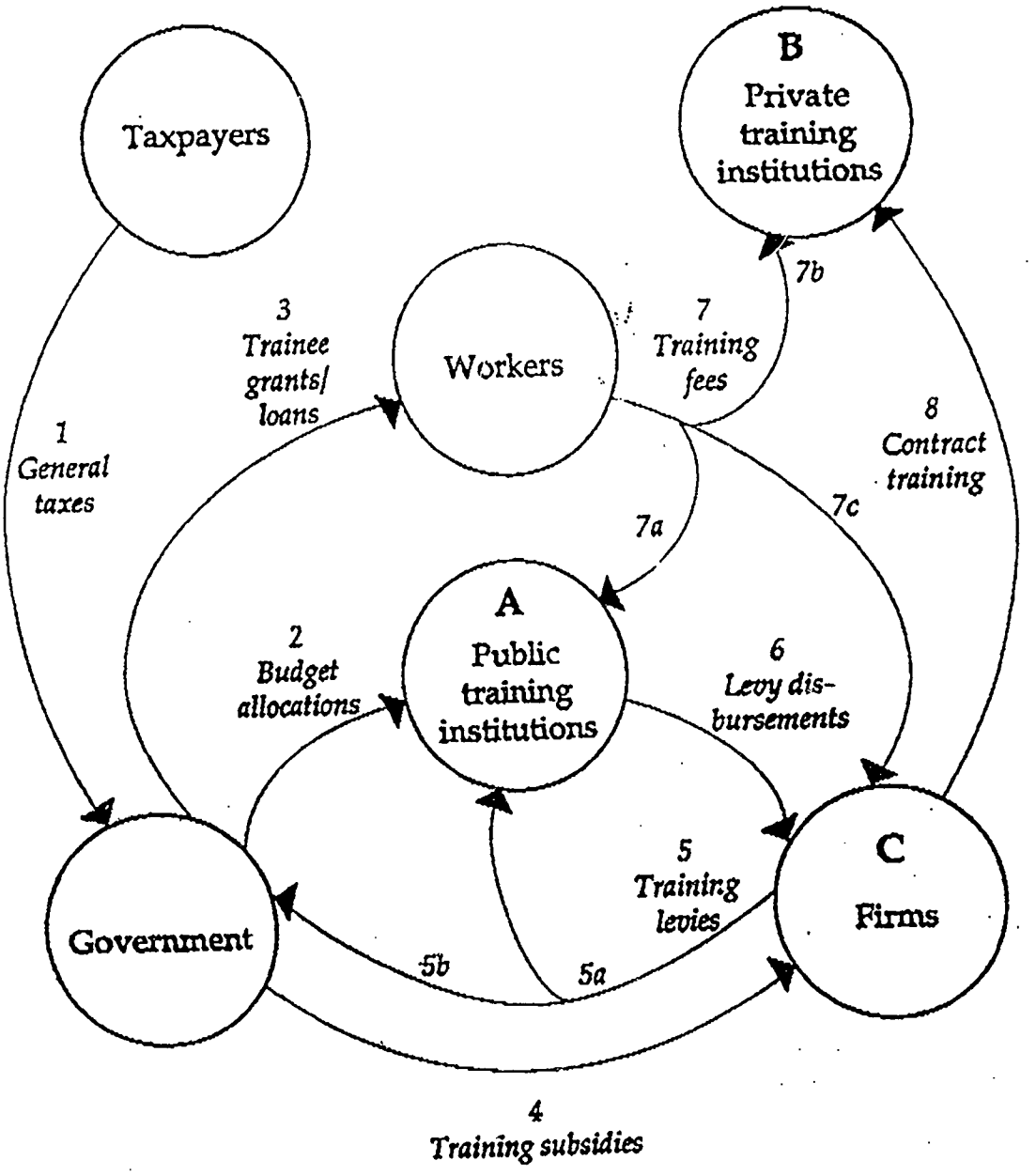
public policies aimed at improving the general education attainment of these groups prior to entering the training market than by compensatory public vocational education programs or targeted training subsidies for those who have failed in the private VOTEC market. The Japanese and German examples also tells us that, in recognition of the undeniable, but hard to measure social returns to VOTEC investments, publ policy should generally aim at lowering the costs of private sector training by continuously improving the quality of general education which increasingly includes also basic levels of technological (e.g. computer) literacy and provides the basis for subsequent private investments in vocational and technical skills. A third kind can be described as less 'corrective', but more 'visionary' public VOTEC policies pursuing macroeconomic goals and aimed at overcoming the 'bounded rationality' or 'myopia' of individual labour market actors. Such public policies designed to achieve macro-economic or industrial policy goals endeavour to influence the existing incentive structures prevailing in VOTEC markets through massive public subsidies for the development of particular skills and/or the forced expansion of publicly financed vocational and technical higher education programs. Their value and effectiveness, however, crucially depend on policy makers' and their advisors' ability to forecast future economic developments as well as on the degree to which these policies also manage to simultaneously modify those other behavioural parameters which have prevented training and labour markets to move in the desired direction. The risks inherent in such policies are illustrated by the French example, where the government's intention to substantially raise general and vocational education attainment levels has led primarily to a large-scale devaluation of education credentials in the labour market without really pushing firms to increase the skill contents of jobs and move to higher-value added markets.

34. The above has shown there is indeed a role for government in supporting VOTEC investments. In devising effective VOTEC policies, governments face an array of choices between different policy approaches and intervention tools. Aside from regulatory policies improving information in private VOTEC markets, governments have discretion with regard to the level of involvement ranging from the full public financing and provision of VOTEC towards merely providing financial incentives through tax exemptions and targeted subsidies. In most OECD countries, a large part of public financing in VOTEC is still accounted for by programs involving direct public VOTEC provision. There may indeed be a rationale for a public provision of VOTEC, namely when, due to co-ordination failures among private firms and/or high fixed costs, necessary training would not be adequately provided. However, as noted above, a serious disadvantage or drawback of public VOTEC provision is that such programs frequently do not involve sufficient links to and direct interfaces with the firms as the users of the skills produced, and the experience of several countries during the past years have shown that establishing direct cooperative links between public VOTEC institutions and private employers encounters many obstacles. A way of reducing these inefficiencies and linking public VOTEC provision with private VOTEC markets is to allow public VOTEC institutions to 'sell' their services to workers and firms, thus not only ensuring the relevance of the skills provided in public institutions but also opening new ways of co-financing public VOTEC institutions and mitigating the financial pressures policy makers in most countries face today. A different strategy leaves the provision of VOTEC completely to the private sector (i.e. firms and/or private VOTEC providers)

and restricts the role of public policy to providing training subsidies to either firms or workers or basic funding to private VOTEC providers. In any of these cases, however, strict standards and outcome assessments by public agencies or mesolevel institutions (e.g., employers associations and/or labor unions) who share an interest in the quality of the training provided are required in order to ensure that the public funds are used in ways so as to meet their objective. Finally, in order to account for externalities resulting from private VOTEC investments (e.g., in the form of 'poaching' skilled workers from other firms), and to increase the incentive to invest in skills development for non-training firms governments may, instead of financing VOTEC subsidies out of the general tax revenue, legislate a training levy from all firms whose training expenditures remain below a certain threshold value (France; Australia). However, since firms may differ in their need for skills and therefore also in the returns that they can reap from investments in skills development, any flat-rate training levy imposed on all firms and not differentiated by industries with different skills demand (as formerly in the U.K.), may itself lead to suboptimal outcomes.

35. The different modes of financing VOTEC available to governments and the different finance flows in the VOTEC market are summarized in the chart below. "General tax revenues (1) constitute the main source of government funding for training interventions. Public expenditures for training fall into three broad categories. Budgetary allocations are made to operate or subsidize training institutions in the public sector (2) ... Public funds are also used to subsidize trainees via training grants or loan support (3) . Finally, governments finance training grants or subsidies to enterprises to encourage them to train; these funds are either transferred directly to firms (4) or through a national training authority. Some countries collect special training levies from enterprises, either to finance training at specialized public training institutions (5a) usually run by a national training authority, or to form an earmarked fund for disbursement to firms that provide training (6). Alternatively, training levies may flow directly to government (5b), where they usually remain earmarked for the support of training. Workers purchase training services, either explicitly from public sector training institutions (7a) and from private training institutions (7b) or implicitly from enterprises (7c), by accepting reduced wages during training. Firms may purchase training services directly from private-training institutions through contracts or fee payments on behalf of employees (8), services may similarly be purchased from public institutions, along the line (5A), (J. Middleton, A. Ziderman, A. Van Adams, Skills for Productivity. Vocational Education and Training in Developing Countries, Oxford - New York: Oxford University Press 1993, pp. 118ff.).

36. Which mode of financing VOTEC and which public-private cost-sharing arrangement maybe optimal under different conditions given in each country defines a challenging research agenda for the years ahead.



Source: Middleton, Ziderman, Van Adams, *Skills for Productivity*, Oxford: Oxford University Press 1993, p. 119.

ANNEX I

VOTEC AS AN INVESTMENT AND THE MOBILISATION OF HUMAN AND FINANCIAL RESOURCES

ISSUES AND QUESTIONS FOR DEBATE

1. Viewing VOTEC within an investment framework

1.1. Is there a need for policy makers and other agents involved in VOTEC to adapt a more rigorous investment view on VOTEC balancing costs and benefits/returns?

1.2. Is there more sufficient consensus about the relative importance, goals, and objectives of VOTEC, and by what criteria the value of VOTEC should be assessed?

1.3. What would/should be the core conceptual corner-stones of an investment-oriented framework for evaluating VOTEC, and do we have the means and methods for assessing the costs of and returns to VOTEC?

1.4. What institutional mechanisms would ensure an improved flow of information about the costs, outcomes and returns to VOTEC?

2. Mobilizing human and financial resources through a carefully calibrated system of incentives

2.1. What are the costs and expected returns to VOTEC investments from the perspectives of the different agents involved?

2.2. Are the outcomes of and returns to VOTEC adequately signalled in training and labor markets?

2.3. Can we discern institutional and socio-economic constraints on VOTEC investment decisions that induce sub-optimal outcomes?

2.4. Can we distinguish different national policy frameworks regarding VOTEC in terms of their inherent incentive structures and relate the latter to observable outcomes?

3. Optimizing VOTEC policy frameworks

3.1. Which role(s) for public policy in VOTEC? Creating, supplementing, or supplanting markets?

3.2. How can public policy improve the incentive structures in VOTEC markets?

3.3. How can policy makers enhance private investments in VOTEC without forsaking social equity standards, and what are the institutional prerequisites for effective cost-sharing arrangements between public agencies, firms and individuals?

3.4. How can the efficiency of publicly provided VOTEC be improved?