Development of a Monitoring and Evaluation Framework for sustainability assessment of Road Freight Transport Systems in South Africa

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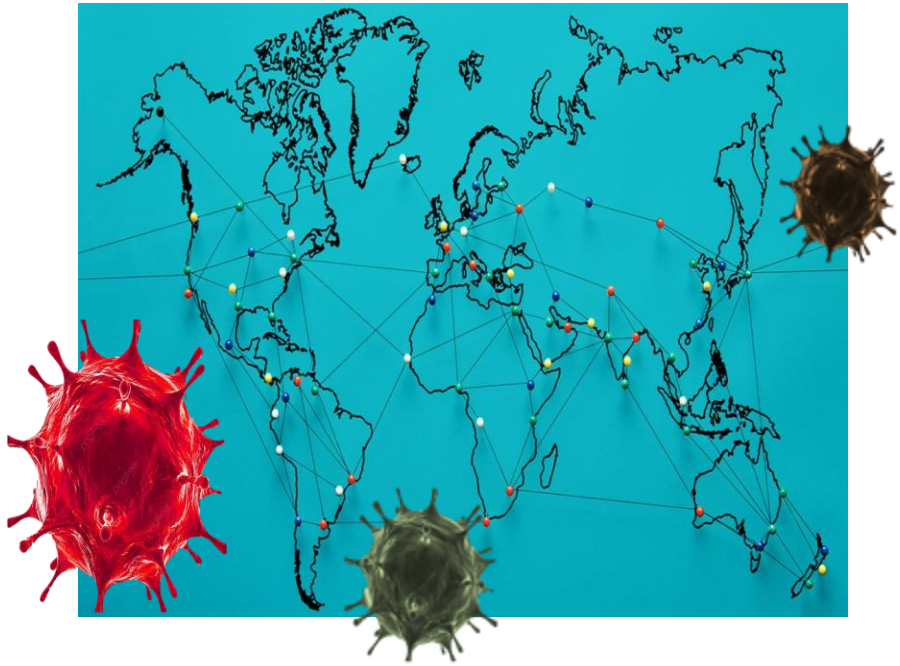
INTRODUCTION

- Sustainable transport has been a fundamental development objective on numerous global forums:
  - UN Global Sustainable Transport Conference in (2016)
  - UN Trade and Development (2015)
  - RIO+20 conference (2012)
  - The Earth Summit (1992)

COVID-19



- The advance of megatrends such as ***globalisation, population growth, digitalisation and demographic changes*** affects transport and its demand (Engström, 2016; The World Economic Forum 2014).

ONLINE SHOPPING

INTRODUCTION

- Movement for trade purposes can be for a business or individuals (Kudoh, 2019; McGimpsey and Morgan, 2013; Tomlinson, 2011; Hillman, 1977).

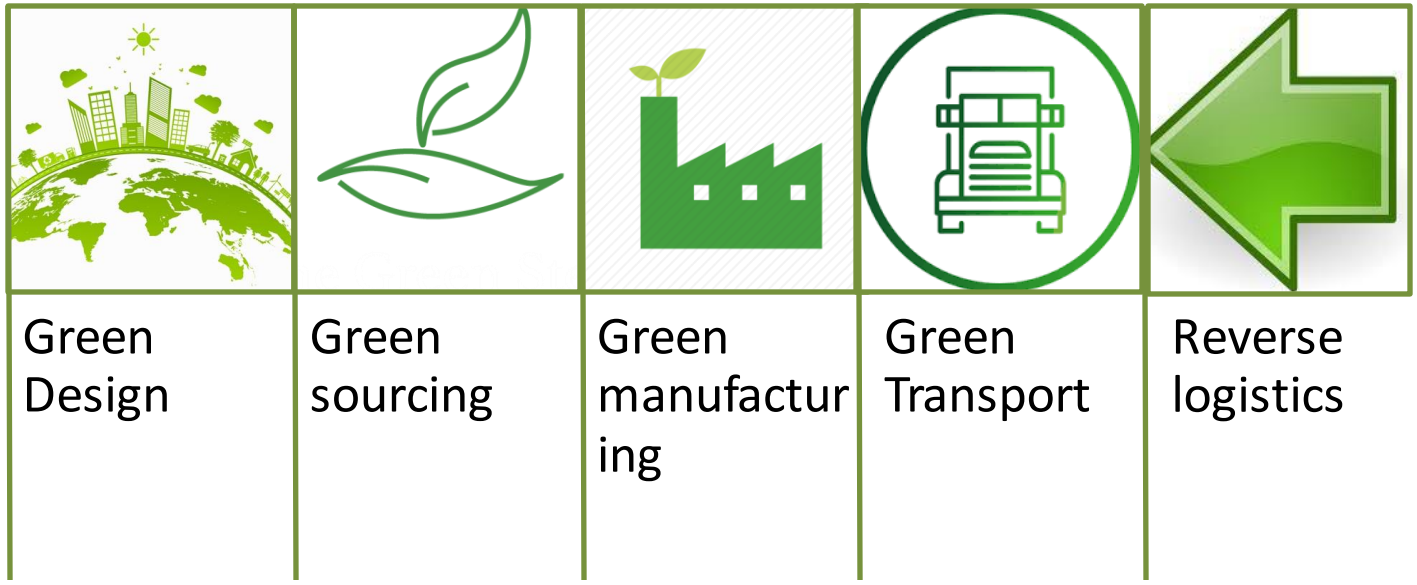
- Two studies conducted by Akeriforetag (2009) and McKinnon (2006) similarly portrayed that many levels of **society would result in chaos** if basic utilities such as the supply of food, delivery of medication to hospitals and the handling of rubbish were to come to a halt for a week.

- **Road transportation:** intertwined with the well-being of society both socially and economically.



BACKGROUND

- Many **industries have made efforts to address issues of sustainability** in their sectors. Particularly in the line of **supply chain management** and **transportation:**
  - Initiatives towards green design
  - Green purchasing and manufacturing
  - Route and load planning for empty legs
  - Reverse logistics

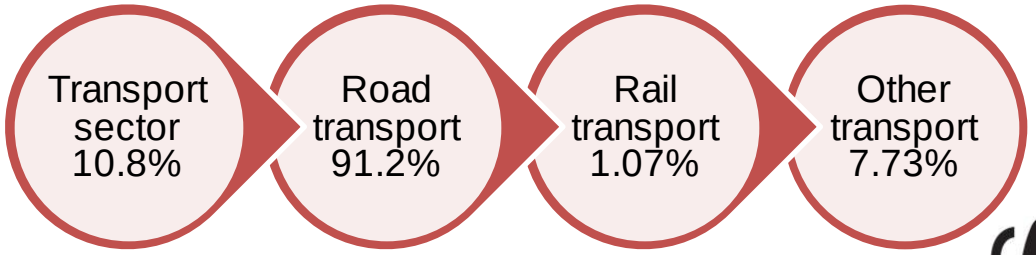


Source: Grant, Banaei-Kashani & Fitzgerald, 2019; Trautrims & Wong, 2017; Evangelista, Ferruzzi, & Carrasco, 2010

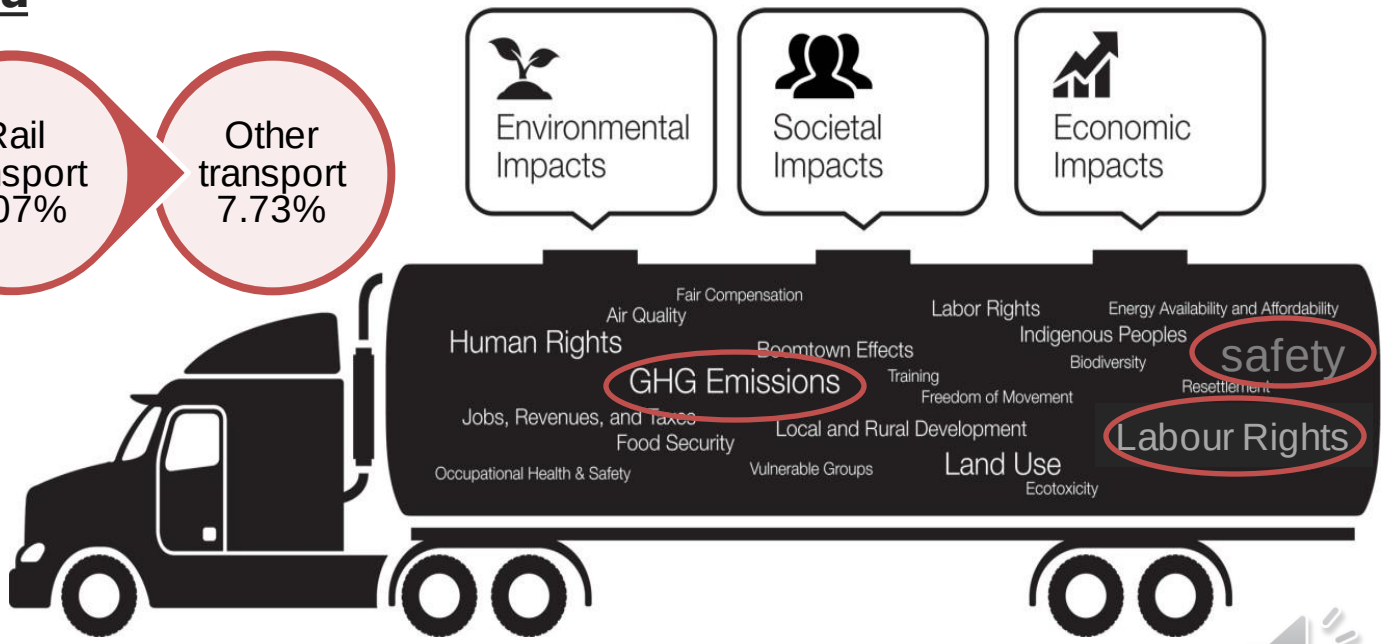
BACKGROUND

- However, **the negative impacts of road freight transportation as a result of all logistics and industrial activity** are still starkly present, regardless of the technological and operational efforts (Gudmundsson, Marsden & Josias, 2016; Baindur & Viegas, 2011; Norojono & Young, 2003).

In South Africa



Source: DoT, 2017



Source: BSR Report, 2012

BACKGROUND

Source: SA Arrive Alive Campaign, 2015

Accidents

Congestion

Source: The Guardian, 2015

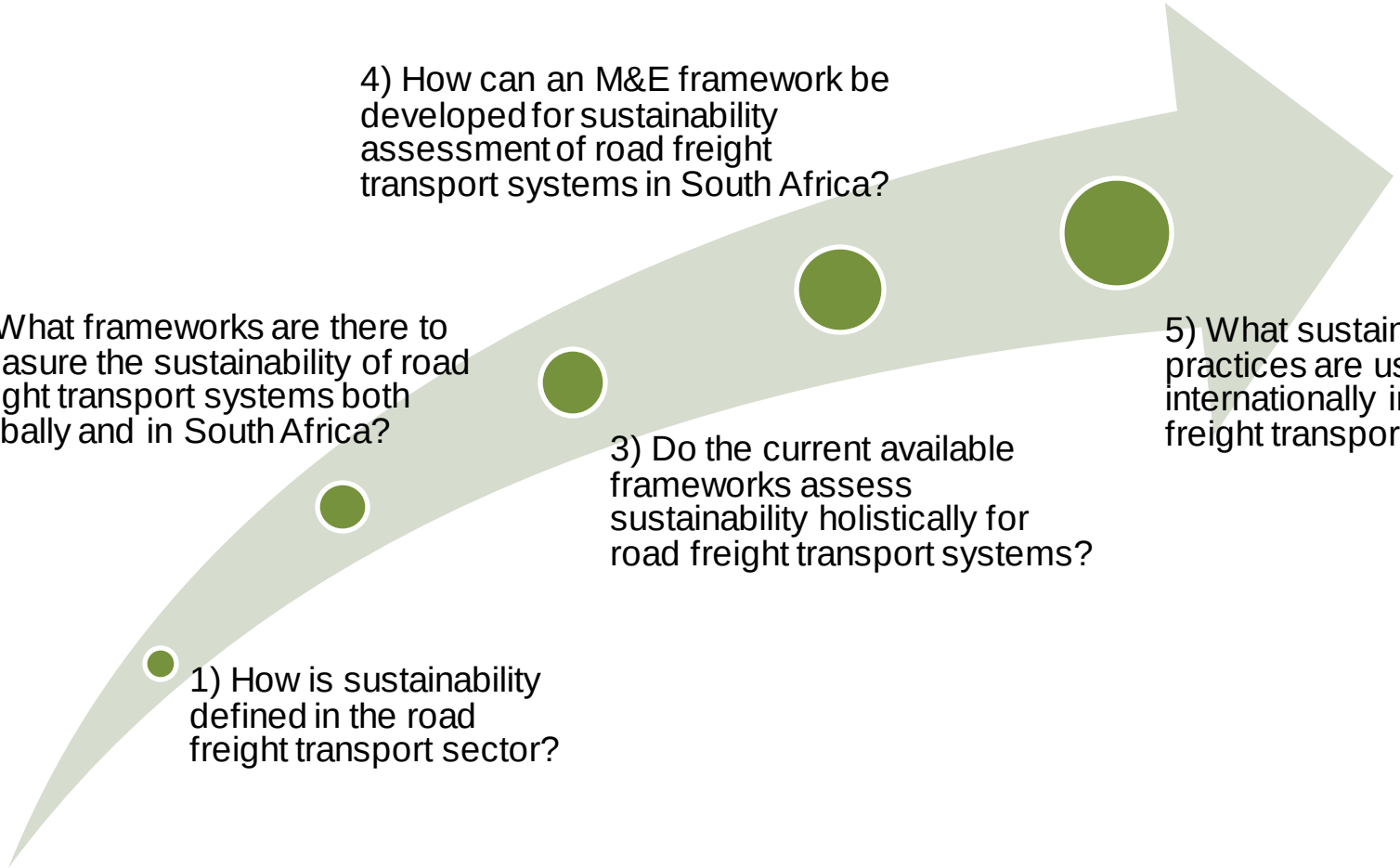
PROBLEM STATEMENT

- There are monitoring and evaluation (M&E) frameworks that investigate the sustainability of transport systems. However, there are **gaps in literature** around M&E frameworks that assess sustainability **holistically** (all three dimensions of sustainability) and there is **even less literature** around sustainability assessment frameworks developed for **South Africa** to be used by South African transporters.

RESEARCH AIM

- Therefore, this research sought to develop a monitoring and evaluation framework that guides holistic sustainability assessment of RFTS's of transporters operating in South Africa.

RESEARCH QUESTIONS



RESEARCH METHODOLOGY

- **Research Design:** Mixed methods (Qualitative and Quantitative)

- **Data Collection** :

  - Secondary sources such as ***online academic articles and theses, reviews and reports***

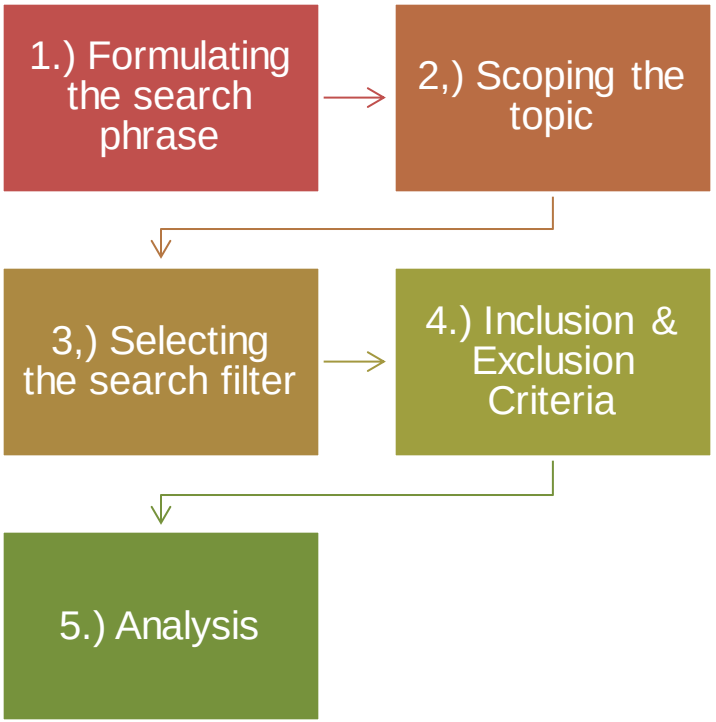
  - Systematic Literature Review (SLR)

- **Data Analysis** : Excel, ATLAS.ti version 8 as well as Scopus and Web of Science Bibliometrics

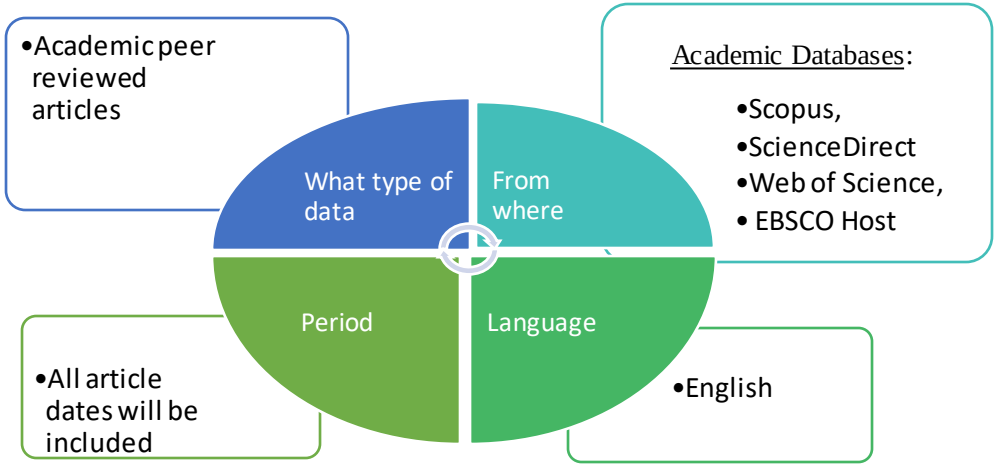
SYSTEMATIC LITERATURE REVIEW

- A SLR, uses systematic methods to collect **secondary data**, by **identifying, selecting** and critically **appraising** research studies. It includes **synthesizing** the findings (Dewey & Drahota, 2016).

Protocol:

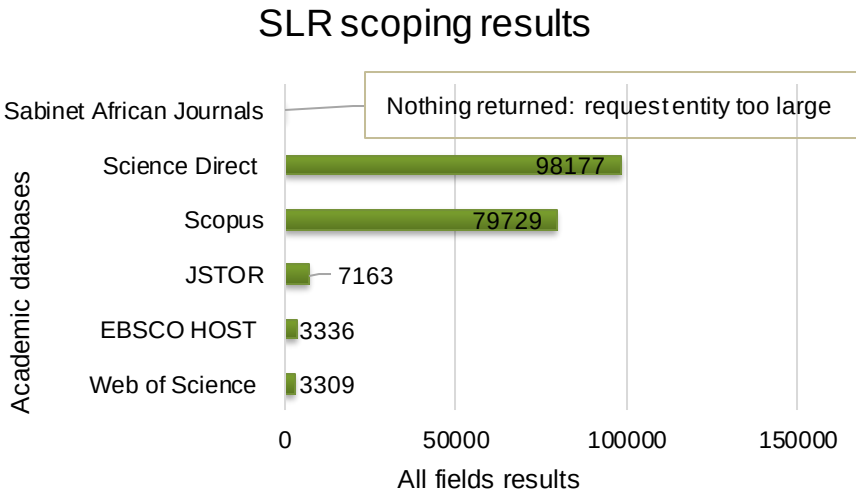


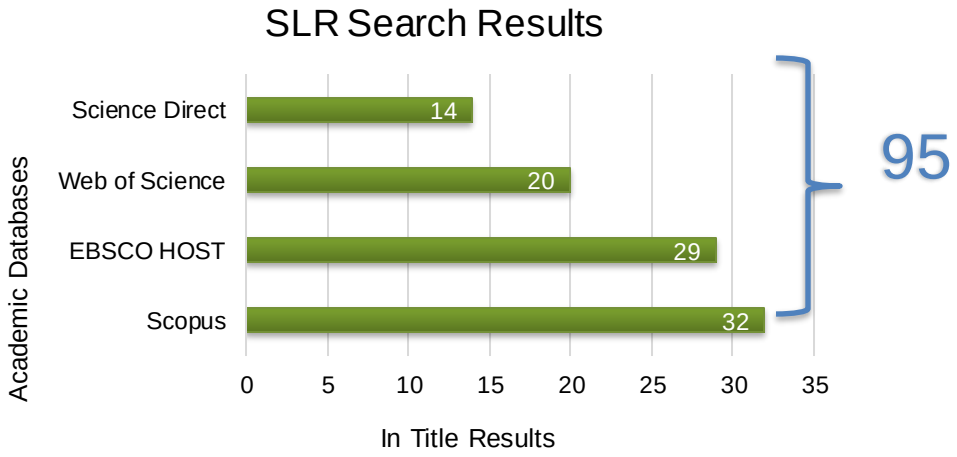
Inclusion Criteria:



RESULTS

Search phrase: *(Frameworks OR "Monitoring & Evaluation frameworks" OR "Monitoring & Evaluation") AND (sustainability OR sustainable) AND ("road freight transport systems" OR "Freight transport" OR transport)* ***NOT (Passenger)***.



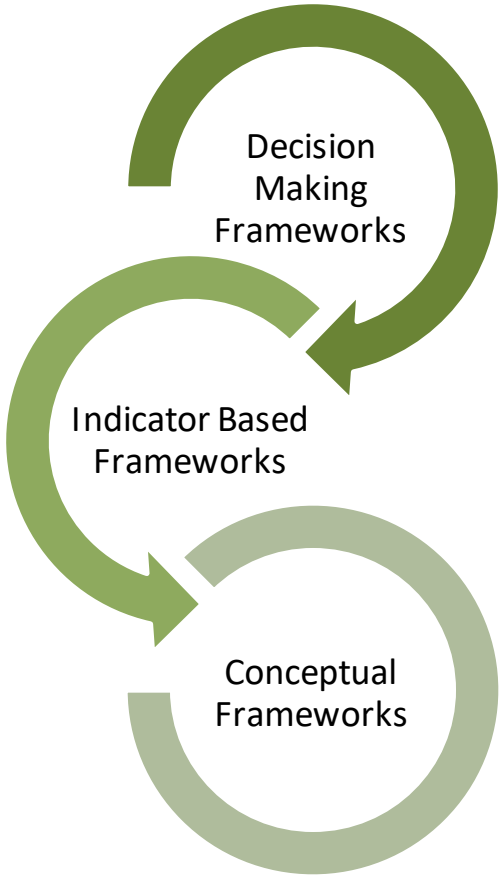


- Scoping results returned about 200 000 documents combined.
- In-title search results returned a combined total of 95 documents.
- Of which 31 of the 95 fit the inclusion criteria.

Fitting results used (31)	
Begun with a combined total	95
Duplicated documents	-55
Remainder	40
Not relevant	6
Remainder	34
No access	3
Total usable articles from SLR search	**31**

FINDINGS FROM RQ2 SLR

RQ2: *What frameworks are there to measure sustainability of road freight transport systems both globally and in South Africa*.



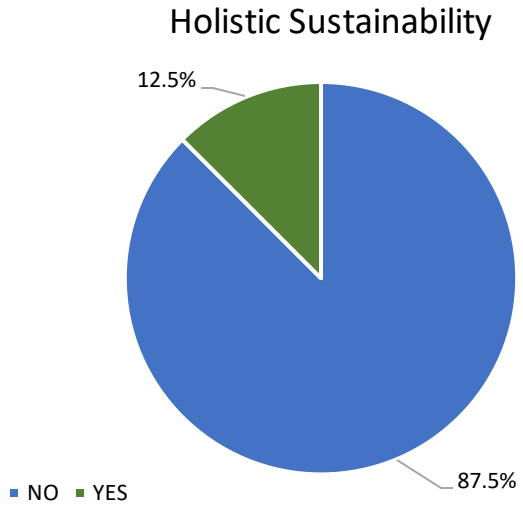
Search phrase: (Frameworks OR "Monitoring and Evaluation frameworks") AND (Sustainability OR sustainable) AND ("road freight transport systems" OR "road freight transport") AND ("South Africa" OR SA) AND NOT (Passenger).

- This search phrase only returned one result in-title filter. The result was an article by Havenga (2011) 'Framework for rail freight transport revival in South Africa'.
- **All fields** search returned 41 documents.
  - The documents were irrelevant, did not include or mention 'South Africa'.

FINDINGS FROM RQ3 SLR

RQ3: *Do the current available frameworks assess sustainability* ***holistically*** *for road freight transport systems?*

Many frameworks tend to have a dominant, if not sole focus, on ecological related matters of the TBL



Search phrase: (Frameworks OR "Monitoring and Evaluation frameworks") AND (Sustainability OR sustainable) AND ("road freight transport systems" OR "road freight transport") AND NOT (Passenger).

Questions used to review the documents from RQ3 SLR search

1. What are the focus areas of the study?
2. What aspects of the TBL are addressed?
3. Does it assess sustainability holistically?
4. What is the gap in research, related to RQ3?

Developing a Monitoring & Evaluation Framework

Study's operational definition:

- *A sustainable transport system is one that is **accessible spatially** allowing **mobility needs** to be met **safely and affordably** with **social cost considerations** (private cost and cost of externalities). The system **operates efficiently with infrastructure** that is an **asset to communities**, offering **modal choice** that is **competitive** and **boosts socio-economic development**; ensuring **future generations are not compromised** to cater for the needs of current societies. Sustainable transport **limits the emission** of air pollution, noise pollution and GHG's. **It reduces the use of land**, **consumption of non-renewable** and renewable resources as well as material resources needed to support the transport system. It **minimises waste**, reuses and recycles its components. It decreases its impact on environments, **protecting ecosystems** and the global climate. Sustainable transport systems **support the economic, social and environmental pillars** and are designed to **involve stakeholders**.*

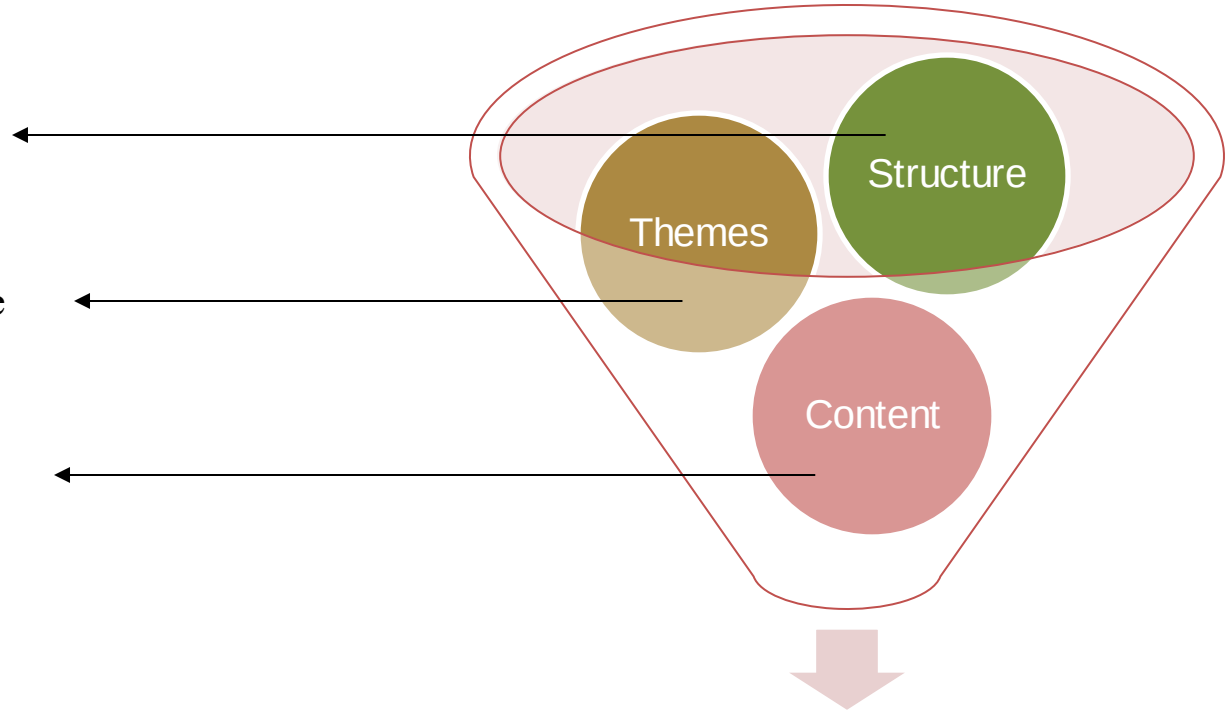
South Africa's vision for sustainable transport:

- *"Provide **safe, reliable, effective, efficient,** and **fully integrated transport operations** and **infrastructure,** which will best **meet the needs of freight and passenger customers** at **improving levels of service and cost** in a fashion which **supports government strategie**s for **economic** and **social development** whilst being **environmentally** and **economically sustainable**".*

Developing a Monitoring & Evaluation Framework

- The framework was developed from the perspective of the freight transporter to assess their system's sustainability.

- Szabo & Varhelyi's (2012)
- Study's operational definition and SA's vision for sustainable transport
- Literature reviewed in SLR



Developing a Monitoring & Evaluation Framework

	Themes	Strategic Objective/ Goal	Input	Output	Measures
Social	*Safety*	Provide and maintain safe systems of work for the driver and vehicle through effective safety management practices. Decrease the number of annual fatalities and injuries recorded as relating to ones RFTS.	• Reasonable driving hours. • Monitoring and effecting consequences to traffic offences. • RTMS certification. • Roadworthy vehicles. • Regular maintenance on vehicles. • Vehicle safety technology (e.g. remote speed sensing, collision damage mitigation braking system (CDMBS) and tracking devices). • LED night lights on vehicles. • Safe loading and off-loading practices.	• Non fatigued drivers. • Reduction in the number of road incidence. • Improved driver behaviour. • Road management system that promotes safety and efficiency. • A decrease in vehicle breakdowns. • Safer road environment.	• No. of accidents and injuries caused by ones RFTS annually. • No. of driver offences reported annually. • No. of road violations registered annually. • % of cost towards vehicle technology interventions. • No. of loading incidences.
	Stakeholders	Stakeholders are considered with regards to RFTS decisions that affect them directly. There is clarity of responsibilities among stakeholders.	• Consultation meetings with stakeholders (e.g. freight owner, agents, consumer, and government). • Collaborative tools where stakeholders can contribute their inputs.	• RFTS designed to incorporate stakeholders.	• No. of meetings held with stakeholders.
	Cost Considerations	Companies take responsibility for their full social cost by mitigating the passing on of RFT externalities cost to society.	• Carbon Tax. • Social and environmentally friendly RFTS initiatives. • Cooperate social responsibility (CSR).	• Companies and end users bearing the cost of air pollution, congestion and accidents caused due to operations.	• Amount of carbon tax paid. • No. of social or environmental initiatives. • Impact of CSR.

Developing a Monitoring & Evaluation Framework

	Themes	Strategic Objective/ Goal	Input	Output	Measures
Economic	*Socio-economic*	Transport being a catalyst of socio-economic growth and development that benefits societies.	• Human and physical capital. • Business growth/ expansion.	• Increased trade. • Access to goods. • Employment opportunities.	• Market share growth • Your RFTS's contribution to GDP. • No. of employees
	Cost Considerations	Generate profits from operations. Continuous productivity and growth.	• Financial, human and physical capital. • Strengthen customer relationships. • Offer competitive pricing.	• Income greater than expenses. • Increase in productivity • Costs do not exceed Return on Investment (ROI). • Expanded market share.	• Profit margin • Output per unit of input • ROI = Investment gain/ Investment base • Increase in customer portfolio.
	Operational Efficiency	To generate income or outputs or returns equivalent or greater, for the same, or lower operating costs. Decrease the time and money lost due to congestion. Improved delivery process.	• Eco driving • Loading facilities (loading and unloading equipment and space). • Efficient loading and unloading plan/schedule. • Route planning • Seek freight to transport for trips that usually return empty. Alternatively sign up to Apps where one can bid to transport freight.	• Decreased fuel consumption. • Increased loading rate. • A decrease in GHG emissions. • Reduced empty leg kms. • (Which in turn decrease costs and increase efficiency).	• Freight km travelled/ fuel expense. • Number of vehicles with efficiency technology. • Number of vehicles using cleaner energy. • No. people needed to off load or load container or truck. • Time it takes to load or off load a containers. • How many containers can be loaded or off loaded in a day. • Freight turnover rate (Tons x km). • Annual empty km travelled.
	Modal Choice & Competitiveness	Offer modal choice that is competitive and boosts social-economic development.	• Fair and competitive pricing for the movement of freight. • Maintenance of physical assets. • Reinvestment into the business.	• Affordable freight transportation prices. • Physical assets that are in good condition. • Capacity to meet demand.	• Average price index vs. one's price.

Developing a Monitoring & Evaluation Framework

	Themes	Strategic Objective/ Goal	Input	Output	Measures
Ecological	*Emissions*	Decrease the total transport sectors emissions by 5% by 2050.	• Pollution control technology • Cleaner energy/fuels • Company goals and targets strategically aimed at contributing to reducing emissions in the RFT sector.	• Cleaner emissions • A decrease in emissions	• No. of vehicles that use cleaner or renewable fuels.
	Resource consumption	Minimising waste and consumption of natural resources, promote their use in an ecological and sustainable manner.	• Recycle waste material. • Reuse and refurbish materials.	• Using natural resources at rates equal to or less than the rate of replenishment.	• Annual recycled tons. • Annual reused or refurbished tons. • Freight tonnes /Energy used. • Km travelled /Energy used.
	Preservation for the Future	Implement company policy that supports sustainability initiatives and protecting the environment for the benefit of present and future generations.	• Company policy and initiatives geared at sustainability	• Conservation of resources.	• Cost % of sustainability initiatives the company has embarked on.

Developing a Monitoring & Evaluation Framework

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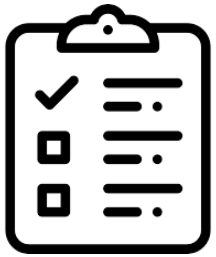
CONCLUSION

4) How can an M&E framework be developed for sustainability assessment of road freight transport systems in South Africa?

5) What sustainability best practices are used internationally in the road freight transport sector?



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THANK YOU ☺

ANY QUESTIONS ???

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