

SARF/IRF/PIARC Regional Conference for Africa
Durban 9 – 11 Oct 2018

Building the next generation of transport leaders in Sub-Saharan Africa

Focus area: **FA7 – Education and training in the roads sector**

Main author: L R Sampson, ReCAP Technical Team Leader

Co-authors: N Leta, ReCAP Infrastructure Research Manager

K Kelly, Mott MacDonald

J Malota, Association of Southern Africa National Road Agencies

Paper Abstract

It has long been accepted that transport is a critical supporter and driver of a countries' economy. However, as highlighted by the World Bank (Ali et al. 2015), Africa, and specifically Sub-Saharan Africa, remains the least connected and under-developed region in the world in terms of transport provision. This remains, therefore, a major challenge that current and future leaders of the transport sector will continue to face.

In line with an approach by the Association of Southern Africa National Road Agencies (ASANRA) and confirmation from member countries of the Research for Community Access Partnership (ReCAP), it was identified that there was an urgent need to build the future transport leadership core, not just in ASANRA member countries but throughout the whole of Sub-Saharan Africa.

As a consequence, a scoping study for a Transport Sector Leadership Development Programme (TSLDP) was commissioned as part of the ReCAP programme, funded by the UK Department for International Development (DFID) through UKAid. The study was undertaken by a consortium of Mott McDonald and the University of Cape Town and is now moving into an implementation phase based on the findings of the scoping study and further deliberations by the ReCAP member countries, ASANRA and the ReCAP Programme Management Unit (PMU).

This paper outlines the requirements to establish a Centre for Sub-Saharan Transport Leadership (CSSTL), whose role would be to develop and implement the sustainable delivery options for future transport leadership capacity building. Three levels of delivery options will be discussed:

- Mentorship programmes, where candidates receive on-the-job training and mentoring focusing on leadership and management in the transport sector;
- Continuing Professional Development (CPD) courses (existing and new) which encapsulate the leadership, managerial and technical content identified for leading transport professionals in Africa;
- A recognised post-graduate qualification in transport leadership.

1 Introduction

The Transport Sector Leadership Development Programme (TSLDP) is a capacity building project commissioned as part of the Research for Community Access Partnership (ReCAP) funded by the Department for International Development (DFID) through UKAid. The concept was originally identified by the Association of Southern Africa Road Agencies (ASANRA) who, in association with ReCAP, recognised the need to develop professional leaders for the transport sector in Sub-Saharan Africa (SSA).

This paper outlines the outcomes from the scoping study carried out on behalf of ReCAP by a consortium of Mott MacDonald and University of Cape Town that included a needs assessment, gap analysis and stakeholder survey to justify the basis for a programme founded on key thematic areas. The scoping study concluded that transport professionals in Sub-Saharan Africa are likely to have a solid academic foundation in transport-related engineering disciplines. However, there is a need for a more broad-based transport professional capable of managing and leading the transport sector in an environment of diminishing resources and enormous social challenges to the region.

The development, management and recognition of these important complimentary skills to support the academic foundation are being addressed through mentorship, Continued Professional Development (CPD) courses and a full post-graduate qualification. The recommended delivery mechanism proposed for management of the TSLDP is based on the establishment of a Centre for Sub-Saharan Transport Leadership (CSSTL), which is also being discussed along with the future plans for a sustainable programme.

2 Needs Assessment

A needs assessment was undertaken to identify training gaps in technical, managerial and leadership skills for transport professionals in SSA. The assessment was carried out in the twelve ReCAP¹ countries and included the following:

- a literature review of existing policy documents on capacity building in the SSA transport sector,
- online surveys of experts drawn from the civil engineering and transportation sectors,
- the identification of curricular requirements for the ideal leader,
- a gap analysis; and
- a survey of relevant academic curricula in Africa.

2.1 Literature survey

While it is well accepted that transportation plays a crucial role in the development and socio-economic growth of any nation, the literature survey showed that SSA is clearly lagging in the development of regional trade particularly related to the poor state of its transport infrastructure. The literature reviewed included: UN Economic Commission for

¹ ReCAP comprises 12 countries in Africa under the Africa Community Access Partnership, AfCAP (DRC, Ethiopia, Ghana, Kenya, Liberia, Malawi, Mozambique, Sierra Leone, South Sudan, Tanzania, Uganda and Zambia), and 5 countries in Asia under the Asia Community Access Partnership, AsCAP (Afghanistan, Bangladesh, Myanmar, Nepal and Pakistan).

Africa (UNECA) Committee on Trade, Regional Cooperation and Integration (6th session, October 2009, Addis Ababa, Ethiopia); ASANRA strategic plan 2014-2019 and UNECA African review report on transport (2005). The broad needs of the transport sector identified from the literature review may be summarised as follows:

- Poor transport network connectivity and state of infrastructure,
- Insufficient human and institutional capacity,
- Insufficient funding,
- Lack of mentorship and training for mid-level engineers,
- Disconnect between the industry and academia,
- Limited opportunities for Continued Professional Development (CPD),
- Insufficient regional interaction,
- Lack of support of transport related policies and programmes by key stakeholder outside the transport sector,
- Lack of a full appreciation for the connection between transport infrastructure design and service planning.

2.2 On-line survey

In addition to the needs highlighted from the literature review, the on-line survey of seventy-one (71) transport professionals revealed that there is a specific need for a capacity building programme focused on leadership and management. The programme should also provide a solid grounding in areas where there are obvious deficiencies and which are critical to the effective management of the sector in SSA, such as transport policy and planning, transport systems analysis, transport operations planning, land-use planning, and road safety. The results showed:

- 62% agree that leadership skills are more relevant to prepare transport professionals for effective management of the sector
- 51% think that the leadership and management components are the most important aspects of the TSLDP
- 85% have little or no skills in transport planning, urban and regional planning, land-use planning and transport modelling
- 82% have little or no skills in transport policy planning and governance
- 75% have little or no skills in project impact assessment.

2.3 Curriculum requirements

In response to the issues highlighted here related to capacity building, knowledge acquisition and professional career development of SSA transport experts, there has been some attempts by various national, regional and international stakeholders to address the challenges. For example:

- The United Nations Transport and Communications Decade for Africa launched in 1991 (UNTACDA-II) had the long-term objective of establishing an efficient and integrated transport and communications system as a basis for physical integration in Africa. Out of 708 projects approved, 466 had been fully or partly implemented by 2000. However, despite these efforts, it is evident that further work such as

proposed by TSLDP is still much needed to develop the professional leaders to deliver the goals,

- A similar programme is the Sub-Saharan Africa Transport Policy Programme (SSATP) Poverty Reduction and Transport Strategy Review (PRTSR), underway in several countries, which has the potential to serve as a tool for policy development in all aspects of the transport sector. In 2007, eighteen countries had completed their PRTSR and started work on implementing the recommendations.
- Many countries have embarked on revised transport sector policy documents as part of poverty reduction strategies. However, a review of these efforts showed that the existing transport infrastructure and services are still far from enabling Africa to achieve the planned socio-economic development and integration.

2.4 Gap Analysis

This section highlights some of the challenges that face the future leaders, but it is clear that one important gap exists in current development efforts: the availability of a holistic human capacity building programme to facilitate the training and mentorship of future leaders to meet the enormous responsibility and challenges they will face.

Having accepted the need for increased human capacity development efforts in the sector, the next step was to conceptualise the components of a programme to equip transport professionals with the necessary skills to lead the sector. In order to create the programme, the following profile of the “ideal” leader was agreed to transform mid-level managers into world-class, innovative and highly competent leaders. The leader should:

- be technically sound in various facets of transport engineering across all land-based modes and users,
- understand the complexities of planning transport infrastructure within the built environment,
- appreciate the impacts of transport decision-making and be able to assess decision-makers,
- be capable of managing complex projects throughout the project life-cycle, and
- be able to envision a future for the transport sector in Africa and lead, inspire and mentor others towards the vision.

Insert a final line here along the lines of:

"The review of the existing curricula in Africa included an analysis of existing collaborations and partnerships, and existing training programmes. This is covered in more detail in the following section."

3 SSA Curricula Review

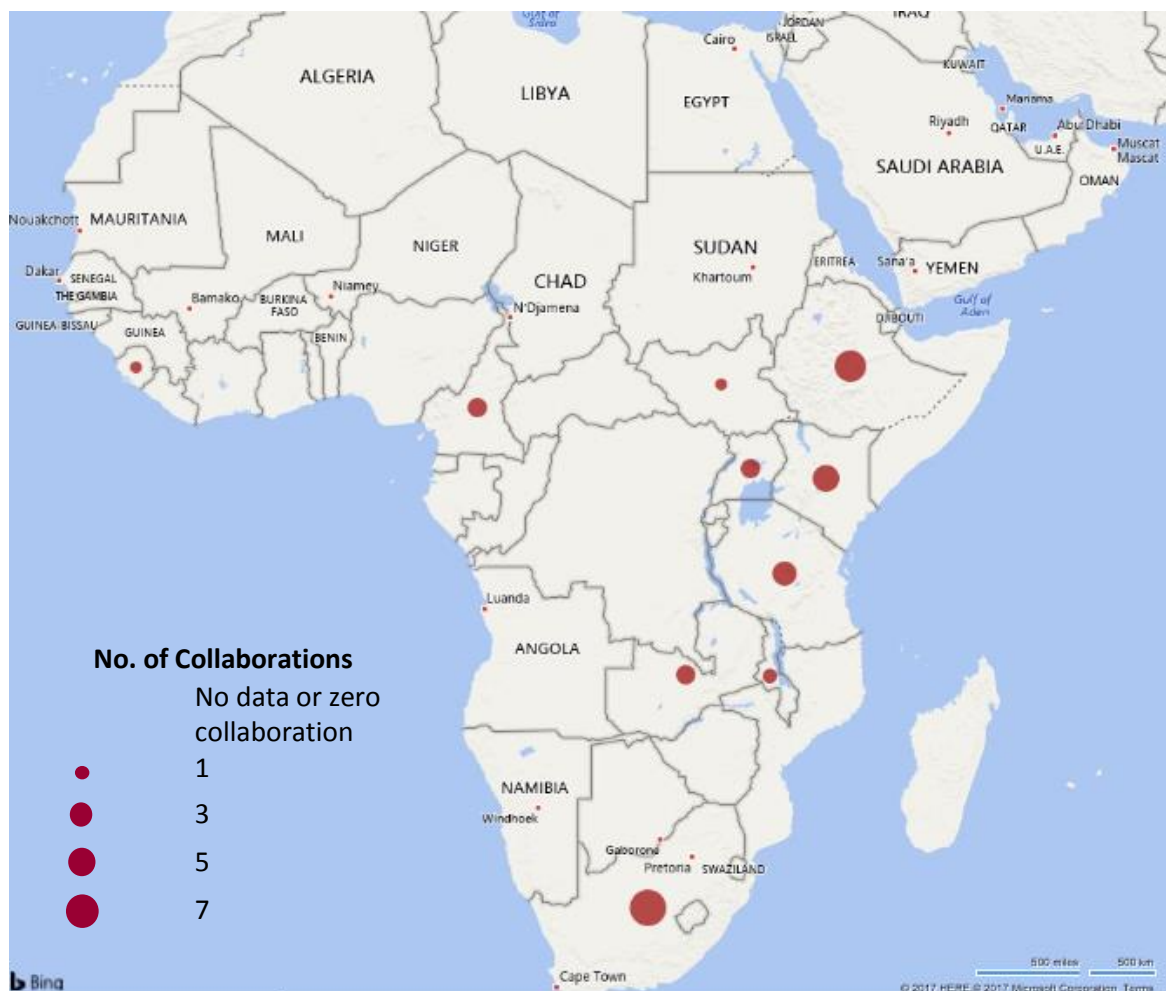
The curricula review was carried out in universities in 15 countries that provided a suitable representation of what is available in SSA in terms of Civil Engineering/Transport courses. The countries surveyed were the 12 AfCAP partner countries plus Cameroon, South Africa and Nigeria. The outcome of this desk study provided an overview of the relevant courses in the partner countries, in order to identify gaps in tertiary education. From the summary data of the institutions in the surveyed countries, four key indicators were selected to reflect the level of robustness of the programmes offered. The indicators were as follows:

- Level of industry collaborations that exists among these countries
- Curriculum content in terms of planning versus engineering
- Availability/access to learning tools (labs and software)
- Existence of CPD content

3.1 Collaborations/Partnerships

Figure 1 presents an outlook of the amount of industry/academic collaborations that exist in higher institutions in some of the countries surveyed. Information on collaborations was only available in the countries represented in the figure. The size of the bubble is an indicator of the summation of both the local and international collaborations existing in institutions of the various countries, as reflected in the survey. Industry collaborations/partnerships were found to be highest in South Africa, Ethiopia, Kenya and Tanzania, when compared to the rest of the surveyed countries.

Figure 1: Industry/academic collaborations in higher education institutions across Selected SSA Countries (ref: Bing Maps)

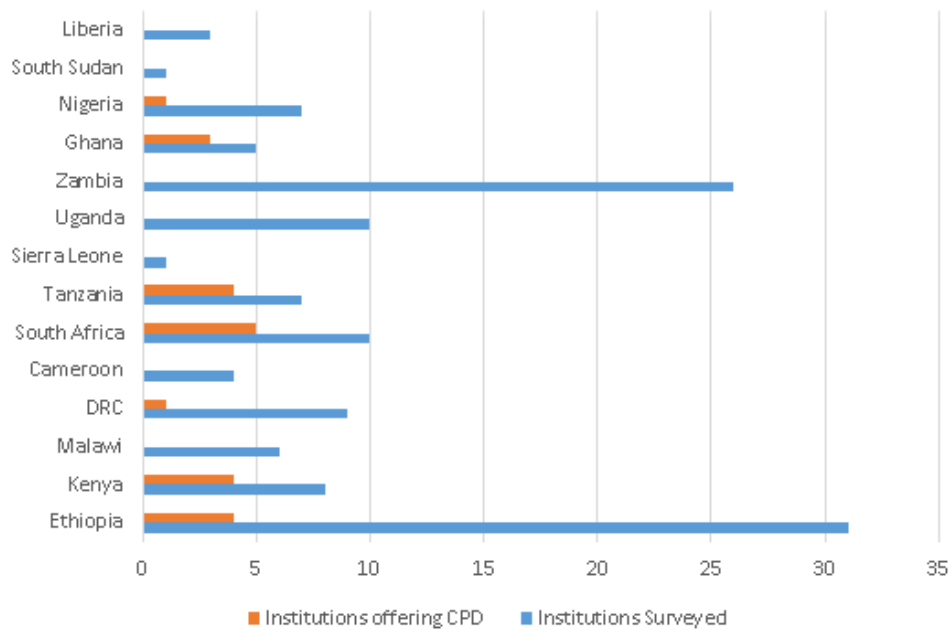


3.2 Existence of CPD programmes

As part of the data collected related to the tertiary institutions and their programmes, information was also obtained on the existence/availability of CPD programmes targeted at industry professionals in the civil engineering and transport sector. Analysis showed that only a few of the surveyed tertiary institutions offer CPD programmes.

A comparison of the surveyed countries was also made in terms of the availability of such programmes. Figure 2 represents a comparison of CPD programmes offered among the various countries. Most of the information on the CPD programme offerings were extracted from the institutions' websites. The highest level indicates the countries with the most number of CPD programmes for the sampled higher institutions. From the survey information, South African, Tanzanian and Kenyan tertiary institutions reportedly offer more CPD programmes when compared to other countries. The figures do not include industry sponsored CPD courses.

Figure 2: CPD Programme offering

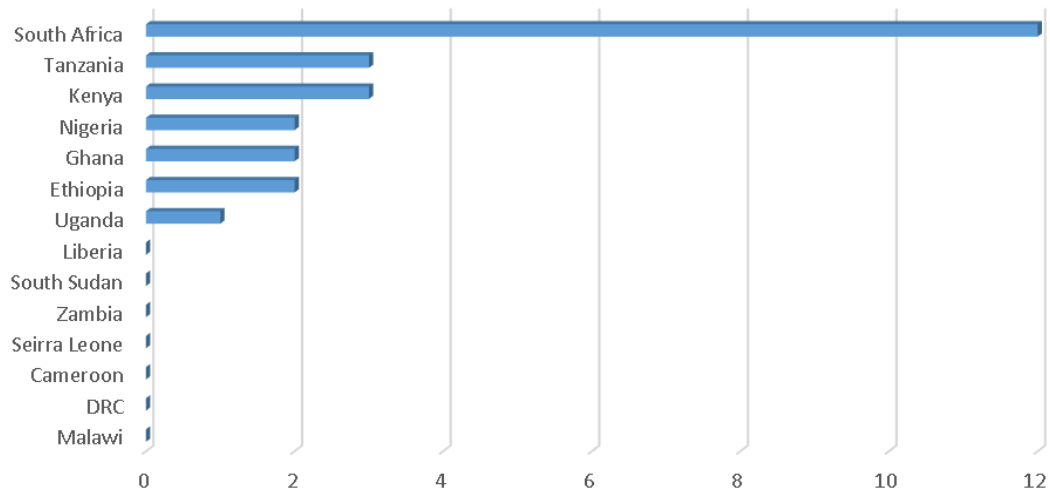


3.3 Ranking of Institutions at the Regional Level

Using web-based ranking information, a comparison was made among the surveyed countries in terms of the ranking of their higher institutions. As the majority of higher institutions in the various African countries do not feature on popular global ranking scales, a regional (continent) level comparison was adopted using www.webometrics.info. The top 50 institutions on the continent were selected and the number in each country then quantified. It is to be noted, however, that this is not a university ranking in a traditional sense of publication output and impact.

Figure 3 shows the various countries and the number of higher institutions featuring among the top fifty institutions across the continent. The ranking reflects the relative strength of higher institutions in these countries measured in terms of their academic impacts, presence and openness. From the chart, it can be seen that South Africa has the majority of the number of higher institutions featuring among the top 50 across Africa.

Figure 3: Country ranking of institutions

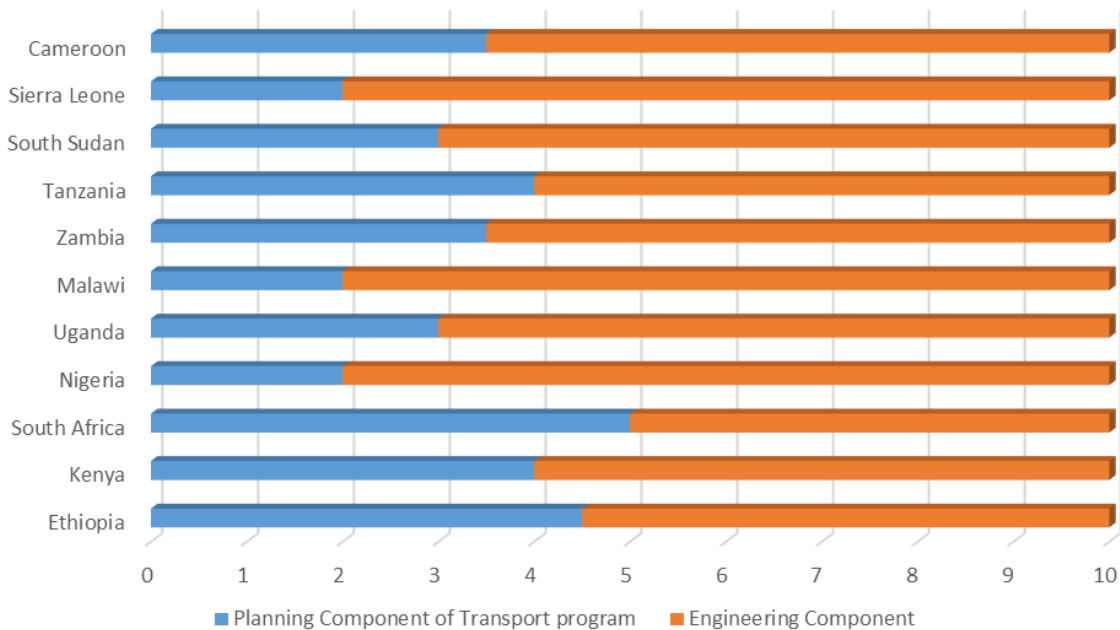


3.4 Transport Curriculum Content

Figure 4 presents an overall outlook of the curriculum content of programmes in transport in the 15 SSA countries surveyed. This has been broken down to a planning related component and the engineering/technical design components, with a score for each component based on a summation of programmes offered at both the undergraduate and post-graduate levels of study. The planning component relates to areas such as transport demand/supply analyses and forecasting, travel demand management, multimodal systems planning, land use planning, service and operations planning. The engineering component, relates to aspects focusing on design of physical infrastructure, such as highway engineering and railway engineering.

From Figure 4, for the majority of countries, more attention is given to the engineering design aspect of transport infrastructure over planning-focussed components. The transport curriculum in institutions in the East African countries, such as Ethiopia, Tanzania and Kenya, as well as South Africa, tend to be more balanced, in terms of these two components, when compared with the other countries.

Figure 4: Country Comparison of Transport curriculum content



4 Gap Analysis

The results from the stakeholder survey and curricula review clearly demonstrated that transport education (typically embedded in civil engineering programmes) tends to focus on the traditional engineering content of highway engineering and design (including geometric design), pavement design, highway capacity analysis and some elementary traffic engineering. Besides foundational courses in transport engineering, most programmes also teach construction management and civil engineering design. Some courses offer project management and to a lesser extent professional practice and/or reporting skills.

The results showed a clear need to broaden the knowledge base of a transport professional. While there is a diversity in course offerings, especially in South Africa, the findings from this study have identified a list of course topics that would need to be included in a balanced transport leadership curriculum.

Error! Reference source not found. summarises the analysis and the gaps. Blocks in green are covered in-depth in all countries, typically in existing civil engineering curricula; courses in orange are the topics that are mostly offered; and gaps that have been found in current under-graduate courses are shown in yellow (only available in a few countries and not in depth) or red (generally no offerings).

The gap analysis contributed to the design of the curriculum to fill these gaps that is shown in subsequent section.

5 TSLDP Options

Building on the findings of the needs assessment and gap analysis, the project defined format options, a delivery method and programme structure to achieve the defined learning objectives. The format the TSLDP takes is key to ensuring candidate and wider stakeholder participation, and ultimately, the long-term, sustainable success of the programme. Whilst

the TSLDP content will cater for both the technical and managerial/leadership needs of the candidates, it needs to:

- be accessible and achievable for all candidates across SSA;
- provide clear guidelines for addressing gender balance and diversity as part of the key selection criteria for candidates;
- strike a balance between achieving the required learning goals and creating something that is too complex, in terms of content, or onerous, in terms of time inputs, as this will have an adverse effect on uptake;
- have a business model for delivering the TSLDP that is cost-effective, implementable and manageable on a self-sustaining basis.

Eight options at different levels were considered for the TSLDP. The advantages and disadvantages are summarised in Table 5.1 of the final project report². Based on the analysis, three levels of the TSLDP were identified as shown in Table 2. These levels are discussed in more detail in the following sections.

It is proposed that the TSLDP will be managed by a Centre for Sub-Saharan Transport Leadership (CSSTL) that is covered in section 6.

² Mott MacDonald & University of Cape Town (2017). *Transport Sector Leadership Development Programme, Final Report*. [online] Research for Community Access Partnership. Available at: <http://www.research4cap.org/SitePages/LeadershipDevelopment.aspx>.

Table 1: Gaps in existing courses required for a balanced transportation leadership curriculum

Engineering	Operations	Policy and Planning	Asset Mgmt.	Impact Assmt.	Project Mgmt.	Project Assmt.	Procurement	Leadership	Mgmt. and mentoring
Route selection	Traffic safety	Policy & legislation	Road maint.	Sustainable development	Risk & uncert assessment	Project appraisal	Tendering & procurement	Technical communic.	Talent managem.
Geometric design	Traffic simulation	Drivers for change	HDM4 & others	Environment. impacts	Project programming	Project funding	Planning & legal framew.	Effective leadership	Situational leadership
Junction design	NMT design & operations	Demand & supply analys	Asset management	Social impacts	Financial accounting	Cost benefit analysis	Legal issues	Best-worst proactice	Coaching
Drainage	PT design & operations	Transport modelling	Geotechnical management	Economic impacts	Project lifecycle ass.	Multi criteria analysis	Preparation of tenders	Critical thinking	Skillful communic.
Pavement materials	System design	GIS	Pavement asset mgmt.	Transport impact ass.	Contracts & change contr.	Sustainable livelihoods	Stakeholders/ publ engagem.	Systems thinking	Motivation skills
Appropriate technology	Traffic engineering	Land use planning	Bridge/struct asset mgmt.		Quality control		Contract negotiation	Ethics & compliance	Gender awareness
Low volume rural roads	Traffic management	Road user behaviour	Drainage asset mgmt.		Resource management			Complicity of projects	Diversity awareness
Construction mgmt.	road user behaviour	Transport institutions	Street furnit mgmt.		Health & safety			Sustainable development	Perform. Managem.
Safe road design		Gender issues			Project admin			Governance	
CAD		Urban & rural planning			Technical reporting				
Design coordination									
Equitable road space									
Design public spaces									
Universal design									
Typically offered	Mostly offered	Sometimes offered	Generally no offering						

Table 2: Levels of training intervention

Level	Option	Description
1	Mentoring programmes	Offers practical on-the-job learning, offers less theoretical learning outcomes, but quickest to setup and cheapest to run
2	CPD programmes	Increased theoretical learning outcomes, combine with mentoring for practical on-the-job learning, longer setup and increased cost from course fees
3	Post-graduate degrees	Best theoretical learning outcomes, combine with mentoring for practical on-the-job learning, longest setup time, high-cost in tuition fees

5.1 Level 1: Mentoring Programme

The most practical way of addressing this will be for candidates to choose their own mentors, ideally (but not necessarily) from within the employer organisation, with the person being:

- someone in a senior position of responsibility, similar to that which the candidate is aspiring to achieve,
- someone who is regularly accessible to the candidate and available for periodic discussions on progress,
- someone who will support the candidate's development and their participation in the TSLDP.

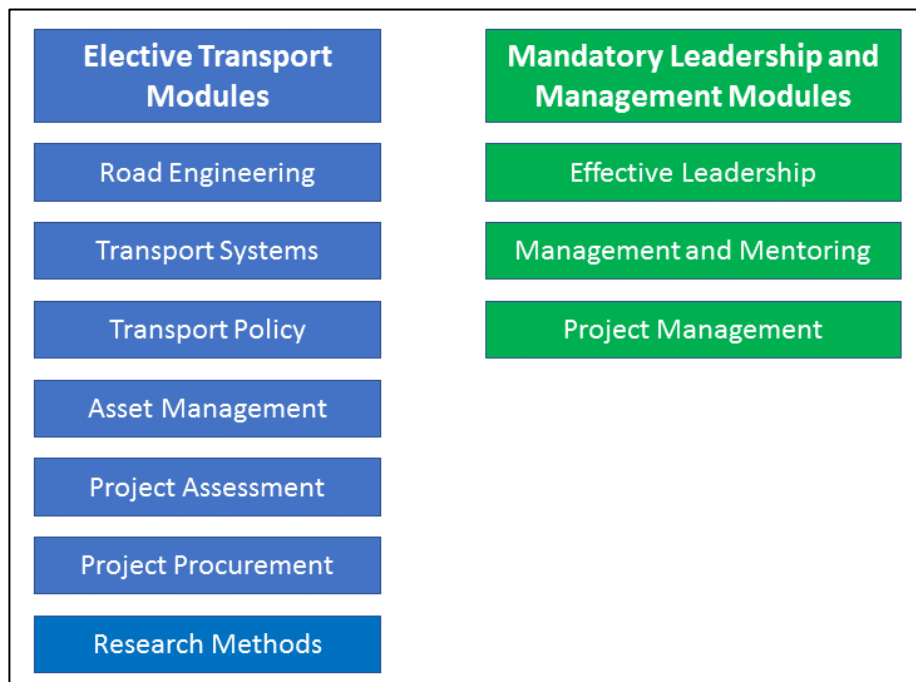
The position of the mentor would be formally recognised with specific amounts of time allocated to the mentor and mentee for coordination and record keeping by the CSSTL.

5.2 Level 2: Continued Professional Development (CPD) course

It is anticipated that the CSSTL will identify and record existing CPD courses and their credits that could be attended by candidates on the leadership development programme. The CSSTL will keep a record of courses attended in building their skills base for leadership positions. Typical skills areas into which relevant existing courses could be grouped are shown in Figure 5.

The business model for managing CPD courses will be further developed in the next phase as part of the establishment of the CSSTL.

Figure 5: CPD course content



5.3 Level 3: Post-graduate Degree

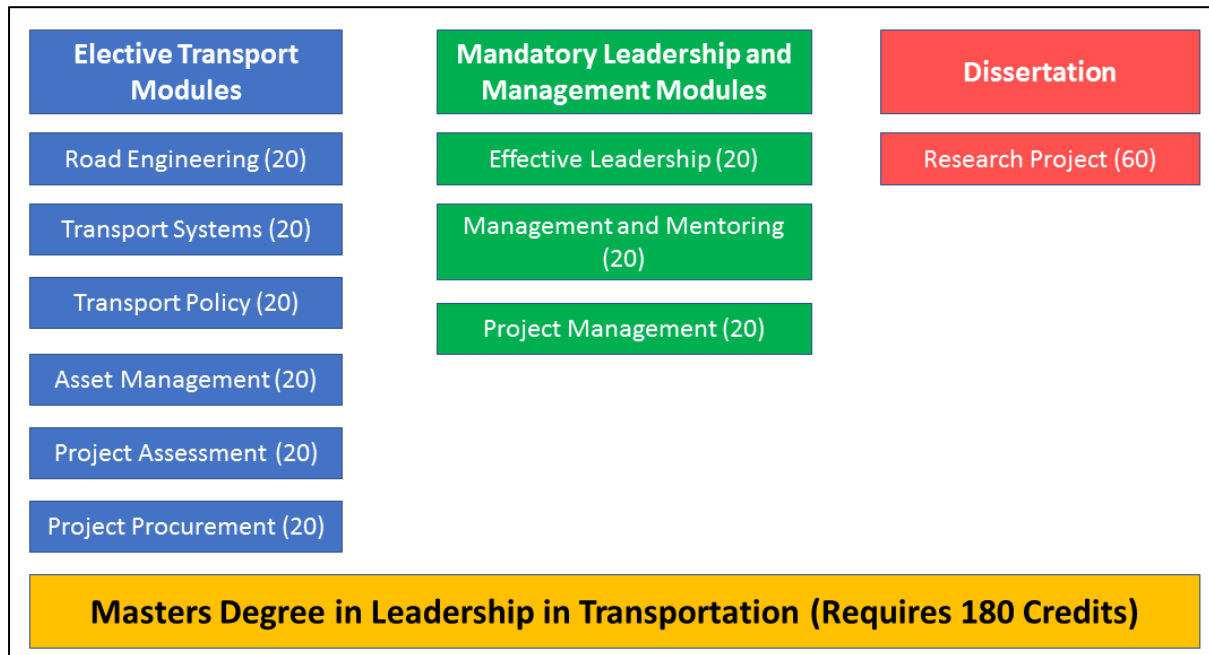
For recognition purposes, a post-graduate degree is the desirable long-term goal. This level of qualification achieves the necessary learning outcomes to develop the next transport sector leaders with some flexibility to accommodate candidate needs and to incorporate the strengths from a combination of Universities.

The degree would be modular over a minimum two-year period. As shown in Figure 6, four out of six *elective* transport modules plus three *mandatory* leadership and management modules and the Dissertation are proposed, giving an approximate 50:50 split between technical and managerial/leadership content. Candidates must achieve a minimum of 180 credits through a combination of mandatory and elective modules to be awarded a **post-graduate degree in Leadership in Transportation**.

The curriculum content was designed using Bloom's classification system³ distinguishing between different levels of human cognition (i.e. thinking, learning and understanding) in the progression of a teaching programme such as the TSLDP.

³ Bloom, B. S. (1956). Taxonomy of Educational Objectives: The Classification of Educational Goals. Handbook 1; Cognitive Domain.

Figure 6: Post-graduate degree structure (values in brackets are indicative credits which the institution delivering the degree will finalise)



5.4 Gender balance

It is recommended that gender balance is addressed in two ways. These are:

- incorporating it into candidate selection to establish balance within the programme; and
- incorporating components into the modules which teach candidates about the importance of diversity of gender in the workplace.

In this way, it ensures that female candidates will participate in the programme and also educates all candidates to the importance of diversity and gender balance in the workplace.

6 Centre for Sub-Saharan Transport Leadership (CSSTL)

Donor-funded programmes such as ReCAP have a defined lifespan (in this case 2014 to 2020). For an undertaking of this nature, this is not sustainable unless an organisation can be established to run the TSLDP on a sustainable basis which implies cost-recovery. However, aid programmes such as ReCAP can provide support to kick-start the process in the form of an establishment plan for a sustainable management delivery structure such as the CSSTL which is perceived to be a small management and coordination secretariat that would promote the courses of the TSLDP.

As part of the establishment plan, several options outlined in the final scoping report will need to be considered in detail. A consortium of international and SSA tertiary institutions to best sustain and manage the CSSTL in line with the business and establishment plans will be required. It is anticipated that the courses at CPD and post-graduate degree level will be developed and run through existing organisations and tertiary institutions. Part of the course fees would be used to support the CSSTL as a management, promotion and marketing arm of the TSLDP in SSA.

7 Conclusions

Based on the TSLDP scoping study, it is apparent that transport professionals in sub-Saharan Africa are likely to get a solid academic foundation in civil/transport engineering, design and operations, land use and transport planning. However, as originally identified by ReCAP and ASANRA, there is a need for a more broad-based transport professional, capable of planning, designing, managing and leading complex transport projects and organisation (public and private sector) in a complex environment of diminishing natural resources, lacking financial resources, enormous social challenges and often complicated governance and tertiary education structures.

The results obtained from an online survey conducted among professionals drawn from the civil engineering and transport sectors in sub-Saharan Africa also revealed that there is a need for a capacity building programme specifically designed for transport experts, especially in SSA, focused around leadership and management. The programme should also provide a solid grounding in disciplines where there are obvious knowledge deficiencies, such as transport policy and planning, transport systems analysis, transport operations planning, land use planning, road safety, that are critical to the effective management of the sector in Africa.

As part of the initial scoping study, key areas, from initial needs assessment and gap analysis, through to defining options for the programme, their structure and a delivery mechanism were undertaken. From this, conclusions have been drawn and a way forward developed as part of the establishment of a CSSTL. This delivery mechanism is the way forward that will be adopted by ReCAP in association with a DFID sister programme for High Volume Transport to the next phase of establishment. This would involve development of a CSSTL establishment/business plan and offers a sustainable means of developing the TSLDP into the future.

The CSSTL is seen as key to the long-term success of TSLDP. This option involves funding one or two staff in a centre which should be setup within an existing institution in sub-Saharan Africa. The centre would be responsible for further developing and implementing the training options identified below and be associated with international and African tertiary institutions.

Three tiers of training options have been proposed for further development and implementation by the CSSTL. The three options are defined as:

- **Intervention Level 1:** mentoring programme that candidates undertake in their place of work. It should be managed by the CSSTL and involve candidates 'signing-off' experience across a range of technical and non-technical thematic areas. It should also include some formal training, particularly on the leadership/managerial theme. Further work on the mentoring programme will be required as part of the CSSTL establishment plan and existing programmes identified in the scoping report will need to be further investigated in this regard.
- **Intervention Level 2:** a set of CPD courses based primarily on existing CPD courses and service providers which broadly follow the same content identified for the post-graduate degree will need to be identified and included in the business model for the CSSTL.

- **Intervention Level 3:** a bespoke post-graduate degree in Transportation Leadership, which is delivered jointly by two or more universities, following a modular format whereby candidates spend two weeks in university and six weeks working from home per module. It is anticipated that the universities would take responsibility for developing and running the degree course in association with the CSSTL and would be further considered as part of the business planning for the CSSTL.