

Chapter 6

Skills and Knowledge Transfer for Transitioning into the Green Economy



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Abstract This chapter aimed at identifying skills required for transitioning into green economy in the transport sector, preferred careers and institutions, challenges that could hinder transition to green economy in transport sector in addition to suggesting policy recommendations in case study carried out Limpopo Province. Case studies are required to provide insight into the nature of the current situation with respect to transition to green economy in the transport sector and providing knowledge and evidence on skills required transition to green transport. The study followed a qualitative and exploratory methodology involving administering questionnaire to purposively selected participants and stakeholder workshop aimed at discussing and debating on required knowledge and skills for transition to green economy in Limpopo Province, identifying challenges and policy recommendations. A total of twenty questionnaires were completed while 56 delegates from different departments and organisations participated in the workshop. A wide range of specific skills needs within technical, management skills and knowledge on techniques and skills on innovation and management for change categories, in the transport sector and their value chains were identified. Many of the skills required in the transport sector correspond to those required for the general green economy indicating that the transport sector will also benefit through implementation of the green economy in all sectors in the province. Most people chose environmental science as the most suitable career to follow in ensuring green economy. The respondents recognized the importance of mainstreaming the green economy at all levels of study. Challenges that could hinder transition to green economy include inadequate training and awareness programs, lack of existing skills directly related to the green economy at work places and inadequate funding for skills development in the green economy.

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Some of the policy recommendations include green growth capacity building for public administrators and policy makers, knowledge and skills transfer to be identified following the value chain based on the jobs required for each mode of green transport, development of methodology to mainstream green economy in all work places, mainstreaming green economy at all education levels, government to fund policy and legislation, and research and innovation related to green transport.

Keywords Green economy · Knowledge transfer · Skills · Transport sector

6.1 Introduction

Transition to a resource efficient and low carbon green economy is essential in reducing greenhouse gas emissions and mitigating climate change by decoupling future growth from the use of non-renewable fossil fuels and other natural resources (CSIR 2014). In South Africa transition into a green economy has also been identified as a key policy area due to its potential to stimulate economic growth and create sustainable jobs. This will aid in responding to critical development challenges faced by South Africa which include high levels of unemployment, poverty and inequality, energy security and climate change (PAGE 2017). However, shortage of skills shortage in green industries, lack of coordination in training and development, as well as the lack of green skills programmes are challenges that needs to be addressed urgently (ILO 2017), to promote transition to a green economy. In addition, National Skills Development Strategy III (DHET 2011) identified the need to develop skills in support of the green economy as a national priority. Having an increased green skills pool will enable South Africa to proactively implement and up-scale green economy initiatives (PAGE 2017).

Transition to green transport will include creation of additional jobs in new or expanding areas, adaptation of jobs to make them greener, substitution of jobs and elimination of jobs (WHO 2011). With these expectations, specific knowledge and skills are therefore required in order to transition into the green economy. One of the key success factors for transitioning to a low-carbon economy in South Africa include addressing shortages of skills in certain areas, re-skilling and development of specific skills capabilities (IDC 2012). Despite the accepted notion that transition to a low carbon economy can be a source of job growth, there is still lack of evidence from case studies to support this. In addition, understanding what skills are necessary to make the transition to a greener economy is critical since data on skills profiles in the green economy is scarce (Slingenberg et al. 2008).

DEA (2010) recommended development of case studies of greening existing skills by various Sector Education and Training Authorities (SETAs) to demonstrate how environmental skills planning is being mainstreamed into development within the context of green economy. Despite this, there is still shortage of studies on identified skills required for the transition to green economy. PAGE (2016) identified the learning needs of ‘champions’ in government, business, civil society and academia,

who drive the transition towards a green economy in diverse policy contexts at national, provincial or local levels in South Africa. The study did not cover skills required by the broader working population for participating in a green economy. A green economy roundtable discussion by Mpumalanga Provincial Government (2016) noted that there is lack of knowledge transfer and skills development related to green economy at the local community level in Mpumalanga, resulting to limited meaningful participation from local communities. This was attributed to low literacy levels, low economic base and low levels of entrepreneurship. This is likely to be the case in Limpopo Province which has these similar characteristics.

Though, the Limpopo government in its green economy plan (LEDET 2013) sees the green economy as an opportunity for economic growth through creating jobs and eradicating poverty, there is a need to identify the skills required for the green jobs. Musyoki (2012) has identified utilisation of biofuel and solar energy as options for transitioning into green economy in Limpopo Province but there is still a need to profile skills required for jobs that are in these categories and other related ones within the context of green economy. This case study is aimed at identifying skills required for transitioning into green economy in the transport sector in Limpopo Province. In addition, the study ranked preferred careers and institutions and challenges that could hinder transition to green economy in transport sector in addition to suggesting policy recommendations. The study contributed knowledge and evidence on skills required transition to green transport, relevant careers and expected challenges. Such information is essential improve on the transition and develop strategies to address challenges on transition to green transport.

6.2 Methodology

The study followed a qualitative and exploratory methodology. Questionnaires were completed by a key professional green economy researcher, government officials, and an education stakeholder, individuals in the private sector, university students and the general public. A total of twenty questionnaires were completed (Table 6.1). A related study by Brown (2015) also interviewed 20 participants including stakeholders from transport and Logistics Company, medium and small sized businesses, Energy Generation Company, green skills centre, amongst others, in Australia. Brown (2015) emphasized that though the latter study had limited scale and reliability, it provided insight into the nature of the current situation. It is expected that though the current study is also of limited scale, it will also provide insight into the nature of the current situation with respect to transition to green economy in the transport sector in Limpopo Province.

The participants were purposively selected. They were contacted by phone and questionnaires sent to them which they returned by email, others were administered at places of work in August 2016. Some individuals were not willing to participate in the questionnaire survey due to lack of general knowledge on green economy and this limited the number of participants in the study.

Table 6.1 List of participants

Participant type	No. of participants	Profession/organisation
Professional key informant (worked a long time in Limpopo)	1	UNISA (green economy researcher)
Private transport users	3	Accounting professions
Department of transport	2	1 Assistant Director and 1 logistics officer (controls transport booking)
Education (teacher)	1	High school teacher
LEDET	3	Deputy director, Assistant director and an in service trainee
Vhembe district municipality	1	IDP officer
Department of agriculture, forestry & fisheries	1	Limpopo province
University Students	6	Universal greening organization (executive) A green economy project supported by government and private stakeholders
Department of water and sanitation	1	Community development officer
COGHSTA	1	Chief town and regional planner (Polokwane)

A stakeholder consultation workshop was also conducted to discuss and debate on required knowledge and skills for transition to green economy in Limpopo Province, identifying challenges and policy recommendations. A total of 56 delegates from different departments and organisations including Department of Transport (DoT), University of South Africa (UNISA), Limpopo Department of Economic Development, Environment and Tourism (LEDET), South African National Biodiversity Institute (SANBI), Department of Environmental Affairs (DEA), Gateway Airports Authority Limited (GAAL), Capricorn Technical Vocational Education and Training (TVET), Letaba TVET, Limpopo DoT, Cooperative Governance, Human Settlements and Traditional Affairs (CoGHSTA), AM Consulting Engineers (AMCE), Polokwane Municipality, Limpopo Premier's office, Mapfura Makhura Incubator (a biodiesel organisation), Transport Education and Training Authority (TETA) and University of Venda (UNIVEN) research team.

6.3 Results and Discussions

6.3.1 Green Jobs and Skills Needs for the Green Economy in Transport Sector

The respondents identified skills needed for the green economy in general (Table 6.2) which were grouped according to where they best add to the value chains of main categories of green skills outlined in UK Government (2011). These include skills that support low carbon transition, resource efficiency, climate resilience and management of natural resources. The identified generic jobs and skills should be given priority in Limpopo Province to promote transition into the green economy.

Table 6.3 indicates the identified specific skills needs in the transport sector and their value chains with respect to alternative sources of fuel and different transport industries (passenger, freight and logistics, automotive industry (including manufacturing and retail)). The skills were identified through stakeholder participation workshop and interviews. Some of the skills cut across all the categories but were placed where they add most value. The results show that the respondents had a fair

Table 6.2 Generic jobs and skills for the green economy

Support low carbon transition	Support resource efficiency	Support climate resilience	Manage natural resources
<ul style="list-style-type: none"> • Business and financial accounting (carbon and natural environment accounting) • Fuel saving knowledge (appreciate use of buses and bicycles) • Energy generation skills • Skills to minimise carbon emissions • Interpretation of environmental legislation • Design and technologies, products processes increasing resource efficiency • Legislation • Entrepreneurial skills (business start-ups) 	<ul style="list-style-type: none"> • Water quality waste and pollution management • Environmental management • Skills to adopt technologies • Environmental science • Recycling • Land use planning • Operator level actions to maximise resource efficiency (reduce waste in production) • Marketing and interpersonal skills • Pollution 	<ul style="list-style-type: none"> • Environmental education • Technical skills • Engineering skills • Modelling and interpreting climate change projections • Risk management • Hydrological skills • Communication skills 	<ul style="list-style-type: none"> • Environmental science • Project management • Environmental impacts assessment (quantification of impacts) • Management of natural resources • Indigenous knowledge skills • Policy development

Table 6.3 Skills needs for green transport

Alternative fuel (bio fuel)	Passenger and alternative transport	Automotive industry	Freight and logistics
<ul style="list-style-type: none"> • Environmental sciences • Chemical engineering • Biofuel production • Power supply technology • Research skills • Education on use of alternative fuel • Air quality • Environmental change detection • Pollution control • Global warming prevention • Value chain analysis • Green procurement • Stakeholder engagements • Accounting for natural environment 	<ul style="list-style-type: none"> • Ability to identify green but economically viable transport alternatives • Understanding of the legislative benefits for moving into the green economy in transport (tax benefits) • Tourism management • Manufacturing of buses • Bicycle maintenance • Use of traditional transport modes (e.g. animals) • Car-pool • Awareness campaign organisation • Efficient driving • Public transport access • Construction of bus stops, train stations and road maintenance • Legal compliance • Operator level actions to maximise resource efficiency (reduce waste in production) • Risk management 	<ul style="list-style-type: none"> • Industrial engineering • Environmental engineering • Mechanical engineering • Chemical engineering • Mining engineering • Technological engineering • Information communication technology • Construction of electric cars • Solar car technology • Skills to minimise carbon emissions • Design and technologies, products processes increasing resource efficiency 	<ul style="list-style-type: none"> • Coordination • Marketing • Interpersonal skills • Communication skills • Communication • Organisational skills • Mobility management and advice • Freight logistics and management • Data management • Refrigerated storage skills • Freight transport management (logistics) • Risk mitigation and adaptation • GIS • Town and regional planning • Modelling and interpreting climate change projections

understanding of specific skills that would be required to transition into a green transport but that many of these skills are still lacking. Many of the skills required in the transport sector correspond to those required for the general green economy. Thus, implementation of the green economy in all sectors of the Limpopo economy will have positive impact in the transport sector.

Maclean et al. (2018) identified specific skills in green transport to include training in infrastructure labour, operation and maintenance, production of more resource-efficient vehicles and their maintenance, research and development in alternative fuel technology, transport infrastructure design and engineering; and public transport network construction, in Asian countries including India, Indonesia, Sri Lanka and Viet Nam. Most of the identified skills are comparable to those identified in this study indicating that skills required for green jobs in the transport sector are likely to be similar in most countries. OECD (2014) reported that in addition to technical skills (for example research or engineering skills), management skills and knowledge on techniques (to become more energy efficient, reduce waste generation and pollution), skills on innovation and management for change (communication skills) are also required to transition to green economy. These are some of the skills that were also identified by respondents in the Limpopo Province case study. Thus, identified skills fit within technical, management skills and knowledge on techniques and skills on innovation and management for change categories.

6.3.2 Ranking of Preferred Careers and Institutions for Transition to Green Economy in the Transport Sector

Careers listed in Table 6.4 were found to be relevant to green economy in transport sector in Limpopo Province by the respondents. Most people chose environmental science as the most suitable career to follow in ensuring green economy, followed by engineering. This career choice if pursued will support the Limpopo Province's green economy plan (LEDET 2013) which views green economy as local production and consumption, efficient use of energy and water and care of natural and created resources thereby providing socially and environmentally solutions to

Table 6.4 Preferred career for the green economy in transport sector

Career type	Rank
Environmental science	1
Engineering	2
Computer technology	6
Education (teachers and lecturers)	5
Electronics	10
Bio-technology and biological sciences	3
Management Sciences	4
Legislation	5
Nuclear and renewable energy	9
Drivers and technicians	8

Table 6.5 Preferred institutions

Institution	Rank
University	1
University of technology	3
FET colleges	2
SETA	4

economic exclusion and resource degradation, since all these are issues of concern within the field of environmental sciences.

Education training is important from primary, secondary and tertiary institutions and was considered to be the third choice of preference in ensuring transition to green economy. The need to study law in order to implement policies that will ensure that daily activities will align with the goal to go green was ranked number five. Careers in technology are important for ensuring development of green cars and machinery hence was ranked number six followed by bio-technology and biological sciences. The need to train drivers and technicians though important to green transport was ranked number eight. Any mode of transportation rely on energy input, however respondents find the study of nuclear and renewable energy not that important ranking it at second last number nine. Career in electronics was found least suitable in going green and ranked number ten. One would conclude that as much as all these anticipated career choices have some input with respect to various respondent's perspectives, the idea of going fully green in transport sector will not require just one field of study but the integration of various studies balanced together to achieve the ultimate goal of green economy not just in Limpopo but in South Africa as a whole.

Institutions preferred for accessing knowledge and training in green economy in transport skills are indicated on Table 6.5. Although respondents recognized the importance of all levels of education, universities and FETs were ranked highest while university of technology and SETAs were least. This implies that respondents recognized the importance of mainstreaming the green economy at all levels of study. Lethoko (2014) reported that transition to green economy will require a complete overhaul of the education system from pre-primary up to tertiary level, creating the need to look closely at the training that is being offered within secondary schools, vocational schools and tertiary institutions such as universities and universities of technology in South Africa. Nenngwekhulu (2017) also noted that since green growth requires higher education qualification for both high and low profile positions, it is important to ascertain the teaching gap so that graduates and unskilled unemployed people can be trained to acquire green jobs. This also confirms that mainstreaming the green economy at all levels of study will ensure inclusion people in both high and low profile positions in green transport.

The results indicated the need for a combination of both three to four years degree programmes as well as short courses (Table 6.6). The three to four year degree programmes were preferred by more respondents. This is likely to be due to that

Table 6.6 Training preference

Training preference	% of respondents
Three to four year degree programmes	57.7%
Short courses	42.3%

the majority of the respondents (Table 6.1) were university students and government officials who would aspire to acquire university qualifications.

6.3.3 Challenges that Could Hinder Transition to Green Economy in Transport Sector and Suggested Policy Recommendations

Identified challenges that could hinder transition to green economy include inadequate training and awareness programs, lack of existing skills directly related to the green economy at work places and inadequate funding for skills development in the green economy (Fig. 6.1). The study in Limpopo Province found that most organisations (70%) did not have training and awareness programmes on green transport (Fig. 6.1). Environmental issues are not considered seriously in most organisations while a few respondents indicated that driving skills and use of fuel with low sulphur content are encouraged at their organisations. Workshops are concentrated on safety and misuse of avoidance initiatives, though conducting such programs is limited by lack of funds.

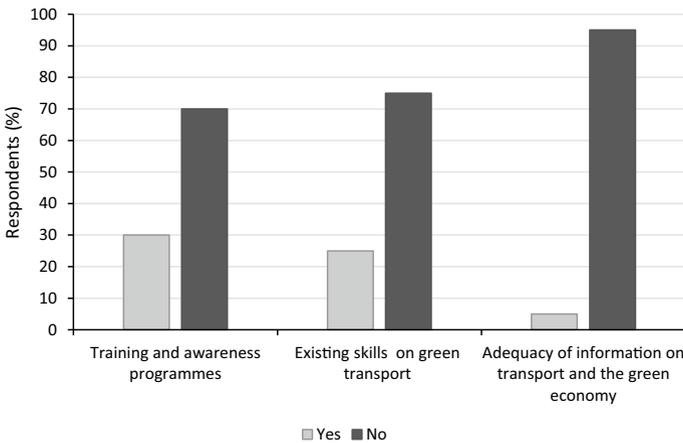


Fig. 6.1 Responses on training and awareness, existing skills on green transport and adequacy of information on transport and the green economy in Limpopo Province

Most of the respondents (75%) indicated that they did not have any skills directly related to green transport but the skills that they have could be improved through re-training and short courses. Nenngwekhulu (2017) also noted that the major limiting factor in the development of a green economy in Gauteng Province is the availability of the appropriate skills and policies to enable such developments. Thus, lack of skills is also expected to affect transition to green economy in transport sector within Limpopo Province. A few (25%) respondents indicated that they had skills in driving to minimise emissions and save petrol. An example is that ‘cars must be driven in the right gear and at the right speed’ as they noted. They felt that more environmental education was necessary at various businesses and establishments. A few respondents (especially students) felt that their training was relevant to the green economy especially courses taken in botany, chemistry, biological sciences, environmental sciences, ecology and resource management, pollution prevention. They, however, raised the need to mainstream the green economy in the curriculum. Hence, the need to develop tailor made training to the needs of various organisations was identified.

The study found that most organisations (95%) are struggling in raising funding to support programmes to transition into the green economy. A key stakeholder strongly felt that the transition should primarily be funded through existing budgetary allocations without further burdening the fiscus. It was felt that private and government entities should seek to redirect funding to promote green alternatives throughout their operations. The respondents’ view was that only limited tax incentives should be granted to entities to support investments in the green economy. Nhemachena et al. (2015) indicated that barriers constraining the implementation of green economy initiatives in the municipalities within in Limpopo Province include lack of information, shortage of workers with full knowledge on green economy, shortage of training programmes on green economy and costs of implementation. This challenges are similar to those identified in this study.

Table 6.7 indicates policy recommendations to be considered for implementation in Limpopo Province to promote transitioning into the green economy in transport sector. These were obtained from questionnaire findings and discussions with stakeholders. In comparison with findings from related studies, Nhemachena et al. (2015) recommended improve awareness of green economy activities across all levels in Limpopo Province. Amis et al. (2018) also noted that there is a great need for increased awareness, shift in practice, and skilling and re-skilling to follow through the commitments made in government strategies and policies in South Africa. ILO (2011) reported that a lot of public policies are inadequate in addressing the skills component of adaptation and mitigation policies. Thus, the identified policy recommendations can be used to fill this gap in Limpopo Province in South Africa.

6.4 Conclusions

Skills required for transitioning into green economy in the transport sector preferred careers and institutions, challenges that could hinder transition to green economy

Table 6.7 Short, medium and long term policy recommendations

Short and medium term	Long term
<ul style="list-style-type: none"> • Making use of existing institutions such as University of Venda, University of Limpopo, TVETs, FET Colleges • Green growth capacity building for public administrators and policy makers • Knowledge and skills transfer to be identified following the value chain based on the jobs required for each mode of green transport: <ul style="list-style-type: none"> – Bicycle repairs, manufacturing of batteries for green cars, trains with green lighting and security – Transforming jobs: a mechanic who used to repair petrol buses maybe trained to become an electrical mechanic – Drivers should be reskilled to become train drivers, security conductors, ticket sellers, for example, within the rail system • Polokwane City's strategies to uplift local skills as a means of investing in local knowledge should be replicated in other areas of Limpopo • Taxi recapitalization for example, provides regulatory framework for knowledge and skills transfer • Public education for car owners • University students to be supported and encouraged to promote green awareness • Enforce adherence to environmental ethics • Public transport usage be encouraged • Training shop stewards to disseminate information to their members • A budget is needed for awareness activities of union members • Methodology to be developed on mainstreaming green economy in all work places • Mandatory training should be provided to staff. The implementation of green initiatives should be added to performance agreements of employees with points awarded for skills obtained and initiatives supported 	<ul style="list-style-type: none"> • Mainstreaming green economy in university, college and school curriculum • Tax incentives should be provided to companies that invest in green economy initiatives and training • Skills developed at all levels on sustainable public transportation • Government to fund policy and legislation, and research and innovation related to green transport • National land transport act to include green economy considerations • Non-motorized transport usage and infrastructure development in all major towns • National transport policy in which training is a standing item • Providing transport service providers and their users with monetary incentives to encourage them to use transport alternatives which promote green economy • Implement policy on use of biogas • Enforce transport and climate change policies • Corporations in the transport industry should be the main funders of such initiatives. The training programs should form part of industries' Corporate Social Investment (CSI) initiatives • Businesses to make donation to support training which tax is deductible

in transport sector in addition to suggesting policy recommendations in Limpopo Province were identified in this study. A wide range of specific skills needs in the transport sector and their value chains with respect to alternative sources of fuel and different transport industries (passenger, freight and logistics, automotive industry (including manufacturing and retail)) were identified. The identified skills were within technical, management skills and knowledge on techniques and skills

on innovation and management for change categories, which are equally important for transition to green economy in the transport sector. The study found that many of the skills required in the transport sector correspond to those required for the general green economy. Thus, implementation of the green economy in all sectors of the Limpopo economy will have positive impact in the transport sector.

Most people chose environmental science as the most suitable career to follow in ensuring green economy, followed by engineering. Although respondents recognized the importance of all levels of education, universities and FETs were ranked highest while university of technology and SETAs were least. This implies that respondents recognized the importance of mainstreaming the green economy at all levels of study. Identified challenges that could hinder transition to green economy include inadequate training and awareness programs, lack of existing skills directly related to the green economy at work places and inadequate funding for skills development in the green economy. Some of the identified policy recommendations include green growth capacity building for public administrators and policy makers, knowledge and skills transfer should be identified following the value chain based on the jobs required for each mode of green transport, development of methodology on mainstreaming green economy in all work places, mainstreaming green economy in university, college and school curriculum, government to fund policy and legislation, and research and innovation related to green transport.

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