Challenges Facing Training Institutions in the Production of Adequate and Appropriate Human Capital for Industrial Development in Tanzania

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Background Information

- One of the reasons for dismal industrialization level in East African countries such as Tanzania despite some of them having large natural resource endowment is the inability to harness their resources for the benefit of their society
- Tanzania like any other developing countries has inadequate scientific, technological, managerial capacity and capability to develop, process and utilize resources they posses.

Background Information (Cont.)

- Experience indicates that no country has attained any breakthrough in its socio-economic development without developing a minimum human capacity base or **manpower** that has adequate skills and knowledge to transform its economy.
- It is on the basis of the level of human capacity development, the poor/developing countries can be differentiated from the developed ones.
- **However, the available pool of human talent in Tanzania and Africa as a whole is typically not only below critical mass but also lacking proper skills to handle society problems and development challenges.**

Background Information (Cont..)

- The above is well supported by the previous survey in May 2014 by Inter University Council for East Africa or IUCEA which regulates higher education in the East African Community's five countries – Burundi, Kenya, Rwanda, Tanzania and Uganda showed the following:
  - in **Uganda at least 63 %** of graduates found to lack job market skills; while in Tanzania, **61 % of graduates** were found to be ill prepared;
  - **In Burundi and Rwanda, 55 % and 52 % of graduates**, respectively were perceived to be incompetent, **in Kenya 51 % graduates** were believed to be unfit for jobs.

Background Information (Cont..)

- The Tanzania Investor survey report by UNIDO (2014) on 459 firms (305 domestic and 154 foreign) involved in manufacturing, services, agriculture and mining shows the following:
  - **Foreign companies tend to hire more foreign workers than the locals** due to lack of confidence in the level of human skills **+ the Attitude towards work**
  - **60% of foreign workers in domestic and foreign companies** are employed for **technical, supervisory and managerial positions**
  - **More than 50 % of total employment** in domestic and foreign companies are **Manual workers**

Background Information (Cont..)

- **Reasons for the above trend is partly contributed by:**
  - Having curriculum in higher learning institutions that do not respond to the market demands
  - Having the teaching and learning practices that is not student centred but lecturer or teacher centred
  - Weak linkages between the academia, industry and Govt
- Thus Tanzania needs to gear up with curriculum that are responsive to the market needs as well teaching and learning practices if it wants to build skills and knowledge to its graduates. Also it needs to strengthen the triple helix linkages.

Teaching and Learning Practice

- There is very little student talk in classrooms, Group work is extremely rare, even in classes with favourable student teacher ratios.
- Attitudes to knowledge are closed; alternative explanations of phenomena are seldom pursued.
- Education and training in HEIs have been particularly hard hit by current methods of teaching and learning – **"Chalk and Talk" – lecturing !!!!!**

Teaching and Learning Practice (Cont..)

- Higher order **cognitive skills** of interpreting, analysing, synthesising and critiquing are not much in evidence
- Formal encouragement of student explanations, hypotheses and rationales is rare.
- There seems little active involvement with the environment surrounding the Colleges or Higher learning institutions in the country

Teaching and Learning Practice (Cont..)

- **Curriculum**
- Science syllabuses remain content-laden instead of laying greater emphasis on processes, that is, techniques and methods of scientific enquiry—the 'whys' and 'hows' of things—with basic facts acting as mere illustrators of these techniques and methods of testing hypotheses.
- The best student for us is the one who remembers most facts and, among his rewards is to climb the ladder of the education pyramid where he/she continues filling his/her head with more scientific facts, laws and `proven form

Teaching and Learning Practice (Cont..)

- Teaching too many hours per week/per month/ per module; teaching more than the required number of credits for a module/programme
- Too many courses being offered to uneconomically-sized groups (the economic size for Business/Human and Social Sciences differs from that of Engineering and technology) – **Topics have been changed to subjects**

Teaching and Learning Practice (Cont..)

- Too many programmes being offered per department programmes per department)
- A good number of institutions that offer Masters programmes have inadequate academic staff for even the bachelor programmes
- There exist a Teaching overload in HEIs. Academic staff doing too much teaching; students attending too many lectures: unhealthy

Teaching and Learning Practice (Cont..)

- Teaching Overload

Teaching and Learning Practice (Cont..)

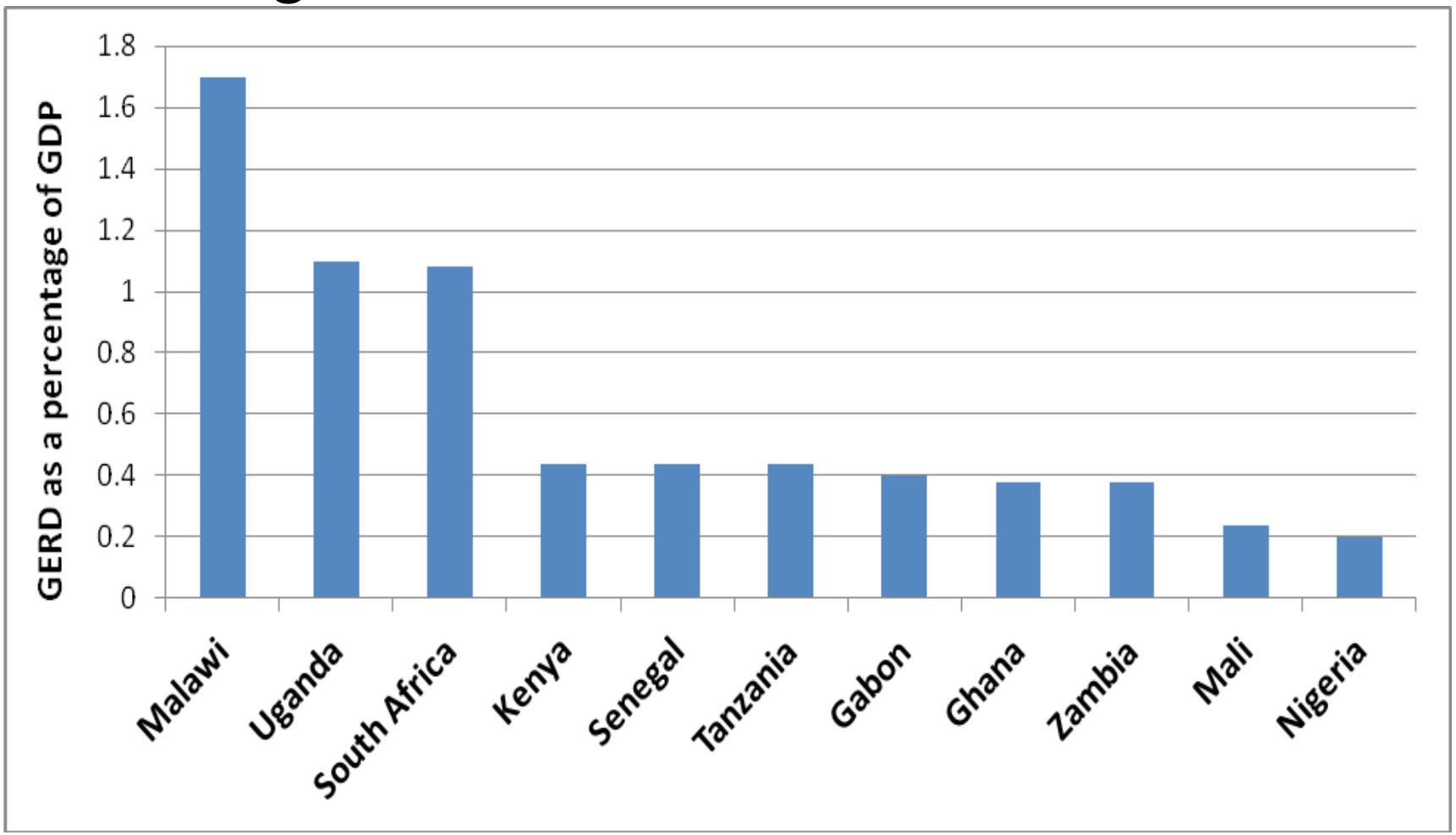
- **Inadequate Physical Infrastructure required by HEIs in Imparting Innovation Culture**
- Currently, laboratory resources are many students **share few if any laboratory facilities**. This leads to students to conduct superficial fact-finding, **survey-type and non-innovative research,** as opposed to **targeted, mission-oriented research.**
- Limited access to journal materials, which are available at unaffordable subscription rates.

Teaching and Learning Practice (Cont..)

- **Academic Staff**
- A survey by the Royal Academy of Engineering and UNESCO in the 1990's in the 2005 show that:
  - Academic staff in higher learning institutions in the region had very little exposure to engineering practice although well-qualified academically, had no industrial exposure.
- **Technicians? Low number of well qualified technicians to support experiments in schools and higher learning institutions**

Teaching and Learning Practice (Cont..)

- **Funding**



Human capacity development

- Numbers of engineers available

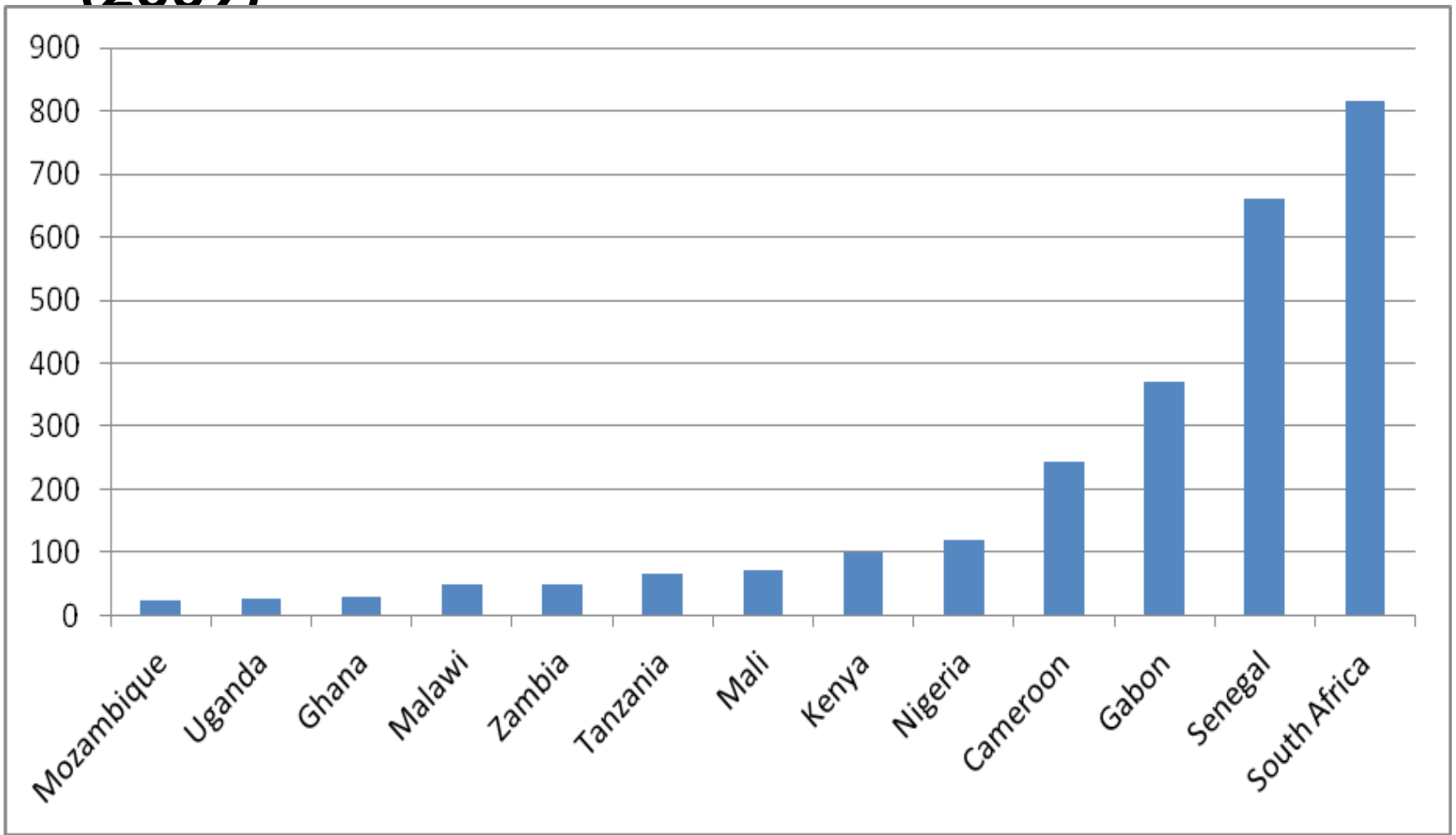
S/No	Country's Name	No. of persons/Engineer
1.	China	130
2.	India	150
3.	Brazil	220
4.	United Kingdom	300
6.	Malaysia	500
7.	South Africa	3,100
8.	Tanzania	6,000
10.	Kenya	6,500

Human capacity development (Cont..)

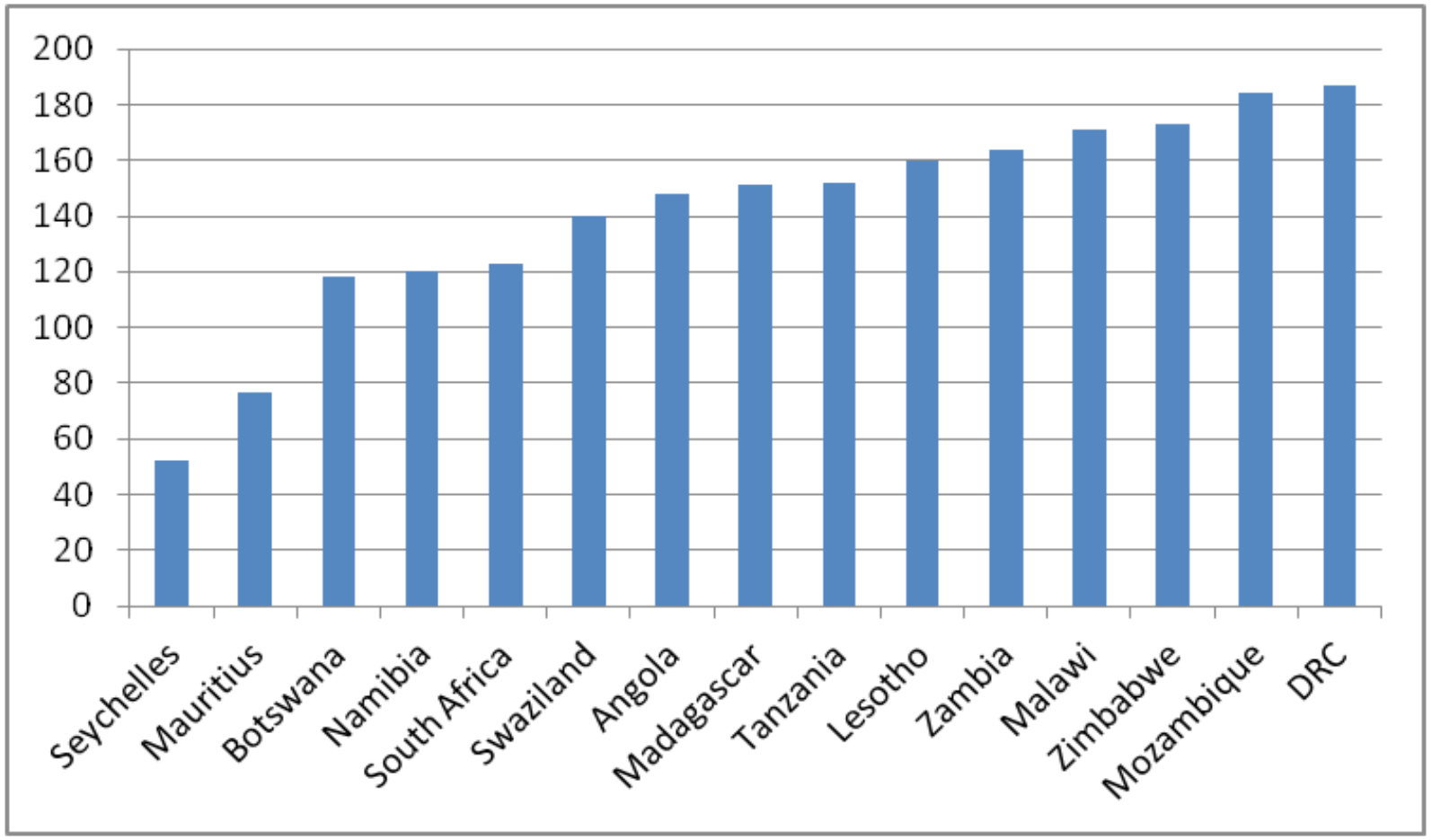
- Much as there is a shortage of engineers, engineering graduates remain unemployed or are under-employed: poor quality of engineering education (Improving Quality of Education in Sub-saharan report- 2014)

Human capacity development (Cont..)

Low Number of Researchers/million inhabitants (2009)



Human development Indicators ranking in SADC countries (out of 187 countries) – 2011



Human capacity development (Cont..)

- **Student Enrolment**
- Problems of enrolment for learning of science start, historically, with secondary schools, where mathematics, along with the science subjects, especially chemistry and physics, have often been shunned by students
- This has been worsened by expansion of private secondary schools, most of which are arts and humanities based mainly due to the often less investments necessary-Small catchment area

Human capacity development (Cont..)

- **National Framework**
  - Defines Levels and Titles of Qualifications such as Certificates, Diplomas, Higher Diplomas, Degrees.
  - Ensures consistency and uniformity in the Titles of Qualifications.
  - Sets minimum standards for NQF Credits required in a qualification
- .

Human capacity development (Cont..)

- Although there exist a national framework guiding tertiary institutions and universities on what needs to be attained, **curriculum from Universities are not different from those from tertiary institutions**
- Graduates from tertiary institutions are supposed to be more practically oriented than those from universities i.e. **65 % practical and 35 % theory** – this is not the case in Tanzania

Human capacity development (Cont..)

- Further to that, the country **is producing more degrees than technical certificates**
- Most of the institutions which were producing technicians in the country have changed as a milling plants for manufacturing degrees
- Unhealthy situation: low number of doers
- Higher enrolment rates have not been translated into sufficient economic gains, as **unemployment among university and college graduates remains stubbornly high**

Academia- Industry- Government

- There exists very low level of linkage between industrial firms and knowledge organizations- the reason for the poor uptake of research outputs from the higher education institutions or even sponsoring of R&D at these institutions
- There exist inadequate mechanisms for identifying and linking existing knowledge to innovation – A valley of death

Academia- Industry- Government (Cont..)

- Placement of students for industrial work is still also problematic, with industry unwilling to provide the necessary allocation
- Inadequate supervision by the industry and academic staff during student practical training in industry and consequently graduate students end up having inadequate practical engineering skills

Mitigating Measures

- **Teaching and learning**
- There is a need also to assess our kind of **knowledge based curriculum** before changing to Outcome based curriculum
- Our kind of **teaching and learning pr**actice need also to change from "**Chalk and talk**" to "Problem based" curriculum

Mitigating Measures (Cont..)

- **Outcome Based Curriculum (OBC):** is a student-centered learning process which requires students to demonstrate the skills and competencies they have acquired at the completion of their studies.
- One of the features of Outcome Based Curriculum is that of transforming the unit weighting of courses into credit weighting

Mitigating Measures (Cont..)

- OBC seeks to ensure effective **comparability of qualifications and credit across the national**, regional and international education training systems: hence **facilitates mobility of students**
- **Outcome-Based Curriculum** must include a standardized method of determining National Qualification Framework (NQF) levels, Entry Requirements, NQF Credits, Curriculum Content and Subject Learning Objectives

Mitigating Measures (Cont..)

- **Problem Based Learning**
- **PBL** is one of the ways of improving the way we teach our students in our higher learning institutions so as to impart the right skills and knowledge for employment and for creating employment
- Involves Team work and enhances innovative skills,
- Closer relation between research, teaching and to real life problems. Generally, PBL enhances quality.

Mitigating Measures (Cont..)

- Students are made top produce tangible products to the society and offload their research results to the industry - moving towards *third generation universities* (3GUs)
- However, PBL has a number of challenges for EAC:
  - Curriculum Review to integrate PBL in EAC university needs time – awareness creation
  - Involves students group of 5 to 6 per supervisor/lecturer etc.

Mitigating Measures (Cont..)

- **Academia-Industry-Government**
- The academia in collaboration with the private sector should develop a well-structured system of **reviewing the curricula to meet the technological changes in industries**
- The need to establish or **strengthen Industry Internship for academics**
- Introduce Visiting Professors from industries that will be involved in supervising student projects- 20 days per year or more as for the case of UK universities

Mitigating measures (Cont..)

- Linkages between **Academia-industry-govt** need to be enhanced
- All academic staff should be facilitated to **attend industrial placements** for at least a year or so – and this should form one of the conditions for employment at HEIs
- All academic staff must be r**egistered by Professional qualification Bodies such as ERB,NBAA etc or equivalent** for them to qualify to lecture at HEIs

Mitigating Measures (Cont..)

- **Teaching and learning**: Overloading
- Avoid Teaching the same course/module to 1 or more disciplines/groups/ departments with a slight variation in application, e.g. Statistics for Engineers; Statistics for Accountants)
- Avoid Teaching various modules (which have a 90-95% similar core) to different groups
- Avoid Breaking up larger classes into small groups (consider seminar-style teaching)
- Avoid Teaching of unnecessary subjects: this will reduce the overloading!!!

Mitigating Measures (Cont..)

- **Funding**
- Attracting the private sector and public-private partnership could be effected through:
  - Tax exemptions and rebates,
  - Creating endowments by which private industries, commercial companies and private groups could inject a significant proportion of starter-capital, jerking-capital
- Through collaboration and networking with regional and international organizations such as SADC, NEPAD, UNESCO, Sida-SAREC, NORAD as well as the Diaspora

Mitigating Measures (Cont..)

- **Human Capacity development**
- Abide to ILO ratio of **1: 5: 25** for **engineers/scientists/degrees: technicians: artisans**
- Create awareness to various stakeholders on the benefits of having more technicians than degree graduates
- Introduce incentives for students to join more technician courses such as giving loans to selected fields at technician levels

EDUCATION AND TRAINING IN KOREA

Educational Pipeline

Vocational Pipeline

DOCTOR (PhD)

PROFESSIONAL ENGINEER

MASTER CRAFTSMAN

MASTER

CLASS I ENGINEER

CLASS I ASSISTANT

CLASS II ENGINEER

CLASS II ASSISTANT

Practice Career

ASSISTANT CRAFTSMAN

High School Graduate

UNIVERSITY

JUNIOR TECHNICAL COLLEGE

VOCATIONAL EDUCATION AND TRAINING

NO REQUIRMENT FOR PREVIOUS EDUCATION

In Conclusion

- The complexity of challenges facing training institutions aimed at producing the adequate and qualified human resources for industrial development involves **multi-combinatorial problems/factors** which are difficult to separate.
- However, with the **right polices and commitments** from both the **Government, the industry and academia** it is possible to overcome them.

The end

THANK YOU FOR LISTENING