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**An Analysis of Needs and Experiences of  
Employers with Technical Personnel in  
Ethiopia with Special Emphasis on Technicians  
(Level 5 NTQF)**

**Final Report**

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## Abbreviations and Acronyms

BoFED	Bureau of Finance and Economic Development
BPR	Business Process Re-engineering
CEE	Center of Excellence in Engineering
CIM	Center for International Migration
CoC	Center of Competence
CoE	Center of Excellence
CSA	Central Statistical Agency
CTA	Chemical Technical Assistant
DC	Development Cooperation
Ecbp	Engineering Capacity Building Programme
ECPC	Ethio-Chinese Polytechnic College (Addis Ababa)
EMIS	Education Management Information System
ESDP	Education Sector Development Programme
FC	Financial Cooperation
FTI	Further Training Institute (at Adama University)
GDP	Gross Domestic Product
GEQIP	General Education Quality Improvement Program
GER	Gross Enrolment Ratio
GTP	Growth and Transformation Plan
GTZ	German Agency for Technical Cooperation
ILO	International Labour Organisation
INCHER	International Centre for Higher Education Research (University of Kassel)
KfW	German Development Bank
MDG	Millennium Development Goals
MLE	Medium and Large Enterprise
MoE	Ministry of Education
MoFED	Ministry of Finance and Economic Development
MoWUD	Ministry of Works and Urban Development
MoTI	Ministry of Trade and Industry
MSE	Micro and Small Enterprise
MSME	Micro Small and Medium Scale Enterprise
MTA	Medical Technical Assistant
NER	Net Enrolment Ratio
NTQF	National Technical Qualification Framework
NTTA	National Technical Teacher Academy

OECD	Organisation for Economic Cooperation and Development
OS	Occupational Standard
PASDEP	Plan for Accelerated and Sustained Development to End Poverty
PTA	Physical Technical Assistant
R&D	Research & Development
SME	Small and Micro Enterprise
SNNPR	Southern Nations, Nationalities People Region
SPSS	Statistical Programme for Social Sciences
TVET	Technical and Vocational Education and Training
UNIDO	United Nations Industrial Development Organization
VET	Vocational Education and Training

# 1. Summary

Ethiopian employers are somehow dissatisfied with the competencies of their employed technical staff at levels equivalent to levels 4 and 5, and in the field of leadership and managerial and practical competence. The big majority has high expectations towards the qualification of the new type of technical personnel and thus sees many advantages in hiring technicians instead of craftsmen. The most important capabilities expected are “experimental and practical work attitude”, followed by “theoretical base of engineering” and “applied technical knowledge”.

Only a few managers personally know TVET institutes providing initial training, if so, predominantly in Addis Ababa and from those companies that are in contact with the Ethio-German Engineering Capacity Building Program (ecbp) which means private companies working in industrial areas, e.g. leather industry, supported by ecbp. Despite of the fact that most of them have experiences with TVET interns and co-operative training their perceptions and opinions about TVET providers are predominantly negative. They are strongly interested in learning about the NTQF and particularly about the latest developments within the TVET system. Many suggestions call for the establishment of systematic awareness raising and information sharing mechanisms to be undertaken by TVET.

Plans and projections of investments and economic developments nationally and regionally partly exist but are difficult to obtain thus hampering a realistic and empirical based estimation of demand for human resources of the TVET system. Regional TVET agencies are partly undertaking market assessments and are trying to find out about the employment careers and perspectives of their graduates but there is plenty of room for improvements. Numbers and details of companies, especially private companies as potential employers of TVET graduates are not systematically listed; comprehensive statistics are not available.

The total enrolment in TVET has grown from 106,336 in the year 2004/05 to 308,501 in the year 2008/09. As such it exceeds the size of enrolment of students in the second cycle (grades 11 and 12) of general secondary education. Female enrolment constitutes 46.2 percent of total enrolment, indicating a relatively good gender balance at the national level. Those figures could be higher or in some cases lower because of unreliable and partly unsystematic reporting procedures.

A general growth in TVET enrolment and in the production of middle level human resources is necessary if the country is to become a “middle level income country” within a short range of years as envisioned by the GTP and the ESDP IV. A “realistic” optimistic scenario based on three important assumptions regarding growth of the economy and in particular the manufacturing area indicates a likely demand for middle level human resources where the provided number and kind of TVET graduates might probably match the labour market demand.

The new type of NTQF level 5 “technician” is needed by the labour market. The total demand within the next three years among the 51 companies involved in the survey is 1,488. Theoretical projections based on educational and economic statistical data and a number of assumptions indicate that approximately 25,000 level 5 technicians would be trained within 10 years. The most urgent demand is in production/ manufacturing in industry – the key area for economic growth - whereas the demand for handicrafts and trades to be organised as MSEs cannot yet be determined. Agriculture and services as the two other major occupational areas besides industry mentioned in the GTP may also need technicians but as long as financial means – the planned FC support – are limited priority should be given to industry.

As the industrial development differs from region to region the regional demand for technicians will follow existing sectoral structures with regard to employment in industrial sectors or occupational areas. The distribution of future polytechnics and the decision on occupational standards and training capacities for level 5 is likely to follow a comparable distribution.

Further training (as opposed to initial training and offered by the FTI of Adama University) of already employed technical personnel including those working at levels equivalent to levels 4 and 5 is strongly demanded by the employers. The strongest demand is in electrical and mechanical engineering, production technology and information technology. The big majority demands advanced as opposed to basic training. As regards the duration of the further training 37 of the 51 involved companies need 11 weeks on average independent of size and sector. Technicians respectively those considered working as such are considered as the largest group in need of further training. Then follow all levels of craftsmen. These figures demonstrate a strong need for permanent provision of further training.

Employers consider TVET teachers and instructors generally as weak in almost all regards – whether or not this perception meets the reality. It is of utmost importance to provide properly trained teachers (so-called A-level teachers) who know the world of work and are familiar with production processes in companies for the training of level 5 and, to provide them on time. The planned National Technical Teacher Academy should learn from the experiences of Adama University and its Further Training Institute; teachers at future polytechnics should be assisted during the inception phase by foreign experts provided by German Development Cooperation.

## **1. Background of the Study**

The Government of Ethiopia through the Ministry of Education (MoE) and the KfW German Development Bank (KfW) have agreed to further support the reform of the Technical and Vocational Education and Training system (TEVT) of the country. A KfW mission visited Ethiopia from 27.04. to 07.05.2010 to discuss the TVET investment programme of Financial Cooperation (FC) as part of the larger German Development Cooperation (DC) for the „Engineering Capacity Development Programme (ecbp)“.

The Financial Cooperation programme consists of three components: 1. Support of TVET teachers training institutions; 2. Support of the TVET reform (establishment and support of three „Centres of Competence“ and the Federal TVET Agency; and 3. Support of TVET institutes („Centres of Excellence“) to be expanded to provide level 5 training according to the National TVET Qualification Framework (NTQF) including the establishment of a national welding training center at the Center of Excellence in Engineering (CEE).

FC support of the new phase will be extended to level 5 (technician) – „as this reflects recent TVET concept developments and the country’s priorities. The existing equipment and learning materials at efficient and effective TVET institutes is to be expanded to provide training at level 5 of the NTQF and complemented in lower levels as necessary in occupational standards demanded by the market and integrated into the National TVET Qualification Framework.“ (Minutes of Meeting 2010, 4) As the first step of the selection process of public and non-public TVET institutes to be upgraded to level 5 both parties the MoE and the KfW agreed to undertake a demand analysis to determine occupational standards (OS) most urgently required at level 5. They also agreed to contract the two authors as both have been involved in research and consultancies in the Ethiopian education sector over many years.

A survey of needs and experiences of employers of technical personnel in Ethiopia with special emphasis on technicians (level 5 NTQF) was planned for a period of approximately three months. The preparation of the intended survey started already in August 2010 (for the TORs see Annex 1); its execution took place in Ethiopia between 15 September and 9 October 2010 (for the schedule of visits see Annex 2). Due to some problems with the analysis of questionnaires and processing of data in Germany the draft report was finalised at the beginning of December.

A number of studies have been conducted over the last years on the concept and establishment of polytechnics (see References) and its inclusion into the national TVET system, and first theoretical projections as to how many technicians would be needed were done (Winkler 2008). Nevertheless, reliable empirical data were not sufficiently available on the demand aspect and its implications for the selection of industrial sectors/areas and occupational standards and the upgrading of „Centres of Excellence (CoE)” to the status of polytechnics. The most recent survey undertaken by the ecbp Component 4 (private sector support), the so-called „market survey“ found out that it is difficult for employers to find technicians trained at polytechnics in the labour market - quite understandable in a situation where polytechnics do not yet exist in the country.

### 3. Purpose and Methodology

Unfortunately, research is not yet a common feature and in-built element of the TVET sector in Ethiopia due to lack of capacity and funding among others. On the other hand, developing a national TVET system is such a challenging and costly undertaking that advanced research like this study becomes indispensable in order to save on time and finance. Knowing the higher education system quite well the authors are of the opinion that such reports should also be used to teach and train university students on how to do similar research. This requires an open and honest description of the plan and documentation of its realisation.

**Purpose.** The study is supposed to provide plausible and empirically based guidance as to which occupational areas / occupational standards should be supported with the limited FC resources available. It has taken into account current and projected future demand for OS on regional levels, especially resting on the results of a former needs analysis of one of the authors (Winkler 2008).

Furthermore, the study was expected to consider plans, projections, assessments, surveys and small scale demand studies that have been conducted on the topic, and tries to update and complement them. For obvious reasons the study is limited to the regions/national states of Tigray, Amhara, Oromia, SNNPR, and the City Administration of Addis Ababa.

According to the Terms of Reference (TOR) (see Annex 1) the aim of the study is to answer a number of questions:

(A) What are **the most urgently needed skill areas from the perspective of employers / labour market** for which TVET institutes are ready to train manpower in general and in particular for NTQF level 5 (technicians) and, in addition, for which the Further Training Institute (FTI) of Adama University will be prepared to provide further training.

(B) What are the **implications of plans and projections** as established by the Ministry of Trade and Industry, the Ministry of Finance and Economic Development, their regional branches and bureaux and regional TVET agencies for skill areas, levels of technology and numbers of technicians needed in order to become a middle income country by the year 2017 as envisioned in the Plan for Accelerated and Sustained Development to End Poverty (PASDEP)?

(C) **How many level 5 TVET graduates (technicians) per occupation** are needed in order to become a middle income country by the year 2017 as per the PASDEP and according to national and regional economic and social development plans and expectations (projected enrolment in TVET) and compared to the development of comparable countries?

**Underlying assumptions.** Talking of manpower requirements for areas of skills and levels of technology with special consideration of level 5 needs prior clarifications in at least two

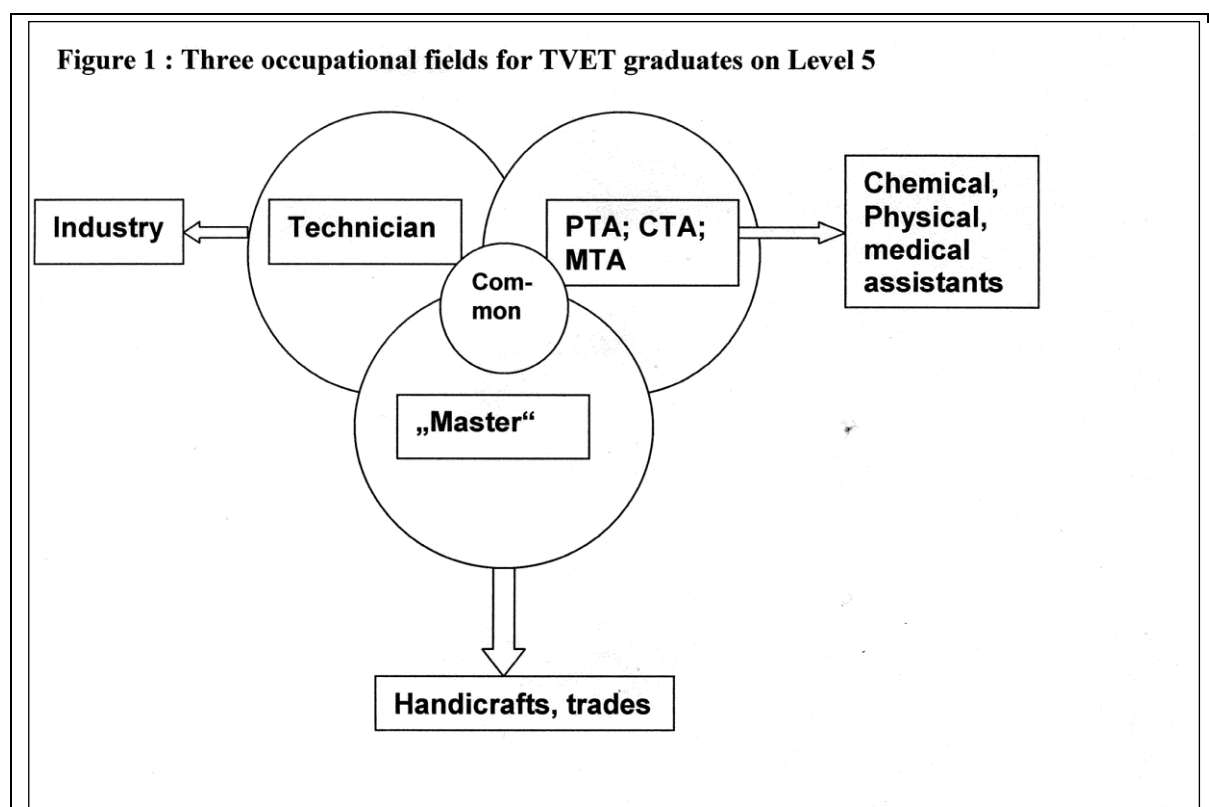


regards: First **towards the possible occupational fields for which occupational standards for level 5 graduates might be developed or revised** and second **towards the functional composition of technical workforce in general.**

By an definition often internationally used, technicians are highly vocationally trained persons with at least two years, rather five years professional experience after their graduation as skilled workers (level 4) followed by two-year studies at a polytechnic with a national diploma. Compared to engineers they have mid-level understanding of theory but high-level of mastering production technology and tools. They are highly requested by industry as they serve very important semi-professional duties at the shop-floor level, like production supervision, group supervision, production preparation, work-flow organisation and else.

Emphasising the importance of technicians for industrial production and manufacturing may be seen as one sighted as other semi-professional areas on level 5 exist. This would be firstly, assistant's jobs in medical/clinical, pharmaceutical, and chemical enterprises and services. Under gender aspects these are very important fields for female employment and occupation not yet or by no means fully explored by the Ethiopian TVET system. Secondly, one must take into consideration that the occupational fields of craftsmen and artisans are also in need of well trained and experienced personnel. They are especially in need of persons, who can establish and run a small handicraft business, can train their own personnel (with an official license), and are able to administer a Micro and Small Enterprise (MSE). We would actually not call them "technician" rather "master" (German "Meister") only, and also not "Master Craftsman" as by many employers and even TVET experts. The denomination of level 4 graduates as "master craftsman" is highly problematic, as they are missing at least professional experience of five years after graduation of level 4. Given the general confusion in defining qualification levels within the national TVET system it is recommended to MoE and GTZ to update or even newly develop a glossary of the latest version of the NTQF and make it available as widely as possible.

Figure 1 shows that training of level 5 (technicians) may have to be organised in three specialised occupational areas and one smaller common area. Out of the three areas it is obvious that industry would be the most important one for economic development and for turning the country into a middle level income country by the year 2017 (see chapter 4.C).



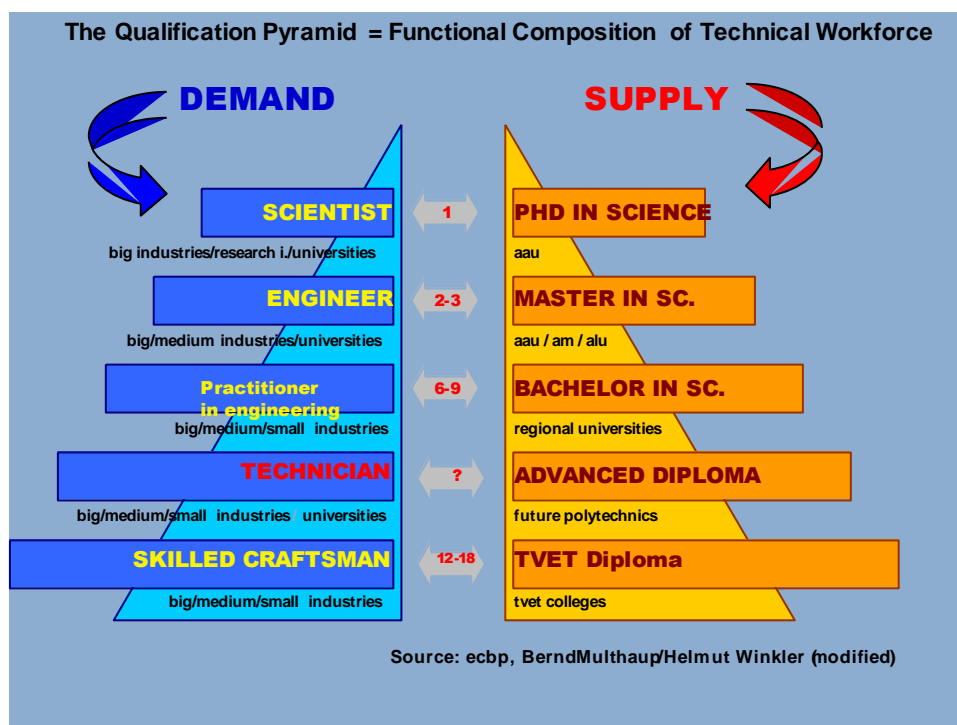
Candidates for level 5 training (the future new type of technical personnel within the NTQF) usually possess already a qualification in an occupational standard in level 4. To upgrade them to technician level a “generalist” approach will provide the necessary additional qualifications. It is advisable to orient this approach generally towards “production technology”. The description of NTQF level 5 (see ecbp March 2010) should concentrate on the following tasks and responsibilities:

- Production organisation (planning, design, operation)
- Production supervision
- Work preparation
- Logistics (tools, machinery, materials)
- Analysis of productivity, efficiency, cost reductions
- Waste treatment and ecology etc.

Already existing as well as newly developed occupational standards and the curriculum must reflect that and should be developed mutually by TVET, the future polytechnics and the industry (as the most important potential employer of this type of technician). Some ideas could be borrowed from a recently introduced new occupation in Germany, the “production technician” (in German “Produktionstechnologe”).

As to numbers, the distribution of the different qualification levels within the workforce is assumed to generally have a pyramid structure (see the following Figure 2).

**Figure 2: The Qualification Pyramid = Functional Composition of Technical Workforce**



Source: ecbp, Bernd Multhaupt / Helmut Winkler (modified)

As the process of levelling occupational qualifications is still going on and thus producing sometimes considerable confusion among employers the figure does not show the different levels of craftsmen (1-4). Instead it calls all those below level 5 “skilled craftsmen”, simply because they had undergone systematic training and received a diploma. However, following the logic of the “qualification pyramid” and subsequently the NTQF, technicians with an

advanced diploma would be level 5, Bachelor (BSc) level 6, Master (MSc) level 7, and Ph.D level 8. On each level of qualification a certain amount of personnel is employed. In the figure the estimated number of workers/employees is indicated as related to the highest qualification level, e.g. related to one engineer or scientist with a Ph.D. The estimated relation between workers and engineers in Ethiopia ranges from 12 to 18. Such relations must be understood as a precondition for producing projections on technical qualifications needed.

The amount of employees at each level in a company shows specific differences due to the technology involved, machinery in use, work processes etc. Generally, we found a high number of semi-skilled and unskilled workers and only a small amount of engineers and scientists in the involved industrial companies. This might be due to the specific investment structure for the medium sized industry in Ethiopia which emerged during the last years. It can be characterized as follows:

- one or only few main production processes;
- products are produced mostly by imported “high-tech” machinery from industrialised countries;
- the work processes are mostly fully automatic.

All technological knowledge and engineering competence is incorporated in the bought machinery so that the employment of engineers or scientists is not necessary. In case of malfunction or necessary repair/maintenance the machinery experts of its producer will be engaged.

As the workers are trained in only one or two skills, a qualification level of 1-3 is sufficient. But it was mentioned by most employers that the qualification of workers graduated from TVET institutes is questionable if it comes to machine operation and tool handling. Higher qualifications will be required, if the machinery should be maintained and new work processes have to be planned and implemented within the company. In this case qualified personnel on level 4 (skilled craftsman) and 5 (technician) will be required and employed.

**Research plan.** As can be seen from Annex 1 the rather general questions mentioned above were broken down into more detailed research questions in order to guide the development of research methodology and instruments. The overall research plan elaborates on (a) research steps, (b) sources of information/data, (c) methods and instruments of collecting information/data and, (d) processing and analysing data.

As to (a), the research plan includes a total of 15 different but interrelated steps, most of them were carried out while in the country. As to (b), three major groups of sources for information and data gathering were considered relevant: (i) Literature and documents, (ii) official plans and strategies and statistics of government bodies and (iii) resource persons, among them managers of employers and potential employers of TVET graduates as key resource persons.

As to (c) five methods were selected as appropriate: Content analysis, investigation by means of printed questionnaire and semi-structured or structured interviews, group discussions and analysis of statistics. Additionally, two TVET institutes and three companies could be visited and their general managers interviewed. As to (d), the research team upon a first assessment was to agree on how to process the different types of data available and collected from different sources.

Whether all envisaged documents (such as studies, reports, donor publications etc.) and in particular official plans and strategies as well as statistics of government bodies would exist, and if so whether they and in particular the key resource persons would be available within the given time frame was difficult to anticipate.

**Sources of information.** Most of the literature and study reports on the topic especially for Tigray and Amhara were already known to the team from prior consultancies. The so-called “baseline study” conducted at the beginning of 2007 by ecbp was seeking “baseline data for the monitoring of ecbp's indicators as well as to see the major demands of support formulated by the participating companies.” (ecbp no year) As a follow-up a “company survey” was undertaken by ecbp (Component 4) over a period of some months in 2010. Out of a cross sample of 173 companies a net sample of 68 enterprises, mainly medium and big companies, was selected for interviews. 36 are based in Addis Ababa, 11 in Oromia, 10 in Amhara and 8 in Tigray. This survey “was not only used to look into the employment effects of the educational components but at the same time used to assess the companies’ performance with and without ecbp intervention.” (Kluve December 2010) Both provide some feedback from employers about their impressions on employed TVET graduates (craftsmen and engineers) and interns which is somehow comparable with the outcomes of our study in regard to regional and sectoral aspects of industry (working areas, satisfaction, further training needs, missing skills, services provided to interns).

These studies are part of a comprehensive GTZ sector project “Employment-oriented Development Strategies and Projects” that aims at “measuring the employment effects of ecbp in Ethiopia” (so the title of the latest status report). Assessing demand and needs of employers for technical manpower and in particular technicians is not part of it. It should be noted that detailed information about methodology and instruments could not be obtained before the end of the first week in the country. The status report (Kluve December 2010) and the analysis of the baseline study were received in December only. As suspected, to obtain plans and strategies of ministries other than the MoE and in particular from their regional bureaus but also the regional TVET agencies proved difficult and partly impossible despite the assistance provided by the TVET sector of the MoE, some donors and the GTZ experts of the TVET component and the other components of the ecbp.

Various drafts of the new poverty reduction strategy, the Growth and Transformation Plan (GTP) for the period 2010/11-2014/15 of the Ministry of Finance and Economic Development (MoFED) could be obtained but not until the days before departing the country. To get papers of the Ministry of Trade and Industry (MoTI) on the revision of Micro and Small Enterprise (MSE) Policy and Strategy high level intervention was needed and thus took weeks. The same was true for reports on Large and Medium Scale Enterprises of the Central Statistical Agency (CSA) and cluster development in Ethiopia of UNIDO.

**Methodology for projections.** Projections are used in planning procedures as prognostic instruments. Methodologically, they provide plausible calculations of possible future developments for certain groups of persons. Mostly, they show expected numbers of people; in educational planning these are very often applicants, pupils, students, graduates, and teachers. As educational planning is part of the political decision making on complex structures, projections have to be made very carefully and must be based on reliable statistical data. The data have to be obtained from official sources, e.g. national, regional, and sectoral statistics over several years prior to the projections which in the case of developing countries are not easily available or hard to obtain. And as usual these data are mostly more than two years old. If even these data are not available plausible assumptions have to be made based on extracted information about comparable data from various kinds of sources, e.g. through interviews with knowledgeable persons, study of literature, analysis of prior studies etc.

The complexity of the subject is due to interferences with other societal areas and actors causing unwanted or conducive influences. Due to these interrelations and connections with other areas of interest, e.g. urbanisation rate, age structure of population, numbers in relevant age groups, existing and necessary labour force, (un-)employment rates, economic growth rate, planned and realized investments etc. Government officials, ecbp and TVET experts seem to hesitate to produce hard planning data. Thus, a producer of projections must be impartial and brave as well.

The mathematical procedures in producing projections are less difficult in comparison. On the base of data representing the history of development of a certain category of persons one can calculate the average annual growth rate (or in cases of decrease the respective data). This growth rate can be used as incremental factor in projecting data for the future. One has to keep in mind that all growth processes – natural or societal, politically influenced or economically determined – show the same characteristic: slow growth in the initial phase is followed by acceleration and leads into a certain “saturation” phase where stability is reached (*“Trees are not growing into heaven!”*).

The following correctional factors in producing projections had been taken into account:

- Changes in educational policy can alter projections;
- Shifts of importance and attractiveness of educational sectors (sub-sectors) into another can occur causing less or more applicants and
- Natural disasters (extreme drought, floods, and earthquakes) can occur and disturb a steady economic growth;
- Population growth rate might change over time;
- External influences might cause disturbances, e.g. loss of international support due to change in policy of donors; war etc.

Projection as a method does not produce exact or empirical data, therefore projection data should be scrutinized in a monitoring process every third year. Hence the methodology must and should not be changed – which also applies to the basic statistical methods in gathering data. In cases of alteration some confusion about the reliability of statistical and projected data might result.

Additionally to the projection method another method for calculating progressive data in education has been applied for comparison with other developing countries as in the case of previous projections for technical manpower by one of the authors (Winkler 2008). This method - called benchmarking – can be described as follows. “Benchmarking” is a comparative process using indicators for scientific and technological competitiveness and technological capacity built up in different countries. Such main indicators are: Gross Educational Ratio (GER) in Higher Engineering and TVET Education; graduates in Science & Technology and TVET; R&D personnel per 1000 employees; technical personnel per 1000 employees, technical trained personnel per industrial sector; technical human resources in relation to total labour force; etc. The indicators which can be used for benchmarking may rely on comparative data sets from the USA; the European Union, OECD countries, and neighbouring Sub-Saharan countries.

Benchmarking need clear political objectives which can reach from “being among the best”, “keep up with the Joneses” (which means average), to comparison with developing countries with similar structures.

**Educational and economical statistics.** The five regions, in particular the regional TVET agencies were requested to help with plans and projections of economic and human resource development and reports on the where-about of TVET graduates (tracer studies) as well as any other studies undertaken in the respective regions. Whereas papers from Tigray (e.g. BoFED, Tigray Regional Five Year Strategy Plan 2006-2011, 2006) and partly Amhara were available from previous missions of KfW, only the SNNPR responded more or less satisfactorily, even with some data on tracer studies. Previous reports such as the Tigray labour market assessment (Dangelmeyer/Franz 2003) proved to be incomplete as annexes and recommendations for further planning are missing. However, its findings about the urgent need for TVET graduates (without mentioning level 5) in the sectors of construction and industrial technology are in line with our findings. A few documents on enrolment from Tigray were received in Tigringna at the end of our stay only. The major source for data on

enrolment is taken from the Education Statistics Annual Abstract 2008-09. However, it seems that the MoE is not always accurately and regularly informed about the employment situation of its TVET graduates and thus can only speculate about the employability of them. A major handicap was the fact that economic statistics could not be received easily and on time either from the federal government or any of the regions.

**Resource persons.** Identifying relevant resource persons proved to be a tiresome task. Apart from persons working as national and international TVET experts with federal and regional governments, at institutes and universities and even with donors, the team spent a lot of time to identify existing and potential employers (public and non-public companies, education and training institutions, MSEs etc.) and later on to contact their managers to participate in the research. It seems that no one in Ethiopia knows how many employers exist, where they are and how to contact them because details are not at all or only partly known.

Industrial area specific lists were received from the ecbp concentrating on those areas that are supported by ecbp, e.g. leather industry. In addition, region specific lists of known employers were made available in a few cases. However, most lists turned out incomplete and little comprehensive apparently due to the source (ministries, associations etc.) and their intentions (usage in prior surveys etc.). Some lists contain many details including company size and/or numbers of employees; others do not even mention owners, manager's names, addresses or telephone numbers.

**Methods and instruments for data collection.** It was planned to distribute a printed questionnaire via postal mail and/or e-mail and to organise some intensive oral interviews. Since lists of employers could not be obtained prior to the arrival in Addis and most of those lists finally received after the first week were incomplete (no postal addresses, telephone numbers or e-mail addresses) the plan had to be reconsidered. This move was enhanced and reinforced after consultations with the ecbp, revealing the manifold problems with accessibility and availability of key informants and general managers and in particular with English language competence and familiarity with handling professional questionnaires encountered during their "company survey". Managers of medium and big companies involved in that survey (and therefore known) had participated in a difficult, very detailed, time consuming and thus tiresome telephone interview. Because of that ecbp recommended not bothering the same companies and their managers again for the new survey. Time restrictions added an additional challenge.

Companies in the five regions were then first contacted by telephone and if interested their general or personal managers invited to one of altogether six workshops in the five regions where the two researchers first explained purpose and background of the survey. The participants were then asked to fill in the questionnaires in English language (see Annex 5); were necessary an Amharic version of the questionnaire (see Annex 6) was used as well and national research assistants were helping in translating. After that a structured group discussion took place on four issues among them the potential need for further training for which a separate questionnaire was used. This provided an opportunity for the participants to openly express opinions and ask questions their own that would not have been possible by applying the original plan. For many of them the roughly four hour sessions were the first opportunity to learn about the TVET system.

Not all participants filled in or handed over a filled in questionnaire. Some questions were left open partly because participants lacked proper information or felt not entitled to provide authorised answers. However, out of approximately 250 employing institutions/organisations contacted, 52 participated in the workshops, and 51 filled in questionnaires were received within two weeks. A real return rate thus cannot be calculated. In comparison to the "company survey" with the same target group which was running over a period of several

months the amount of 51 returned questionnaires within a period of a bit over two weeks is remarkably high.

Annex 3 shows in more detail what was originally planned, how it was changed and modified, for what reasons and with what effects. It also explains how sampling and research assistance was organised.

**Processing the data.** The total of 51 filled in and received questionnaires have been handed out to the International Centre for Research on Higher Education (INCHER) at the University of Kassel. There at first a so-called codebook was produced. This instrument allows the attribution of single items of the specific questions in the questionnaire to variables in the data set.

The next step was the scanning of the received questionnaires with a special scanner. The scanner had been calibrated by producing a scanning mask by using an original empty copy of the questionnaire. The scanning was done by differentiating the data along the incorporated regions. Then the scanned data were scrutinized. Due to bad quality (copied versions, data sent via e-mail etc.) about 50 % of the questionnaires had to be reproduced manually and very thoroughly by assisting staff which caused some delay.

The result – a basic data set in Excel – was newly formatted in a version which then could be analysed with the international standard Statistical Programme for Social Sciences (SPSS). The results of the analysis with SPSS are tables and figures. A first (standard) break is counting the frequency distribution of the items (see Annex 7). Two other breaks have been produced by showing the distribution alongside the major industrial branches or sectors (Annex 8) and the visited regions (Annex 9). The three breaks – especially the printed tables - form the basis for further analysis of the results of the survey which are part of the (draft and) final report.

Data processing showed two important observations that should be taken into consideration when final results are being assessed:

- a) Many questions (rather 30 %) have been left out within the single questionnaires by the respondents which indicate a certain uneasiness of the respondents with questionnaires of the used type.
- b) Alpha numeric answers have been transferred originally into the data set; they show a very weak mastering of English language of the respondents.

A different set of qualitative data was received from the group discussions following the filling in of the questionnaires during the workshops. The participants were asked to answer or comment on a set of four general questions (see chapter 4, A.2, A.4, A.5 and C.6). Comments often resulted in further questions or discussions with the moderating researchers and/or among the participants themselves. As such for some participants it was a sort of briefing on crucial TVET issues.

It is well known among the TVET experts in Ethiopia that the training and employment systems are not well linked with each other. As one effect, employers do not know much about the TVET training system both public and non-public, its structure, vision and mission, government's development plans and opportunities for communication and cooperation. As well, the TVET sector and institutes may not always understand the situation and needs of employers of their graduates.

The outcomes of these discussions are complemented by first-hand information from oral interviews with general and personnel managers during three company visits. Of course, not all participants of the workshops participated in the discussions as most of them didn't have enough time or in a few cases felt uneasy (or unable) to participate in English conversation. However, the outcomes are meant to throw more light on the factors preventing a closer link between the two systems.

**Preliminary findings.** At the end of the three-weeks stay in Ethiopia a very temporary report was prepared and presented to the State Minister of Education of the TVET sector, to MoE and GTZ staff of the MoE TVET sector, the German Embassy and the KfW country director (ecbp directors were unfortunately prevented from participating in the briefing).

## 4. Findings

Findings are presented following the structure of the research questions in the ToRs under three general questions which in turn were broken down into more detailed questions. For easing the reading of the statistical figures are separately attached in Annex 4.

**(A) Most urgently needed skill areas from the perspective of employers / labour market for which TVET institutes are ready to train manpower in general and in particular for ETQF level 5 (technicians) and, in addition, for which the FTI of Adama University will provide further training**

### A.1 Which companies / employers are particularly in need of level 5 graduates?

This sub-chapter contains major findings emerging from the analysis of the questionnaires: Basic data on the companies involved and their employed staff, demand for technicians, required knowledge, qualifications and soft skills.

**Regional distribution of responding companies.** As mentioned above a total number of 51 employing organisations could be addressed by organising six workshops in Ethiopia. The workshops took place in Addis Ababa (three), Bahir Dar (Amhara), Mekelle (Tigray) and Awassa (SNNPR). Due to time restrictions it was not possible to organise further workshops e.g. in Adama, Dirre Dawa or other places with employment relevant industry. Some companies based in Oromia participated in the workshops in Addis Ababa; in addition, the Adama University was consulted to learn about the situation in their vicinity and/or catchment area. The regional distribution can be seen in Figure 1 of Annex 4. The status of the companies involved is evenly distributed between being an independent enterprise or either a central or peripheral branch of a bigger company (see Table 2 in Annex 7).

**Number of employees.** The 51 companies represented in the workshop and the study have a minimum of 3 and a maximum of 1,400 employees, on average 213 employees which indicates that most of them are medium sized. The total number of employees in the companies is 7,889; the respective total number of employees in the bigger companies is 13,836 employees. This is representing a share of the total industrial urban employment sector of rather 1%. The total employed urban population in 2009 is counted as 4,547,266 in the last “Analytical Report on the 2009 Urban Employment-Unemployment Survey” of the Central Statistical Agency (CSA) of Ethiopia. With a percentage of 32.1 for the number of employees in the comparable industrial sectors therefore the manpower can be counted as 1,456,672 employees. Therefore, the coverage or share of the involved companies represents a sample of 0.94% of employed population in urban areas (Central Statistical Agency Ethiopia March 2010; p. 46, Fig. 5.2 and p. 51, Summary Table 5.3).

**Economic/industrial sector of involved companies.** The distribution of the involved companies among economic/industrial sectors can be seen in Figure 2 in Annex 4. Leather and garment industry form the biggest part, followed by production companies with production of several kinds of goods. Agro-processing industrial companies are on the third place indicating that the national strategy of agricultural development based industrialisation shows first results. However, almost 70 percent of the involved companies are working in production/manufacturing clearly indicating the priorities of areas of support in view of limited financial means.



**Legal status of companies.** The vast majority (81%) of involved companies is private industry, only 11 are either parastatals (9%) or public organisations (2%). The rest did not indicate their status.

**Main production processes.** Many of the respondents have been answering to our open question about the main production, that they are mostly engaged in manufacturing goods (29%). All other production processes were named each by only one respondent.

**Employees with background in engineering and TVET.** Many companies (in total 80%) report employing 1 to 10 engineers with an average of 8 engineers per company (see Table 5 Annex 5). Many more employees have a background in TVET. A total of 1478 persons with an average of 36 employees per company being trained/educated in TVET institutions have been counted.

**Expected development during the next three years.** The responding companies in the survey were very optimistic about their future employment situation in their vast majority (35 of 37 answers). Only 2 companies report that they expect either a decrease in employment or a stable number of employees. 72% of those companies who are intending to hire technical personnel during the next three years have been indicating numbers between 5 and 50 additional positions for technical personnel to be filled in (see Table 13 Annex 7).

**Rating of competencies of employed technical staff.** We asked the participating companies how they rate the competencies of their technical staff, grouped in three categories: practical, theoretical and leadership/managerial. The results show some dissatisfaction with the competencies (see Figure 3, Annex 4).

**Demand for technicians.** The strongest demand for technicians was articulated for the field of production with an average of 37 technicians per company for the next three years. But also for other fields technicians are requested (see Table 22, Annex 7).

The total number of required technicians in the participating companies for the next three years is 1,488. If we divide this by three the result is a demand of 496 technicians per year. If we split this demand up to the different fields we can see that some fields need more, others fewer technicians (see Figure 4, Annex 4). The greatest demand is articulated for the fields of production (n = 630) and production supervision (n = 141) which is quite in accordance with the sector distribution of the companies.

**Satisfaction with the skills of TVET graduates.** We have asked how far the employers were satisfied with the skills of the TVET graduates hired last year (as opposed to the totally employed technical staff). Generally the employers are rather satisfied with their overall qualifications in contrast with the qualification of their technical staff at all (see Table 21, Annex 7).

For the two dimensions of theoretical knowledge and practical skills most of the employers rate their practical skills (74% from 1 to 3 on a 5 digit scale between 1 = not at all and 5 = very much) lower than their theoretical knowledge (66% from 3 to 5).

**Advantages seen in hiring technicians instead of craftsmen.** Employers expect a lot from the new category of technical personnel named technician: 91 % of them see an advantage in hiring them instead of craftsmen (TVET graduates). Asked in an open question they articulate several reasons for this expectation; only some of these reasons will be presented here (out of 28 articulated reasons). (The citations are original transcripts of the handwritten answers to the question 2.15 in the questionnaire. The weak English might be due to a certain uneasiness of the respondents to the English version of the questionnaire.)

- “Better theoretical knowledge they accept new ideas easily”;
- “Could be use for multitask”;
- “Have practical skill”;
- “Understanding the processing technology on the product”;
- “In addition to their practical task they can give training”;

- “Supervisor and guidance to lower craftsmen can be provided”;
- “Have work experience”;
- “Technicians can understand things easily and executed at one time”;
- “The technicians are more concentrated on practice”;
- “They are more familiar for practical and theoretical aspect”;
- “They have both the technical and analytical knowledge better”;
- “They might have practical knowledge”;
- “They possess better theoretical and practical competencies ...”

One can see that expectations about practical competencies are ranked high and some are doubtful if this hope will be fulfilled.

**Important aspects for hiring technical personnel.** The above mentioned high expectations towards the qualification of newly hired technical personnel – especially for technicians – can be seen also in the answers to the question about the important aspects for hiring. Again, employers consider practical experiences gained during initial training as the most important criteria for hiring/employment (see Figure 5, Annex 4).

**Familiarisation time on the job.** The experience of the employers about the necessary time to introduce newly hired technical personnel into their specific jobs can be expressed by the needed average time for that. For technicians they expect an average duration of 5.6 months; for TVET graduates this duration is estimated at 7 months. Asked again in an open question what reasons might be responsible for differences the respondents gave interesting statements like the following (selection from 18 answers):

- “It depends on their knowledge for their progression”;
- “Level of knowledge and kind of work”;
- “Not capable of practical knowledge”;
- “shortage of money and time”;
- “self motivation ...”

**Specific functional knowledge required at workplaces.** We asked the representatives of the participating companies about the importance of certain qualifications of technical personnel acquired during the introduction phase and to fulfil their duties. The answers show a wide variety with a dominance of technical knowledge (79%), followed by communication skills (47%), and knowledge about the organisational structure of the company (45%) (see Figure 6, Annex 4).

**Specific qualifications expected of technicians.** As mentioned already, the expectations of employers towards the qualifications of the new type of technical personnel named “technicians” are rather high. Therefore, we have asked the participating companies to specify this expectation by giving them a set of qualification areas in three fields:

- Non-technical subjects
- Methodical knowledge
- Professional (technical) knowledge.

The results are represented in Figure 7, Annex 4. Again, it can be seen that the capabilities of candidates in “experimental and practical work attitude” are of utmost interest (value 1.9), followed by “theoretical base of engineering” (2.0), “applied technical knowledge” (2.2), and “measurement and control”.

**Requested “soft skills”.** Due to the increased importance of so-called “soft skills” for human relations at the work places we asked the employers about their expectations in this regard. They ranked these mostly very high (see Table 45, Annex 7). The rating of the existing soft skills by the involved employers is rather undecided: 40% have chosen the category 3 on a

scale of 5 (1 = very good; 5 = not sufficient), whereas 36% rated them as good (categories 1+2) and 24% as not satisfactory (categories 4+5).

## **A.2 Which and how many companies are aware of opportunities for training technicians?**

Only a few managers personally know TVET institutes providing initial training, if so, predominantly in Addis Ababa and from those companies that are in contact with ecbp (via C4 “private sector development”) which means private companies working in those industrial areas e.g. leather supported by ecbp. Despite the fact that most have provided internships for TVET students, the vast majority of the workshop participants do not know much about TVET training providers and nothing about training for level 5. Subsequently, they have never visited such an institute and have never heard about the only institute that is already providing training for level 5, the Ethio-Chinese Polytechnic College (ECPC) in Addis Ababa.

The same holds true for opportunities for further training. Only managers of leather companies know two government centers or institutes that are providing short term training in Addis Ababa. The activities of the FTI at Adama University are somehow known by those very few which had benefited from its programmes which are of course limited to 4 to 5 industrial areas and occupations.

The fact that managers do not know TVET training providers in person does not mean that they have no opinion about them – just the opposite is true. Most of them do have experiences with TVET interns and co-operative training. However, independent of the source of their perceptions and opinions most of them commented to a differing extent on key aspects of particularly initial training at TVET institutes:

- Graduates (with unspecified qualifications): they are not properly trained; do not possess enough practical skills and experiences; have wrong perceptions about working in production etc.; must be skilled in workshop and machinery management and their maintenance.
- Teacher/trainers (again unspecified): they are not well trained; are theory-oriented; lack practical competences; are not motivated; do not know the situation of the employers; are often not able to handle equipment and machinery and, generally there are not enough qualified teachers for all industrial areas available; training should emphasize quality instead of quantity.
- Equipment/machinery (not specified): most institutes are only poorly equipped; not in sufficient numbers available etc.
- Curricula (known in a few cases only): are generally too theoretical; too many subjects that are not needed for employment; some curricula were developed prior to or without the assessment of training demands of companies.
- Teacher-student/trainee relation: class rooms/workshops are overcrowded; too many trainees depend on one teacher.
- NTQF: almost none of the participants is informed (and rather confused) about the NTQF, in particular about the levels 4 and 5; all of them expressed their great interest and intention to get further information on it.

These perceptions might be biased however, but they influence the motivation of the employers to communicate and cooperate with the training system and its stakeholders and – more importantly - their readiness to employ TVET graduates and even to support the TVET system.

### **A.3 How do companies meet their labour demand (currently and in future)?**

**Provision of and experience with TVET internships and co-operative training.** Most of the companies have provided internships for TVET students. This majority of 65 % had up to 20 interns and 25 % took care of more than 20 interns in their company.

30 of the participating companies say they have worked together with neighbouring TVET institutions and the overwhelming majority (84%) of the internships were organised by these TVET institutions. The TVET institution also provided monitoring and guidance services to most (66%) of the companies. The average duration of internships was 2 months.

The benefits given to the TVET interns were either transport cost allowance (52%), salary/allowance (45%), or medical insurance (3%). The majority of the employers have been rather satisfied with the competence of the interns (see Table 34, Annex 7).

**Availability of technical staff on labour market.** For a needs analysis for technical personnel the information about the availability or scarcity of personnel of different qualification levels is of interest. Therefore, we asked the company managers about their experiences with difficulties in finding appropriate staff for their companies. The results are visualized in Figure 8 in Annex 4. It is remarkable, that – against prior expectations – engineers with a bachelor degree are easier to find than technicians or TVET graduates on level 4. That indicates either an over-capacity in the engineering education system or a burning need for qualified technicians and skilled craftsmen or even both. On one hand, the fact that Bachelors have been made available by the University Reform Component of ecgp right from the beginning may have made some employers believe that in the absence of technicians (the very few working in Ethiopia is said are hired from abroad) Bachelors are the experts they would need. On the other hand, despite a few unrealistic expectations the great majority of the employers are convinced that they need experts as described in this study (and also in the workshops) as technicians.

If companies cannot get hold of appropriate qualified personnel they must find other ways for recruiting staff. We have asked them what kind of measures they use. The great majority (71%) provides in-company training for their already employed staff or they hire persons with no training (15%) or with other backgrounds (15%).

**Procedures used in hiring new technical personnel.** The respondents are describing several methods and procedures in hiring new personnel. The main way to find applicants is the advertisement in printed media (63%), followed by direct applications (43%). An overview is given in Figure 9 of Annex 4.

**Hired TVET graduates.** Most involved companies have experiences with the employment of TVET graduates. They have hired them in remarkable numbers with an average of 12 persons per company during the last year. But 11% have not employed any TVET graduate during the last year. 29% of the respondents report that they have not hired female staff with a TVET background (although females form the big majority of the manpower in many companies e.g. in garment or leather – but they are not trained in TVET). 89% of the employers also report that they do not support the hiring of female “technical” staff (answers to question 4.2). Although this statement could not be further explored the findings indicate that females either have not much interest in technical subjects or the TVET system does not provide enough opportunities for them. In fact most females are more attracted by “typical” female subjects such as secretarial/office work, sewing/embroidering, hair dressing, computer work etc as can be clearly seen from the statistics of most private TVET providers.

It might be of interest to know that the MoE TVET sector has been trying to follow up on the where-about of the TVET graduates, in particular on their job seeking and type of employment. TVET institutes (and regional TVET agencies) are expected to provide graduates with a check-list to be returned after some time, which would allow the TVET sector to develop statistics showing the occupational area and the employers' names (see Ministry of Education Ethiopia, ecgp March 2010). The MoE is, unfortunately, at the

beginning of October still waiting for the return of check-lists and regional statistics. The team has seen one check-list example only – from Hawassa TVET College in the SNNPR.

**Supporting and employing level 5 graduates (technicians).** Since the ECPC in Addis Ababa has started training of level 5 by the end of last year only, there are currently no TVET technicians trained at Ethiopian polytechnics available in the labour market. From the above findings it seems to be clear that most employers in need would be ready to hire them as soon as they are available. However, it does not automatically mean that employers would agree on the cost sharing procedure for training level 5 of the TVET system.

We have however, asked the employing companies whether they would send some of their technical staff to polytechnics to become technicians. The majority would be ready to do so but the time period of two years seems to be too long for them. If possible, 81% would support further training in short evening courses; 81% would support up to two weeks short term training, and 50% would be ready to support three-months training. Only 28% of the respondents would allow their staff to be trained at polytechnics in a two-year programme.

Those companies which are in serious need of technicians and have to upgrade or hire such experts at their own costs (assumedly rather medium and big companies) would seem to be convinced that the employers must cover the fees raised by polytechnics. Those who are convinced that technicians are needed for the purpose of their companies (export, competition etc.) are also of the opinion that the employer would have to continue paying the salary of the employee throughout his or her training period at the polytechnic. If this could not be guaranteed no employee would be able and willing to join a polytechnic (see also under A.4).

As can be seen from the next sub-chapter, employers are divided into two fractions over this question. A bigger group that tend to keep their employment costs as short as possible (on the expense of the employees) may not yet be ready to fully participate in the financing of the training whereas a smaller group with professional (and somehow internationally experienced) managers are able to see the comparable advantages and therefore understand the need for cost sharing with the TVET system. However, the question of salaries for technicians being above the level of skilled craftsman and below a Bachelor in Science was left open.

#### **A.4 How could the training (supply) system be better matched with the employment (demand) system and vice versa?**

As only very few managers personally know TVET institutes and their means and ways to operate it was difficult for the participants to make proposals as to how to improve the existing relationship between the two systems. The following were mentioned:

- TVET institutes should provide tailor-made training programmes for the companies in addition to initial training of students;
- The TVET system should seek regular feedback from the industry/companies/employers;
- Occupational standards, curricula and assessment criteria should be developed jointly with the employers;
- Human resource demands and special needs of industrial sectors need to be analysed (e.g. like in leather industry);
- Boards of TVET institutes should ensure active participation of relevant industrial sectors and employers;
- Formal bilateral cooperation between TVET institutes and employing companies could help both parties;

- TVET institutes could employ managers of employing companies as temporary teachers/ trainers in order to bring them together; most participants in the workshops are ready to teach/train;
- Employers must be prepared to finance the fees for both the two-year as well as short-term training for level 5 at polytechnics;
- Also mentioned, employers would have to be prepared to continue paying the salaries during the two-year training;
- Employers who tend to pay their employees below the required levels of qualification must be ready to employ fully trained graduates and pay them accordingly.

Interestingly, chambers of commerce whether national or regional were not mentioned as means or mechanism for improving the relationship between the two systems.

### **A.5 What are the further training needs of companies / employers / TVET institutions?**

Participants of the workshops were asked after filling in the questionnaires whether they would have any needs for further training (as opposed to initial training) of their technical staff. Those responding positively were then requested to fill in a simple one-page questionnaire developed by the FTI of the Adama University. The questionnaire includes the following categories: 12 industrial sectors (two more were mentioned additionally), two possibilities of training depth (basic and advanced), two possibilities for the duration of the further training (single days and one week) plus the eight levels of the qualification pyramid. It was explained that the 12 sectors are not covering the whole range of industrial sectors in Ethiopia but are the ones for which the FTI could in principle provide further training (see Figure 3). This explains the fact that demand for further training concentrates on those 12 or respectively 14 industrial sectors only. It is very likely that the overall demand for further training is higher and includes more industrial sectors than was explored in this study.

37 of the 51 involved companies/employers filled in the questionnaire and thus documented a strong need for further training. It was explained that this training would be meant for already employed staff; it could emphasize on basic as well as on advanced qualifications, skills and topics and would generally be organised as short term training. The duration could be flexible ranging from a day to many weeks. However, to keep the analysis of the questionnaire as simple as possible participants were asked to decide between one day or one week. Not all participants filled in all categories as can be seen from the Figures 10 to 12 in Annex 4.

**Number of responses per industrial sector.** By far the strongest responses came from electrical engineering with 23, production technology with 20, mechanical engineering with 19, and information technology with 15 votes out of a total of 70 votes (multiple voting was possible) (see Figure 10, Annex 4).

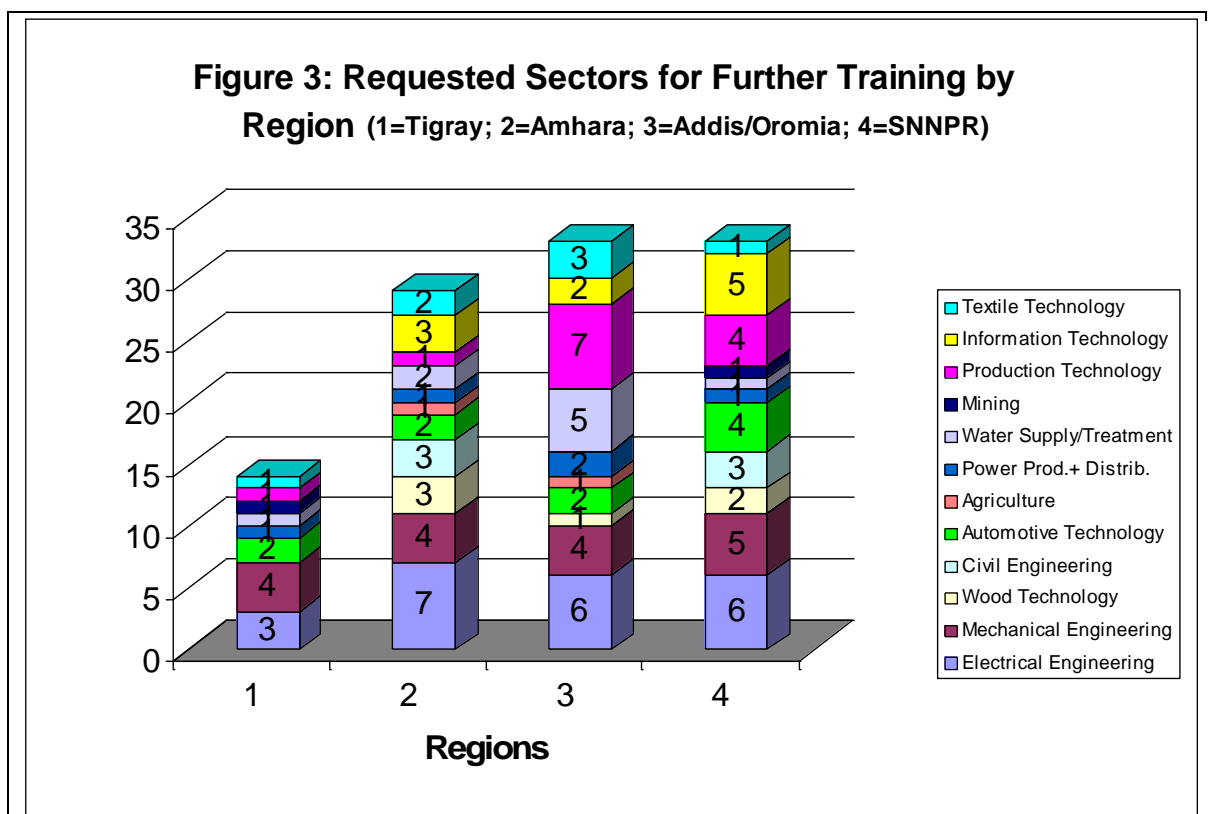
**Type of further training demanded.** Generally speaking the responding employers have a strong demand for advanced training. As compared to basic training it is about three times as big. As shown in Figure 11 in Annex 4 the greatest demand is in the sectors of production technology and electrical engineering both with 16 votes, and mechanical engineering with 15 votes respectively.

**Duration of further training demanded.** In only a few cases training for single days was considered appropriate. In all other cases duration of at least one week was estimated as necessary by the employers. In total, the 37 involved employers are demanding 415 weeks of further training in 14 industrial sectors. This equals about 11 weeks per company independent of size and sector. These figures clearly demonstrate the strong need for the permanent provision of further training provided by FTI or other institutes or TVET institutes (Figure 12, Annex 4).

**Target groups.** The research team had assumed that most employers would not be familiar with the qualification structure and the different levels of the NTQF. Prior to filling in any questionnaire a PowerPoint presentation was shown with the overview of the structure (see chapter 3, Figure 2: The qualification pyramid = functional composition of technical workforce) in order to provide a common platform and first orientation. Nevertheless, many managers were still confused about the levels particularly of master craftsman and of course technician and the anticipated differences between them. The way they considered the staff in their own company could not be clarified. This should be kept in mind when interpreting the point in question.

From Figure 13 in Annex 4 it is clear that technicians (respectively those employees who are considered to work as such) are considered as the largest group in need of further training. Then follow all levels of craftsmen. Here again, the understanding of the qualification differences between them and their functional relationship with the TVET levels could not be fully clarified.

The following Figure 3 illustrates the demand for further training per region as explored during the study: It shows how many companies are in need of further training in which industrial area or sector as offered by the FTI (slight differences are due to multiple voting). It is proposed that the FTI and the TVET institutes promoted to polytechnics plus industrial area/sector specific trainings institutions (whether existing or newly build) make use of this proposal when planning short term further trainings.



Given the strong demand for further training of already employed technical personnel (and the relatively weak readiness of employers to financially support initial training) it is clear that not only the FTI but also future polytechnics will have to provide such type of training. FC experts will have to assist in preparing potential polytechnics for the dual goal.

**(B) Implications of plans and projections as established by the Ministry of Trade and Industry, the Ministry of Finance and Economic Development, their regional branches and bureaux and regional TVET agencies for skill areas, levels of technology and numbers of technicians needed in order to become a middle income country by the year 2017 as envisioned in the PASDEP**

It should be noted that at the time of preparing the ToRs of this study the content, vision and mission of the new national poverty reduction strategy paper, the GTP, was not known. That is why the PASDEP is used as reference for the development of the terms of reference. However, after the new Growth and Transformation Plan (GTP) was received it was taken into consideration as well.

**B.1 Which plans and/or projections of whatever source (MoTI, MoFED, BoFEDs, TVET agencies etc.) exist on investment and economic development nationally and regionally?**

Assuming that national and regional economic development plans and strategies would also reflect on the respective demand for human resources the team had prior to the field trip requested the MoE TVET sector and ecbp to assist in searching and as far as possible in collecting such documents. As already mentioned under chapter 3 (Sources of information) it was not possible to receive such policy papers, neither from federal ministries, in particular from the Ministry of Trade and Industry and the newly created Ministry of Science and Technology (MoST) or the Federal Micro and Small Enterprises Development Agency (FeMSEDA), nor from any of their regional bureaux.

The two volumes on the micro and small enterprises (MSE) policy and strategy of the MoTI (MoTI August 2010) was obtained after data collection only, as was the Central Statistics Agency (CSA) report on large and medium scale enterprises in electricity (CSA December 2009). However, both documents are far too general and can as such not serve as basis for demand analysis for the NTQF, not to mention for specific levels such as technicians. In addition, they do not elaborate on requirements for human resource development as being provided by the TVET system.

The UNIDO study on cluster development in Ethiopia (UNIDO no year) was received just a day before departure. It presents the experience and results of the UNIDO cluster development project "Unleashing the Potential of MSMEs in Ethiopia" (2005-2009) and include three clusters from Addis Ababa and one from Mekelle. A "cluster" is understood as "a geographical concentration of interconnected enterprises and associated institutions that face common challenges and opportunities" (UNIDO no year, p. 4). It is obvious that not only medium and large scale enterprises but also MSEs and MSMEs are in need of qualified workforce (see chapter 3, underlying assumptions) and a few participants in the employers workshops were indeed representing MSEs. To understand their training demand, in particular for level 5, more detailed information of those MSE, their industrial areas, field of technology, labour force etc. would be needed. Although individual members of regional Micro and Small Enterprises Development Agencies (ReMSEDA) participated in one or two workshops in the regions, they could not help obtain such information.

The new Growth and Transformation Plan (GTP) of the MoFED for the period 2010/11-2014/15 is meant to replace the PASDEP. Various drafts and versions were received while in Ethiopia but no final document. One draft document (MoFED August 2002) concentrates on support of MSE and the development of six industries by among other goals providing „trainers training for 10.000 professionals“ and „trainings for 3 million people (entrepreneurship, hand crafts and technicians)“.

The MoE refers to the GTP when asked about the underlying economic perspectives. Four major areas should be considered by the TVET sector: Agriculture and rural development, mineral and mining, basic infrastructure and trade and industry. Trade and industry shall be developed by two types of institutions: Micro and Small Enterprises (MSE) concentrating on



the needs of communities and Medium and Large Enterprises (MLE) concentrating on manufacturing/production in eighth industries. According to the MoE, plans exist to create or support new factories in the mineral/mining area and in particular in the field of infrastructure where roads, electricity, telecommunication and “more than 2.395 km railways will be build”.

Again, to determine training demands and in particular demand for training of technicians such projections alone are not sufficient. As a requirement the number of existing MSE and their characteristics must be known.

The above mentioned draft document also highlights the role of TVET in the development of MSE whereas a later draft of the GTP underlines the importance of the ongoing General Education Quality Improvement Program (GEQIP) for achieving the vision of the GTP: „The TVET system will continue to serve as a potential instrument for technology transfer, through the development of occupational standards, accreditation of competencies, occupational assessment and accreditation, establishment and the strengthening of the curriculum development system. TVET institutions will serve as the centres of technology accumulation for MSEs. Rigorous and regular monitoring and evaluation will be carried out amongst TVET institutions, both government and private, monitoring will enable them to ensure the minimum level of competency“. (MoFED September 2010)

## **B.2 What are the underlying assumptions or implications regarding manpower for skill areas and levels of technology and especially for level 5?**

Please refer to chapter 3 (underlying assumptions) and in particular the two figures on the “three occupational field for TVET graduates on level 5” and on “the qualification pyramid = functional composition of workforce”.

## **B.3 Which market assessments are available and what are their conclusions regarding needed manpower?**

As can be seen from the list of references different attempts have been made to find out about labour market demands since the inception of the TVET system. The first studies were undertaken with the help of GTZ respectively the ecbp, e.g. the national labour market study on middle level qualified human resource of Moleke et.al (2006) or the regional labour market survey in Tigray (Dangelmeyer/Franz 2003).

The so-called Business Process Re-engineering (BPR) undertaken by the government in recent years has generally helped the TVET sector to pay more attention to demand orientation and thus make market assessments at different levels an integral part of overall management. MoE, ecbp and regional TVET agencies were therefore asked to present or send their market studies. During previous KfW missions a regional assessment report from Amhara (Amhara National Regional State TVET Agency, June 2008) and a project assessment of 16 woredas in North-Western Tigray (Shire ATVET College) were already received and mentioned respectively as existing (Sandhaas, May 2010).

During our survey only one more brief labour market study covering the levels 1-5 in the SNNPR for the years 2002-2006 could be received. Although named “Labour Market Study” it is in no way an assessment of the labour market of the region. Instead a “proposal has been prepared for the purpose of forecasting the number of trainers and trainees in accordance with the national directives and also on the current situation of the TVET colleges and institutions” (SNNPR, TVET Agency March 2001 E.C., p. 3). Whether any employer was contacted in this regard is doubtful.

The most comprehensive study is the labour market assessment of the Amhara TVET Agency. It covers some 20 employers both public and private with the aim to find out how to design or revise training programmes so as to be “harmonized with the market demand”. The findings could be summarised as follows: Most of the current employees are under-qualified. The labour market increasingly needs trained manpower in up to seven fields, particularly in

production and in particular at levels 4 and 5. Compared to the other available studies the fields of needed training vary from region to region.

#### **B.4 How is the technical teacher training system responding to the inception of level 5 (technician)?**

As was described in previous reports of one of the authors on the Ethio-German Programme for the Reform of TVET II (Sandhaas March/April 2010, Sandhaas May 2010) the only qualified teachers for training level 5 in Ethiopia are some so-called A-level teachers with a Master degree at the Ethio-Chinese Polytechnic College (ECPC) in Addis Ababa. These teachers were trained at universities, in particular at Adama University in Bachelor and Master programmes. Right now some 40 B-level teachers are being trained in China to become A-level teachers.

In order to provide more and sufficient numbers of technical teachers and also for this new level, the MoE is planning to establish a national technical teacher academy (NTTA) at the campus of the ECPC in Addis Ababa. The NTTA would train 800 B-level and 200 A-level teachers in addition to 2000 technicians using the same already existing facilities and equipment. These would increase the national capacity for teacher training. A visit of the ECPC revealed no new development since the last visits in April/May 2010. A short look at four workshops where now only 189 students are trained (as opposed to more than 300 registered last year) raised some doubts on the suitability of some of the equipment for training level 5. In addition, it seemed as if some equipment (e.g. CNC machines) and library books have never been used and were not made available respectively. If it is the aim of the polytechnic and the teacher training curricula for A-level to prepare students mainly for production and manufacturing then some equipment might not be sufficiently appropriate.

The team also visited the Adama University and its FTI and held discussions with the FTI staff and the University leadership. The FTI is now an institute of the School of Engineering and cooperates with the School of Pedagogics which is providing the curriculum for TVET teachers. Six foreign technical advisors (“Fachlehrer”) are currently attached; employing local counterparts is hampered by the fact that the salary structure is not very attractive. Through the MoE-KfW cooperation the number of industrial areas/sector will be expanded by another three to four workshops so that the FTI can run practical trainings in at least eight sectors for teachers as well as for staff of companies.

According to the president, Adama University has been requested to enlarge its capacity for TVET teacher training so as to train 1000 students per year, of whom 800 will study up to B-level (comparable to Bachelor degree). A first batch of 157 B-level students is currently trained for two years to be upgraded to A-level (comparable to Master degree). They will be awarded an MA Pedagogics, not an MA Science in order to emphasize their (potential) teaching profession. This group together with the 40 returnees from China would be the first candidates for training technicians at polytechnics which are planned to be upgraded from the status of TVET institutes (Centers of Excellence).

Adama University is following a strict course of practice orientation in all fields of engineering and TVET. In a conference with companies providing internships the message of stronger practice orientation was well received by the University. Now training of teaching practices in schools (in German “Schulpraktische Studien”) has been planned, but equipment and facilities are still missing. In case of implementation Adama University would be the first and only university with such a programme.

Another important element of Adama University's approach is the strong role of internships in companies. Well performing students are sent to companies “accredited” by the University. Learning by experimenting and doing in the real world of work, provided the internship is well designed and organised, is considered as more effective than organising it by the training system itself. The positive responses from more and more companies, in particular private ones, seem to be proof of that.

“Learning factories” are another good idea to provide “experimental learning by doing”, a learning principle underlying also the concept of the CIM “fabricators” assisting TVET institutes. The idea is that an educational institution is hosting a production facility which is organised like any other industrial/commercial enterprise. It is run like a factory, is able to attract customers and produce goods that can be sold on the free market thus making profits. At the same time it offers education/training to students who are working like regular employees in an industrial enterprise. Teachers and instructors are at the same time managers and supervisors of the work being done by students. Students are enabled to produce, to handle machinery, tools, and material and to deeply understand the “real” world of work. Adama University is developing concepts for such learning factories in the technical disciplines and could thus serve as a model. Engineering students, future TVET-teachers and technicians could be the first students/apprentices in such learning factories.

An effective teacher training system and well designed approach are crucial for the production of efficient and employable technicians and the further development of the national economy. A number of studies has pointed to the many weaknesses of the “old” system (e.g. Erhardt/Kreuchauf 2007). A very recent study (a Ph.D dissertation at the University of Kaiserslautern, Germany) on “influences of individual and contextual factors on improving the professional development of TVET teachers in Ethiopia” strongly recommends a change in perspective on competence development (see Ayele Abebe Januar 2010). It seems that this study is also one of the first genuine research works in the field done by an Ethiopian TVET expert.

### **(C) Numbers of level 5 graduates (technicians) per occupation needed in order to become a middle income country by the year 2017 as per the PASDEP according to national and regional economic and social development plans and expectations (projected enrolment in TVET) and compared to the development of comparable countries**

#### **C.1 What is the general trend of economic growth differentiated according to sectors over the last years?**

Ethiopia has experienced strong economic growth in recent years. With real Gross Domestic Product (GDP) growth at or near double digit levels since 2003/04, the country has consistently outperformed most other countries in Africa and expanded much faster than the continent-wide average (see Figure 14, Annex 4).

**Recent trend in real GDP growth.** Real GDP growth averaged 11.2% per annum during the 2003/04 and 2008/09 period, placing Ethiopia among the top performing economies in Sub-Saharan Africa. This growth performance is well in excess of the population growth rate and the 7 percent rate required for attaining the MDG goal of halving poverty by 2015. Yet, a number of issues warrant the attention of policy makers. Ethiopia’s economy is highly vulnerable to exogenous shocks by virtue of its dependence on primary commodities and rain fed agriculture. Ethiopia has experienced major exogenous shocks during the past five to seven years. These are notably droughts and adverse terms of trade (e.g., prices of coffee and fuel). There is a strong correlation between weather conditions and Ethiopia’s growth performance. The last major shock to growth was in 2002/03 when the economy suffered a major decline in real GDP growth on account of severe drought. Since then real GDP growth has consistently been above or near two-digit levels. Other sources, e.g. the IMF, present lower numbers for growth rates in Ethiopia. They estimate them around 6-8% annually.

**Sectoral growth rates.** The pace of agriculture sector growth during the 2003/04-2008/09 period declined, while the industrial and services sectors grew more rapidly (illustrated in Figure 15, Annex 4). Until recently, agriculture (particularly smallholder crop production) was by far the most dominant sector. In 2003/04, crop production alone accounted for 60 percent of overall GDP growth. The share of the services sector in GDP has been rising, while that of agriculture has been declining steadily.

On the other hand, the share of industry in GDP has remained relatively static, amounting to between 13 and 14 percent. The manufacturing sub-sector contributed less than 4 percent of GDP growth in 2008/2009. The low share of the manufacturing sector, a crucial sector in transforming an economy, is a concern for the Ethiopian government (see Figure 16, Annex 4).

### **C.2 How has enrolment in education and in particular in the TVET sub-sector developed during its inception according to OS, sector of economy and levels (1-4)?**

Percentages of children in school are represented by Gross Enrolment Ratios (GER) and Net Enrolment Ratios (NER). GER is the number of pupils enrolled in a given level of education regardless of age expressed as a percentage of the population in the theoretical age group for that level of education. NER is the number of pupils in the theoretical age group who are enrolled expressed as a percentage of the same population. 79% of girls and 85% of boys are in primary schools, whereas 4% of the population of tertiary age are in tertiary schools (see Figure 17, Annex 4).

**TVET enrolment.** As general secondary education (grades 9-10) has expanded (at over 20% per year on average) there has been increased demand for secondary places at the next higher level. To meet this demand, Technical and Vocational Education and Training institutions have increased in number and the training areas have been diversified. TVET enrolment is expanding at 21.3% annually, and staff and schools are increasing at almost the same rate (see Ministry of Education Ethiopia March 2010). TVET provides training on market-oriented programmes based on industrial demand to various target groups such as graduates of grade 10 as well as school leavers, people who are in employment, school dropouts and marginalized groups in the labour market.

The total enrolment in TVET in the year 2004/05 was only 106,336. As of the year 2008/09, enrolment has increased to 308,501. While still a fraction of the enrolment of students in the entire secondary cycle, at the moment it exceeds the size of secondary second cycle (Preparatory Program). As shown in Figure 18 in Annex 4, in the year 2008/2009, female enrolment constitutes 46.2% of total enrolment, indicating a relatively good gender balance at the national level. It is likely that numbers of enrolment and schools could be higher or in some cases lower than indicated in this document as there are some government and non-government TVET institutions that did not respond to the annual questionnaire at all, as well as correctly, and hence we have taken the maximum enrolments of the years 2007/08 and 2008/09. Additionally, some TVET centers have been opened in various universities and their enrolment and staff have been reported as part of the university/tertiary education, rather than as part of the TVET. Moreover, some programmes like social science, natural science, language, mathematics and physical science are reported as part of TVET while there are no such programmes in TVET.

### **C.3 What are the challenges and pitfalls of the TVET system when compared to countries in comparable development/economic situation and pursuing a similar development approach?**

Generally spoken, needs analyses cannot produce harder findings than those presented in this report. Three reasons might be mentioned as reasons for that:

- a) There is always a “mis-match” between supply and manpower requirements (please refer to the German discussion about “Fachkräftemangel”, also un-employment rates indicate that);
- b) Theoretically and empirically vocational research has produced knowledge about an “objective vagueness” of qualification needs (see Teichler 1978)

- c) Employers have a bordered (limited) knowledge about their future need, and their responses cover only a time period of not more than 3 years and are not very reliable, even if they are the only source of information.

One of the authors has already done a synthesis of findings of a multi-country study of ILO about of vocational education and training reforms (see Winkler 2008, Appendix 2). This study compares countries from all parts of the world, classified into three groups by their labour market characteristics: (i) high labour force growth, low employment growth, and high unemployment and underemployment rates; (ii) high labour force and employment growth and low unemployment rates; (iii) low labour force growth, low employment growth and high unemployment rates (see ILO (Ed.) 2007).

As available labour market data in Ethiopia indicate, the country does not fully fit into one of the groups mentioned and is therefore not easy to compare. However, to understand pitfalls and challenges it would be helpful to clarify the pressure put on both systems involved in the reforms, the demand side (the labour market) and the supply side (the TVET system) as done in the ILO study. Critical issues have been and still are:

- The systematic organisation of the TVET reform as a continuous national goal;
- The provision of TVET (in particular by private providers);
- The financing of the system (in light of the chosen dual approach).

The lessons learned with regard to the main ingredients of success in vocational education and training (VET) reforms are still relevant for the future development of the Ethiopian TVET system (see Winkler 2008, pp. 50-51). Supporting elements for a well structured, organised, financed and regulated TVET system are manifold:

- “ Successful reforms appear to be those which combine public financing of initial or pre-employment training with rigorous evaluation of programme impact in design, and ensure competition between providers in delivery.”
- “Matching instruments e.g. public or private subsidies, to target groups are as important as choosing the best delivery mode.” While mechanisms, through which VET is supplied, are important, it is critical that these programmes target groups which will most benefit from them.” The “usefulness of scientific evaluations” in matching instruments cannot be overemphasized.
- Government’s “role as a facilitator of information on the availability and effectiveness of vocational programmes” has been relatively neglected and thus resulted in “lack of reliable information on the effectiveness of public training programmes and the availability of privately provided VET programmes.”
- For the provision of short-term courses of further training “that lead trainees directly to jobs, clear and balanced legislation seem to be even more important than government subsidies. Because the willingness of pay for relatively general skills, e.g. language and computer skills, often arises sooner than for occupation-specific skills, e.g. as technicians or operators, the private market for commercial training emerges before that for technical programmes. Where demand for workers with technical skills has increased due to growth of modern manufacturing, and where regulations are balanced, the private supply response for technical training has been equally vigorous.”
- The experiences of countries in all parts of the world show “that a strong political will to reform – not socio-economic and institutional factors – is the common determinant of successfully restructuring of VET systems.”

#### **C.4 What does a “realistic” scenario for the demand of TVET graduates and in particular level 5 look like that is based on national and regional statistics and data available?**

The following scenario presents a somehow “realistic” optimistic view. It is an achievable scenario provided the assumptions listed below are realised:

- Economic growth will fluctuate between 5% and 7% per annum.
- Structure of the economy starts to show changes, i.e. the manufacturing sector will grow by an average of 8%- 9%.
- Economic environment is conducive towards investments.

Within the next 10 years some 25,000 technicians might be needed. The data shown under this scenario indicate a likely demand for middle level human resources where the provided number and kind of TVET graduates might probably match the labour market demand.

#### **C.5 How many level 5 graduates for which economic sectors/occupations are needed per region?**

Generally speaking, the demand for technicians will follow the existing national sectoral structures with regard to industrial sectors and related employment as can be shown by the figure indicating the employment situation in manufacturing as the key area for economic development (Figure 20, Annex 4).

Some ministries – in this case the Ministry of Works and Urban Development (MoWUD) - have already articulated their specific needs for technicians in the construction sector (see Figure 21, Annex 4).

Some other projections, e.g. the Moleke-Report (Moleke et.al. 2006) show comparable structures for the demand of sectors and occupational fields (Figure 22, Annex 4 and Moleke et.al. 2006). Two points need to be made. First, almost all figures mentioned talk of demand for “middle level”, “skilled workers” or “skilled craftsmen”, not explicitly of demand for “technicians”. Second, the demand refers to “industrial areas”, “industrial sectors” and sometimes to “occupational fields”. This is partly due to the general confusion regarding the terminology of TVET.

**Regional demand.** As the industrial development differs from region to region – with Addis Ababa still as leading industrial centre – the distribution of capacities for TVET institutions devoted or elected as “polytechnics” with facilities to train and educate technicians on TVET level 5 should in principle follow the distribution of the labour force between the regions (see Figure 23, Annex 4).

The distribution and probably decision of locations of polytechnics in the country should be based on this regional distribution of labour force. Numbers of candidates for training of level 5 should be estimated and decided on the basis of the distribution of employment per “industrial areas”, “industrial fields” or “occupational fields” in each region taking into account seriously projected new investments and economic developments. As the next step, the demand of employers for human resources must be jointly analyzed in order to find out which qualification levels (levels 4 or 5) are appropriate. Only then type and numbers of occupational standards and thus numbers of technicians per occupational standard should be decided and subsequently developed.

For planning purposes the cited prior studies, the presented needs analysis and projection data are amalgamated into the following “tableau” which is a proposal for the next years. It shows regions and figures of students to be trained. Whether or not all five major regions should have one polytechnic right from the beginning as proposed by the MoE or perhaps in the wake of the years to come is a political question. However, the need for technicians in all five regions has been substantiated by the survey.

Whether all five regions should train the same number of students must be clarified by considering a number of aspects such as capacities (ECPC in Addis Ababa for example has a high capacity and could also train students from Oromia) and teachers available, possibilities for cooperative training, internships and practicing during the two-year programme among others and not the least the demand for further training.

**Figure 4: Necessary capacities of polytechnics to train technicians at level 5 NTQF**

<b>Regions / Capacities</b>	<b>Capacity Phase I (entrants/year)</b>	<b>Capacity Phase II (student capacity)</b>
Tigray	180	360
Amhara	180	360
Addis Ababa	180	360
Oromia	180	360
SNNPR	180	360
<b>Total</b>	<b>900</b>	<b>1800</b>

Phase I is supposed to start in 2011. After three years the scheme should be evaluated and if necessary modified. Phase II would then start in 2014.

It is further supposed to concentrate on a number of occupations or technology for the initial training of technicians (see Figure 5) for the first years. Priority should be given to those fields that are related to production and manufacturing. As long as financial support can not be fully secured a selection between occupations/technologies might be appropriate. Polytechnics should in principle train technicians for the national labour market but should not necessarily offer all occupations/ technologies neither from the very beginning nor at all. The ECPC as the only existing and biggest institution designated to train technicians should be able to offer all fields mentioned. The others should find out on which ones they could specialize best (e.g. agro-mechanics instead of automotive technology).

**Figure 5: Occupations / technologies fields for training technicians at level 5 NTQF**

<b>Rank</b>	<b>Occupations / Technologies</b>
<b>1</b>	Manufacturing Technology
<b>2</b>	Building Construction + Management Technology
<b>3</b>	Electronics and Communication Technology
<b>4</b>	Industrial Electronics and Control Technology
<b>5</b>	Automotive (incl. Agro-Mechanics) Technology
<b>6</b>	Metal Engineering – Advanced Trade Technology

## **C.6 How can TVET institutes/colleges identify and decide on demand for level 5 graduates in their respective coverage area?**

Under sub-chapter A.4 we have listed proposals of employers on the question as to how the training system could be better matched with the employment system. Some of them if accepted and implemented by TVET would definitely help TVET institutes to also better identify and generally decide on demand of level 5 graduates in the country. This is true in particular with regard to aspects such as establishing strong relationships with employers, seeking regular feedback from them by among others undertaking regular market assessments and conduction tracer studies with their graduates. When it comes to decide on demand for coverage areas, the TVET sector will have to clarify a question that was answered either in a non-uniform way or not at all by the TVET institutes recommended to KfW as Centers of Excellence (CoE) and also by regional TVET agencies (see Sandhaas March/April 2010, Sandhaas May 2010): For which area/labour markets are future polytechnics training technicians – for the national, regional or sub-regional level?

So far it appears that regional TVET institutes are producing human resources for their respective regions only, sometimes regardless of whether a potential labour market is available for the occupational standards offered. The ECPC is a case in this regard. Trainees are so far recruited from the City Administration of Addis Ababa area only with the effect that the college can not fill all places. The regional TVET Agency of Oromia does not want to send trainees despite the fact that many of them are living in the vicinity of Addis Ababa. Instead Oromia is waiting for having an own polytechnic. On the other hand the Shire ATVET College in North-Western Tigray may want to train technicians specifically for the agriculture sector in the North-Western part of the region.

It should be clear from these three examples, that there is an urgent need to clarify this question at national federal level and to organise proper coordination so as to first serve the labour market nation wide in terms of technicians and their qualification fields and second to make sure that regional or rather sub-regional demands are also taken care of.

From A.3 we have seen that employers who are accepting TVET students for co-operative training or even as interns to a high degree tend to later on also employ the new graduates. Since co-operative training usually takes place not far from the location of the TVET institute it would be necessary to establish new and strong relationships with those employers as proposed under A.4 in rather abstract terms: inform employers on the structure and intentions of the TVET system (NTQF), seek regular feedback from the employers, include representatives of the employers in the boards of the institutes, develop occupational standards and curricula jointly with them etc. From other countries could be learnt what possibilities exist in establishing better relationships between the two systems. It could even develop into a formalised partnership between TVET institutes and companies as in a particular case in Addis Ababa.

Employers generally complained that TVET institutions do not know the situation of the employing companies, in particular private ones, and thus do not know their specific needs in terms of human resource demands. As mentioned already, undertaking regular market assessments was actually introduced for this purpose. Helpful guides have been provided e.g. by the MoE (ecbp March 2010). Purpose and methodology of such assessments must be first of all understood by the staff of TVET agencies and institutes and should indeed be carried out regularly and, wherever possible, by joint teams. Of course, the regional TVET agencies and institutes would have to also meet regularly with those regional bureaux that can provide up-to-date information on plans for investment and economic development. A policy paper such as the GTP is not meant for that purpose.

The next chapter on recommendations provides many hints and examples as to how TVET institutes can identify and decide on demand within their coverage area once the definition of “coverage area” is clarified. Again, the major requirement is a close and regular relationship with the labour market/employers, regional and sub-regional bureaux responsible for employment, investment and development and planning economy and infrastructure.



## 5. Recommendations

The recommendations (43 in total) follow the main research questions and are based on the findings of the study. They are grouped according to the key issues of the research and refer partly also to open issues of the FC programme for phase II. They are addressed to the main and responsible actors of TVET: the TVET sector of the MoE (later the Federal TVET Agency), the regional TVET agencies and the TVET institutes (public and non-public), in particular future polytechnics. In most cases the initiative for implementing the recommendations should be started by these **responsible stakeholders** whereas **their partners** such as GTZ, KfW, the consultant and the TC experts should assist. They **are always highlighted in bold**. Many recommendations are relevant not only for training level 5 but also levels 1 to 4 and somehow even levels 6, 7 and 8.

### Occupational fields:

- (1) In principle level 5 training should provide for three different fields of occupation: The main field of “technicians” is in industry. Another field is assisting in medical/clinical, pharmaceutical and chemical enterprises and services as MTAs, PTAs, and CTAs. Whereas these two fields and an understanding of related occupations already exist, the third field needs many clarifications: handicrafts and trades businesses, envisaged to be organised as MSEs in future. They need equally qualified “masters” as outlined in Figure 1 **(MoE, KfW, other donors)**.
- (2) As these fields may need slightly different qualifications, polytechnics should design their level 5 training programmes according to these orientations **(MoE, GTZ, TVET institutes)**.
- (3) The greatest demand for technicians in industry is in production and manufacturing related duties regardless of the sector. Workshop facilities, equipment and training curricula must reflect that. As long as capacities and financial means are limited German FC support to training of level 5 should concentrate on production technology. **(MoE, TVET institutes, FC consultant, KfW)**
- (4) **German FC** should concentrate on a limited number of occupations and technologies during phase II of **KfW** support (see Figure 5 in chapter C.5). If **additional donors** are interested to also assist, **MoE** should coordinate and **KfW** and **FC consultant** should provide orientation.

### Qualification levels:

- (5) As the system of the NTQF is to a large extent unknown by the employers, the TVET sector at federal and regional levels should immediately start awareness raising and informing on the system as such, its structure and philosophy behind. The specific qualification and competence of a technician should be made clear and the opportunities and advantages for employing them highlighted. **(MoE, regional TVET agencies, TVET institutes, CoC)**
- (6) **TVET institutes** and **future polytechnics** supported by **MoE, GTZ, FC consultant** and **TC experts** should organise regular opportunities for meeting with employers – be it within TVET institutes (open days), **CoCs** or **chambers of commerce** or other suitable institutions – where they can learn about TVET and where written information is made available. It can be assumed that this will help employers to better understand the need of initial training and subsequent cost sharing.
- (7) Employers understand the difference between the qualifications of “craftsman” (levels 2 to 4) and a “technician” and expect a lot of additional or different competencies from the new category of technical personnel. As they understand their advantages in hiring them instead of craftsman the TVET system should develop a clear profile of a “technician” with different specialisations. **(MoE, TVET institutes)**

- (8) Given the general confusion in defining qualification levels within the national TVET system it is recommended to **MoE and GTZ** to update or even newly develop a glossary of the latest version of the NTQF and make it available (at least to employers) as widely as possible.

#### **Knowledge and skill areas:**

- (9) Employers consider “technical knowledge” as the most important type of knowledge of technicians followed by “communication skills” and “knowledge about the organisational structure of companies”. This has consequences for the development of the curricula and calls for the development of close relationships and cooperation between polytechnics and employing companies (**MoE, TVET institutes, companies**).
- (10) More specifically, “experimental and practical work attitude” followed by “theoretical basics of engineering” and “applied technical knowledge” is seen as the most important qualifications expected from technicians. The development and description of occupational standards, curricula and assessments must take this into account (**MoE, TVET institutes, COCs**).

#### **Planning the capacities for training:**

- (11) TVET institutes that intend to apply for promotion to polytechnic status should be prepared to provide both initial training for level 5 and further training for already employed technical personnel working at comparable levels (mainly levels 4 and 5). Their applications should show their readiness and how the requirements (such as teachers, workshops, equipment, management etc) could be met. (**TVET institutes, FC consultant, TC experts**)
- (12) When planning capacities for level 5 training, the demand should be determined by observing the existing sectoral structures with regard to employment and occupational fields and sectors. Knowing such data and referring to the NTQF and the underlying functional composition of the workforce allows deciding on numbers needed. For quantities Figure 4 in chapter C.5 provides guidance for **MoE and KfW**. (**regional TVET agencies, FC consultant, TVET institutes**)
- (13) Regional demand could be identified by referring to the regional distribution of the labour force and employment-unemployment statistics – another reason why the TVET sector must have access to strategies, plans and statistics of **relevant ministries and regional bureaux**. (**MoE and regional TVET agencies**)
- (14) **Polytechnics** must clarify as to which areas of training for which labour markets they are supposed to offer prior to any decision on occupational standards and industrial sectors. They should in principle serve the national labour market but should specialize on the overall regional or even sub-regional situation. (**MoE, regional TVET agencies**)
- (15) Occupational standards should be developed after sectoral structures (employment and occupational fields) and the needed numbers in the country and in particular in the respective regions are known – not vice versa. (**MoE, GTZ**)

#### **Relationship between TVET system and labour market:**

- (16) The instrument of internship seems to be accepted by most of the employers (unlike co-operative training). **TVET agencies** and training providers (**TVET institutes**) should therefore analyse and document “good practices” and implement them.
- (17) **Polytechnics** as well as any other **training provider** should learn from the example of **Adama University** (cooperation with companies, accreditation of suitable companies etc); Adama University might offer some systematic orientation. (**FC consultant, TC experts**)

- (18) **TVET institutes** should aim at better identifying and generally deciding on demand of level 5 graduates in the country. This could be done by establishing strong relationships with **employers**, seeking regular feedback from them by among others undertaking regular market assessments and conduction tracer studies with their graduates. **(GTZ, FC consultant, TC experts)**
- (19) Labour market assessments, in particular regional assessments are needed by the **TVET providers** as an instrument to provide continuous information on the human resource demand of the employers and to ensure employability of its graduates. Staff of **regional TVET agencies** and **future polytechnics** must be enabled to carry out such assessments regularly and wherever possible jointly with representatives of **employers**. **(FC consultant, TC experts)**
- (20) To get regular feedback from the labour market, graduates of the polytechnics must be advised and assisted in providing detailed information on their employment/unemployment. This information should be used to prepare tracer studies for different sectors, regions and colleges. **(MoE, regional TVET agencies, TVET institutes, polytechnics, FC consultant, TC experts)**
- (21) Co-operations between **polytechnics** and particular **companies** should be pursued even to the status of a formalised partnership as for example in the case of **Wingate College** in Addis Ababa which may serve as a model. **(TC experts)**
- (22) Training on the projection method should be organised by the **MoE** and **regional TVET agencies** for planners. It could be provided e.g. by INCHER, University Kassel; HIS GmbH, Hannover; IAB Bundesanstalt für Arbeit, Nürnberg; CHE, Gütersloh, CEDEFOP, Saloniki; IIEP, Paris and would need approximately 3 months. **(FC consultant, GTZ)**

#### **Further training:**

- (23) The clearly stated demand of employers for different sorts of further training for already employed staff at technician level calls for the establishment of an institutionalised system of further training within the framework of lifelong learning. The TVET sector should clarify whether to enlarge or duplicate or even multiply the **FTI at Adama University** in order to increase training capacities or to enable future **polytechnics** to regularly offer similar training courses or pursuing even both. Such courses should in principle be short-term and tailor made and should be to a large extent financed by the clients in case of **companies** in order to strengthen the training system. **(MoE, KfW, other donors)**
- (24) To avoid duplications and unnecessary spending **MoE** jointly with employer umbrella organisations and relevant ministries should find out what possibilities for further training already exist **(government, employers institutions/organisations, private TVET institutes etc.)**.
- (25) The **FTI, TVET institutes** and **polytechnics** as well as **sector specific training institutions of/for employers** should use Figure 33 in chapter 4.A.5 as guide for prioritisation of industrial areas, sectors and occupations.
- (26) As advanced training is the most needed type of training in production and other industrial sectors with an average need of 11 weeks per company more training opportunities should be planned and realised. **(MoE, KfW, GTZ, other donors)**
- (27) The **FTI** as the main provider of further training so far should design its capacities and workshops so as to address the needs of technical personnel at technician level (followed by craftsmen) as the main target group. **(FC consultant)**
- (28) The needs and special conditions of companies, their possibilities and limits should be regularly assessed in the framework of general market assessments. **(MoE, GTZ, KfW)**

### **Implications of plans and projections:**

- (29) The **government** and the **MoE** should ensure access to economic development strategies and plans as well as to employment-unemployment statistics at federal as well as regional levels. Communication mechanisms should be established between relevant regional bureaux in order to discuss on implications for the demand for human resources.
- (30) The training of technicians should be understood by the **TVET sector (MoE)** as a contribution to the development of primarily trade and industry which is only one of the four goals of the GTP.

### **Selection and distribution of polytechnics:**

- (31) Decisions on a comparable distribution of polytechnics in the country should be generally based on the regional distribution of the labour force which should be used as an overall selection criterion. **(KfW, MoE, FC consultant)**
- (32) Selection of **Centers of Excellence (CoE)** to be promoted to polytechnic status should be based on mutually agreed criteria (results of assessments of graduates undertaken by CoCs should also be considered as criteria). **(MoE, KfW, FC consultant)**

### **Training teachers for level 5 training:**

- (33) It is recommended to develop a master plan on the training of technical teachers for the TVET sector that includes all opportunities, in particular training at universities (especially Adama University) and at the envisaged National Teacher Training Academy (NTTA) in Addis Ababa. **(MoE, Adama University)**
- (34) Since **Adama University** has the longest experience in teacher training and has developed an innovative practice oriented approach thereby making use of its **FTI**. It should serve as a model also for technical teacher training. Adama University should be ready to assist in introducing it for the national system of technical teacher training. **(MoE, NTTA)**
- (35) Elements such as “teaching practices training” in schools, cooperating with (“accredited”) companies and setting up of “learning factories” should be seriously considered when preparing the master plan of the **NTTA**. Even future **polytechnics** (and of course other **TVET institutes**) should consider copying such ideas wherever appropriate. **(Adama University, FC consultant, TC experts)**
- (36) As A-level teachers should also understand how to train level 5 students for production and manufacturing in industry. The current equipment of the **ECPC** and its organisation may not be suitable in all workshops and might thus need some improvement. **(NTTA, FC consultant, GTZ)**
- (37) The design of the training should consider the changing view on competence development as a lifelong necessity as opposed to preparing for an occupation once and forever, thereby probably redesigning the relationship between initial, further and on-the-job training. **(MoE, GTZ, NTTA, TC expert, Adama University)**

### **Employers' readiness to support level 5 training:**

- (38) As long as employers are not informed about offers, plans and expectations of the TVET system it is unlikely that they will all financially support level 5 training. The TVET system should establish mechanisms for briefing, orientation of, information for, and exchange of information with the employers. This should happen at federal, regional and sub-regional (zonal or institute) levels. **MoE, regional TVET agencies and TVET institutes** with the help of **GTZ** and **TC experts** should primarily target those medium and large scale companies with the biggest demand for technicians as they are rather ready to participate in the cost sharing modus of the government.

- (39) **Employers** in need of technicians but not yet ready to support their initial training and to fully pay for their service once employed should calculate their costs-benefits relation considering alternatives. **GTZ** and **TC experts** should assist.
- (40) **Employers** should make use of their **professional umbrella associations** such as e.g. the **chambers of commerce** to improve on the current unsatisfying relationship between the TEVT system and the labour market.
- (41) **Chambers of commerce** whether at federal or regional levels should ask themselves what their role should be in improving the relationship between the TVET system and the employment system. **(ecbp, TC expert)**
- (42) As most **employers** do not know the new programmes of the TVET system they are not yet ready to send candidates for two-year level 5 training. The two parties should discuss on how the immediate demand for technicians during the transition period could be met: by a combination of initial and further training or special courses for upgrading already employed staff. **(MoE, regional TVET agencies, TVET institutes, TC experts)**
- (43) To improve both employers' knowledge about TVET and the relationship between the supply and the demand side this report should be made available to those employers who participated in the study and expressed a sound interest in the findings by putting it on the websites of the **MoE** and/or **KfW country office**. A shortened version of the recommendations might be printed and distributed as well. **(FC consultant)**

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### Annex 3: Methods and instruments for data collection

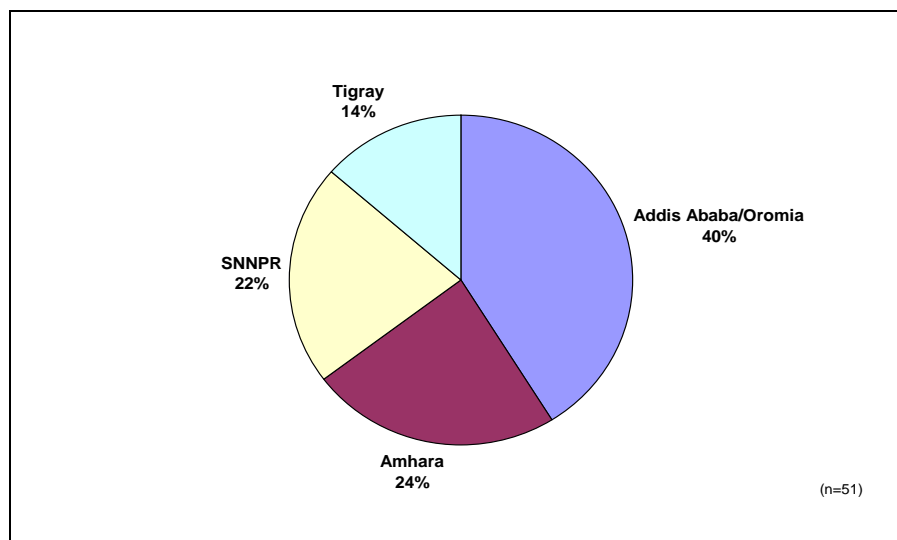
Ideal (planned) Method	Modified	Reasons	Effects
<p>Development of instruments by all participating researchers:</p> <p>a) Questionnaire for postal distribution</p> <p>b) Interview guidelines for oral interviews</p>	<p>Development of</p> <p>a) a questionnaire with the help of a member of the International Centre for Higher Education Research (INCHER) at University of Kassel and</p> <p>b) guidelines for group discussions</p>	<p>Time restriction</p>	<p>Oral interviews with employers were not possible except during two company visits;</p> <p>Some questions have been missing (e.g. further training);</p> <p>Additional researcher (statistician) employed</p>
<p>Pretest of instruments with a small number of employers (samples)</p>	<p>No pretest done</p>	<p>Time restriction</p>	<p>Some items in single questions missing (e.g. industrial sectors leather and garment);</p> <p>Required English language proficiency to answer the questionnaire (too) demanding</p>
<p>Printing of questionnaires (see Annex 3)</p>	<p>Only minor modifications</p>		
<p>Gathering contact addresses using existing lists of employers</p>	<p>Decision to contact companies with either more than 20 employees or at least one engineer (sampling criteria)</p>	<p>Appropriate (official) lists of employers either hard to get or not available and/or in differing formats</p>	<p>Biased sampling</p>
<p>a) Distribution of questionnaires via surface mail</p> <p>b) Organising oral interviews via direct or telephone contact</p>	<p>Decision to organise regional workshops (6 in total) with employers and to distribute (and fill in) the questionnaires during the workshops (Addis Ababa/ Oromia, Tigray, Amhara, SNNPR) with a group discussion following each</p>	<p>Reliable postal service not existent; distribution via e-mail needs copying of original documents which makes data analysis by using a fast scanner difficult as copies have to be transferred to original format</p>	<p>One person employed as research assistant taking care of workshops; GTZ staff members assisted in organising the field trips to regional workshops;</p> <p>Less costs due to the fact that no interviewer were needed;</p>

	workshop		Only employers from the federal and the regional capitals could be invited
No prior contacts necessary	Contacts were made via telephone by own assistant or GTZ and government staff in regional offices of partner agencies	Regional contacts necessary	One full-time secretary was employed as research assistant making these contacts and controlling the list of outgoing and incoming questionnaires
Oral interviews	<p>During six regional workshops participating representatives from employing companies have been asked to fill in the questionnaire, assisted by research team;</p> <p>Following that, they participated in a structured group discussion on four key issues</p>	Due to language problems an Amharic version of questionnaire had to be produced (see Annex 4)	The Amharic version was used during workshops for better understanding of questionnaire; in addition, two national research assistants were helping translating in Addis Ababa and Hawassa; members of the TVET agencies plus individual managers were assisting in Bahir Dar and Mekelle
Return rate is the ratio between distributed and returned questionnaires, normally a return rate of approx. 30% is considered to be sufficient	Totally approx. 250 employing institutions /organisations have been contacted, 52 companies/ employing institutions participated in the regional workshops; 51 filled in questionnaires were received	Not all contacted companies reacted positively, e. g. a lot of them did not participate in workshops due to time pressure, distance and manpower	<p>A real return rate cannot be calculated.</p> <p>In comparison to a prior survey (company survey) the amount of 51 returned questionnaires is remarkably high</p>
Data processing at INCHER University of Kassel	No modification	In almost 50 % of cases a transfer of data into original format was necessary	Additional costs for employing assistants for data transfer and slight delay

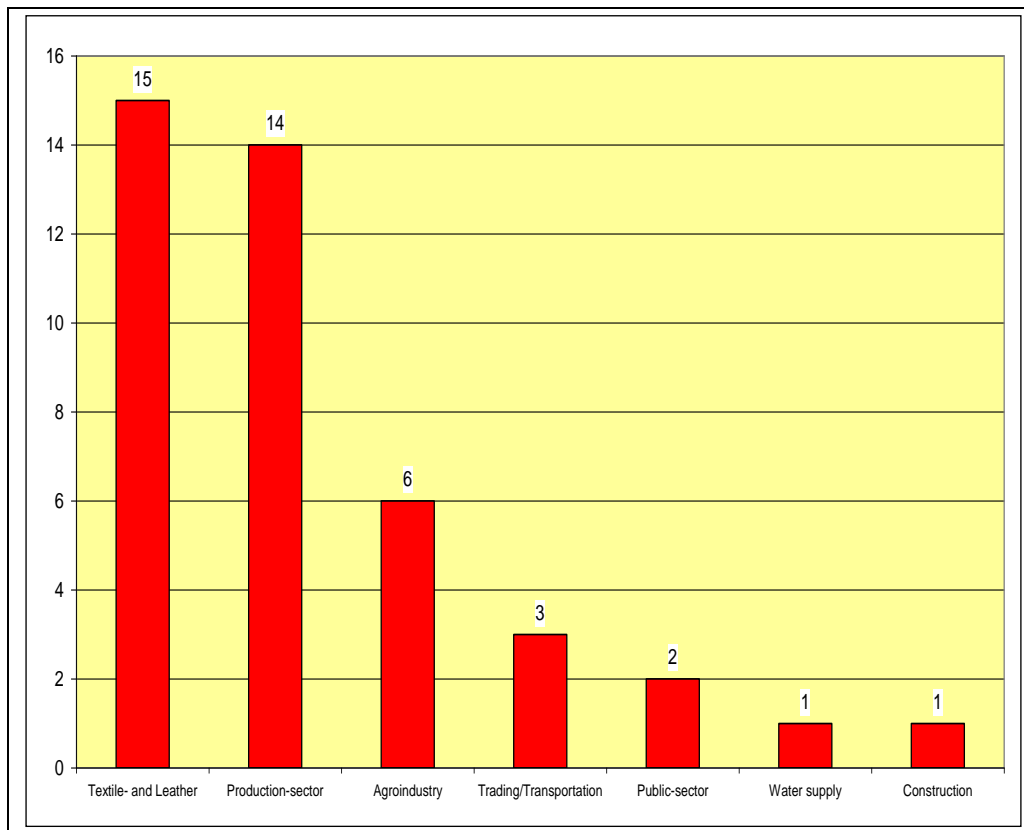
## Annex 4: Statistical figures

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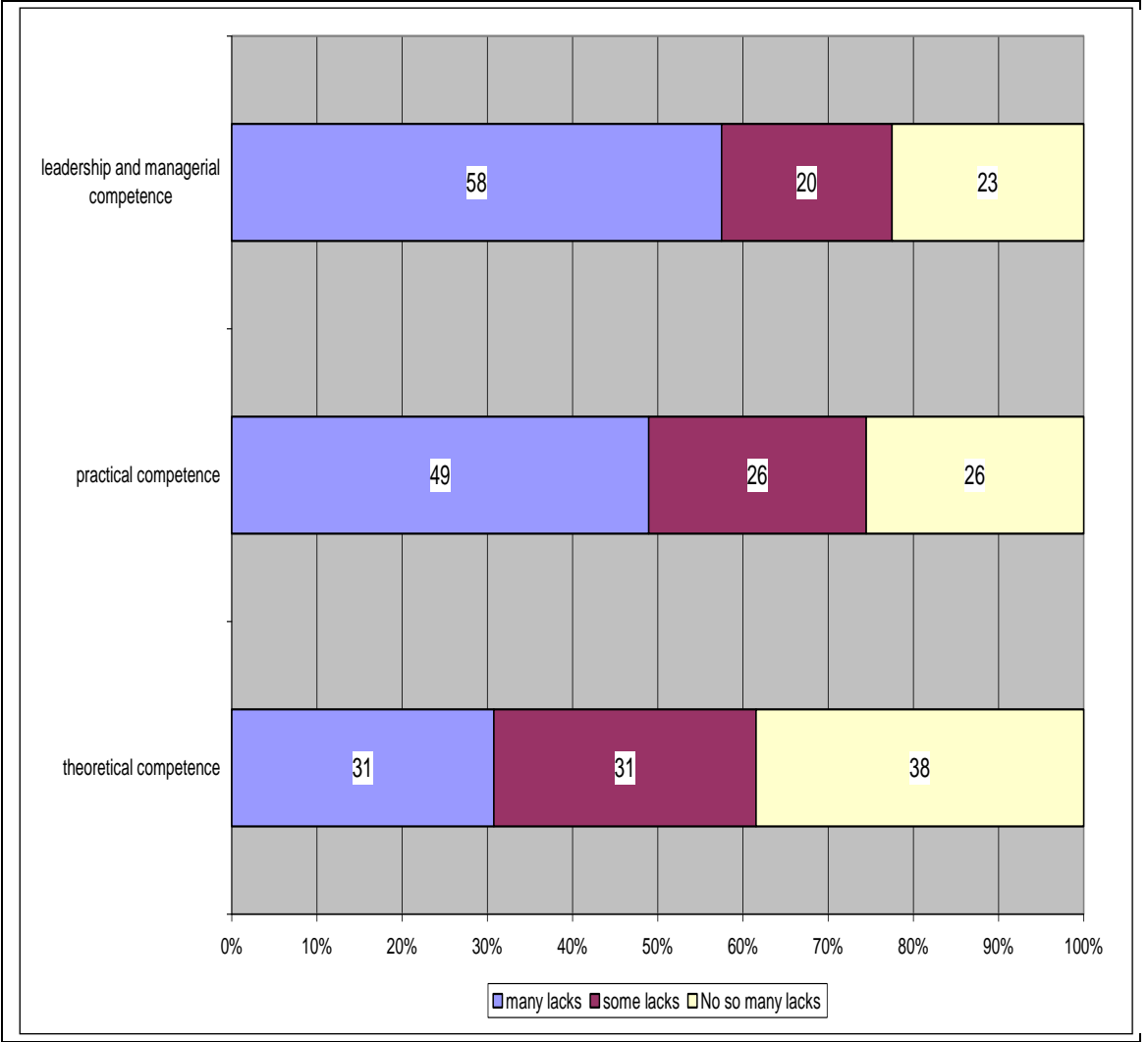
**Figure 1: Regional distribution of involved companies**



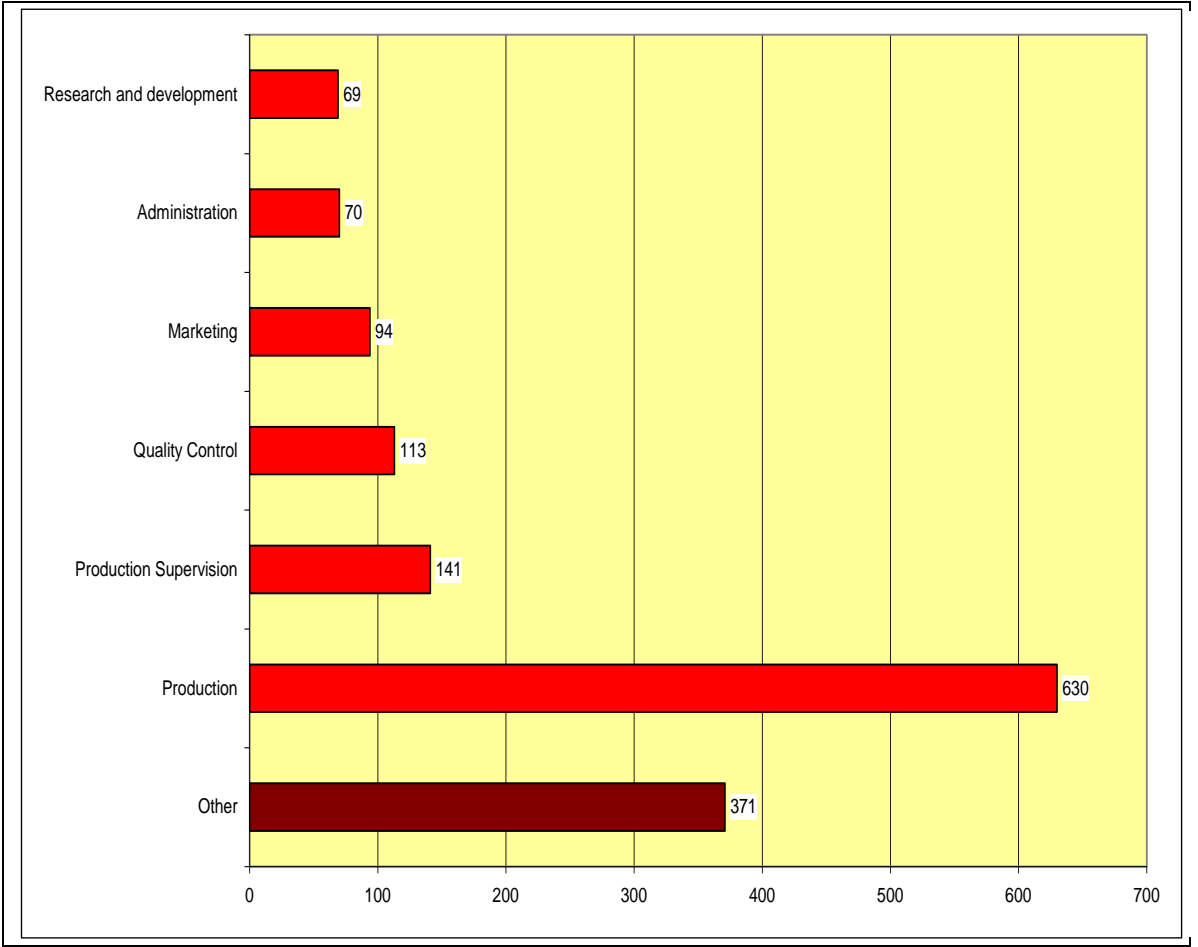
**Figure 2: Distribution of involved companies between industrial sectors**



**Figure 3: Rating of competencies of employed technical staff**

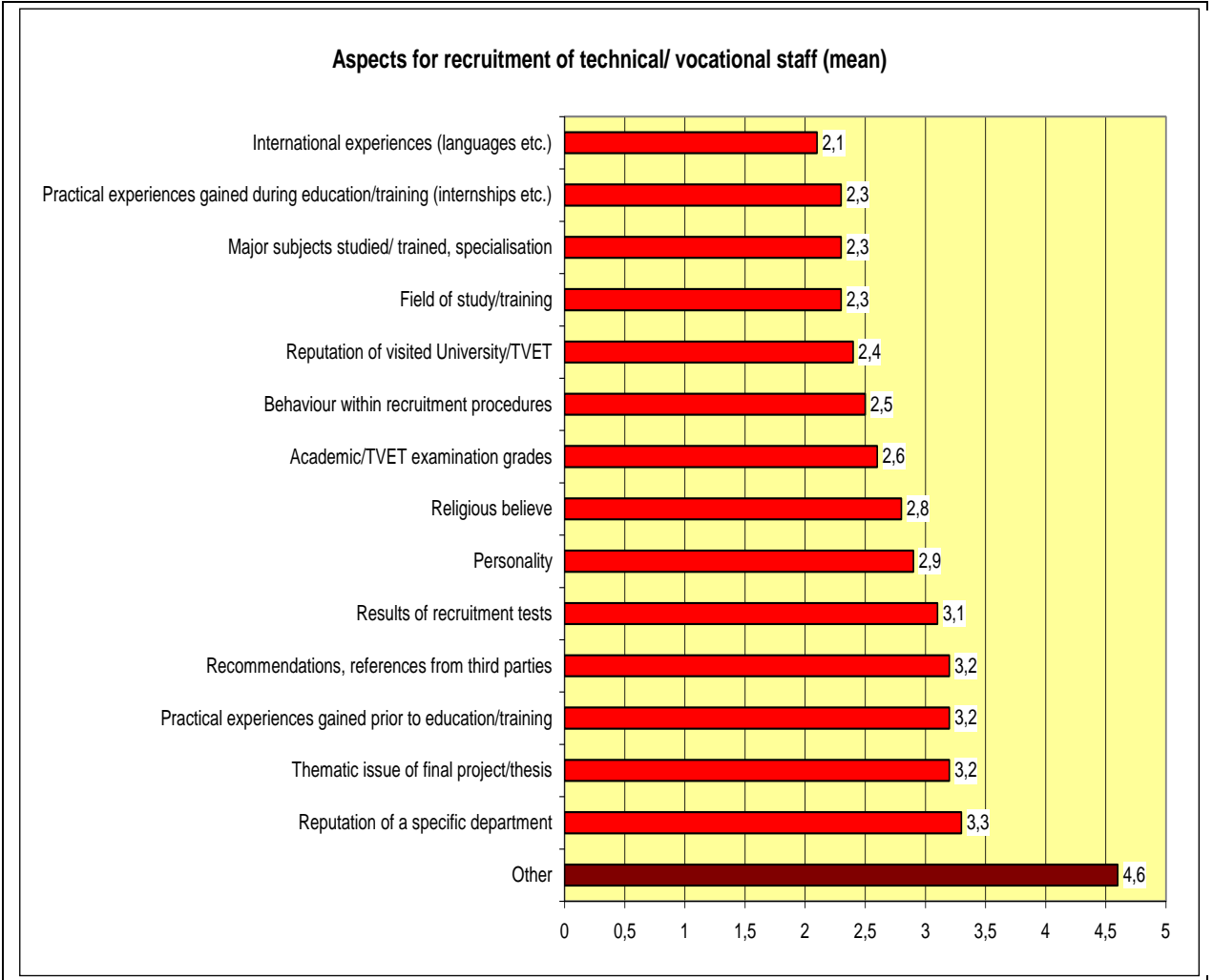


**Figure 4: Demand for technicians in different fields**

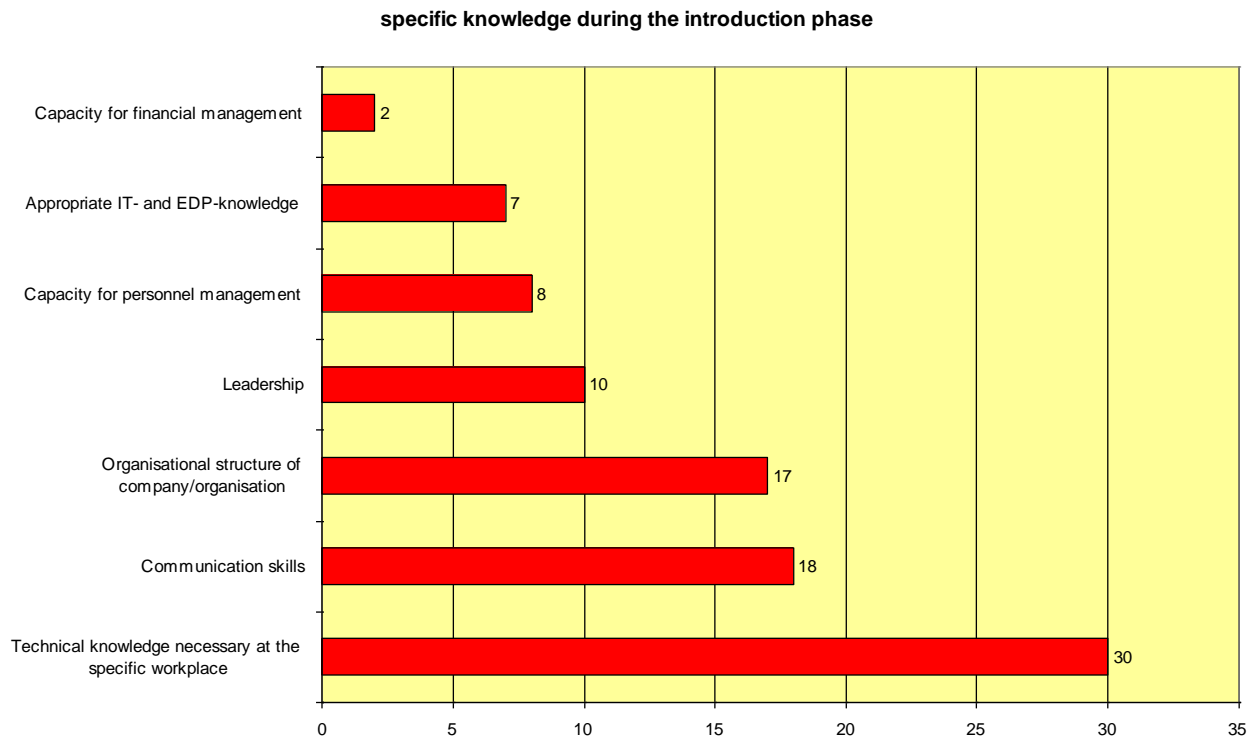


**Figure 5: Important aspects in hiring technical personnel**

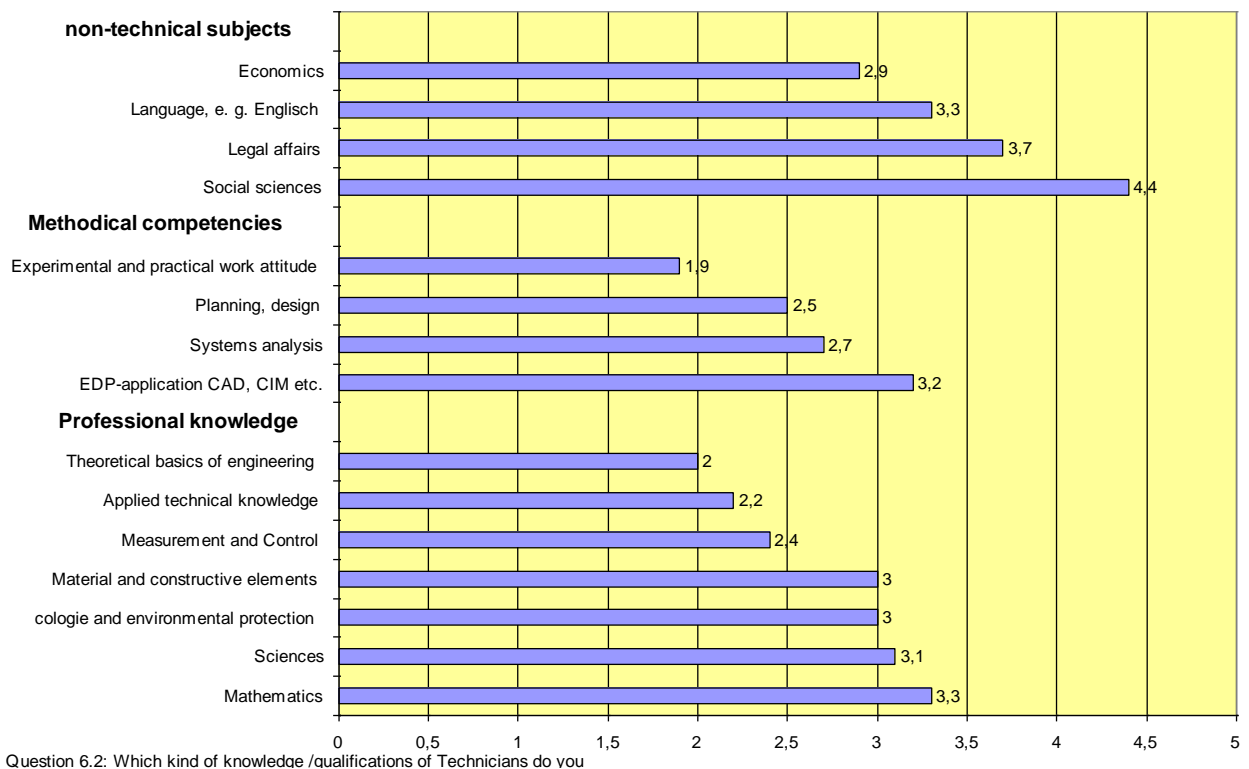




**Figure 6: Acquired specific knowledge during the introduction phase**

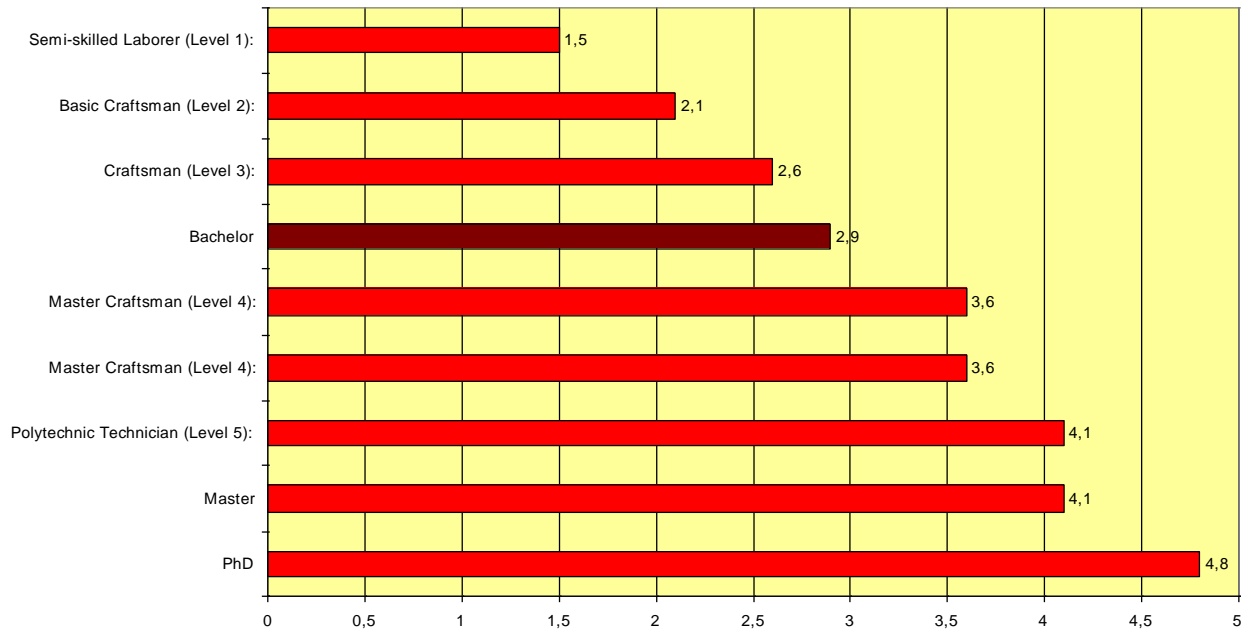


**Figure 7: Expected qualifications for technicians in specific fields**



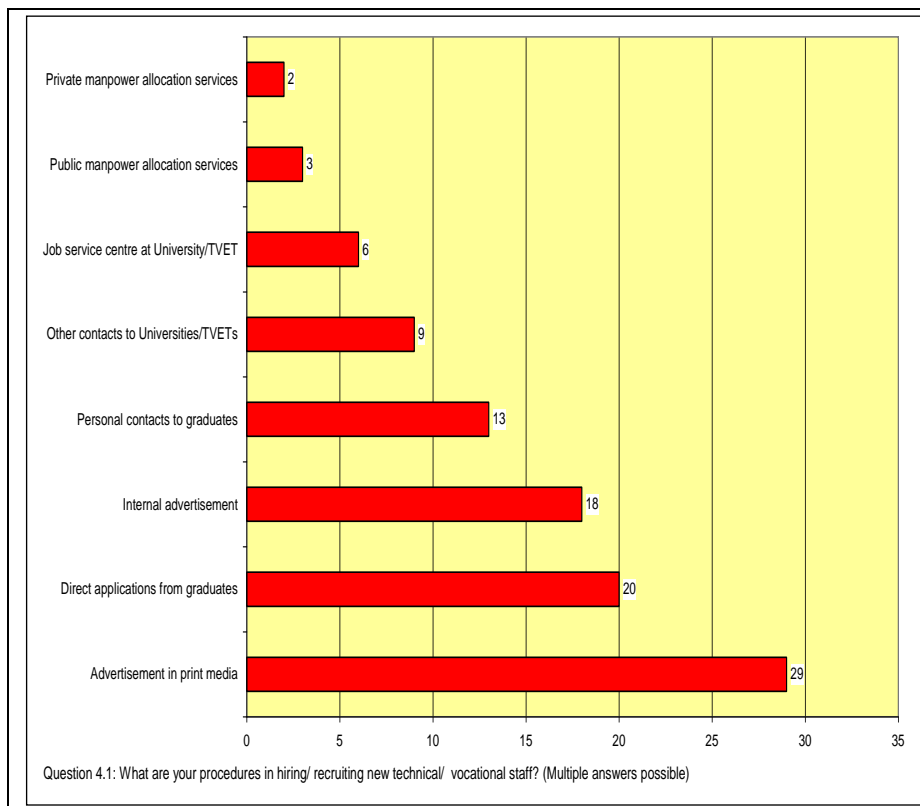
**Figure 8: Difficulties to find technical staff**

**Difficulties in finding technical staf (mean)**



Question 2.5: Which kind of technical staff with the qualification levels listed below are most difficult to find in the labour market? Scale from 1=Easy to find to 5 =Not

**Figure 9: Procedure used for hiring technical staff**



**Figure 10: Number of respondents per industrial sector**

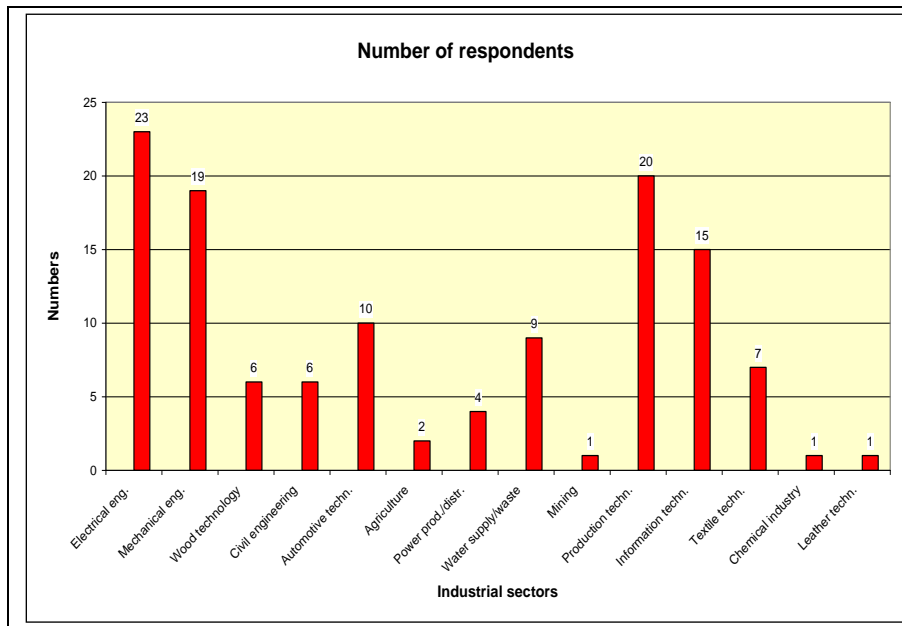


Figure 11: Type of further training demanded

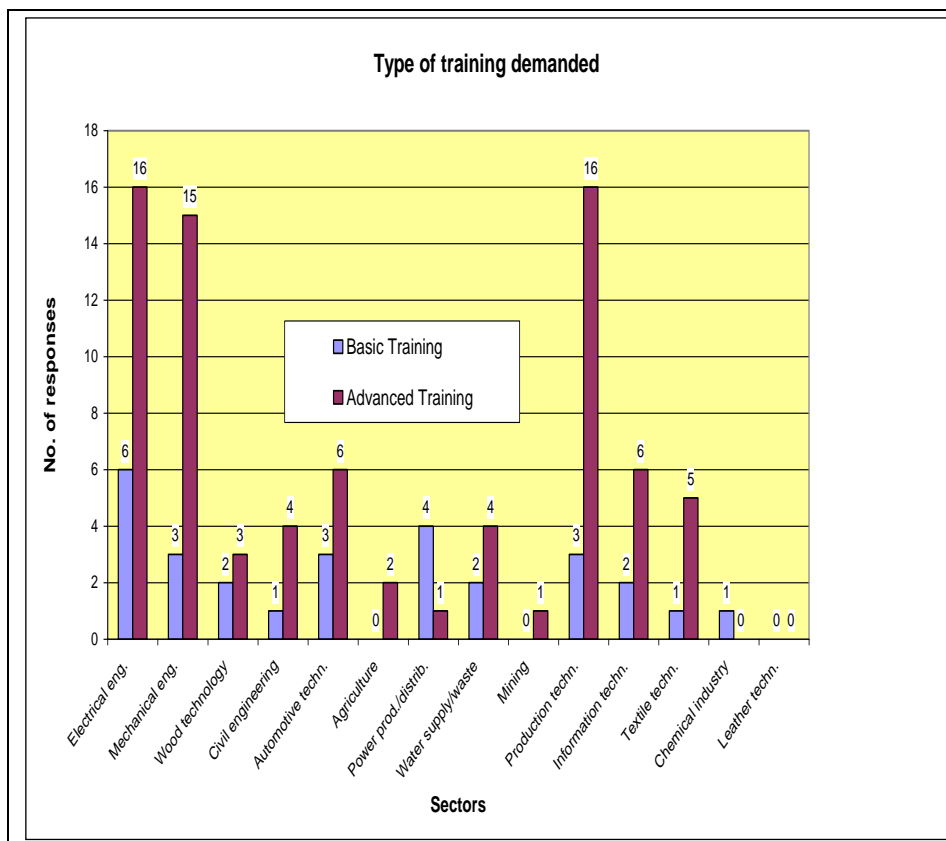


Figure 12: Duration of further training demanded

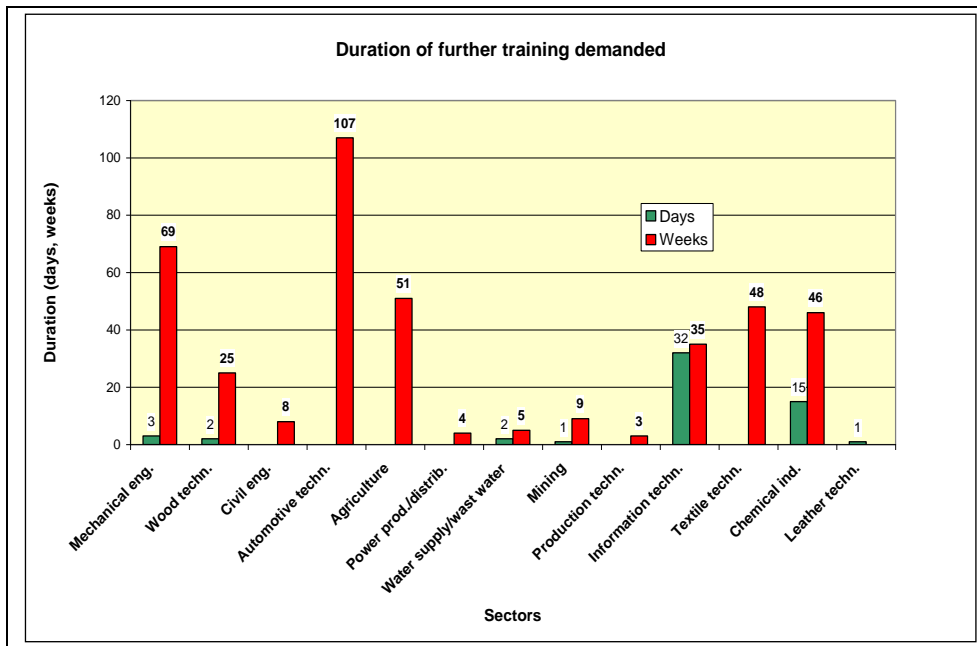


Figure 13: Target groups / qualification levels for further training

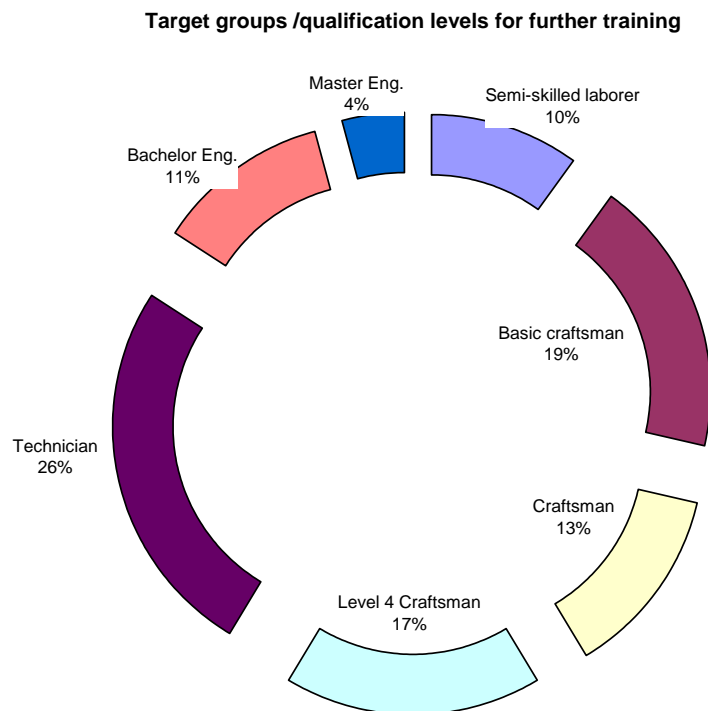


Figure 14: GDP growth rate comparison

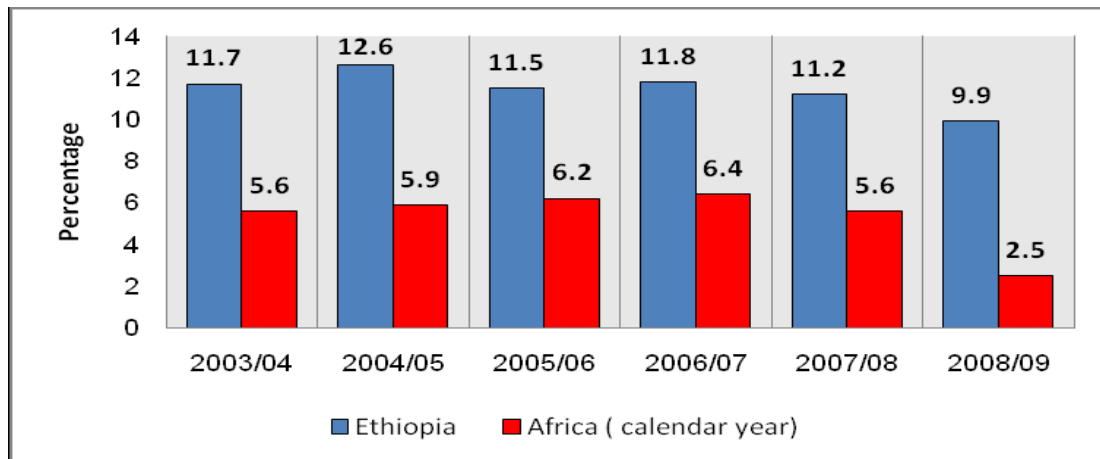


Figure 15: GDP growth rate by sector

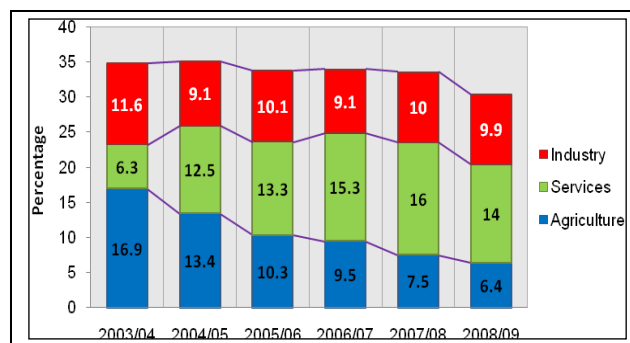
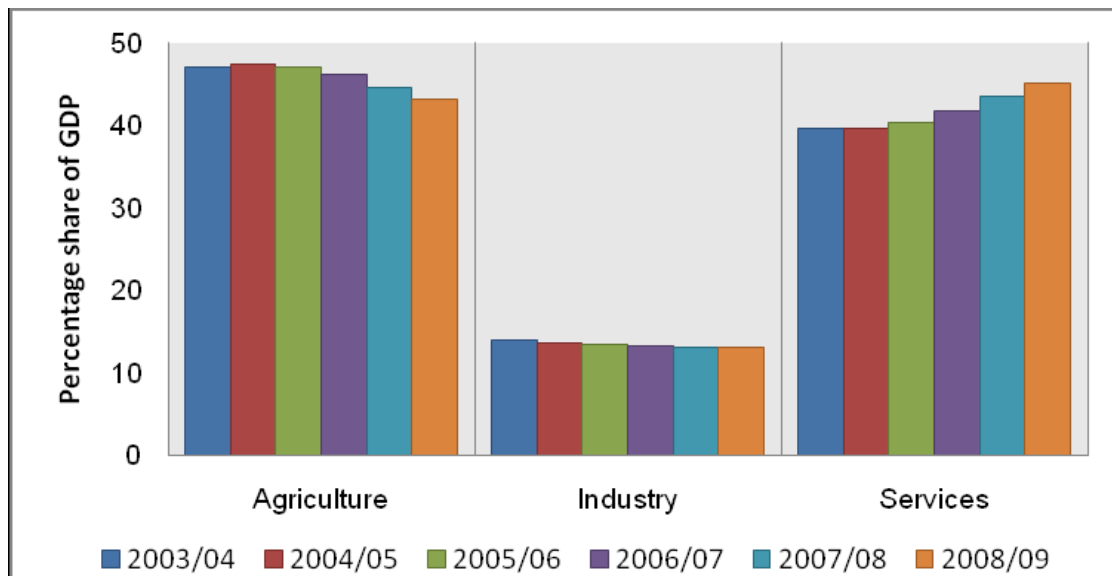
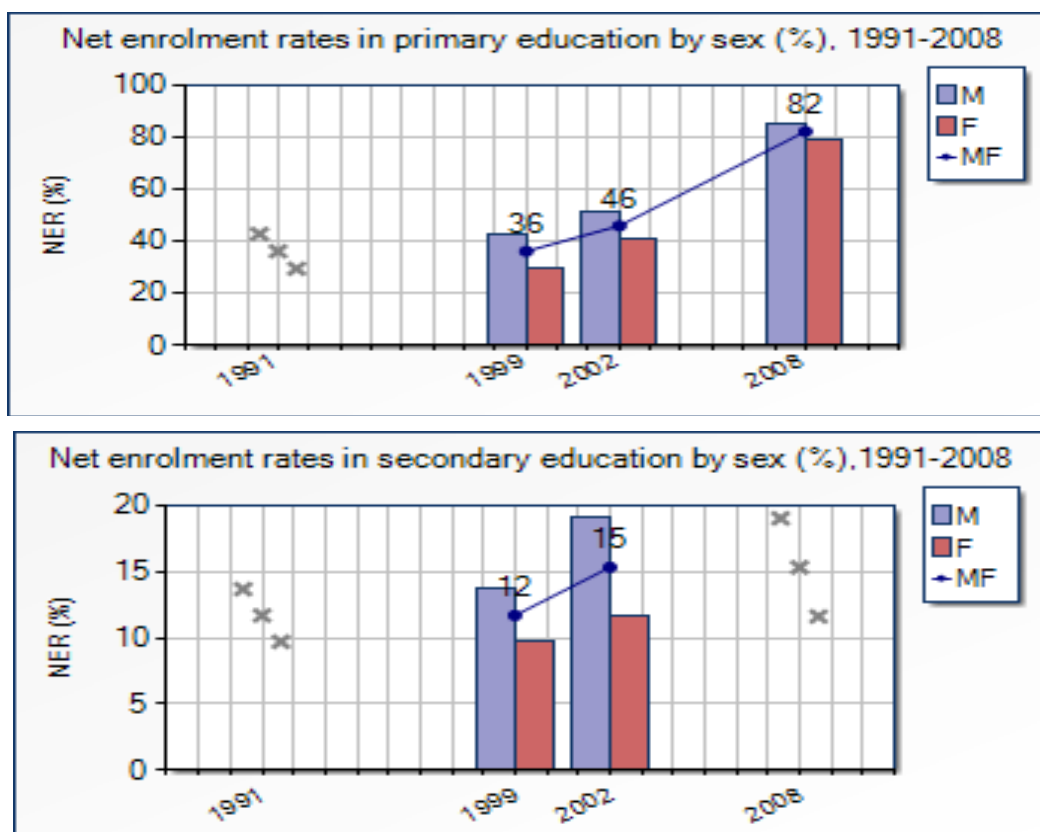


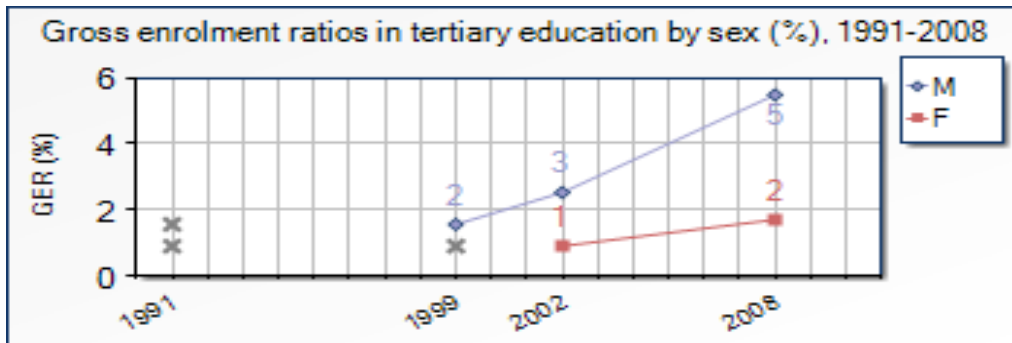
Figure 16: Structural composition of economy



Source: African Development Bank 2010

Figure 17: Enrolment in primary, secondary and tertiary schools





Source: UIS Statistics in Brief; URL:

<http://stats.uis.unesco.org/unesco/TableViewer/document.aspx?>

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Figure 18: TVET enrolment in Ethiopia

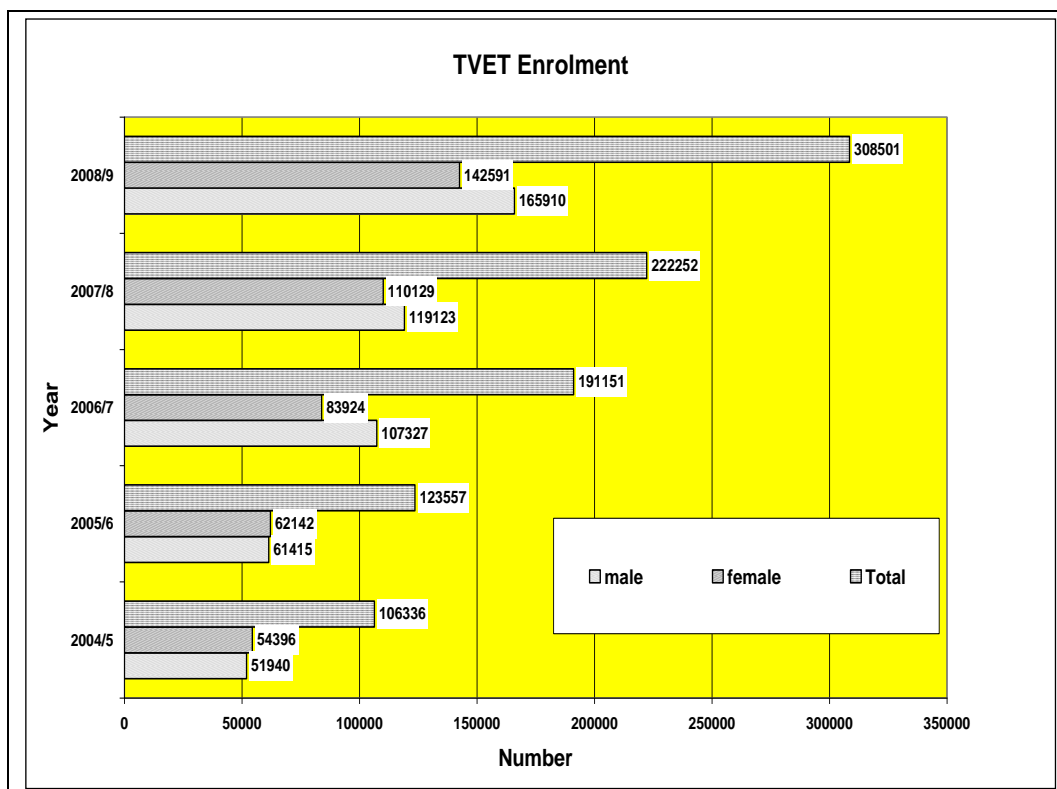
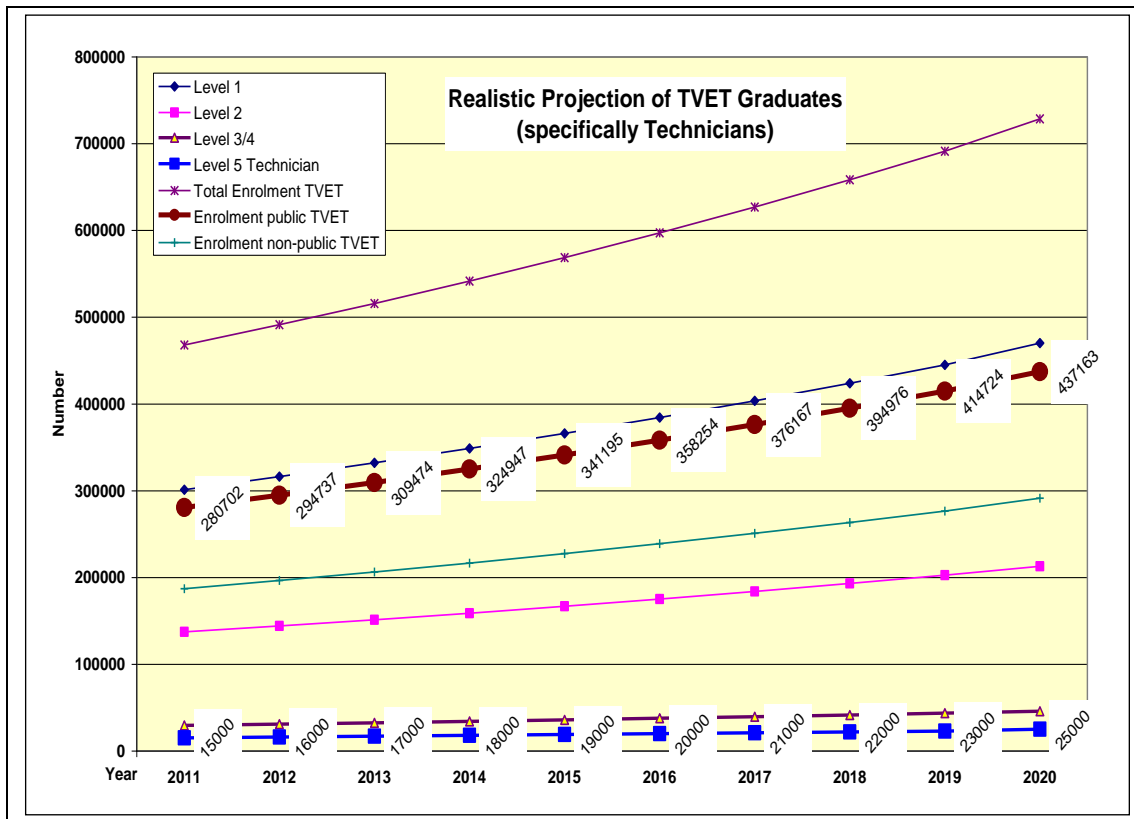


Figure 19: Realistic projection of TVET graduates particular level 5 “technician”





Source: Winkler 2008

Figure 20: Employment in manufacturing

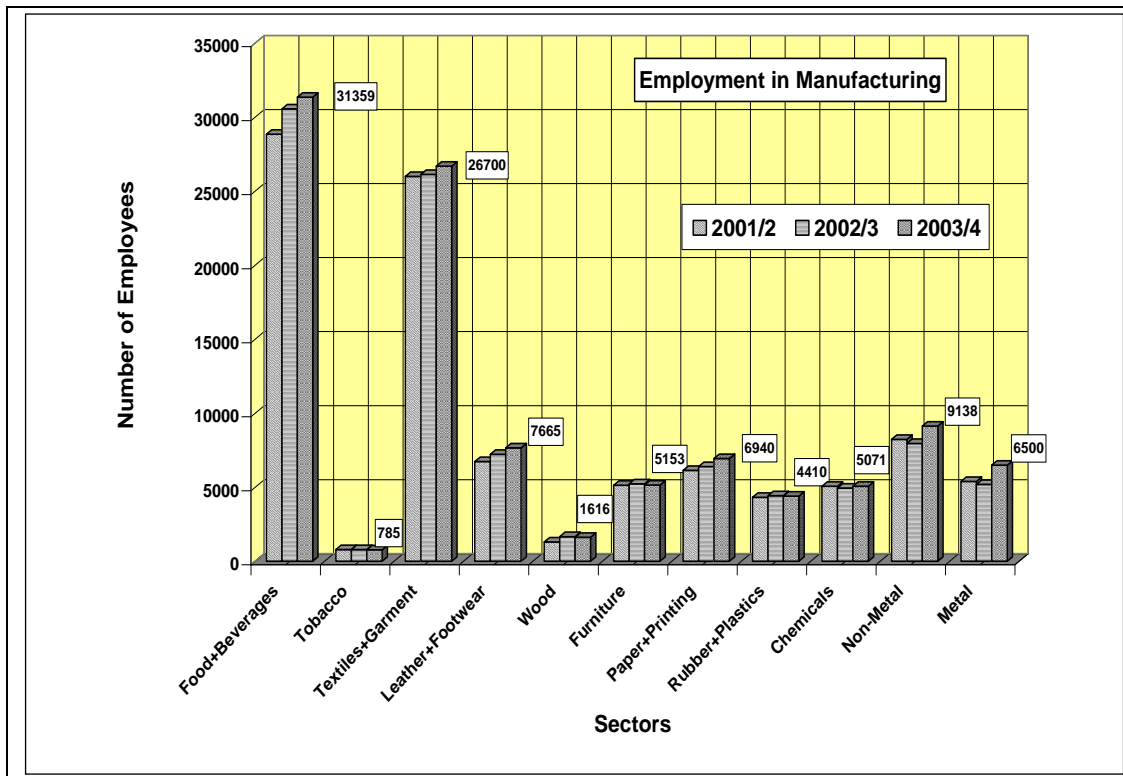
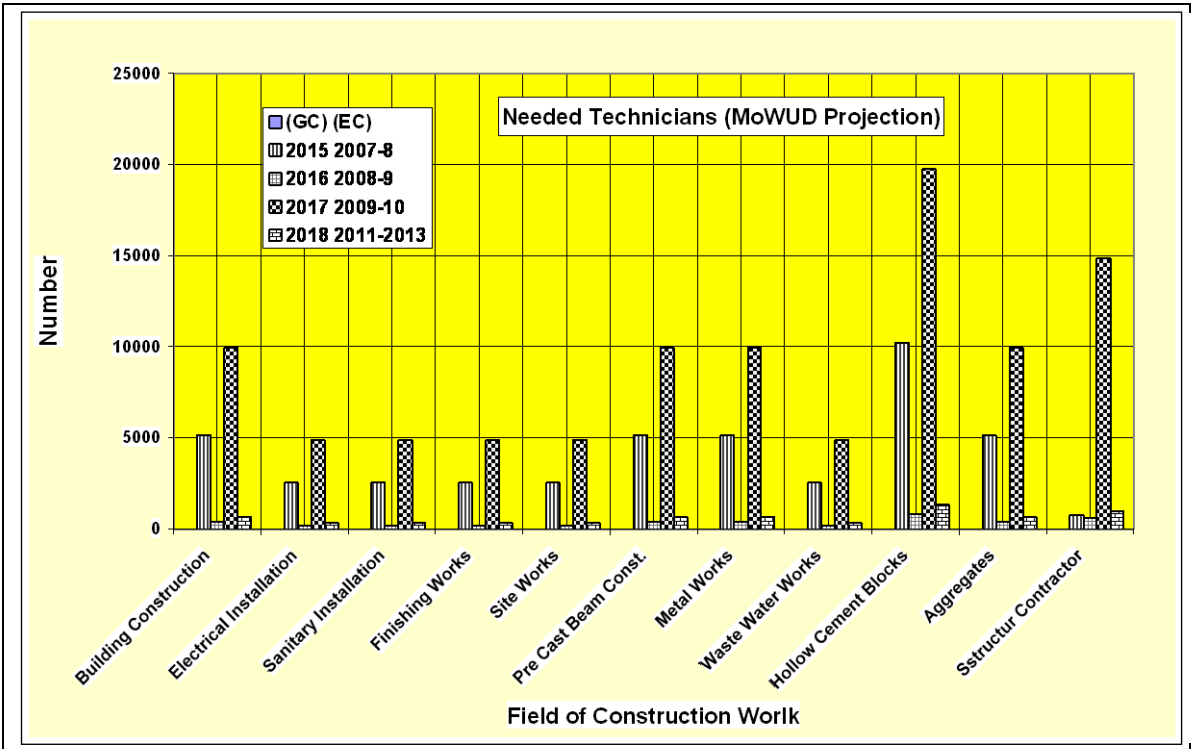
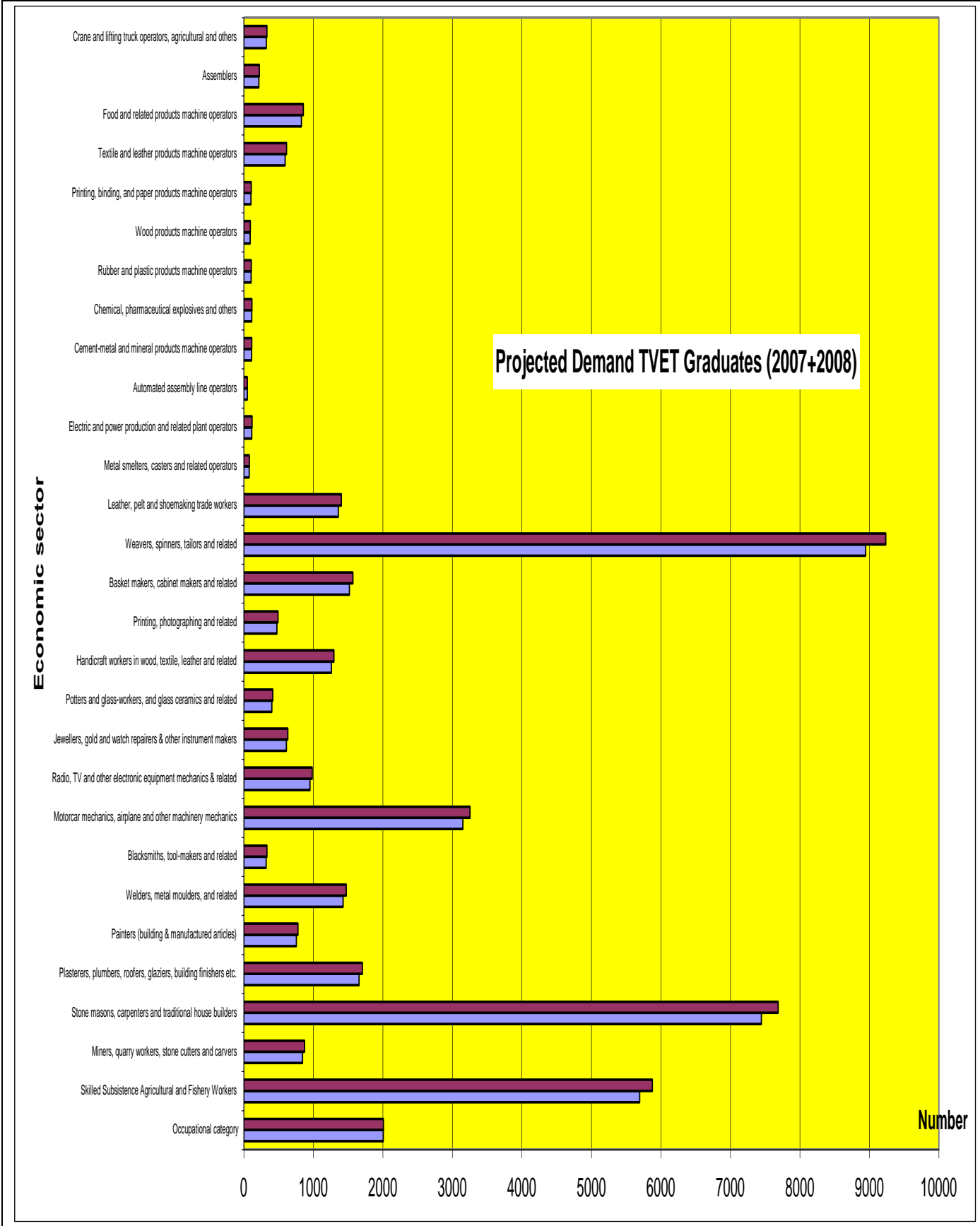


Figure 21: Projected needs for technicians at MoWUD



**Figure 22: Projected demand for TVET graduates**



Source: Moleke et.al. 2006

Figure 23: Regional distribution of labour force in Ethiopia

