



# LEVERAGING ON TECHNOLOGY IN HAULAGE OPERATIONS

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A black and white photograph of a person in a dark suit, white shirt, and dark tie. The person is holding a whiteboard with their right hand. The word "INTRODUCTION" is written in large, bold, black, hand-drawn capital letters on the whiteboard. A horizontal line is drawn across the bottom of the word. The background is a plain, light-colored wall.

# INTRODUCTION



# INTRODUCTION

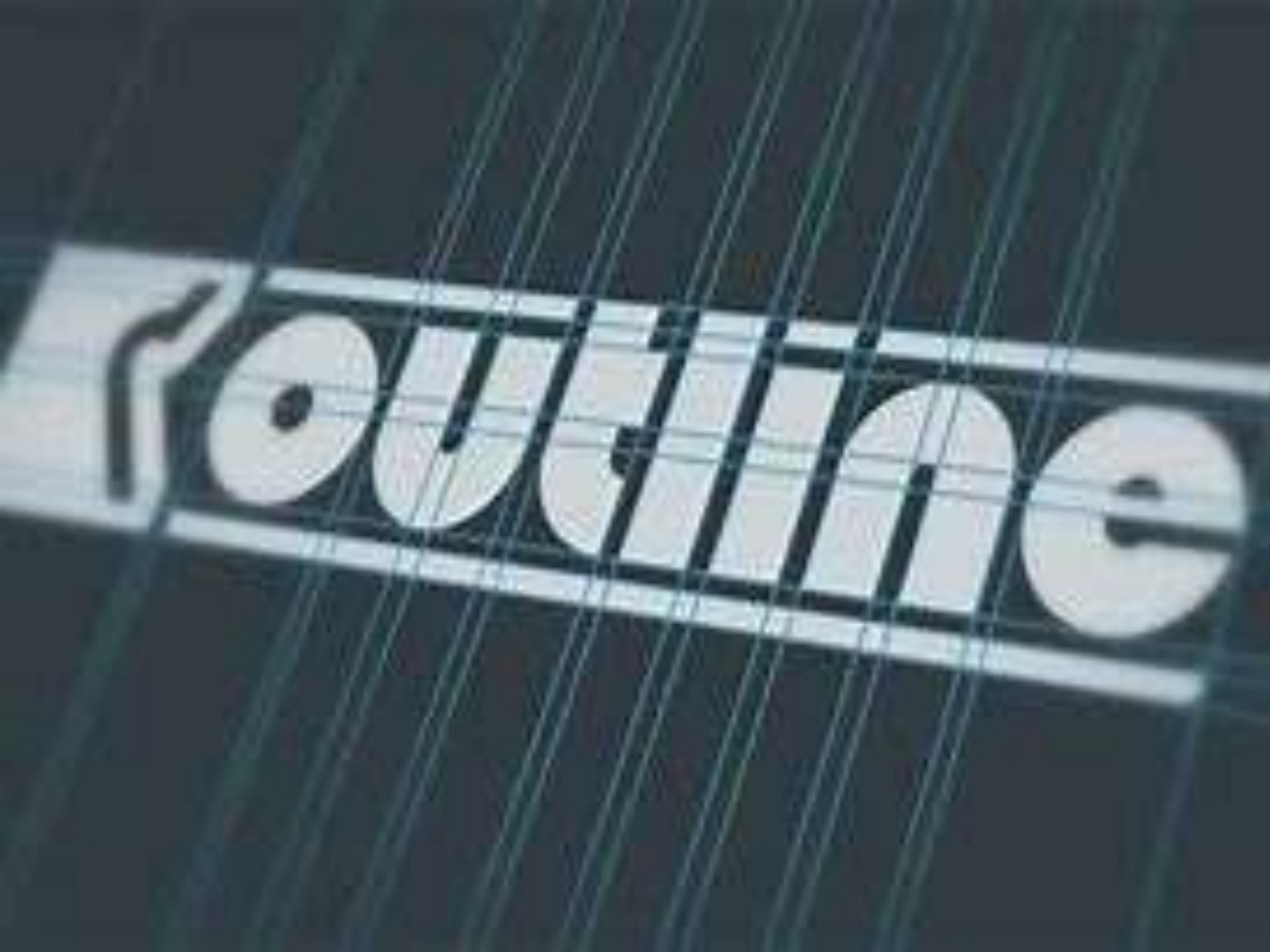
The haulage industry is a major economic thrust towards promoting efficient and effective service delivery in the economy of nations.

Its ever increasing importance to international trade, import and export of business and investment cannot be underestimated. It equally touches on individual needs and well-being, which is deeply connected to an overwhelming socio-economic exchange within the economy.

Logistics (haulage) is a big game both locally and internationally, because every thing we use daily has been shipped and delivered across various destinations before it is sold and put to use. Albertyn (2019)



- The haulage industry is not well developed in most developing countries especially African region as haulage operations is beset with a lot of challenges including low technological engagement. This is quite evident in Nigeria as non or low deployment of Science, Technology and Innovation (STI) has resulted in sub-optimal performances
- Therefore, this paper seeks to highlights the essence and identify certain technologies that could enhance the performance of Haulage Operations in developing economies like Nigeria.





# OUTLINE

Introduction

Conceptual Clarification

Essence of Technology in Haulage

Technologies in Haulage Industry

Situation in Nigeria

Challenges

Way forward

Conclusion





**CONCEPTUAL**

**CLARIFICATION**



# CONCEPTUAL CLARIFICATION

**HAULAGE** can be described as the commercial transportation of bulk goods from certain locations to other areas where they mostly attract higher values.

- It is basically ‘Horizontal Transportation’ in contrast with ‘Vertical Transport’ of the same such materials with cranes, known as hoisting (Blaszak, 2006)
- This includes everything humans might wish to move in bulk - from vegetables and other foodstuffs.
- All transportation modes participate in Haulage Operations





**HAULAGE OPERATION** is basically the business of transporting goods between suppliers and large consumer outlets, factories, warehouses, or depots.

Rushon and Croucher, (2017) identify the Scope of Haulage Operation to include;

- developing a viable and efficient business plan for storage, warehousing, inventory, packaging of goods, efficient communication, financing drivers recruitment and training, having strong customer base through demand forecasting and generally optimizing the operating cost.
- choosing the type of vehicle fleet to use, their registration, licensing, maintenance plan and minimization of vehicle downtimes due to maintenance and repair, loading style, legal and regulatory framework in areas of operation.
- establishing the type of goods and freights you will be carrying.
- carrying out a detailed contingency plan on the safety and security of the vehicle fleets.



**TECHNOLOGY** is the result or application of accumulated knowledge and application of skills, methods, and processes used in industrial production and scientific research (Liddell, et al, 1980)

It is regarded as the application of knowledge to the practical aims of human life or to changing and manipulating the human environment. Technology includes the use of materials, tools, techniques, and sources of power to make life easier or more pleasant and work more productive. While science is concerned with how and why things happen, technology focuses on making things happen (Merriam –Webster Dictionary 2022).



Title: LEVERAGING ON TECHNOLOGY IN HAULAGE OPERATIONS






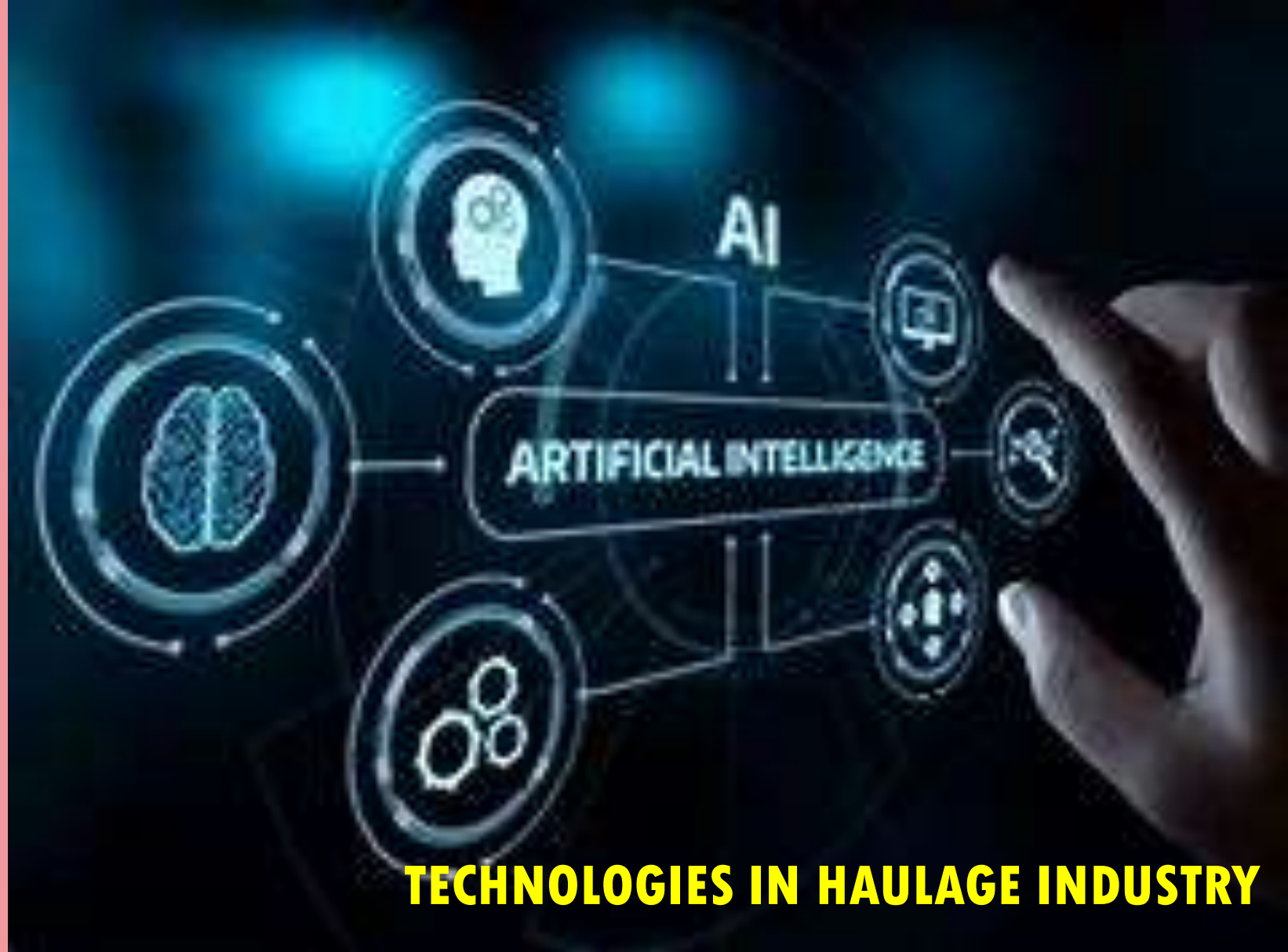
# ESSENCE OF TECHNOLOGY IN HAULAGE

Technology according to Liddell, et al, 1980

- Reduces the cost, time and mileage through efficient routing hence load optimization.
  - **Apps.com** now predict a delivery's estimated time of arrival as well as instruct drivers about the best route to take for efficient time management.
- Enables goods to be moved faster and safer on both rail and road transport.
- Enables tracking of merchandise and thus allows customers access to information about orders, estimated time of arrival and other delivery issues in real-time.
- Helps to evaluate carrier mix and mode selection

- 
- Enhances supply chain productivity
  - Transforms warehouse management with the introduction of Artificial Intelligence and Robotics.
  - Makes possible the introduction of self-driving fleet of trucks that can navigate between warehouse and the customers without the need for human involvement.
  - Internet of Things (IoT) facilities synchronises all data into easily accessible networks for optimal inventory control
  - Cargo scanning facility eliminates unnecessary delay in sea ports.





## TECHNOLOGIES IN HAULAGE INDUSTRY

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# TECHNOLOGIES IN HAULAGE INDUSTRY

Several aspects of haulage industry are enhanced with the deployments of Technology. these include;

- a. Storage, warehousing and material handling.
- b. Sea Port handling.
- c. Product Packaging and unitization.
- d. Haulage Operations.
- e. Recruitment, training and retention of drivers.
- f. Tracking, Monitoring and Enforcement.
- g. Road Safety.



## a. Storage, Warehousing and Material Handling



A warehouse equipped with Kiva robots can process as many as four times the orders handled by a non-automated warehouse.

-Source: MIT Technology Review





- Warehouse is needed for storage in order to cope with fluctuating demand-supply.
- Some of the technologies are:
  - (i) **High speed sortation system-** conveyor belts and the likes to sort products to specific storage zones as well as route



- (ii) **Warehouse Management System WMS-** it can consolidate all critical warehouse data into

- one easily accessible platform, give select members of supply chain full view of workings, report, real-time statistics, and accurate planning capabilities. Examples include
  - Stand alone System,
  - ERP Module,
  - Cloud-Based, and
  - Supply Chain Module.
- They all have unique benefits for different warehouse needs. Many factors are considered before deciding which WMS is going to work best for a warehouse.
- These includes; Sortly, NetSuite WMS, Fishbowl Inventory, 3PL Warehouse manager, Sofeon, InforSCM etc









- **(v) Automated Inventory Control Platforms-** It is often said that your inventory is your business

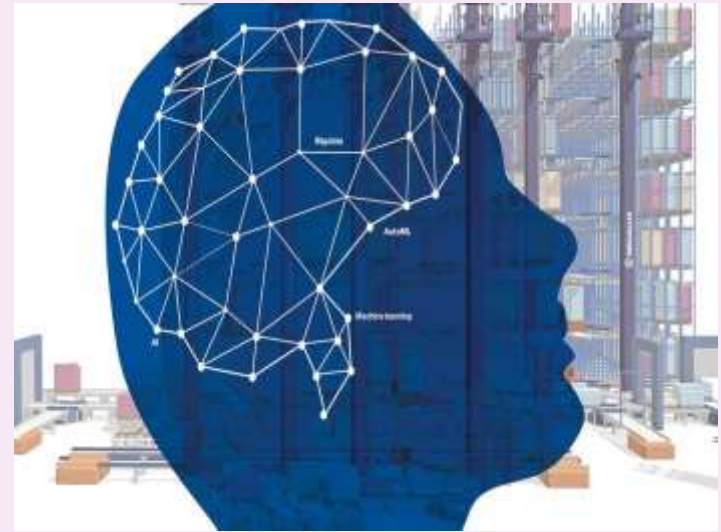
- If one does not pay attention to inventory, ordering needs, financing etc one will be wasting his money on products no one wants while missing the opportunities to offer products most desired
- Motorola (2018) reported that up to 41% of warehouses still depend on manual method of inventory logging, cycle counting and stock taking.
- This methods is prone to errors in data, transcription and consistency and can disrupt operations. An inventory control platform with requisite use of asset and inventory tags allows automation of stock counting.

- **(vi) Some of the Best Inventory Management Software and Apps** include;

- Stockpile by Canvas
- Veeqo
- Ordoro
- Delivrd
- Sortly
- Inventory now
- Cin7 inventory and POS
- Zoho inventory
- Inventory control with Barcode Scanner
- Fishbowl
- Partender: Bar inventory software
- Asset & inventory Tracker
- Stock control
- SOS inventory
- Boxstorm
- SalesBinder
- Goods order inventory
- Cashier live
- Odoo



- (vii) **IoT** (Internet of things) implementation – [blockchain](#), [5G](#), [machine learning](#), [big data](#), sensor and predictive analytics, **are some of the basic cornerstones of the [Industrial Internet of Things \(IIoT\)](#)** etc
- This can help to reduce risk , accidents and avoid mistakes through early detection with the following
- It synchronizes all the data into easily accessible network to optimize inventory control
  - Sensor in the warehouse can monitor temperature, moisture and other conditions
  - Data coming from the ship conveyances, vehicles and the product can be combined to reduce theft, counterfeiting, diversion and spoilage





- **(viii) Material handling**-This is the movement, protection, storage and control of materials and products throughout manufacturing, warehousing, distribution, consumption and disposal
  - Handheld scanners- for indexing, finding out price of goods, etc



- **(ix) Automated Storage and Retrieval System AGCs**- it identifies and collects data



- **(x) Mobile Computers**- for coordinating activities in the store



- **(xi) Warehouse management**



- **(11) Caster and wheels-**







## b. Sea Port handling





Maritime transport is the backbone of the global economy, accounting for over 90% of cross border trade.

Ports is however beset with;

- **Unnecessary paper works** leading to
  - extortion of truckers in attempt to avoid delays
  - Delays and Congestion-ships spent up to 10% at anchor translating to 3-4days out of the 15-30day trans-pacific voyage LaRocco Ann, (2022)
  - untold demurrage and increase freight rate and consequent
  - diversion of cargoes in Nigeria



- **Fuel Pollution** by vessels. IMO directs GHG reduction (decarbonisation) by 50% by 2050 thus requiring;

- energy efficient ship
- Electricity in port to relieve heavily loaded ships birthing from burning diesel (for sometimes a week in some Ports). Or build electric vessels.

- **Insecurity** and pilferage to mention a few.

There is need for the ship and the shore to be in sync and by extension the whole hinterland logistics (too-truck, trains, Ro-Ro services, unloading, freight forwarding) to get **Just-In-Time (JIT)** arrivals.





Some of the technologies to support the efficiency of an **electronic call-up** system otherwise known as '**Eto**' in its effort at halting malpractices on the scheme and enhancing the smooth evacuation of cargoes from Lagos ports are as follows;

- (i) **closed-circuit cameras** (CCTV) in strategic locations of the port. For example, from Lagos port complex, multiple cameras are overseeing Creek road, Warf Road and the gates.
- (ii) **Access control barriers**
- (iii) **Access control card readers**
- (iv) **Underground bollard system**-to deter all forms of malpractice by the transporters by preventing access to the port area without having the appropriate booking reference code



- (v) **Unique pairing of next-gen sensor and automated Navigation system**- As soon as it becomes clear that the port will not be ready to receive a vessel at the original Estimated Time of Arrival (ETA) the Navi-Port system info the ship to slow down its speed instead of coming to wait at port

- **(vi) Cargo scanning** refers to a non-intrusive Inspection (NII) of inspecting and identifying goods in transit to specified destinations.
  - It is frequently used to scan freight shipping containers and this means that scanners can be mounted on trucks to scan vehicles, containers and other objects, without opening them.
  - This it achieves by producing X-Ray images of the scanned objects.
  - Not only does cargo scanning quicken the cargo clearing process, it is also more efficient than physical inspection because of its ability to detect contraband and other illegal goods, which may escape physical detection.

- That way, a country protects its sovereignty from the influx of illegal arms and substandard goods.
- For decades prior to the Federal Government's Nigeria Customs Service (NCS) modernization programme in 2005, 100 percent physical examination was employed in cargo clearance.





- **(vii) Autonomous vessels** can run 24/7, with electricity, less crew and in all weather. Since inland crew cost amount to 1/3<sup>rd</sup> of operational cost, reducing crew members is important,  
(<https://www.riveramm.com>)  
Other technologies that facilitate port operations include;



- **(viii) Simulated Training-** It addresses the issues of risk of accidents, as well as damage to expensive equipment and offer added value i.e Crane Simulator and Straddle Carrier Simulator packages.
- **(ix) Internet of Things (IoT)** This has been discussed earlier. It is smart technology that connects physical objects.
- **(x) Expansion of 5G network** makes the following communication possible on the road;
  - **Vehicle to Vehicle (V2V),**
  - **Vehicle to Pedestrian (V2P), and**
  - **Vehicle to Infrastructure (V2I) systems,** which allow vehicles to access information about each other, and their surroundings.



The 5G network- This offers;

- improved flow of information,
- widespread adoption of automation and Artificial Intelligence (AI) in ports and terminals on a worldwide scale for supporting on-site engineers, to monitor and optimize construction planning at the port..
- greater capacity to connect thousands of devices in one area at the same time needed to revolutionize automated port operations, optimizing supply chain and port operations and improving efficiency.
- More responsive and reduced latency needed to boost efficiency in Ports

- **(xii) Drones-** This is an autonomous drones that perform self-flying aerial maneuvers without human input presently being used to
  - monitor traffic and optimize routes,
  - transmitting real-time data to control centres and to individual vehicles and vessels
  - But increasingly being used for cargo carriage.
- **(xiii) Augmented Reality (AR)** combines a real-world environment with enhanced, computer-generated information. It is being used as an aid to [navigation systems](#), and offers visual support to crew members for ship operations and watch-keeping.





## c. Product Packaging and Unitization



“Good, bad or indifferent, if you are not investing in new technology, you are going to be left behind.”

-Philip Green, Retail Executive





- Unitization is the act of consolidating multiple smaller units into a larger unit for improved warehouse efficiency, quicker packaging and arranging, and more efficient handling and transportation.
- Packaging is the act of enclosing or protecting the product using a container to aid its distribution, identification, storage, promotion, and usage.
- According to Kotler – Packaging constitutes all the activities of designing and producing the container for a product.

The following are the types of packaging;

- Paperboard (folding cartons) boxes (commonly used in cosmetics/medicals)
- Corrugated (cardboard) boxes (think shipping or moving boxes) printed plastic boxes (see through recyclable)
- Rigid gift (luxury) boxes
- Chipboard packaging boxes (think cereal boxes)
- Poly bags (re-sealable/printable plastic bags)
- Foil sealed bags (prevent damage from sunlight and better for maintaining at specific temperatures.



Some of the technologies used in packaging are shown below



(i) Multiple Sealing foods in can



(iii) Paperboard (folding cartons)



(ii) Dry bean in polythene bags



(iv) Covering foods in plastics plates





(v) Sealing foods in disposable plates



(vii) Bottling water products

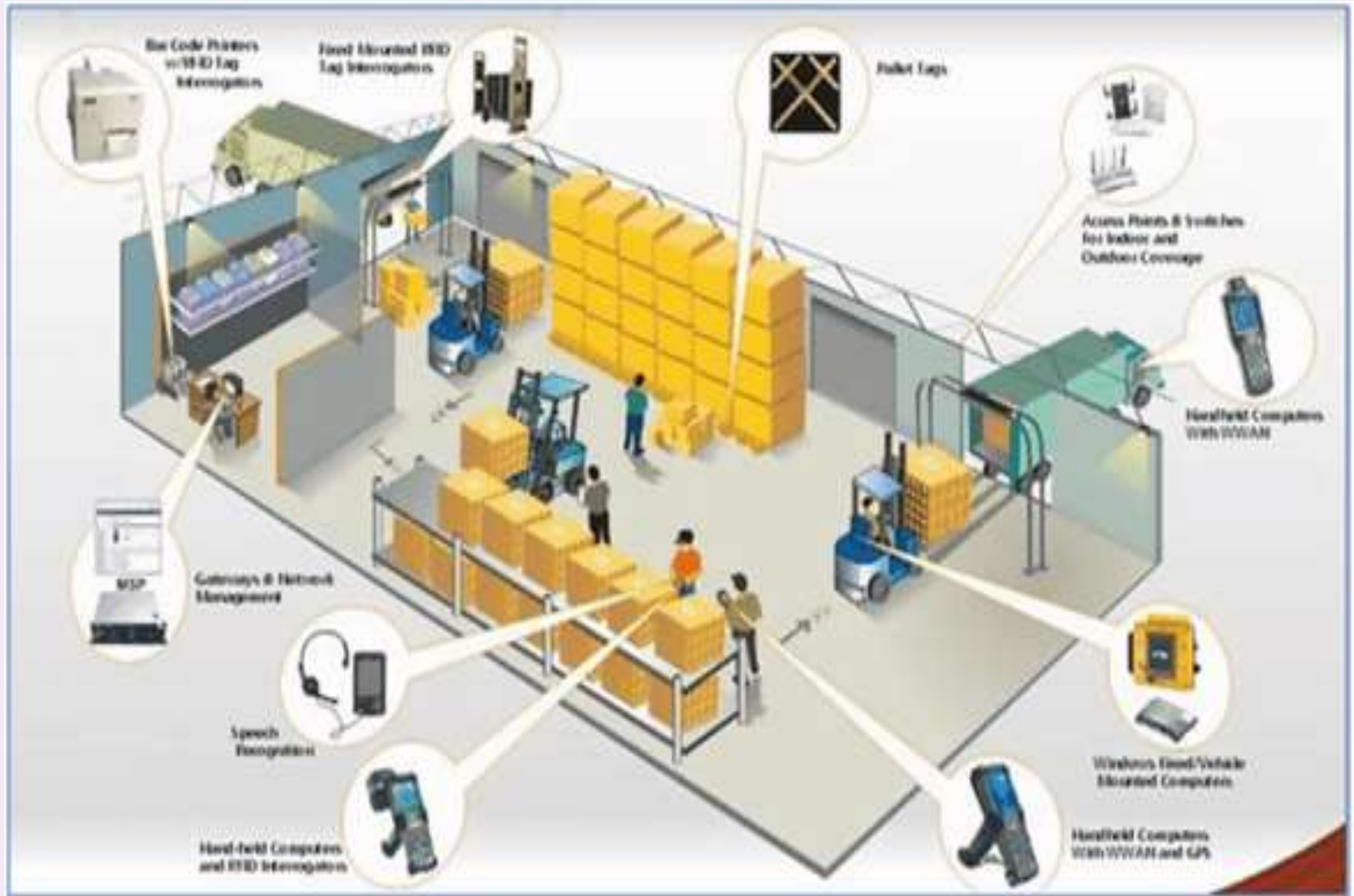


(vi) Conveyor belt transporting packaged foods



(viii) Packaging fruits

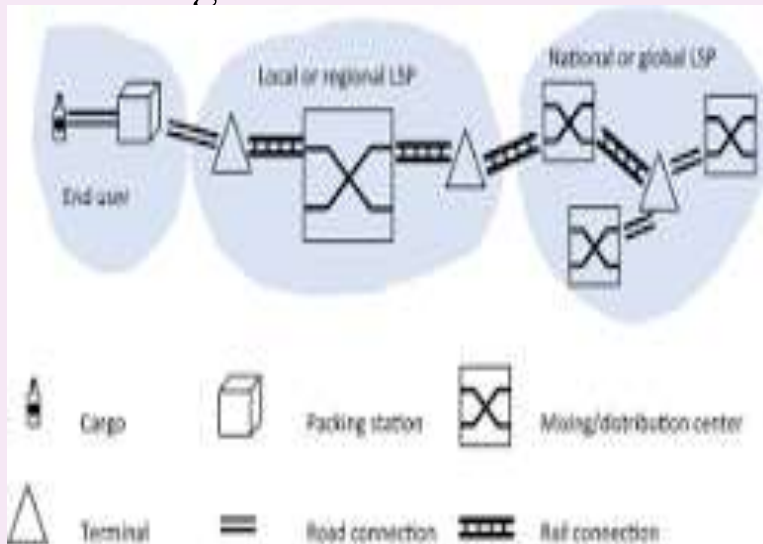
# d. Haulage operations





- Dennis Adonis (2022) identifies nine technology trends affecting the Haulage Operation. These are;

- **(i) Physical internet (PI)-**  
This is the transformation of the physical handling, movement, storage and supply of objects with the aim of improved efficiency and sustainability for global logistics



- **(ii) IT Standards-** adoption of consistent IT standards allows for supply chain consistency and transparency. IT standards also create ideal conditions for more efficient collaboration between all target audiences such as internal stakeholders and remote workforces.



- **(iii) Data Analytics-** very large data volumes allow much greater capacity for forecasting and understanding customer requirements. This leads to improved inventory visibility and management and greater operational efficiency.





- (iv) **Autonomous vehicles-** reducing the need for human input into driving, delivery and warehousing offers the potential for significant cost reduction and asset optimisation
- (v) **UAVs/Drones-** It offers different channels for workforce reduction and improved efficiencies in areas such as inventory management, surveillance and deliveries.





- **(vi) Robotics and Automation-** AI and automation, has helped to deliver lower cost by reducing the need for a physical presence of employee in the workforce.
- Technicians will simply monitor the operational status from their homes, using laptops or tablets, make adjustments as needed, and occasionally respond to more serious situations by riding out in their (probably driverless) cars to get hands-on with machinery or inventory



- **(vii) 3-D Printing-** On-site creation via 3D printing reduces the need for shipping finished goods while shifting transportation loads to lower volume raw materials. It automatically produces prototype of goods found in the place of origin at the place of destination
  - Replacment of truck parts could simply be printed





- (viii) **Cloud Delivered Capabilities** can be rapidly bolted onto existing workflows. This offers diversified, significant business models and process flexibility as well as a consistent brand experience

- In the trucking industry, businesses need to keep track of their fleets to stay competitive.
- A combination of cloud computing and GPS technology allows .
- Cloud computing services such as infrastructure as a service (IaaS OR PaaS) and its software-SaaS can simulate the operation of computer hardware hence the company does not need to purchase new server from time to time. The upgrade is done via cloud.





- **(ix) Self Driven Vehicles** is now in vogue. As a precaution, drivers inside monitor the rigs and take control in case of emergencies.
- The drivers inside self driven vehicles leverage on the integration of cloud technology with transportation
- Trucks will then be able to communicate with each other and other vehicles to avoid collision, access traffic data, identify congested areas and plot safest route.



- Even customers may also access information from the vehicles, customize their orders, select their pick up or schedules etc
- Cloud technology is shaping the trucking industry hitherto known for resistant to change hence customers should follow suite.
- Particularly with the use of tools such as Ubuntu, MySQL, GitLab etc there seems to be nothing impossible





- (x) **Blockchain**- A blockchain is essentially a **digital ledger** of transactions that is duplicated and distributed across the entire network of computer systems on the blockchain.
- This enhances supply chain security in the form of reducing fraud, bottlenecks, errors during documentation, and increase efficiency such as we witness in Sea Port transactions and other aspects of life today.
- IT can spot inefficiencies of employees within the supply chain. It would also allow customers to view how products performed from a quality control perspective as they transit from origin to retailer.
- Will carry a range of identifications like driver's license, passport, social ids and so on. Blockchain Id is a digital signature to replace all the id and get a single id by signing up at registrar
- Since cloud data are not immune to hackers, blockchain can act as back up



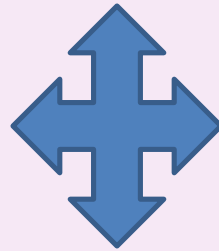
- **(xi) The (Electronic Logging Devices)**  
**ELD-** makes transportation technology more efficient- previously the records of drivers hours of service (HoS) is done with either Bluetooth or USB and both are deficient, delay etc. advance fleet tracking in cloud addresses this deficiency.
- The system is called 'telematics' type of transfer and it provides robust communication and real-time data exchange between supervisors and truckers, even while they are in transit.
- Fleet manager can track if driver exceed HoS and advise them to rest
- This would help to retain drivers by
  - Improving relationship between drivers and managers as drivers performance records are digitally better kept.
  - Driver safety- Drivers feel undervalued if their safety is not the fleet managers concern in terms of safe driving behaviour, and vehicle maintenance. Some ELDs

- have drivers safety scorecards system to identify drivers with poor performance and safety scores as well as automatically monitor faults codes and instantly display this on Motive Dashboard.
  - Ensure rewarding good performances and safe driving- Rewards such as bonus checks, extra vacation days etc may dramatically improve retention rate. An ELD technology helps fleet manager establish performance-based reward system after monitoring critical safety events such as hard braking, hard cornering and excessive acceleration.





## e. Recruitment, Training and Retention of Drivers







- For a company to efficiently gain an edge in the market, it must be able to attract a pool of talented people. Hence, the standard of recruitment, training and retraining of workers must be of utmost concern.
- Finding the right talent, especially drivers is a challenge in the Industry;
- Driver shortage is the most significant issue in the trucking industry right now. According to estimate (gomotive.com, 2022), the industry will need 900,000 new drivers in the next ten years.
- The growing driver shortage problem also reemphasises the importance of retaining good drivers particularly after the shortfall in drivers in Europe after COVID-19.
- Cable News Network (CNN, 2021) puts the annual turnover rate at 95% for truck carriers.
- Incidentally many drivers in Nigeria are still pedestal in operations and professionalism and do not have requisite character and skill to take up the job when Europe called on them after COVID-19.



- Haulage Operators need to find creative ways to attract and retain drivers and one important aspect of the recruitment process is the image the company presents to prospective candidates.
- Lengthy and intimidating recruitment process can drive away prospective drivers.
- Leveraging on technology can be a way of retaining these drivers who are most likely in their 50 years of age.
- Drivers needs to be able to use the internet, social media and other means to find the right job, the same way the haulage companies screen drivers.



STI could help in drivers recruitment through:

- **(i) Company website:** Investment in professionally-designed site that speaks well of the company brand is essential.
- **(ii) Social media channels** like Facebook, Twitter, LinkedIn are essential tools that can be leveraged to attract application. A properly maintained company social media platform gives opportunity to applicants to learn about the company, developed interest, interact with recruiters, etc.
- **(iii) Virtual interviews:** like Zoom, WebEx and other virtual meeting software solutions have made it easy to interview candidates without bringing them into the office for an in-person meeting.
- **(iv) Automated Employment Verification:** One of the most time-consuming steps in the recruiting process is the verification of previous employment. In outdated traditional recruiting models, it can take weeks for a driver's previous employment history to be verified. But automated employment verification can do this in minutes.




## (v) Apps-

- **Mobile Recruiting Apps:** Our mobile telephone and smart phones can do almost anything today. Hence a well-designed App that is user-friendly can simplify the task for applicant to staff recruitment process.
- **Supply chain management app-** Drivers often complain of long hours of queuing at service point. Kuebix is an example of an app to create a singular platform for every participant in the supply chain.
- **Time management app-**
  - inspect App- The time spent in filling log book, collecting fuel receipts etc could well be spent behind the wheels. Fleet management software- Fleet complete inspect App removes the hassle of paper works without losing any important information
  - The in-cab alert – This can be a big time saver enabling fleet manager pass quick information to drivers.

**(vi) Dash cams-** Placing front-facing dashcam in trucks provides clear evidence in accident investigation. Protecting and backing your drivers when they are not at fault can be a good retention strategy. It can also help in case of fraudulent claims or fines by law enforcement agents



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- vii. Online Training Modules. Modules are created to enhance drivers training and standards. The Federal Road Safety Corps recently migrated to the version 2.0 of its drivers training module for better drivers training in Nigeria. Prospective drivers licence holders are mandated to attend driving schools for 26 days session.
  - viii. Computer Based Training (CBT) Examination .The software is so designed that driving school operators or any other person cannot do the CBT for the trainee since the computer camcoder takes picture of the trainee randomly. It is the most frequent face that will appear on the certificates
  - ix. Internet generated Certificate of Professional Proficiency is for training of already certified drivers on periodic basis based on certain modules using technology.



- x. Driving Schools Standardization Programme has also been digitalized in Nigeria to enhance registration, certification and Monitoring and Evaluation of Driving Schools nationwide
- xi. Establishment of Truck Driving Schools leveraging on technology will also enhance availability and quality of truck drivers. Dangote Truck Driving School has just been accredited by the Corps
- xii. Driving Simulators-** also help in drivers training

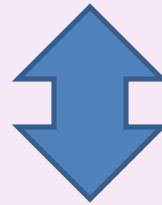


xiii. Certification of Transport Operators- The Road Transport Safety Standardisation Scheme (RTSSS) of the FRSC monitors the training of drivers, vehicle conditions as well as the Operators compliance to Safety Standards on yearly basis for certification and classification of the haulage companies





## f. TRACKING, MONITORING AND ENFORCEMENT








The major goal of a Logistics operator is to bring as many processes together as possible in an effort to improve efficiency, reduce errors and lower operational costs. Some of the promising technology to achieve these are as follows;

- (i) Supply Chain Management Software**\_(often called an SCM) is an essential modern tool that can help operators to connect all the vital steps and processes that take place throughout the supply chain.
  - SCM can handle automation alerts on statuses, forecasting, transport and other management as well as the day-to-day operations.
- (ii) GPS and Tracking Tools:**\_GPS and tracking tools make real-time tracking a realistic possibility for companies of all sizes, adding a level of transparency to the logistics industry; that's a true game-changer for operators of all sizes.
  - Automatic Vehicle Identification/Automatic Equipment Identification (AVI/AEI) is also expected to contribute to improved transportation efficiency and security. For example, a trailer could be automatically identified, given permission to enter a container yard and instructed where to drop its load.



(iii) Drones are certainly coming as an industrial product that can offer an array of benefits to logistics and warehousing firms.

- The camera and software system embedded into today's commercial and industrial drones have numerous applications including surveying, observations and even warehouse management.

(iv) Mobile phones and smart devices with Optical Character Recognition (OCR) technology. The modern smart phone is a technological marvel, cramming an astounding amount of power and functionality into a handy and reasonably affordable device.

- Smartphone and tablets have already transformed our every day routines and these devices are starting to transform logistics management as well.

**(v) Radar Gun-** for determining the speed of oncoming vehicle and check excess speed



**(vii) Tachograph-** automatically records its speed and distance, together with the driver's activity selected from a choice of modes.



**(vi) E-ticketing device-** for booking traffic offenders



**(viii) Weigh bridges to discourage overloading of trucks**



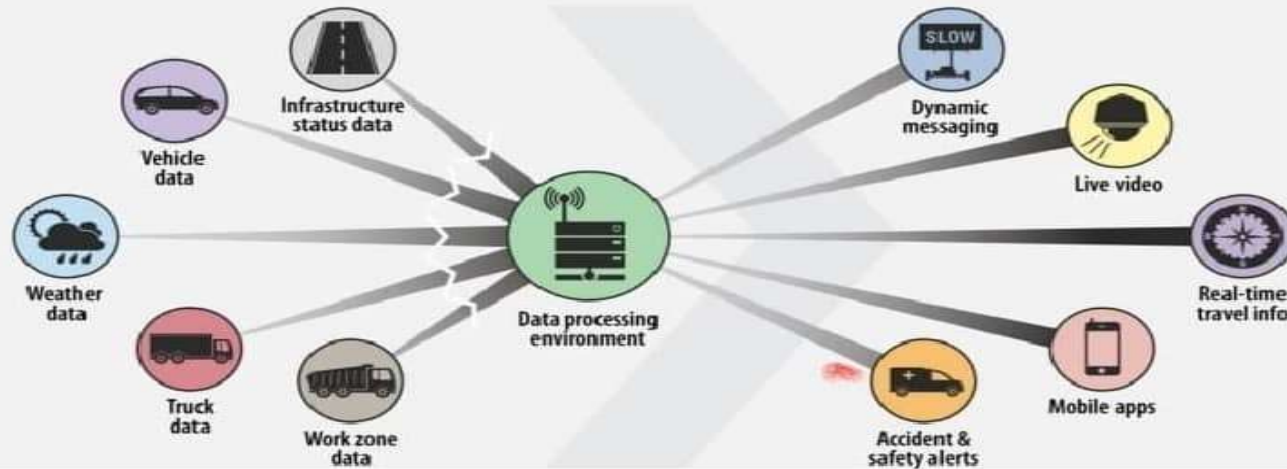


- In terms of enforcement, Law Enforcement Agencies also need to leverage on technology in order not to be a clog in the wheel of haulage operations.
- The Federal Road Safety Corps laps extensively on STI Consultation. It uses tens of applications, e-ticketing, radar guns, tracking devices for operational vehicles, body cameras for motoring personnels and operational vehicles on the road and creation of control rooms with emergency toll free numbers and real time monitoring of roads and activities among others.





(ix) Traffic Monitoring: The deployment of technology to ensure that incidences on the roads are detected as soon as they occur is essential. Road users should be provided real-time traffic situation reports using smart system to give information that could enhance safety and allow making safer, more efficient driving choices as they commute. With about 20Million telephone subscribers in the Country, a suitable **traffic app** could harness traffic information and Crowd sourced traffic situation report for enhanced vehicular movement (Olagunju, 2015). Identifying congested routes and opting for freer alternatives will aid effective Haulage Operations.



- Traffic Monitoring: Its Data Capture & Management (source: IRF Webinar: Work Zone Congestion Mitigation. February, 2015)



## g. Road Safety





A major means of transportation of bulky goods is by trucks. The growth of Trucking Industry in interstate movement has been encouraged by the introduction of Containerisation and Roll on-Roll off world wide; Balogun (2022).

However, trucks compete with other drivers on the road and are susceptible to road crashes due to;

- Infrequent operation
- Poor road and driving condition
- Inexperienced drivers and
- Poor maintenance of vehicles

Out of a total 136,672 crashes that occurred in Nigeria between 2013 and 2020 as many as 14,489 (11%) are attributed to trucks alone (FRSC, 2022). This is relatively huge considering the vehicular population

This human and material loss can be mitigated with the application of technology.



Some of the technologies for enhancing road safety in truck industry include;

**(i) Technology targeting breath alcohol**

- Driver Alcohol detection system (DADSS) ([www.dadss.org](http://www.dadss.org) 2022) or Breath Alcohol interlocking device (BUIILDS). It is a technology built into a vehicle dashboard or control to check driver's alcohol level and prevent vehicle from starting if beyond legal limit
- Touch-based system uses sensors in the ignition button or gear shift to determine a drivers alcohol content below the skin surface
- Hand held devices used by the Police when placed close to the nostrils of driver

**(ii) Technology to detect behaviour**

- Driving monitoring and assistance system (DMAS) are automatic, unobstructive device to monitor steering, braking, driving trajectory (infer driver's alertness), head position, eyelid closure and eye gaze direction (for impairment) and the autonomously activate emergency braking, where necessary.

Other devices and technologies that enhances safety on the road are shown below;





A black and yellow traffic speed bump, also known as a speed hump. It is a long, low, black plastic or rubber device with three yellow rectangular reflective strips. It is designed to be placed on roads to slow down vehicles.

57



- (v) Road furniture



- (vi) AI for road safety



- (vii) AI for Road safety

## SMART Mobility 2030

i-crossing



- (viii) Google map



# SITUATION IN NIGERIA



SITUATION

IN

NIGERIA



# SITUATION IN NIGERIA

The highlights of the Situation in the haulage Operations in Nigeria relating to engagement of technology include;

- Low level of technology deployment
- Reliance in obsolete technology (non upgrading)
- Low investment in technology by both public and private sectors
- Low Capitalisation of Haulage business and poor Accessibility to funding facilities
- Non engagement in Research and Development Programmes
- Poor Data Gathering and Management
- Shortage in technologically competent Manpower

The low level of technological deployment has resulted in :

- Delays and non reliable service delivery
- Poor ratings on the Ease of Doing Business
- Traffic Congestion
- High incidences of RTC





- Haulage companies have low M&E of their vehicles hence delays in transit and difficulty in tracking.
- Poor Road Safety Standards – Vehicles, drivers and Operators.
- Insecurity.
- Low Enforcement of Standards and Laws.
- There is poor recruitment process of drivers and some of the drivers training still go through manual processes.
- The operating environment of haulage business in the country is harsh.
- Low level of Insurance.





# CHALLENGES

- Will power of companies to invest in emerging technologies is low
- There is government inability to provide conducive environment for technology application
- There is infrastructural gap i.e lack of infrastructure like constant electricity needed for technology application
- There is manpower –competency gap or not readily available.
- Technology development requires some background data, unfortunately, most data are either not credible or not readily available
- Technology is to reduce discretions and corruption hence corrupt officials in the system will do every thing to sabotage the technology
- There is poor level of research and development in areas of innovation.



- The technologically advanced countries are reluctant to transfer the technology or do so at exorbitant cost to developing nations
- The developing nations have poor maintenance culture for emerging technologies
- Poor Funding
- Inadequate Competent Manpower Resources
- Poor infrastructure
- Weak Regulation





WAY  
FORWARD





# WAY FORWARD

- Government to provide conducive environment for companies to participate in technological innovation
- Better funding of STI agencies like NITDA
- Companies to get more involved in the provision of technological innovations and lap on the benefits of STI
- Training Institutions such as Higher institutions, ITF, Academies, ICDL etc to come up with necessary curriculum and manpower development programmes in line with World Best practices for technological innovation.
- The right competences, right data, right analytical tools are needed for data management.
- There should be local and foreign exchange programmes to train the right personnel on maintenance of parts of the technological innovations
- Non availability of certain equipment parts and components



- There should be proper monitoring and evaluation
- Provision of research grants to help in research and development.
- The Draft Transport Policy must be updated to accommodate emerging technologies and approved accordingly
- Improved Data Collection and Management- there should be robust Databases
- Funding Facilities with low interests should be made available to Operators
- Government at all levels should tackle the issue of insecurity nationwide
- Government should encourage local development of STI as dumping of unnecessary technologies should be discouraged
- Parts of equipment and devices should be made readily available
- The Policy on STI should be fully implemented



# Conclusion





# CONCLUSION

- In order for the Haulage Industry to properly achieve its role as a key economic driver and a major factor towards achieving the sustainable development goals in today's ever changing world, the Operations must lap on STI
- This calls for strengthened investments in the sector especially in the area of
  - Science, Technology and Innovation (STI)
  - Research and Development
  - Data Management
  - Training and Manpower Development
  - Management and Maintenance and
  - User adaptability.
- The haulage industry needs to adapt to STI in all ways in other to unlock the benefits in today's transportation world. Nigeria must not be left behind.





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# ANY QUESTIONS?

