

Logistics and Supply Chain Systems: A Western Cape Perspective on Research and Education

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What we'll cover today

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The African Context

Why logistics and supply chain skills matter now

02

The MEng Programme

Structure, modules, and delivery mode

03

Western Cape Research

Cold chain innovation in fruit exports, digital logistics planning and electric road freight

04

Industry Partnership

How we collaborate with industry

05

Join Us

How to apply or partner with us

The African Logistics Challenge

Logistics costs in South Africa represent approximately 12% of GDP — nearly 50% higher than the USA and EU average of ~8%

Supply chain skills are a critical national enabler

SECTION 1

The MEng Structured (IE) Programme

Focus area in Logistics and Supply Chain Systems – offered by Stellenbosch University

Structured Masters in Industrial Engineering with focus area in Logistics and Supply Chain Systems

180

NQF Credits

8

Taught Modules

60

Research Credits

2

Study Modes

Delivery & Format

- Fulltime or part-time
- Online or in-person at Stellenbosch University
- Module-based with continuous assessment
- 2 weeks pre-reading per module
- 5 contact days (synchronous)
- 6 weeks post-block assignments

Who Should Apply

- NQF Level 8 qualification (or international equivalent)
- 4-year BEng degree (any discipline)
- 4-year BSc degree (any discipline)
- Any 4-year degree with analytical major (Maths, Computer Science, Applied Maths)

Core & Elective Modules

CORE MODULES (6 × 15 credits)

Data Sciences (Engineering)

Analytical foundations for supply chain intelligence

Adv. Topics in Engineering Management

Systems thinking and management principles

Project Management

Planning, executing and closing engineering projects

Sustainable Logistics Systems

Designing resilient and green logistics networks

Supply Chain Risk and Resilience

Risk frameworks and disruption mitigation

Introduction to Logistics Management

Dependent on prior qualifications/experience

ELECTIVE MODULES (choose 2–3)

Strategic Supply Chain Engineering

Competitive positioning through SC strategy

Logistics Resource Engineering

Optimising assets and resources in logistics

Supply Management (Inbound)

Procurement, sourcing and supplier relations

Supply Management (Outbound)

Distribution, fulfilment and last-mile delivery

+ Research Assignment

Industry-relevant topic | 60 credits

SECTION 2

Western Cape Research in Action

Cold chain management in fruit exports, Advanced Digital Logistics Planning and Electric Road Freight

The Cold Chain Challenge in Fruit Exports

Contradictory Protocols

PPECB documentation contains conflicting guidance on container pre-cooling — some advise against it, others mandate a minimum 3-hour pre-cool.

Temperature Integrity

Maintaining precise temperature during loading and export is critical for stone and pome fruit quality and commercial returns.

Container Rain Risk

Condensation ('container rain') is a known risk during pre-cooling — but its impact on stone and pome fruit is not yet empirically quantified.

Equipment Variability

Carrier vs. ThermoKing refrigeration systems may have different pre-cooling lead times and efficiency characteristics under Western Cape ambient conditions.

Spatial Distribution

Temperature differentials between core and peripheral fruit positions within pallets create uneven quality outcomes — poorly understood.

Evidence Gap

No validated, evidence-based standard operating procedure (SOP) exists for optimal pre-cooling protocols in stone and pome fruit supply chains.

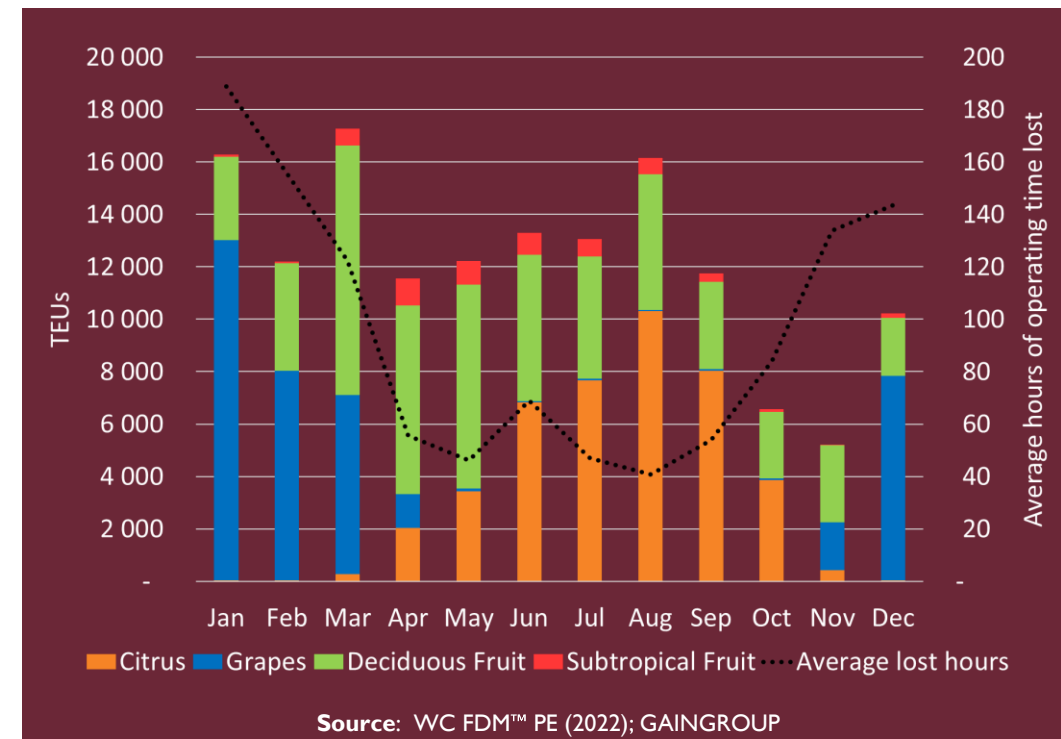
The Role of Digital Twins and Data Exchange Ecosystems in Enabling Advanced Digital Logistics Planning: A Case Study of the Port of Cape Town

The Problem

There is limited knowledge of the data pipeline designs needed to connect multiple stakeholders into a coherent, real-time representation of operations, and the standards and frameworks necessary for integration. This gap restricts the DLP's ability to evolve toward international best practice and limits the economic and logistics benefits that could accrue to the Western Cape's export industries, particularly as perishable exports continue to suffer billions in losses from delays that predictive tools could help mitigate.

Three Research Objectives

1. Analyse the functional relationship between a digital twin and a digital logistics planning platform and identify how the twin extends platform capabilities.
2. Identify global best-practice models of data pipeline and API design that support real-time multi-stakeholder information exchange.
3. Evaluate how a digital twin can enhance scenario modelling, congestion management and inspection planning in a port environment.



Data provided by industry partners | Operational hours lost vs Citrus exports volumes: 2022

Collaborative Planning for Electric Road Freight: A Multi-layered Framework for Shared Opportunity Charging and Resource Management for SME Fleets

The Problem

No standardised layered framework for multi-stakeholder coordination, leading to a fragmented approach that is geographically misaligned with regional freight movement and not achieving economies of scale necessary to overcome high implementation costs, especially when neglecting shared opportunities.

Three Research Pillars

Analytical Structure

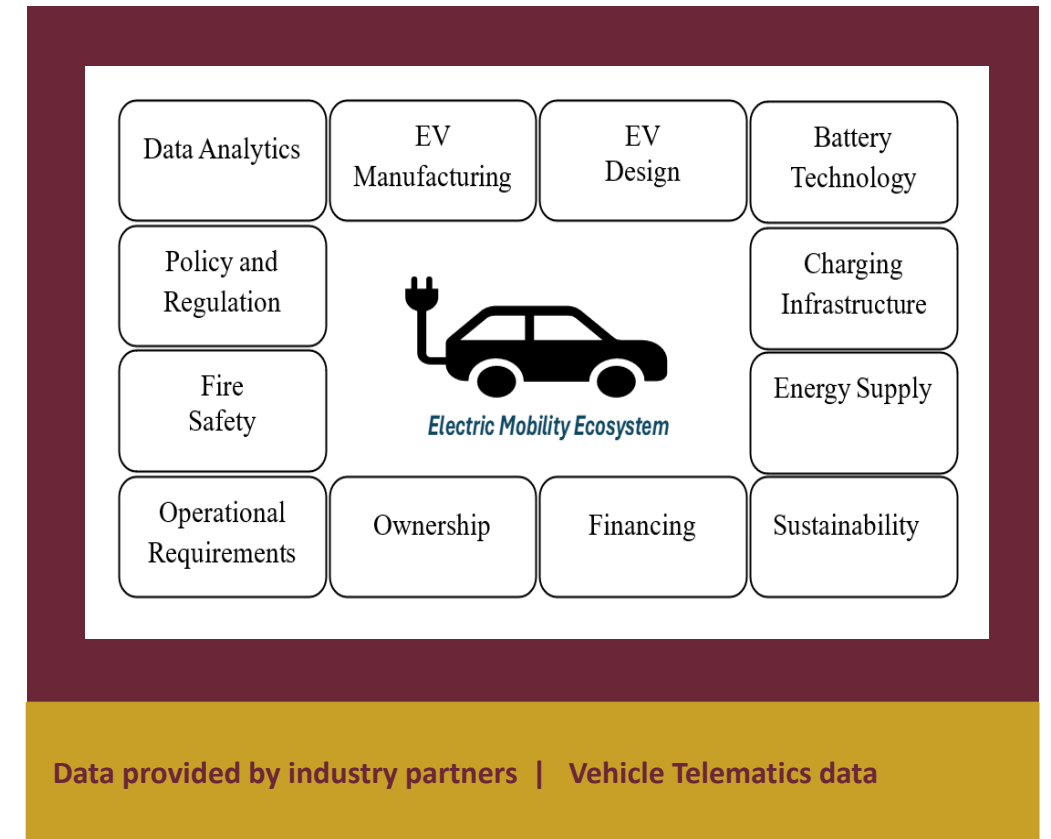
Multidimensional Telematics Data Ontology: Custom ontology development and attribute engineering to extract functional fleet behaviour and patterns

Spatial-Energy Synthesis

Analytical Engine: Methodological approach for semantic staypoint detection and vehicle energy consumption modelling.

Framework, Governance & Siting Tools

Integrated Siting and Resource-Sharing Model: Developing a framework-based micro-siting tool and resource-sharing governance protocols validated via fleet cluster case studies



SECTION 3

Industry Partnership

How Stellenbosch University and industry create impact together

What Industry Gets — What Industry Provides

WHAT INDUSTRY PROVIDES

- Access to operational data (temperature logs, quality data)
- Equipment and logistics resources for controlled trials
- Real-world problem statements with commercial relevance
- Agreement to share findings for evidence-based standards
- Graduate employment pipeline from trained MEng students

WHAT INDUSTRY RECEIVES

- Validated, evidence-based operational protocols (SOPs)
- Independent academic analysis of complex supply chain problems
- Access to advanced IE methods: ML, factorial design, statistics
- Peer-reviewed research that supports industry-wide standards
- Skilled graduates trained on industry-relevant problems

Current Research Partners:

Agreements in place.

Africa's leading research university in logistics & supply chain systems



Academic Excellence

Ranked among the top African universities; accredited by ECSA and internationally recognised programme structure.



Industry Embedded

Research is grounded in real industry problems.



Data-Driven Approach

Advanced data science, ML, and statistical methods embedded across the curriculum and research programme.



Sustainability Focus

Sustainable Logistics Systems module ensures graduates can design resilient, future-ready supply chains.



Flexible Access

Fulltime or part-time. Online or in-person. Designed for working professionals in the Western Cape and beyond.



Proven Partnerships

Established industry agreements with leading logistics operators; structured NDA and data-sharing frameworks.

Two ways to engage:

Enrol in the Meng Structured (IE)

- 180-credit Structured Masters programme
- Fulltime or part-time — online or in person
- Applications for 2027 now open
- Contact Dr Frei or Prof Goedhals-Gerber

Partner on Research

- Bring your operational supply chain problem
- Co-develop evidence-based findings
- Access advanced IE methods at no cost
- Receive independently validated research findings

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Thank you
Enkosi
Dankie