WORKING PAPERS IN ECONOMICS

DEPARTMENT OF ECONOMICS
UNIVERSITY OF ZIMBABWE

ALTERNATIVE TRAINING MODES: ENGINEERING ARTISANS IN ZIMBABWE

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The development of a sound national vocational training system hinges critically on the availability of information that can be used to assess the cost-effectiveness of investments in different types of training. Not surprisingly, therefore, human resource economists have been centrally preoccupied with undertaking research that will provide this information.

An important strand of research has focused on assessing the cost-effectiveness of alternative vocational training modes among broadly similar occupational strata or groups. In particular, the variety of quite clear-cut training modes among artisan level occupations has attracted considerable interest.[1] However, there exist virtually no detailed empirical studies of the economics of vocational training alternatives in sub-Saharan Africa.[2]

This article summarises recently completed research[3] that has attempted, inter alia, to assess the relative cost-effectiveness of the following three distinct artisan training modes in Zimbabwe: (1) conventional in-plant apprenticeship; (2) artisan

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training for children attending secondary technical schools; and (3) post-school, pre-employment artisan training that is mainly provided off the job in training centres.

One area of skill formation has been chosen, namely mechanical engineering because training in the basic engineering trades (and, in particular, fitting and turning and automotive mechanics) has been provided by all three of the training modes under investigation and, furthermore, mechanical engineering artisans comprise a core segment of the skilled labour force in all sectors of the Zimbabwean economy.

The discussion will be structured as follows: The first section discusses briefly artisan training policy and provision in Zimbabwe since 1980 and, in particular, describes the main features of the case study institutions that are the focus of this article. Section 2 then reviews the research methodology and data used to derive social rates of return, the measure of cost-effectiveness commonly employed by human resource economists, for each of the three training modes. The main research results are presented in section 3. The possible policy implications of this research are explored in the final section.

1. Artisan Training Policy and Provision

Prior to Independence in 1980, in-plant apprenticeship modelled on the British system was virtually the only type of artisan training available to school-leavers in what was then Rhodesia. This four year training was generally of a high quality with apprentices being trained primarily on the job by experienced journeymen. However, almost all apprenticeships were whites.

With Independence, the racial segregation of educational and training provision that had been such a hallmark of the colonial

period was rapidly dismantled. The newly elected ZANU(PF) government of Robert Mugabe also embarked on an ambitious development strategy which gave particular priority to the much neglected rural areas of the country. The government has also sought to train large numbers of skilled personnel including artisans which, it is argued, are urgently needed to implement this development strategy.

However, ten years later, the numbers of apprentices sponsored by Zimbabwe's still predominantly white owned and managed private sector have stagnated and even declined in most of the core artisan trades. Initially, politicians and policy makers attributed this 'reluctance' by companies to train apprentices as being mainly due to the racist recruitment practices of 'Rhodie' managers. But, with over 90% of new intakes now African, this is certainly no longer true.

The government has repeatedly regaled private sector employers to train more artisans. But, for reasons that will be discussed later, the response of private capital has been muted to say the least. Faced with this situation, the government has promoted two alternative types of pre-employment artisan training in the country.

The first is the secondary technical school where children receive recognised ie. certified artisan training in the core trades (such as carpentry, fitting and turning, motor mechanics, building) while continuing to follow the normal academic curriculum. The colonial government did build a small number of secondary technical schools during the 1970s (known as F2 schools), but they were very unpopular with both children and their parents and were disbanded after independence. However, by the mid 1980s, concern was mounting in both government and party circles about what was regarded as the excessively 'academic' orientation of secondary schooling in a situation where the

majority of school-leavers were not managing to find waged employment in the formal sector[4]. In 1986, it was decided, therefore, to partially vocationalise the school curriculum so that children can acquire practical skills that will allow them to be productively self-employed and thus 'self-reliant', especially in the rural areas of the country where over 70% of them grow-up.

The government of Zimbabwe has also actively promoted the establishment of post-school artisan training institutions either run by its own ministries or by non governmental organisations in both rural and urban locations. These institutions constitute, therefore, a second distinct pre-employment artisan training mode in the country. While some of them train school-leavers to become artisans in the 'formal sector of the economy,[5] others (most notably the youth training centres) have the specific objective of promoting artisan self-employment in rural areas.

Government training policy is premised on the belief that these two types of pre-employment artisan training are cost-effective alternatives to conventional apprenticeship training. And, more important still, by de-linking the provision of artisan training from employer sponsorship, the potential exists to expand rapidly training provision in this vital area of skill formation. But, given the considerable evidence that has been amassed over the years concerning school-based vocational training, government policy in this area has been seriously questioned, in particular by the main bilateral and multilateral aid donors who have declined to support this initiative.[6]

The Case Study Training Institutions

The following training institutions were selected as being representative of the three artisan training modes under

investigation in Zimbabwe:

Training Mode	Institution(s)
1. In-plant apprenticeship	Companies/ Harare Polytechnic
2. School-based technical and vocational training	St. Peter's Kubatana Vocational Training School, Harare.
3a. Post-secondary school, pre-employment: Government	Chaminuka and Phangani Youth Training Centres
3b. Post-secondary school, pre-employment: Private	Chinhoyi Rural Training Centre, Chinhoyi.

As can be observed in Table I, the academic entry requirements, duration and terminal qualifications vary quite considerably from one training mode to another. It is necessary, therefore, to describe briefly the main features of each of these training modes.

In-plant indentured apprenticeship: Anyone wishing to become an apprentice must first register with the Apprenticeship Board, which is part of the Ministry of Higher Education. Once registered, an individual is free to apply for apprenticeships offered by companies and other organisations. An apprentice is indentured to his sponsoring organisation for four years. On the job training by experienced journeymen accounts for nearly ninety percent of the apprenticeship period.

For the remainder of the apprenticeship, each apprentice receives formal instruction in his chosen trade at one of seven government run polytechnics and technical colleges in the country. For most trades, including engineering, apprentices attend one of these training institutions for three six week periods normally during the first year of the apprenticeship. They are then examined and, if successful, are awarded the Zimbabwe National Crafts

Certificate (ZNCC).

School-leaver demand for apprenticeships is enormous. Over 100,000 candidates applied for slightly more than 1000 places in 1989 (See King, 1989). Minimum entrance requirements are high by developing country standards--at least five 'O' levels[7] and, for the engineering trades, these must include english, mathematics, and science. Demand for this training is becoming so intense that school-leavers with 'A' levels are also applying to be apprentices. Both students and their parents correctly perceive that apprenticeship is a relatively low cost route to well paid, high status[8] jobs.

Apprentices from two trades, production engineering and automotive engineering were selected for this study. These apprentices all did their ZNCC course work at Harare Polytechnic in 1985 and thus nearly all of them completed their apprenticeships in 1988 or early 1989.

School-Based Artisan Training: St. Peter's Kubatana (SPK) Vocational Training School was, up until 1988, the only secondary technical school in the country. It was originally established by the Catholic Church and offered a three year post-'O' level, "pre-apprenticeship" training. However, when the school was effectively taken over by government in 1984, it was decided to offer artisan training to children in their final two years of secondary school ie. Forms Three and Four.

SPK students spend about one-third of their time learning one of the four basic artisan trades offered by the school, namely building, carpentry, machineshop engineering, and motor mechanics. The school also follows the ZNCC curriculum. In addition, SPK students also study the normal range of academic subjects and, like any other secondary school student, take their 'O' level examinations in these subjects at the end of Form Four.

Unlike apprenticeship, the demand for SPK training among Form Two graduates is not high since these children (and their parents) recognise that it is 'O' levels that determine access to jobs or further education and training. Thus, including a sizeable component of technical training in the secondary school timetable is likely to reduce the average student's chances of obtaining these all important 'O' levels. Given this situation, SPK has only able been to attract academically less able students. Not surprisingly, most of them have failed to cope with the very demanding academic and vocational curriculum, and pass rates for both ZNCC and 'O' levels have been low.[9]

SPK production engineering students who finished their training in 1988 were selected for this study.

Post-Secondary, Pre-Employment Artisan Training- Government:
The first of thirteen government funded youth training centres (YTCs) was established in 1980. The original intention was that the YTCs should provide a 'practical', two year training to ex-combatants who fought in Zimbabwe's war of liberation and to other unqualified, mainly rural youth which would equip them with the necessary skills for productive self-employment as artisans in rural areas.

However, because this training was not recognised by any of the national examination boards (and thus employers), a YTC training was not regarded as an attractive option even among poorly qualified school-leavers. The curricula was, therefore, comprehensively revised in 1984 so that students could obtain trade tests.[10] For the engineering trades, this has meant extending the training period to three years. In addition, candidates must now normally have 3-5 'O' levels. YTC engineering trainees spend two six month periods on industrial attachments during their second and third years.

Demand for YTC training, while not as high as for apprenticeships, is still considerable. In 1989, there were over twenty thousand applicants for fewer than one thousand training places.

Three engineering courses at two YTCs were selected for study; automotive mechanics at Chaminuka YTC, located in Mashonaland East Province, and fitting and turning and welding at Phangani YTC in Matabeleland South Province. The expectation is that most of these students should pass trade test one by the end of their third year of training. In practice, however, because of shortages of instructors, equipment and materials most only manage to pass trade test two or three.

Post-Secondary, Pre-Employment Artisan Training- Private:
Chinhoyi Rural Training Centre (CRTC) was established in 1979. It is privately run by the Catholic Church and receives no financial support from government. It caters mainly for Form Four school-leavers who have performed badly in their 'O' level examinations A two year training is offered in automotive mechanics, carpentry and metalworking with total enrollments of 20, 20, and 10 respectively.

CRTC awards its own certificate of competence rather than relying on government trade tests. While recognising the obvious advantages of following the stipulated trade test curricula, the management of CRTC argue that, given staffing and other financial constraints, it would not possible to maintain the prescribed standards of instruction laid down by government. As a consequence, the artisan training offered by CRTC has generally not been recognised by employers.

2. Research Methodology and Data Sources

In common with other studies of training effectiveness, individual pre-tax incomes have been used as the key indicator of social benefit. Most of the individuals in this study are employed in the private and parastatal sectors where, in Zimbabwe, pay for artisans is determined according to open (external) labour market forces. The early 1990 basic incomes for relatively large samples of trainees who (with the exception of CRTC)[11] graduated from the case study institutions between mid-1988 and mid-1989 were obtained using a combination of tracer surveys and postal questionnaires (see below).

With no time series income data available, the following shortcut method of calculating internal rates of return had to be relied upon.

$$\text{Social IRR} = \frac{\text{Post-training income} - \text{pre-training income}}{\text{Total social costs of training}}$$

This widely used method is acceptable when the post-training period of work is relatively long (which it is likely to be in all three training modes under study).[12] It also has to be assumed that income differentials between individuals trained in the different modes do not change markedly during the course of their working lives. Only subsequent research will be able to establish whether this is a reasonable assumption in Zimbabwe.

According to data obtained from the 1986-87 Labour Force Survey,[13] the average income for all economically active Form Four school-leavers aged between 20-24 was $2171 per annum in 1986/87. This figure has been used therefore to measure the social opportunity costs of training in terms of the value of production forgone for the groups of trainees who undertook post-secondary artisan training. The social opportunity cost of the

Form Three and Four students attending SPK is the average income earned by all Form Two school-leavers aged 15-19. This amounted to $1037 in 1986/87.

Engineering apprentices comprise an increasingly elite group of school-leavers in Zimbabwe and it is likely therefore that, in the absence of their training, they would have still earned considerably more than the other trainees. Consequently, a second set of IRRs have been calculated for this group on the assumption that their average pre-training income was $5486 which, according to the Labour Force Survey, was the average income of employed Form Four school-leavers aged between 20-24.

Interviews with major employers of engineering apprentices in the Harare area indicate that, taking the four year period of training as a whole, the average apprentice's direct contribution to production actually exceeds the value of his wages so that these should not be included in calculating training costs. Moreover, with the exception of the first year of training, apprentice wages are considerably higher than the probable income forgone. Thus, the social opportunity costs of apprenticeship training are effectively zero.

Data Sources

A tracer survey established the early 1990 whereabouts of nearly all the selected engineering artisan trainees who completed their training during 1988/89. Once traced, a three page questionnaire was mailed to each individual. One section of this questionnaire requested information on current income. While the numbers of individuals from each group of graduates who provided income data are quite small, it can be seen in Table II that, with the exception of production engineering apprentices, the overall questionnaire response rates are quite respectable.

Data on formal training costs were surprisingly difficult to collect, particularly for Harare Polytechnic where, until recently, no separate departmental budgets have been kept. Government buildings and equipment are not officially valued in Zimbabwe so this component of costs could not be included. Only sufficiently comprehensive recurrent expenditure data were available from each case study institution for 1988/89 so these data have had to be used for earlier years. However, in view of the steady reductions in the real value of annual training budgets during the late 1980s, this is unlikely to have resulted in any significant overestimation of training costs.

Estimating the on the job training costs incurred by organisations sponsoring engineering apprentices and other artisan trainees is also not easy. The main cost item here is the time devoted by skilled workers to the training process. Clearly, this varies both within and between organisations. However, from discussions with training managers and foremen working for engineering companies in the Harare area, about 25% of an experienced artisan's working time is normally devoted to training each apprentice during the first year of training. This then falls to around 10-15% in the second year and is minimal in the third and fourth years. These estimates have formed the basis of the on the job training costs for both apprentices and also YTC trainees while they are on industrial attachments.

3. Costs, Net Benefits and Rates of Return.

The personal characteristics of the questionnaire respondents from each of the case study training institutions are presented in Table II. Most of them were African, aged between 20 and 25 years old and, with the exception of CRTC, had 3-5 'O' levels. There were no women trainees.

Total off and on the job training costs plus opportunity costs (ie. income forgone) are presented for each training mode in Table III. It can be observed that the YTCs are by far and away the most costly training mode mainly because YTC trainees attend the centres for two full years and, unlike apprentices, do not spend enough time training on the job to become productive. In contrast, recurrent off the job training costs are lowest for apprentices mainly because of the limited amount of time spent at Harare Polytechnic.

With little or no income forgone and no on the job training costs, the secondary technical school and the rural training centre are the least costly training modes. While training at CRTC is post-secondary, the trainees undertake work for local clients which makes the centre virtually self-financing. The value of this work is at least as much as probable income forgone by trainees so that the social opportunity costs of the training are, as with apprentices, zero. But with high staff-student ratios and relatively generous provision of training materials, the formal training costs per student are relatively high.

Average, median, and upper and lower quartile annual income values for each of the training modes are presented in Table IV. Virtually all respondents were wage earners. The most striking feature of these income data is that apprentice-trained apprentices earned, on average, at least three to four times more than individuals who had undertaken pre-employment artisan training. This income differential is higher still after average incomes have been adjusted downward to take into account respondents who were unemployed at the time of the survey (in particular, from St. Peter's Kubatana VTS and CRTC).

Combining these social cost and benefit data allows social ROR estimates for each training mode to be calculated using the short-cut formulae. Net social benefits have been derived by

subtracting the appropriate social opportunity cost income value from the average post-training gross-income for each group.

Given the very considerable marginal income benefits of the apprenticeship training mode, the social RORs for apprentice-trained engineering artisans are outstandingly high under both social opportunity cost scenarios. In particular, the ROR for production engineering apprentice training is an incredible 126.9%. In contrast, the social RORs for the other three training modes are at the very least four times lower than the corresponding rates for the apprentice trades.

In absolute terms, however, only the YTC welding and CRTC metalworking courses have social RORs which are considerable below the aggregate social opportunity cost of capital in Zimbabwe which was around 15% during the late 1980s. Had all the graduates from the secondary school and CRTC been employed in early 1990, then the social RORs for these two training modes would, in fact, have been very respectable indeed. But, at the time of the survey, these individuals had had at least eighteen months to find a job so it is unlikely that the relatively high levels of unemployment among these groups will fall dramatically, at least in the immediate future.

The YTC graduates finished their training in mid-1989 so at the time of the survey they had had less time (only 6-8 months) to secure employment. However, with regard to the YTC welders, even if all of them do succeed in finding jobs (which seems highly unlikely), the social ROR for this training would still only be slightly above 10%.

4. Policy Implications

The central finding of all previous research on alternative artisan training modes has also been that the RORs to in-plant apprenticeship training are considerably higher than the alternative pre-employment, mainly off the job training modes. This, it is argued, is primarily due to the combined effect of markedly higher internal and external efficiencies of training processes that are characterised by on the job training (ie. 'sitting by Nellie') by young people who have been carefully selected by employers and who have made clear-cut career choices to become artisans.

The main policy recommendation that has emerged from this research is that public provision of pre-employment artisan training (particularly in secondary technical schools) is not generally cost-effective whereas in-plant training most definitely is and, as the preferred training mode, it should be actively supported by governments.

Thus, given the very sizeable ROR differentials between the pre- and post-employment artisan training modes in Zimbabwe, there would appear to be strong, prima facie empirical support for the the same or very similar policy prescription in this country. However, as with all rates of return to education and training research, it cannot simply be assumed that earned incomes accurately measure the actual contribution of individuals to the overall welfare of a society. And yet, in Zimbabwe, as elsewhere, our understanding of the structure and functioning of skilled labour markets falls far short of being able to address this issue adequately.

Notwithstanding this problem, the very size of the income differentials between apprentice and non-apprentice trained engineering artisans in Zimbabwe would seem to indicate that, on

its own, the human capital-ROR explanation will not suffice. It is true that the large majority of engineering artisans in the country are employed in the private and parastatal sectors where one would expect, therefore, pay to be determined by open (ie. external) labour market forces. What is more, experienced artisans are in extremely high demand both in Zimbabwe and the Southern African region as a whole, so with their very marketable general skills, competitive market pressures are likely to be strong.

However, the tracer survey indicates that the outputs from the post-secondary artisan training modes tend to be concentrated among two quite distinct groups of employers. On the one hand, apprentice-trained artisans are mainly sponsored by and subsequently work for a relatively small group of mostly large companies, who in terms of net output and employment, dominate key sectors of the economy, particularly in mining and manufacture. Companies enjoying this degree of market power have the 'ability to pay' substantially higher salaries to their employees. Furthermore, the specific nature of the technologies employed by many of these companies may well give rise to firm-specific internal labour markets with the usual implications for labour turnover and wage structures.

Graduates from the YTCs and CRTC, on the other hand, have generally found jobs as artisans with much smaller enterprises (ie. with less than 200 employees) which rarely enjoy anything like the same degree of market power as the large corporate entities nor are they likely to have their own internal labour markets. Consequently, employers in this segment of the labour market for engineering artisans have lower abilities to pay and individual incomes are more likely to be determined by the interaction of demand and supply functions as these are conceived by standard neoclassical economic theory.

It is important, therefore, to take into account the labour market 'distortions' arising from this segmentation of the engineering artisan labour market in assessing the relative social profitability of apprenticeship training. However, while this may lead to a reduction in the net income benefits accruing to this particular training mode, the size of the apprentice-non-apprentice income differential is such that there is unlikely to be any major alteration to the overall pattern of rates of return.

Another possible criticism is that the three artisan training modes under investigation are, in fact, sufficiently different from another that they cannot be regarded as real alternatives. It is certainly true that important differences do exist in the quality of the intakes to these training modes (especially between the secondary technical school students and apprentices) and in the training processes themselves. However, the key point to emphasise is that the government of Zimbabwe believes that pre-employment, mainly off the job training can be an effective substitute for conventional apprenticeship, both in terms of the quality of training provision (hence the use of the same or similar formal qualifications viz ZNCC and trade tests) and the general employment prospects of trainees. In practice, this training has proved not to be a meaningful alternative, in particular because of the largely intrinsic inefficiencies of any training process that relies primarily on off the job skill acquisition.

Does this still mean, however, that the government of Zimbabwe should abandon its pre-employment artisan training policy and focus instead on increasing the numbers of apprentices? Despite the labour market segmentation distortions mentioned above, it is indisputable that apprenticeship training is the most efficient artisan training mode in Zimbabwe and, what is more, very significant shortages do exist (ie. there is excess effective

demand) in most of the core engineering trades which urgently need to be rectified through increased apprenticeship training.

The obvious question is, therefore, why are employers not prepared to increase their sponsorship of apprentices? In fact, the number of engineering apprentices sponsored in 1989 was almost 25% lower than at independence in 1980.[14] A major part of the explanation centres on the considerable dissatisfaction of employers with government policies and practices concerning the apprenticeship system in Zimbabwe during the last decade.

Interestingly, training cost considerations and associated externalities are probably not important negative factors depressing employer demand for apprentice training in Zimbabwe[15]. All registered employers are obliged to pay a one percent payroll tax as a training levy but, in return, they are reimbursed for apprentice wages during the first two years of training along with all other direct training costs. And, as noted earlier, most apprentices start to 'pay their way' (and more!) during the remaining third and fourth years of the apprenticeship. So even if the apprentice does move on to 'greener pastures' soon after completing his training, the sponsoring company, although obviously inconvenienced, does not incur serious financial losses.

It was rather the attempt by government, starting in the mid-1980s, to centralise apprenticeship recruitment that has seriously upset the traditional relationships between employer, apprentice and the state. Employers protested that without control over whom they recruited, the whole apprenticeship system would breakdown. The motive of government in introducing centralised recruitment was to counter the allegedly racist recruitment practices of employers in what has remained a predominantly white owned and managed formal sector. In the event, many employers were so disgruntled that they either

reduced their level of sponsorship or just stopped training apprentices altogether.[16] Although centralised recruitment was effectively abandoned in 1988, the overall effect of this government intervention was to further strain relations between the apprenticeship authorities and private sector employers.

The other major concern of employers has been the very poor quality of instruction at Harare and Bulawayo Polytechnics where most engineering apprentices go for their formal, off the job training. Chronic staffing problems, which have been mainly due to the very poor salaries and other conditions of service offered to lecturers most of whom have very marketable qualifications, have been the main cause of what has been a very rapid decline in teaching standards. Thus, many employers believe that there is no point sponsoring apprentices when they cannot receive timely and good quality instruction.

Consequently, even if it is accepted that the social RORs to apprenticeship training in Zimbabwe are genuinely much higher than the corresponding rates for the other training modes, it is still not all clear how the government can encourage the private sector to sponsor more apprentices. Regaining the confidence of these employers in the apprenticeship system will not be easy. But, as first steps, formal training provision and the client responsiveness of civil servants responsible for vocational training need to be urgently improved. However, if apprenticeship training is as cost-effective as this research suggests it is, serious consideration should also be given to increasing substantially the economic incentives for employers to sponsor more apprentices.

Finally, what steps should the Zimbabwean government take concerning the future of the alternative pre-employment training modes? As can be observed in Table IV, their unemployment adjusted social RORs are much lower than the corresponding rates

for apprenticeship training. Nonetheless, as noted earlier, all but two of the six alternative training courses included in this study have social RORs above 10% which, while lower than the aggregate rate of return on capital in Zimbabwe, are only marginally so.

Where the graduates of these training courses are managing to find jobs as artisans (as is the case for the YTC fitters and turners and the CRTC automotive mechanics) then, from a social viewpoint, it is probably justified to continue with these training activities, especially if the quality of the instruction and facilities could be improved.

However, in the case of those training courses where the majority of graduates are failing to obtain training-related employment, one must seriously question the wisdom of continued government support. This is certainly true of the secondary technical school where over 75% of its 1988 graduates only managed to get jobs as unskilled and semi-skilled factory operatives. The fact that they found jobs at all indicates that their training has helped them obtain relatively favourable places in rapidly growing school-leaver employment queues (hence the social ROR of over 11%). But, once again, in terms of the likely net impact on overall social welfare, this type of training investment is merely fuelling credentialism within the education and training system in Zimbabwe and constitutes, therefore, a serious waste of resources.

Table I: Course characteristics at the case study institutions.

TRAINING MODE	DURATION (mths) At instit.	On the job	ENTRY REQS.	QUALIFICATION
Apprenticeship: Firm/Polytechnic	4.5	43.5	5 'O'	ZNCC; certified journeymen
Govt. pre-employ post-secondary: YTCs	24	12	3-5 'O'	Trade tests (4 lowest to 1 highest)
Govt. pre-employ secondary: St. Peter's Kubatana	24	0	ZJC; Form 2	ZNCC and 'O' levels
Private pre-employ post-secondary: Chinhoyi RTC	24	0	None-but 'O's preferred	Own certificate

NOTES:

(i) ZJC is the Zimbabwe Junior Certificate. This examination is taken at the end of the second year of secondary school.

Table II: Background characteristics of trainees.

TRADE	Number sample	AGE LQ	Med	UQ	AV.	'O' levels LQ	Med	UQ	AV.	% unemployed
PRODUCTION										
Apprentice	23 (25)	24	25	26	25	5	5	6	5	4.3
YTC (W)	30 (75)	19	20	21	20	0	3	4	2	40.0
YTC (F&T)	17 (52)	19	19	21	20	2	3	5	3	11.8
Secondary technical	18 (86)	21	22	23	22	2	4	5	3	25.0
Rural training centre	11 (55)	25	27	27	26	0	0	2	1	27.3
AUTOMOTIVE										
Apprentice	26 (46)	25	26	28	26	5	6	7	6	3.8
YTC	20 (74)	19	19	20	19	3	4	5	4	20.0
Rural training centre	15 (65)	24	26	28	26	0	0	2	1	20.0

NOTES:

(i) Figures in parentheses are satisfactorily completed questionnaire returns expressed as percentages of total outputs.

(ii) YTC (W) and YTC (F&T) refer to welding and fitting and turning courses respectively.

Table III: Total costs per trainee (Z$), 1988/89.

Cost category	Prod	Auto	YTC	SPK	RTC
1. Formal (off the job) training					
Salaries	1400	1200	1110	940	1200
Other recurrent	600	580	750	270	1200
Total annual recurrent	2000	1780	1860	1210	2400
Total recurrent training costs	2000	1780	5580	2420	4800
2. On the job training					
Supervisor's time	12000	12000	7500	0	0
Materials etc.	750	750	500	0	0
Wage costs	0	0	0	0	0
3. Production forgone	0	0	6513	2174	0
TOTAL	14750	14530	20093	4594	4800

Table IV: Annual gross incomes and social rates of return, 1990.

TRAINING MODE	1990 INCOME LQ	Median	UQ	AVERAGE		SOCIAL IRR	
1. PRODUCTION ENGINEERING							
Apprentice	16800	20400	24024	20892	(20892)	126.9	(126.9)
YTC (F&T)	4320	5760	7728	5664	(5004)	17.4	(14.1)
YTC (W)	2592	3360	4800	4392	(2640)	11.1	(2.3)
Sec. Tech.	2772	4224	4860	3732	(2676)	34.0	(11.0)
RTC	1920	3840	5808	3804	(2424)	34.0	(5.2)
2. AUTOMOTIVE							
Apprentice	15708	16800	20400	17880	(16500)	108.1	(98.6)
YTC	4428	4812	7200	5628	(4500)	17.2	(11.6)
RTC	3840	4800	5568	4332	(3396)	45.0	(25.5)

NOTES:

(i) Figures in parentheses are average annual incomes and social rates of return adjusted for unemployed ex-trainees.

(ii) The IRRs for production engineering and automotive artisans under the second cost scenario are 104.4 (104.4) and 85.3 (75.8) respectively.

(iii) YTC (F&T) and YTC (W) are fitting and turning and welding courses respectively.

ENDNOTES

1. The most well known studies are by Bofus (1977) and Fuller (1976).

2. See Dougherty (1989) and Middleton et al (1990).

3. This research forms part of a comprehensive study of mechanical engineering training at the professional, technician and artisan levels in Zimbabwe during the 1980s, See Bennell 1990a and 1990b.

4. While secondary school enrollments have expanded tenfold since 1980 (from 74,321 in 1980 to 670,557 in 1989), waged employment has increased by less than 20% during the same period. See IBRD, 1990. 4.

5. The Harare Institute of Technology is the most important initiative in this area of training. However, having only been established in 1988, it was not possible to include HIT as one of the case study institutions.

6. The World Bank, in particular, has questioned this vocationalisation initiative, arguing that schools should first and foremost concentrate on providing 'general skills' training. See IBRD (1990).

7. At the end of four years of secondary education, children write Cambridge School Certificate 'O' (ordinary) level examinations in all the main subjects. These examinations are still set and moderated by Cambridge University although they will be localised by the mid 1990s. The rapid expansion of

secondary school enrollments coupled with limited increases in wage employment has led to significant qualification escalation since 1980. Increasingly, employers are stipulating that applicants, even for unskilled jobs, must have 'Cambridge School Certificate' ie. have passed five 'O' levels at Grade C or above.

8. It is interesting to note therefore that, given the prevailing incentive structure in Zimbabwe, there does not appear to be a serious 'white-collar mentality' in the country.

9. Only 15% of SPK Form Four students passed five or more 'O' levels in 1988 and only 10% passed the ZNCC.

10. Trade tests were originally introduced in the early 1980s mainly in order to certify African workers who had acquired considerable skills but had never received formal recognition from their white employers in terms of status and pay. There are four trade test levels, the highest one (trade test one) being equivalent to a journeyman ie. an apprenticed trained artisan.

11. Comprehensive student records have not been kept at CRTC. However, the staff were able to compile a list of around forty students who had completed their training at the Centre between 1982-1988. Nearly all these individuals were known to be working as artisans. It is reasonable to assume, therefore, that those CRTC ex-trainees in training-unrelated jobs earn less than this group. So, given positively sloping age-income profiles, this means that the net income benefits from CRTC training are likely to be biased upwards vis-a-vis the other training modes.

12. An early justification for this methodology is presented by Psacharopoulos (1981).

13. The Labour Force Survey is a sample survey of one percent of all urban and rural households in Zimbabwe. There were around 1.1 million households when the survey was conducted in 1986-87.

14. Unpublished information on apprentice enrollments, Ministry of Higher Education.

15. Kenya in the late 1970s is an interesting case where training cost was a major factor deterring employers from sponsoring apprentices. See Bennell (1984).

16. Comprehensive information on changes in the numbers and types of employers sponsoring engineering apprentices is not available. However, the information, albeit fragmentary, provided by

personnel managers and training officers from more than twenty private companies in the Harare area strongly suggest that this has been the response of the majority of enterprises.

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