Proceedings of the 37th iSTEAMS Cross-Border Conference – Accra Ghana 2023

Faculty of Computational Sciences & Informatics - Academic City University College, Accra, Ghana
SMART Scientific Projects & Research Consortium (SMART SPaRC)
Sekinah-Hope Foundation for Female STEM Education
ICT University Foundations USA
IEEE Computer Society, Nigeria Section
Intelligent Antitheft Management Networks
Creative Research Publishers – Society for Multidisciplinary & Advanced Research Techniques (SMART) Africa

37th International Science Technology Education Arts Management & Social Sciences (iSTEAMS) Cross-Border Conference - Accra Ghana 2023

Sustainable Enterprise Risk Management Paradigm for Enhancing Nigeria's Road Transport Sector Performance

Hassan Akintoye Kareem, Titus Kehinde Olaniyi (PhD) & Posi Olatubosun (PhD)
SEAD Research Group
Glasgow Caledonian University
London Campus, London United Kingdom
E-mails: Hassan.Kareem@gcu.ac.uk; Titus.Olaniyi@gcu.ac.uk
Posi.Olatubosun@gcu.ac.uk
Phone Nos. +447398759144; +(0)141 2731407; +(0) 141 273 1407

ABSTRACT
This paper proposes the development of a Sustainable Enterprise Risk Management (SERM) as a paradigm for enhancing transportation agency's performance in the Global South (GS) with a focus on the Nigerian Road Transport Sector. Sustainable transport has a key part to play in fostering sustainable economic growth and expanding access to essential services as a vital driver of economic and social development. However, transport sector faces an evolving landscape of sustainability (ESG) risks that can impact their success and even survival. It has been evidenced that current risk management practices are not adequately addressing sustainability risks. Preliminary findings have shown various organisational/institutional challenges in the Nigerian Transport sector driving the breakdown in sustainable ERM. Literature has established that organizational resilience starts at the top with the use of ERM paradigm to achieve good risk governance and organisational objective in normal, volatile and crisis situations. However, there have been a very limited literature regarding alignment of ERM with transportation sector. This paper explores Systems Thinking/Systems Dynamics (ST/SD), Transport specific ERM frameworks in the GN and the two dominant ERM frameworks with a view of adapting their standards and articulating the practices in the Global North (GN) to develop implementation guidance that could enhance the Nigeria road transport sector performance with reduced risk. It aims to provide a better understanding to help policy makers with decision making on sustainable Transportation.

Keywords: Enterprise Risk Management (ERM), Global North (GN), Global South (GS), Sustainability Concept, Sustainable Transportation, Systems Thinking/Systems Dynamics (ST/ SD).

Proceedings Citation Format
Abraham Rasheed Adeyemi (2023): Sustainable Energy Planning and Modelling for Global South: A Case Study of the Federal Republic of Nigeria. Proceedings of the 37th iSTEAMS Multidisciplinary Cross-Border Conference. 30th October – 1st November, 2023. Academic City University College, Accra, Ghana. Pp 107-140.
dx.doi.org/10.22624/AIMS/ACCRACROSSBORDER2023 V2P9

1. BACKGROUND TO THE STUDY

This paper proposes the development of a Sustainable Entersprise Risk Management (SERM) framework for the transport sector in the Global South (GS) with a focus on Federal Republic of Nigeria. Transportation constitutes one of the major features of the economic development of Nigeria. It has a key part to play in fostering sustainable economic growth and expanding access to essential services as a vital driver of economic and social development (World Bank-Transport overview, 2021). It is a prerequisite for international integration of regions and the participation in the process of globalisation. The report from (Trading Economics, 2022) also indicates a growing Gross Domestic Products (GDP) contributions from Nigeria's Transport sector (Figure 1.1). However, according to (Edema *et al* 2019; Onakola and Olajide, 2020) the transportation sector in Nigeria is seriously challenged by under-investment in critical transport infrastructure, lack of maintenance and lack of diversity in modes of transportation, this is further exacerbated by the increase in population and urbanisation-induced congestion as shown in (Figure 1.2). The authors found that the dominance of road transport results in a high frequency of road traffic accidents and environmental pollution posing a serious threat to the health and quality of life as illustrated in (Figure 1.3).

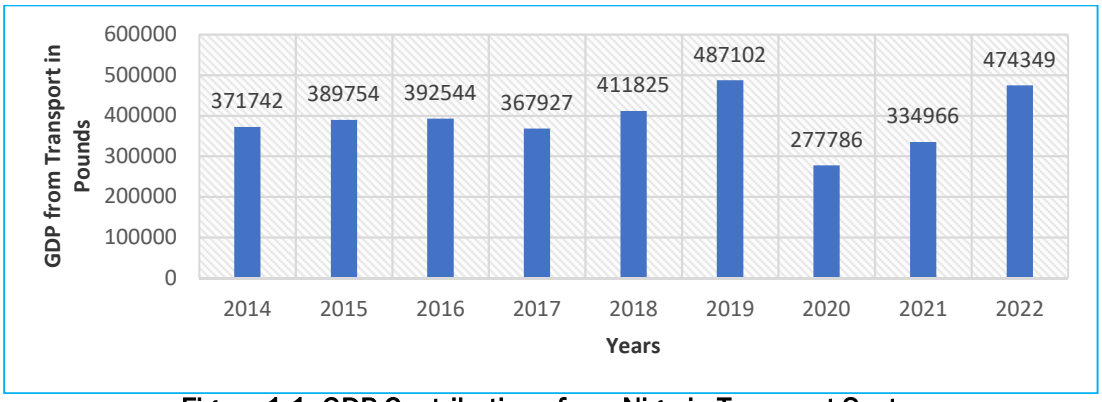


Figure 1.1: GDP Contributions from Nigeria Transport Sector
(Source: Trading Economics, 2022)

Figure 1.2: Road Transportation Congestion
(Source: Onakola and Olajide, 2020)

Figure 1.3: States of Nigerian Roads
(Source: Edema, 2019)

Literature from the public domain has revealed that most of the challenges mentioned above are rooted from poor management control systems put in place in the transport sector. Under the Volatile, Uncertainty, Complex and Ambiguity (VUCA) scenario of 21st century organisations; managing complex and multiple human, technological, political and natural resources is crucial to ensure success (Curtis, 2012; NCHRP, 2016; FERMA, 2020). The World Business Council for Sustainable Development (WBCSD, 2016) and Committee of Sponsoring Organizations of the Treadway Commission (COSO, 2017) research has evidenced that sustainability risks could lead to a significant impact on business.

However, current risk management practices are not adequately addressing sustainability risks (see Figure 1.4). In a similar context, (Samuel Apanisile, 2018 and Abah and Esq, 2019) has noted various organisational /institutional challenges in the Nigerian Transport sector driving the breakdown in sustainable ERM (e.g. Limited ERM implementation guidance, Lack of specific policy/legal framework, Poor risk management awareness/ERM culture, Lack of Leadership support, Budget-constraint, changing internal and external context; Keeping up with technology, Coordination with different Stakeholders etc). The transport sector is facing an evolving landscape of sustainability (ESG) related risks that can impact their success and survival (WBCSD,2016; COSO,2017).

This call for integration of Sustainability and ERM. Embedding sustainability into ERM is a matter of best practice against devastating surprises and disruption affecting transport organisation performance. Academic and practice literatures in the public domain have evidenced that ERM function plays a critical role in monitoring and managing the risks and opportunities that stem from the internal and external forces that can impact organisation's profitability, success and even survival (ISO, 2018; Anton, 2020; Albersteki, 2021). It has been established that organizational resilience starts at the top with an ERM paradigm (Donohue Jessica, 2022) to achieve good risk governance and organisation objective in normal, volatile and crisis situations. However, (Curtis, et al, 2012; NCHRP, 2016) comprehensive transportation research has noted a very limited literature regarding alignment of ERM with transport organisational strategies and objectives (ERM at Agency, Program and Project levels).

Managing the complexity inherent in transport and logistics based on context has therefore become a continuous test even for experienced managers. The academic arguments above underscores the need for a holistic and structured approach to running and managing public and private agencies (including transport sector). It highlights the urgent need to address and manage systemic global risks by involving and creating synergies among all stakeholders to enhance sustainable ERM in the transport sector.

Table 1.1: Key Transportation Challenges

Authors	Title	Transportation Challenges
Shaaban *et al* (2021)	Intelligent Transportation Systems in a Developing Country: Benefits and Challenges of Implementation	▪ Coordination with different stakeholders ▪ Keeping up with the technology integration with existing systems and Budget constraints.
Onakola and Olajide (2020)	Problems and Challenges facing Nigerian Transportation	Under-investment in critical transport infrastructure. Lack of maintenance. Lack of diversity in modes of transportation
(WBCSD, 2016) (COSO, 2017)	Sustainability and Enterprise Risk Management	ERM alignment with the sectors' strategies. ERM alignment with internal/external environmental context, Limited ERM Implementation guidance, Sustainability risks have longer timeline and difficult to quantify, Lack of collaboration between sustainability and ERM function, Sustainability reports and mainstream corporate risk disclosure have different audience and purpose
Kaewunruen *et al* (2016)	Grand Challenges in Transportation and Transit System	Greenhouse emissions and other pollution. Monitoring uncertainties and mitigating risks. Ageing and failing transport infrastructures. Enabling the Internet of Things (IoT). Educating transport stakeholders.
United Nations-(2018) Mishal Alajmi (2018) Abah and Esq (2019).	Planning and Design for Sustainable Urban Mobility. Strategic Enterprise Risk Management Alignment. The Importance of Enterprise Risk Management to Public Sector Organisations in Nigeria.	Lack of proper industry-specific guidance material. Adverse climate conditions Lack of leadership commitment. Consideration of Internal/External Context. Poor risk awareness culture, Corruption and rent-seeking culture, Poor regulatory policy, Fragmented policy implementation, Resources/Budget constraints. Bureaucratic constraints, Historical legacy and recent conflicts.

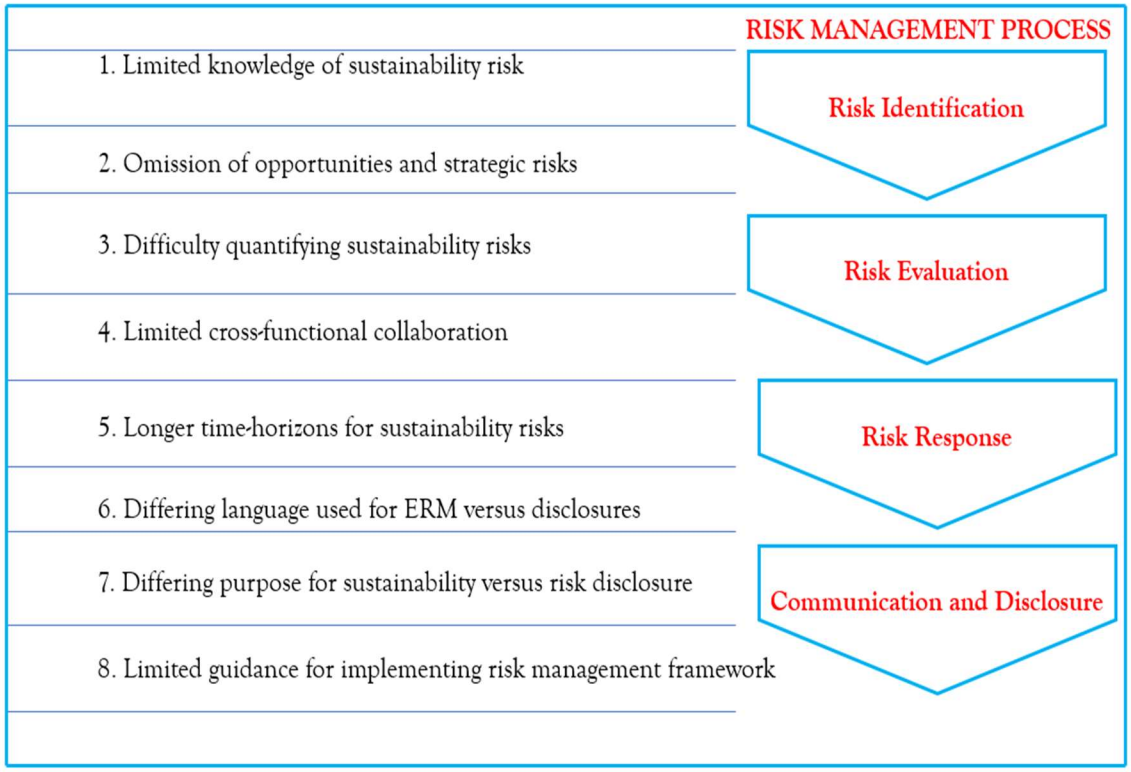


Figure 1.4: Factors driving the breakdown in Sustainability ERM (Adapted from WBCSD, 2016)

2. STATEMENTS OF PROBLEM

Following from the background information above, a sector specific ERM framework for transportation agencies has not been developed yet, despite the fact that the sector has continually exposed to a wide range of uncertainty and risks. It has been acknowledged that there are few published works on holistic risk management related to transport and there is an inadequacy of literature focusing on aspects such as Agency, Program and Project risk management. This research will prioritise sustainability risks and challenges related to sustainable ERM alignments.

Academic and practice literatures in the public domain have evidenced that ERM function plays a critical role in monitoring and managing the risks and opportunities that stem from the internal and external forces that can impact organisation's profitability, success and even survival (ISO, 2018; Anton, 2020; Albasteki, 2021). However, despite the multiplicity of principles, guidelines and frameworks developed in the field of ERM, scholars still regard ERM as an unproven and emerging field in which important knowledge gaps remain in practice and in academia (Kaplan and Mikes, 2014; Anton, 2018; Rubino et al, 2018, Anton and Nucu, 2020).

In addition, current risk management practices do not adequately address sustainability risks (WBCSD, 2016; COSO, 2017; Albasteki, 2021), existing risk management frameworks often have different structures, requirements and terminology that prevent their effective understanding and implementation (IRM 2018a). These frameworks are often criticised for failing to consider the specificity of organisations (Arena et al., 2010; Paape and Spakle, 2012; Hendy, 2018, Rubino et al, 2018). The researcher has also found out that existing frameworks lack a clear underlying theoretical rationale/guidance since they are mostly developed by practitioners. Furthermore, the contingency theory perspective has been suggested for developing customised ERM systems (Woods, 2009, 2011; Kaplan and Mikes, 2014).

Therefore, exploring ERM, especially in the GS transport organisational/institutional context could provide a great addition to the literature in this under-researched field. The framework will assist transportation stakeholders (such as planners, policy makers and their advisers) to implement effective risk response as a significant determinant of the sector success and to manage and reduce systemic global risks within the transport sector. To provide further understanding and insight into the role of ERM in enhancing transport sector performance, a Systems Thinking/System Dynamics paradigm will complement the proposed framework as a way of simplifying the inherent complexities, feedback, non-linearity and delays (see Figure 2.1) below:

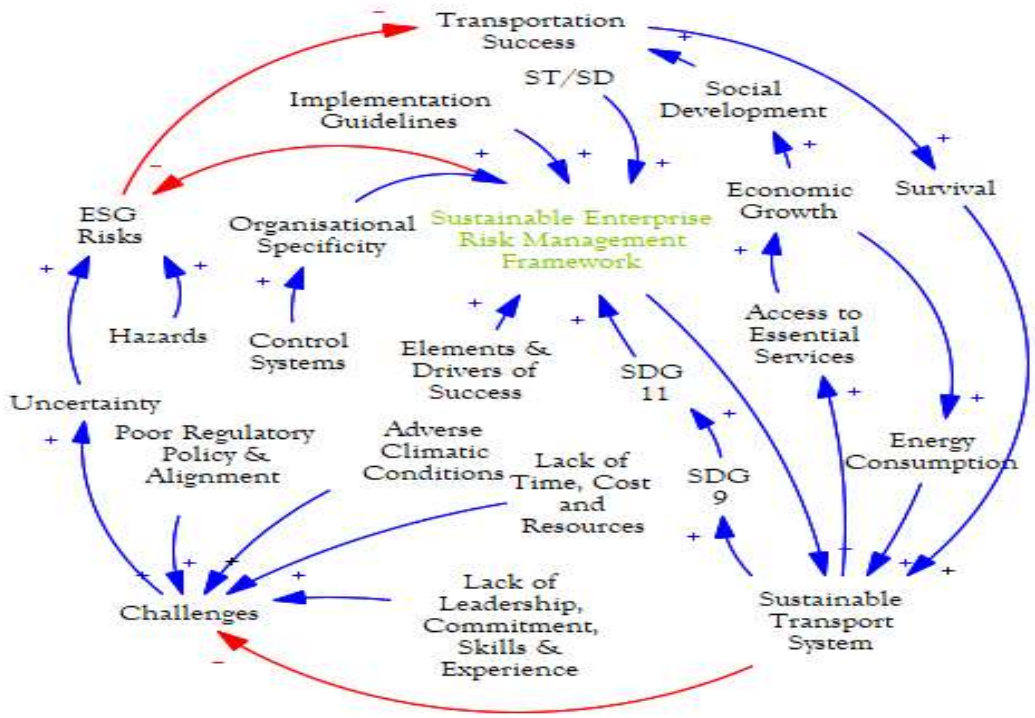


Figure 2.1: Overview and insight into the role of ERM adaptation in enhancing Transport Sector Performance

3. OBJECTIVE

The papers' objectives are as noted below:

- Review literature in public domain with an attempt to develop a sustainable framework for the transport sector in the GS.
- Identify the inherent limitations in the actualisation of a) above with specific reference to the Federal Republic of Nigeria.
- Propose a Systems Thinking /Systems Dynamics (ST/SD) to complement ERM paradigm as a methodological approach for addressing the limitations noted in b) above.
- Develop a sustainable framework for the road transport sector with a focus on Nigeria
- Make informed recommendations for the transport planners, policy makers and their advisers in the application of c) and d) above.

4. LITERATURE REVIEW

Table 4.1: Definition of Key Risk Management Terms (Source: ISO:31000, 2018)

Term	ISO 31000 Definition
Risk	Effect of uncertainty on objectives
Risk Management	Coordinated activities to direct and control an organization with regard to risk
Risk Management Framework	Set of components that provide the foundations and organizational arrangements for designing, implementing, monitoring, reviewing, and continually improving risk management throughout the organization
Risk Management Policy	Statement of the overall intentions and direction of an organization related to risk management
Risk Attitude	Organization's approach to assess and eventually pursue, retain, take, or turn away from risk
Risk Identification	Process of finding, recognizing, and describing risks
Risk Assessment	Overall process of risk identification, risk analysis, and risk evaluation
Risk Analysis	Process to comprehend the nature of risk and determine the level of risk
Risk Evaluation	Process of comparing the results of risk analysis with risk criteria to determine whether the risk and/ or its magnitude is acceptable or tolerable
Event	Occurrence or change of a particular set of circumstances
Risk Tolerance	The amount of Risk that organisations can afforded to bear
Risk Appetite	The ability and willingness of the organisations to take the risk

Table 4.2: Evaluation of ERM Literatures and ERM Framework (Source: Researcher)

ERM Areas	ERM Literature Research Gap	Research Author (Year)
ERM Concept	▪ Existing frameworks are often criticised for failing to consider the specificity of organisations ▪ Contingency theory perspective has been suggested for developing customised ERM ▪ Senior management overreliance on the existing risk management strategies ▪ Weak understanding on the way ERM should be integrated	Arena *et al.,* 2010; Paape and Spakle, 2012; Hendy, 2018, Rubino *et al*, 2018). Woods, 2009, 2011; Kaplan and Mikes, 2015. Beasley, Branson and Hancock (2009). FERMA (2012); RIMS (2013)
Support provided by Management	▪ Lack of intensive support by the management board ▪ Lack of meaningful risk reporting to the board ▪ The boardroom is lacking adequate sets of skills in risk management.	Rubino Michele (2018) Rubino Michele (2018) Mishal (2018).
ERM Integration with Strategy and Processes	▪ The applications of ERM were rarely integrated with strategy-setting and decision-making ▪ Managerial low skills in aligning risk appetite with long term strategies and objectives ▪ Unclear understanding of the link between aligning ERM with strategy and decision making ▪ Low consideration of the changes occurring in internal and external environments. Lack in the adequacy of data	Liebenberg and Hoyt (2003); (COSO, 2004, 2013); Protiviti, 2016) Misha (2018) Beasley (2010), Misha (2018) Rubino *et al*, (2018) Keith (2014); Misiura (2015).
ERM Structure	▪ Ambiguity regarding the effective structure of an ERM framework ▪ ERM deployment was positively associated with the existence of a Chief Risk Officer and Audit Committee ▪ Implementing ERM requires a substantial commitment of resources (time, personnel, money) that are not likely to be available during lean times.	Mikes (2007; 2008) Liebenberg and Hoyt 2003; Beasley *et al*. 2005; Paape and Spekle 2012 Khan (2005)
ERM Challenges	▪ Legal requirements as well as compliance drive ERM application ▪ The ERM is still guided by the global perspectives. ▪ ERM as an unproven and emerging field in which important knowledge gaps remain in practice and in academia ▪ Existing risk management frameworks often have different structures, requirements and terminology that prevent their effective understanding and implementation	Kaplan and Mikes, (2014) Anton, 2018; Rubino *et al*, 2018, Anton and Nucu, 2020 Arena *et al* (2010); Paape and Speklé (2012); Kaplan and Mikes (2015); (IRM 2018a).

4.2 Transportation specific Enterprise Risk Management (ERM) Frameworks

Figure (4.1 and 4.2) below illustrates the Transport for London (TfL)'s Enterprise Risk Management Framework (ERMF, 2018) and Australian Transport Assessment and Planning Framework (2022). The Frameworks illustrates activities and decision support system, with a logical, multi-step approach aimed at achieving the high-level goals and transport system objectives.

The Framework include the following steps in alignment, closely, with (ISO:31000, 2018)

- Step 1 involves the identification of high-level jurisdiction goals (1A), and supporting transport objectives, targets and KPIs (1B).
- The policy choices and system planning phase involves repeated application of an 'objective-problem-option' focus (Steps 1B to 3) to the various levels of planning. It provides direction-setting guidance for all major transport system decisions.
- Step 4 is the culmination of the planning process, resulting in a Business Case for each proposed initiative that demonstrates the proposal has merit, is sensible and is justified.
- In Steps 5 and 6, the range of justified initiatives are prioritised, compiled into an overall program of highest priority initiatives, and delivered.
- Step 7 involves review of proposals after they have been delivered, plus reviews of all aspects of the Framework.

These steps and phases are complemented throughout by key supporting processes: stakeholder engagement, use of quantitative and qualitative data and evidence in planning, assessments, appraisals, benefit management and evaluations. Finally, there is a theme of feedback, reviews and continuous improvement throughout to ensure the learnings from practice can further improve the Framework and its use on an ongoing basis.

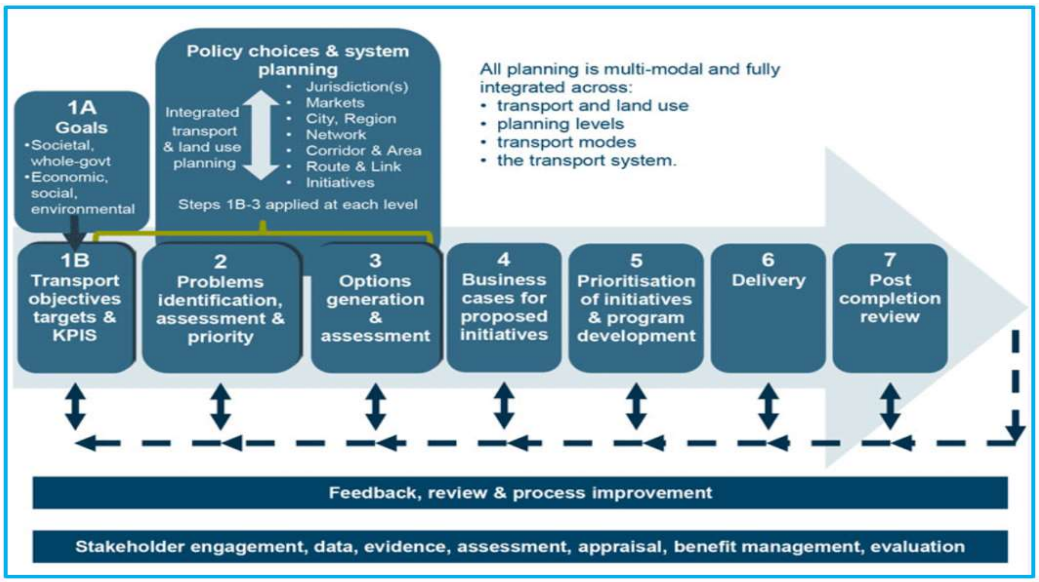


Figure 4.1: Transport System Management Framework
(Source: ATAP, 2022)

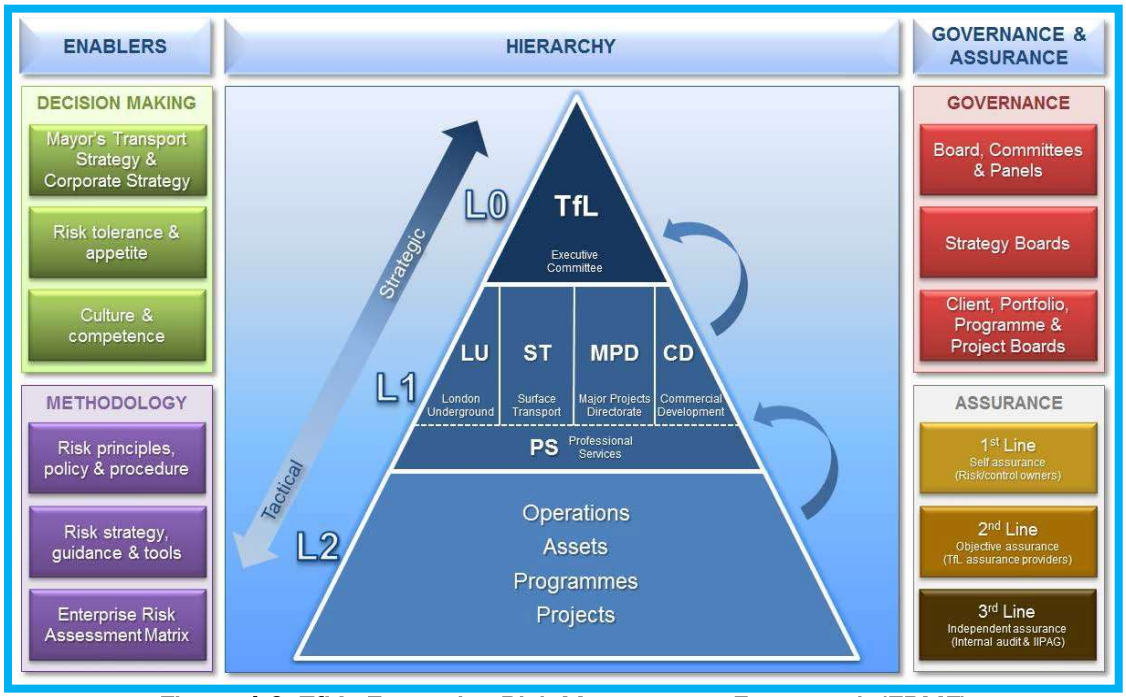


Figure 4.2: TfL's Enterprise Risk Management Framework (ERMF).
(Source: Transport for London, 2018)

4.3: Enterprise Risk Management in the Transportation Business Practices

According to (Curtis et al, 2012; Hallowell et al, 2013; Nune, 2015; Misiura, 2015; TfL, 201 8; US Department of Transport synthesis report, 2021), globally, risk management has been recognised as implicit in the transportation business practices as shown in Figure (4.3). Risk management does not replace performance or asset management but rather it complements them. (Curtis, et al, 2012; NCHRP, 2016) identified four (4) ERM practices at Agency, Program, Project, and Activity management levels, they confirm that transport agency personnel could be managing risk daily, however, holistic risk management, from the agency level to the program, to project and activity level is not a common practice.

Similarly, Transport for London (TfL) Strategic Risk Management updated (2018) identified five (5) key areas of transport risk management practice which include: 1) Strategic risks (2) Operational risks (3) Asset risks 4) Programme risks and 5) Project risks. In transport planning and assessment, risk and uncertainty of varying degrees exist about future socio-demographic, economic, technological and environmental trends. Infrastructure Australia assessment framework (IA, 2018) identified similar sources of risks with respect to ERM in the transportation business practices.

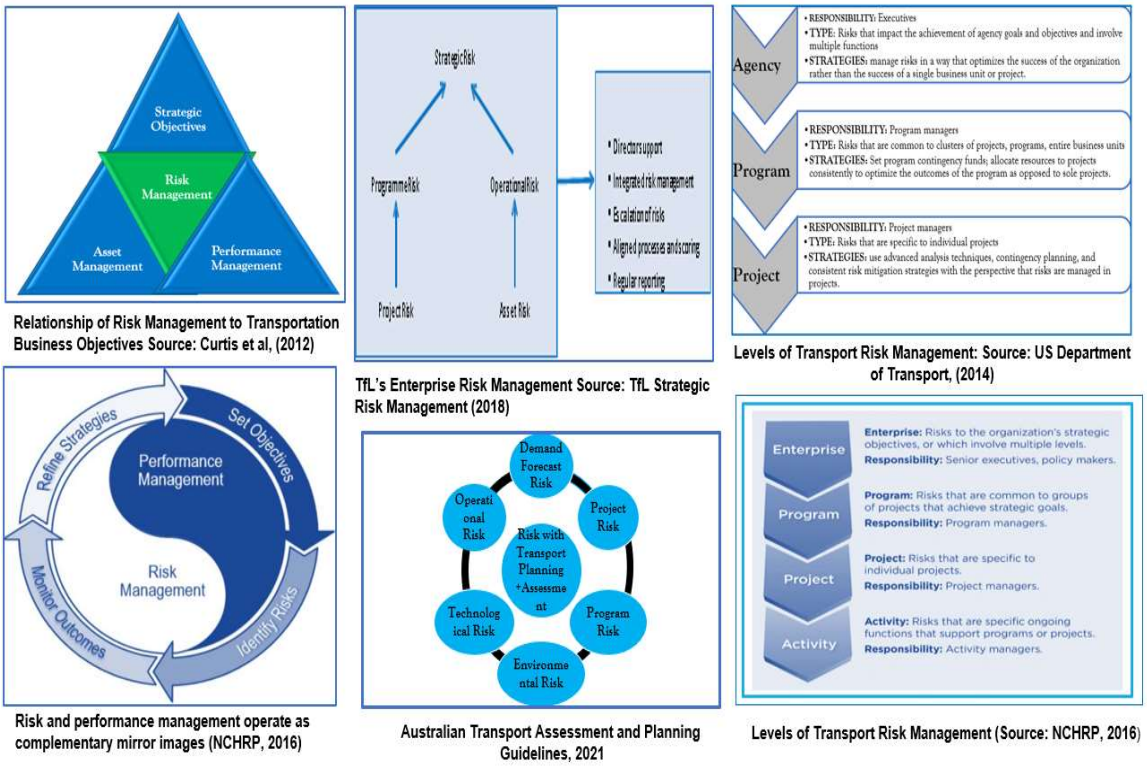


Figure 4.3 ERM in the transportation sector (Adapted by researcher)

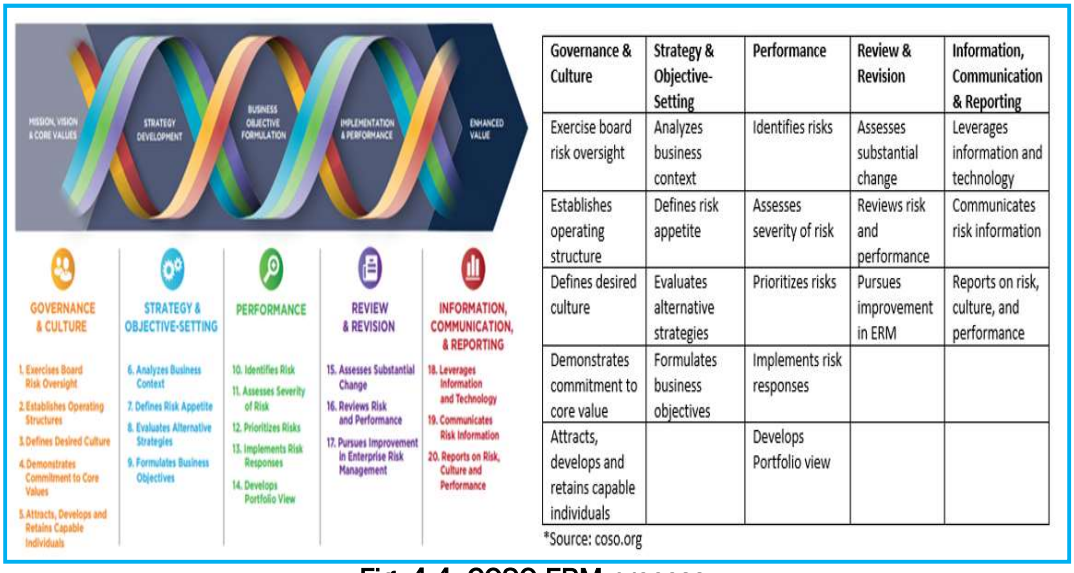
4.4: COSO- Integrated Framework for Enterprise Risk Management (IFERM)

The COSO ERM framework, published in 2004 by the Committee of Sponsoring Organisations of the Treadway Commission, is believed to have become a global template for risk management best practices (Power, 2007; The Institute of Internal Auditors Research Foundation, 2008; Tekathen, 2013). As risks continuously change and dramatically impact organisational success because of their increasing complexity, the updated version of COSO framework in 2017 (see Figure 2.19) highlighted the fact that, executive management and board of directors should concentrate their efforts on improving ERM processes and enhanced risk reporting mechanism. The updated framework considers ERM evolution stages, along with the rising organisational needs for upgrading risk management processes, to cope with the dynamic environment (COSO, 2017).

What distinguishes this Framework is its composition of five parts that can be adopted by various structures and the framework's inclusion and consideration of new technologies and changes in markets and demographics, all of which have evolved the managerial expectation of ERM (Mary, 2017). Further to the review of COSO, 2017 framework, the components that have undergone major changes concern: strategy and objective setting, performance and information, communication and reporting. The new update provides a multidimensional focus in strategy-setting highlighting that risk to the strategy is not the only dimension of risk to consider strategically (Rubino et al., 2017a and b).

There is the possibility of a strategy not aligning with the company's mission, vision and core values; moreover, management must consider the implications of the strategy chosen considering that each alternative strategy has its own risk profile (Protiviti, 2016). Furthermore, the updated framework provides a road map to improve cyber risk management and introduces a focus on reporting that must supports personnel at all levels to understand the relationships between risk, culture, and performance and to improve decision-making in strategy- and objective-setting, governance, and day-to-day operations (COSO, 2017).

Figure 4.3: COSO ERM Framework Evolution
(Adapted from: COSO Frameworks)



Governance & Culture	Strategy & Objective-Setting	Performance	Review & Revision	Information, Communication & Reporting
Exercise board risk oversight	Analyzes business context	Identifies risks	Assesses substantial change	Leverages information and technology
Establishes operating structure	Defines risk appetite	Assesses severity of risk	Reviews risk and performance	Communicates risk information
Defines desired culture	Evaluates alternative strategies	Prioritizes risks	Pursues improvement in ERM	Reports on risk, culture, and performance
Demonstrates commitment to core value	Formulates business objectives	Implements risk responses		
Attracts, develops and retains capable individuals		Develops Portfolio view		

*Source: coso.org

Fig: 4.4: COSO ERM process.
(Source: COSO 2017, p. 21)

4.5: International Organisation for Standardisation (ISO 31000:2018)

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The ISO 31000: (2018) is claimed to be universally applicable and is regarded as an important benchmark for enterprise risk management best practices- Rubino *et al*, (2018).

The standard establishes the creation and protection of value as the core purpose of risk management (ASSP, 2018). These standards provide a complete set of guidelines and benchmarks for ERM initiatives in any organisation. The updated standard places an increased emphasis on: 1) Review of the principles of risk management, which are the key criteria for its success; 2) Focus on leadership by top management who should ensure that risk management is integrated into all organizational activities, starting with the governance of the organization; 3) Greater emphasis on the iterative nature of risk management, drawing on new experiences, knowledge, and analysis for the revision of process elements, actions, and controls at each stage of the process; 4). Streamlining of the content with a greater focus on sustaining an open systems model that regularly exchanges feedback with its external environment to fit multiple needs and contexts. (ISO, 2018). Working toward this goal, the standard starts with a set of eight (8) risk management principles as foundation, then, using these principles to guide the establishment of the risk management framework; and finally, using the framework to guide the establishment of the risk management process. Together, these three sections make up what ISO 31000 calls the risk management architecture as shown below in Figure (4.5) below:

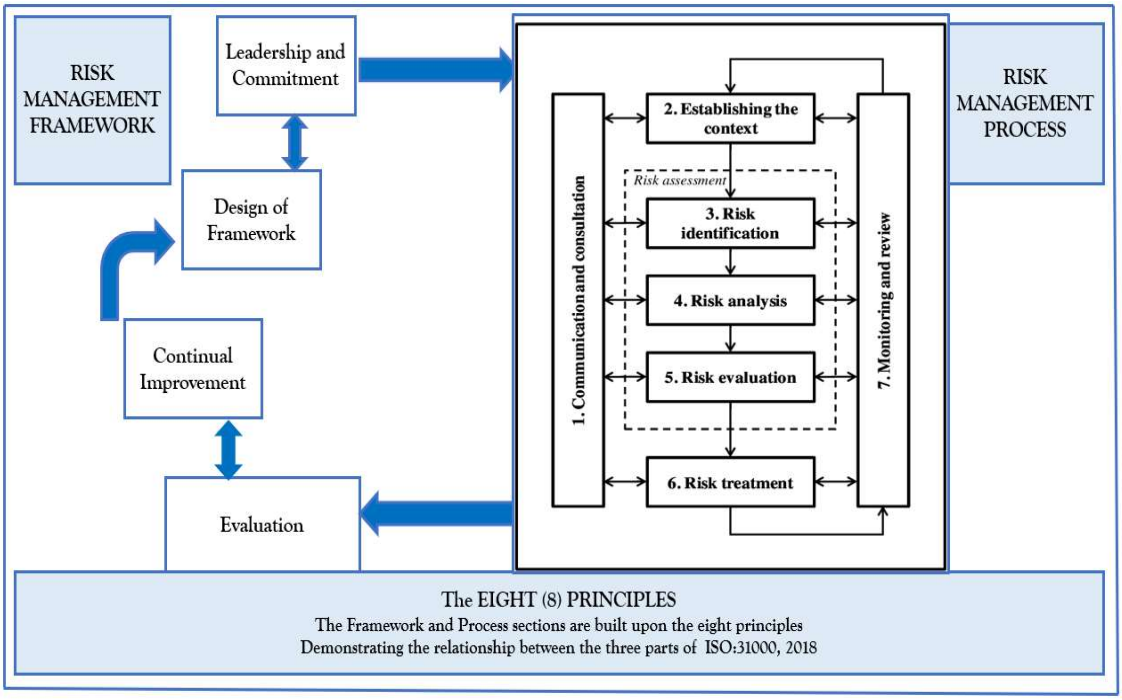


Fig 4.5: ISO 31000 Risk Management Architecture
(Adapted by the Author)

Table 4.3: Synthesis of the stages of Risk Management Process

		Document				
	RM- Guide	RM- Guide	RM- Guide	RM- Guide	RM- Guide	RM- Guide
Phase	Framework for Management of Risk -Canada (2010)	NCHRP 08-60: (2017) Guidebook on Risk Analysis	AS/NZS 4360 2009: Risk Management	COSO: 2017 Enterprise Risk Management	ISO 2009, 2018 Risk Management	Australia Transport Assess. + Planning (ATAP, 2022) Framework
1	Planning and Designing the Approach and Process	Establishing the context	Establishing the Context	Governance and Culture. Objective Setting, Strategy and Objective-Setting	Communication and Consultation, Establishing the Context	Goals: ESG Establishing the context, Transport objectives and KPIs
2	Implementing Integrated Risk Management	Identify, Assess, Analyse	Risk Assessment Risk Treatment	Performance	Risk Assessment Risk Treatment	Problem Identification and Risk Assessment
3	Practicing Integrated Risk Management	Mitigate and Plan	Risk Treatment Monitoring and review	Review and Revision	Risk Treatment Monitoring and Review	Risk Treatment, Prioritisation of initiative + Program Develop.
4	Continuously Improving Integrated Risk Management	Allocate, Monitor and Control	Communicate and Consult	Information and Communication and Reporting	Communicate and Consult. Recording and Reporting	Communicate and Consultation. Recording and Reporting

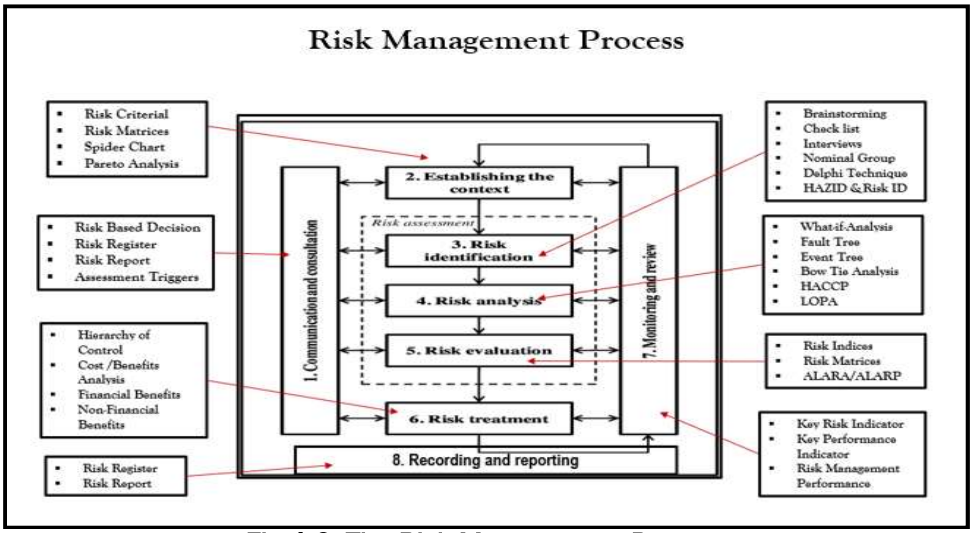


Fig 4.6: The Risk Management Process
(Source: ISO:31010)

Table 4.4: Risk Assessment Tools and Techniques

Tools & techniques

#	Tools & techniques	Risk identification	Risk analysis			Risk evaluation
			Consequence	Probability	Level of risk	
1	Brainstorming	SA	NA	NA	NA	NA
2	Structured or semi-structured interviews	SA	NA	NA	NA	NA
3	Delphi	SA	NA	NA	NA	NA
4	Check-lists	SA	NA	NA	NA	NA
5	Primary hazard Analysis	SA	NA	NA	NA	NA
6	Hazard And operability studies (HAZOP)	SA	SA	A	A	A
7	Hazard Analysis And Critical Control Points (HACCP)	SA	SA	NA	NA	SA
8	Environmental risk Assessment	SA	SA	SA	SA	SA
9	Structure What if? (SWIFT)	SA	SA	SA	SA	SA
10	Scenario Analysis	SA	SA	A	A	A
11	Business impact Analysis	A	SA	A	A	A
12	Root cause Analysis	NA	SA	SA	SA	SA
13	Failure mode effect Analysis	SA	SA	SA	SA	SA
14	Fault tree Analysis	A	NA	SA	A	A
15	Event tree Analysis	A	SA	A	A	NA
16	Cause And consequence Analysis	A	SA	SA	A	A
17	Cause-and-effect Analysis	SA	SA	NA	NA	NA
18	Layer protection Analysis (LOPA)	A	SA	A	A	NA
19	Decision tree	NA	SA	SA	A	A
20	Human reliability Analysis	SA	SA	SA	SA	A
21	Bow tie Analysis	NA	A	SA	SA	A
22	Reliability centred maintenance	SA	SA	SA	SA	SA
23	Sneak circuit Analysis	A	NA	NA	NA	NA
24	Markov Analysis	A	SA	NA	NA	NA
25	Monte Carlo simulation	NA	NA	NA	NA	SA
26	Bayesian statistics And Bayes Nets	NA	SA	NA	NA	SA
27	FN curves	A	SA	SA	A	SA
28	Risk indices	A	SA	SA	A	SA
29	Consequence/probability matrix	SA	SA	SA	SA	A
30	Cost/benefit Analysis	A	SA	A	A	A
31	Multi-criteria decision Analysis (MCDA)	A	SA	A	SA	A

Summary

SA	Strongly applicable (SA)	15	22	13	9	10
A	Applicable (A)	11	1	7	11	11
NA	Not applicable (NA)	5	8	11	11	10

Table 4.5 Best practices of ERM and Future ERM Challenges (Researcher)

Best Practices of ERM	ERM Challenges
The tone at the top and Integrated ERM	Integration of ERM as ERM must align with organisation's key Business Processes/Strategies. Further challenges also lie in integrating sustainability into mainstream risk management
Top-down governance and collaboration between ERM and Sustainability risks	ERM policy which explicitly defined risk-tolerance levels and risk appetite should be discussed by the board of directors and executive management earlier to include functional collaboration between main-stream risk management and sustainability risks.
Risk Awareness Culture	Risk culture is a significant component of ERM implementation due to its deep influence over employee's behaviour.
Policies with specific risk limits.	Among the objectives of risk management is to reduce future unexpected volatility of earnings thus eliminating uncertain sources of volatility.
ERM Dashboard	Reporting risk to the board and the continuous governance by this body remains a critical element of ERM. Sustainability risks disclosed in company sustainability reports and legal filings needs to be aligned.
Robust risk analytics tools	Measuring risk only in case of a certain uncertainty level rather than tail risk will expose organisations to highly unlikely but influential events. Limited knowledge of sustainability risks, Difficulty in quantifying sustainability risks coupled with limited cross-functional collaboration underscore the need to develop risk management interpretive guidance for sustainability risks and robust risk analytics tools. This will require current, best available data to enhance decision-making
Established ERM framework and Optimisation of risk-adjusted profitability	Establishing the context, trainings and incentive programmes would lead into long-term earnings growth and better risk effectiveness, at the same time diminishing excessive short-term risks and staff turn-over which might lead in most cases to future losses.

To summarise the most reflective ERM gaps taking the context of GS countries into consideration. Researcher has proposed the following areas to be addressed by the proposed sustainable framework for the GS transport sector.

- Unclear risk culture running throughout the transport organisations – Transport Organisation Risk Awareness Culture
- Lack of Implementation Guidelines and Practical Directions on the use of ERM framework
- Ambiguity in the ERM Concept- A case for Nigeria transport agencies which leads to:

(i) Insufficient Resource Allocation and Budget constraints

(ii) Limited support from transport agency's senior management and the board

- Unclear understanding of the link between aligning ERM with strategy and decision making –ERM Alignment with Strategy and Decision Making
- Lack of consideration and understanding of external and internal context. Consideration of Nigeria transport organisations (internal and external) context
- Managerial confidence in the existing practices of risk management.

4.6: Theoretical ERM Model and its Components

The theoretical sustainable framework in Figure (4.6) below is mainly developed to cover gaps currently existing in the literature review (section 4 above). It will work as a decision support tool to reveal the important organisational dynamics within both internal and external environments. The key aim of this framework is to ensure a consistent and enhanced transport sector performance, through reducing volatility of their portfolios and increasing predictability of value creation. It also aims to manage possible risks that could have negative impacts on the transport organisation's performance, by improving methods used to achieve business goals and objectives at corporate, program and project levels. The framework comprises of four (4) strategic (interrelated) ERM components viz: inputs, core, integration and outputs. These elements composed of key factors that are usually impacted by changes in the financial, economic, political and cultural environmental context

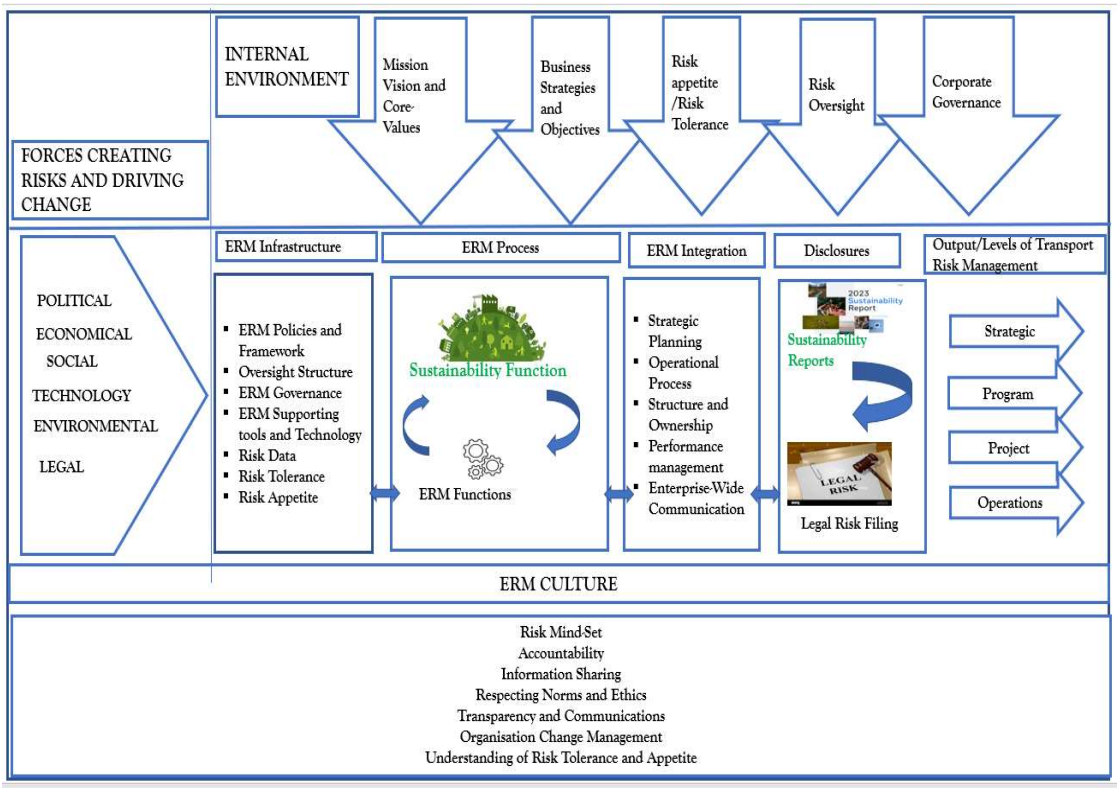


Figure 4.7: Theoretical model for enhancing Transport Sector Performance (Source: Researcher)

5. METHODOLOGY

The study approaches the complexity of the design of the sustainable framework through the conjoint application of contingency, stakeholder and complexity theories with a holistic view of the interconnectedness of how the systems feed into each other. The research employs the Critical Realism Philosophy which aligns well with the potential benefits of applying sequential mixed methods research design as proposed in this research. It recognises the historical causal explanation and experiential verbal explanation in data collection and aligns well with the proposed Case study (Nigeria's transport sector) strategies using abductive approach. A Systems Thinking/System Dynamics paradigm will be used to simplifying the inherent complexities, feedback, non-linearity and delays in the GS transport sector as captured in the literature. Secondary data from public domain will be collected to complement primary data via semi-structure interview and research survey to validate and improve understanding of the proposed sustainable ERM implementation framework. These data will be analysed using text-analysis and Statistical analysis (with IBMR SPSS software). See Figure (5.1) for the summary of the research methodology.

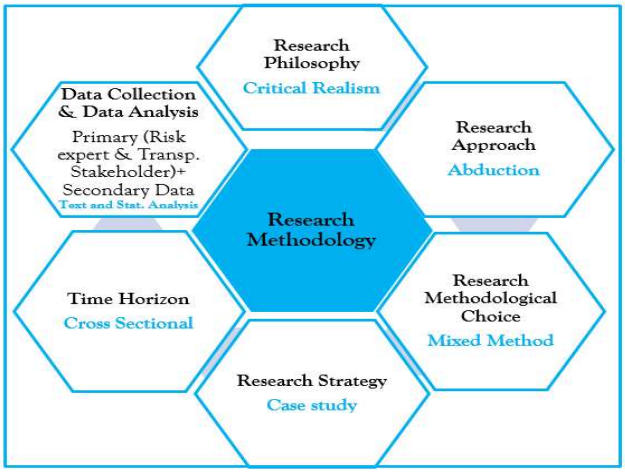


Figure 5.1: Summary of Research Methodology
(Source: Adapted from Saunders et al, 2019)

5.1 The Research Design

This paper will be applying mix-methodology, using a case study focusing on the Nigeria road transport sector as the main strategy of enquiry. The initial finding from literature review was the need to bridge gaps in knowledge associated with current ERM practices in GN and GS and the need for practical implementation guidance that is specific in nature to the transport sector in GS. To do so, this research explore the two dominant ERM frameworks (COSO, 2017 and ISO:31000, 2018) and then modifies it accordingly. Figure (5.2, 5.3 and 5.4) below depict other components and the main dimensions of the research design.

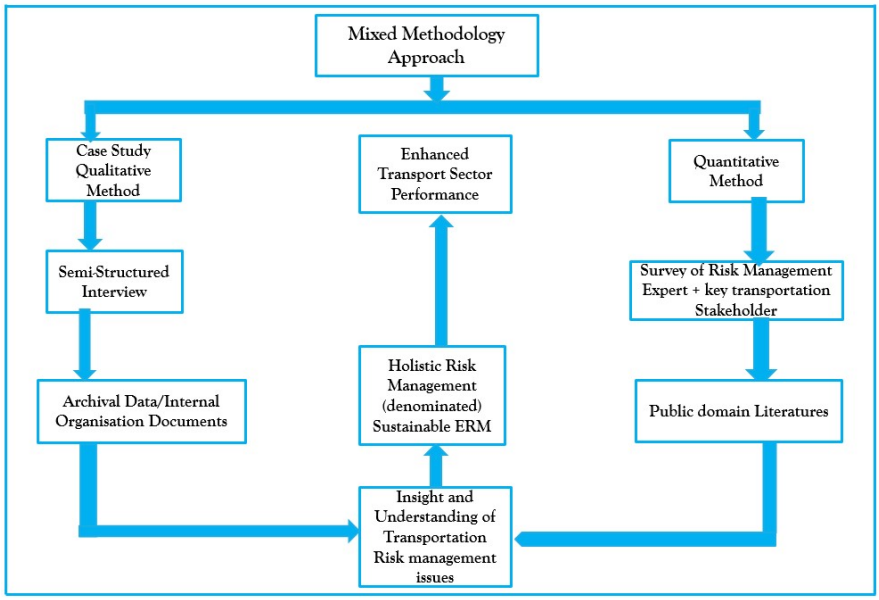


Figure 5.2: Proposed Research Methodology (Developed by the Author)

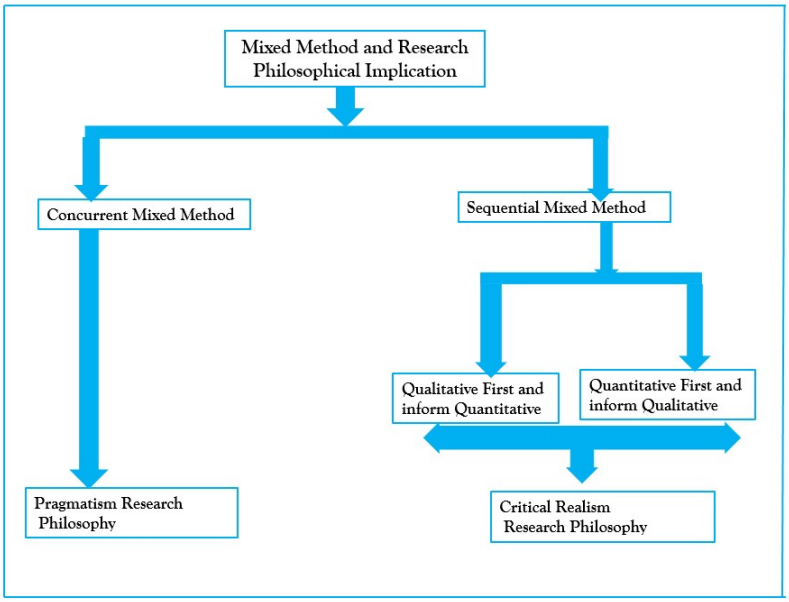


Figure 5.3: Mixed Method and Research Philosophical Implications (Bell *et al*; 2022)

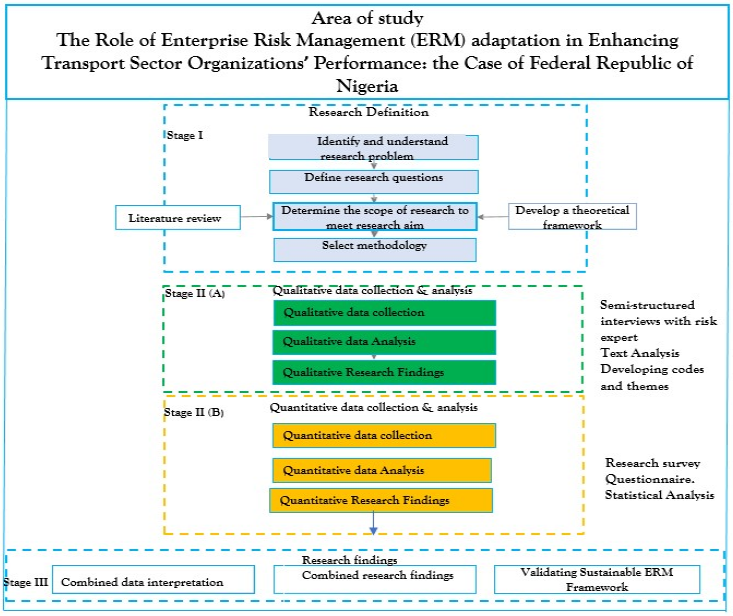


Figure 5.4: Research Strategy and Design (Source: Researcher)

6. DATA PRESENTATION

Ethical approval has been sought, awaiting approval from the GCU ethical committee before the commencement of data collection ahead of data presentation.

7. DISCUSSION OF INITIAL FINDINGS

7.1 Overview of Transportation role in Nigeria

The Federal Republic of Nigeria is a multi-ethnic and culturally diverse federation of thirty-six (36) autonomous states and the Federal capital territory (See Figure 7.1). The country is divided into six (6) geopolitical zones as shown in (Figure 7.2). The zones were not entirely carved out based on geographic location, but rather states with similar ethnic groups, and/or common political history were classified in the same zone. With approximately four hundred (400) ethnic groups and four hundred and fifty (450) languages. There was a need for the Nigerian government to merge similar groups for effective allocation of resources. As noted by (Onakola and Olajide, 2020), transportation constitutes one of the major features of the economic development of Nigeria. It has a key part to play in fostering inclusive economic growth, social development and expanding access to essential services linking people to jobs, education, health care etc. The report from (Statista, 2023) show the distribution of Gross Domestic Product (GDP) across the three (3) major economic sectors in Nigeria (see Figure 7.3). In 2021, agriculture contributed around 23.36 percent (%) to Nigeria's GDP, 31.41 percent (%) came from industry and 43.79 percent (%) from the services sector. Like in most thriving economies nowadays, the services sector which includes the transportation sector is gaining momentum in

Nigeria. More specifically to the transport sector, the report from (Trading Economics, 2022) indicates a growing Gross Domestic Products (GDP) contributions particularly from this sector (see Figure 7.4).

Figure 7.1: Map of Nigeria Showing the Transportation System (Source: Adanikin, 2017)

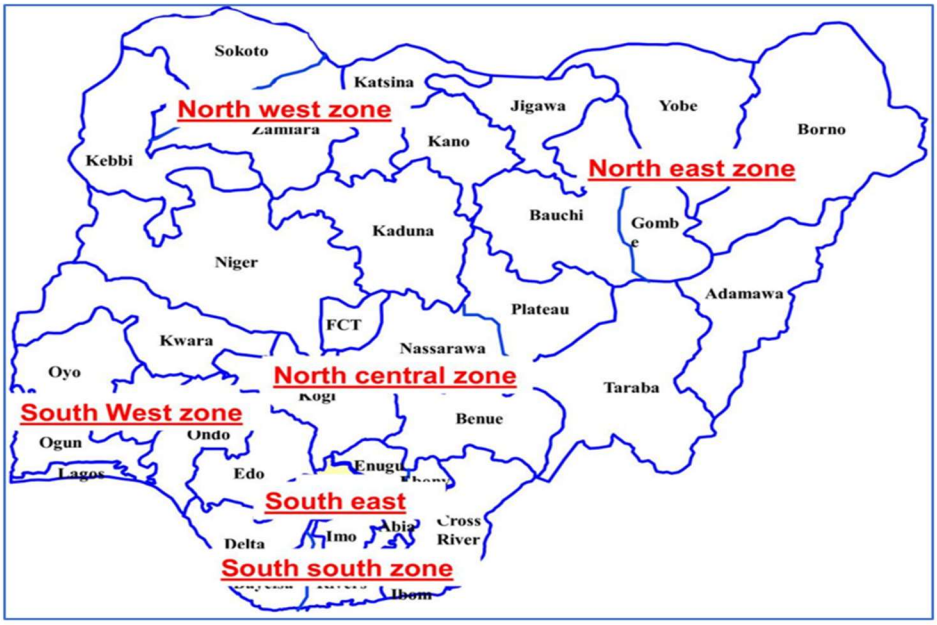


Figure 7.2: Map of Nigeria Showing the six geopolitical zones (Source: maps-Nigeria .com, 2023)

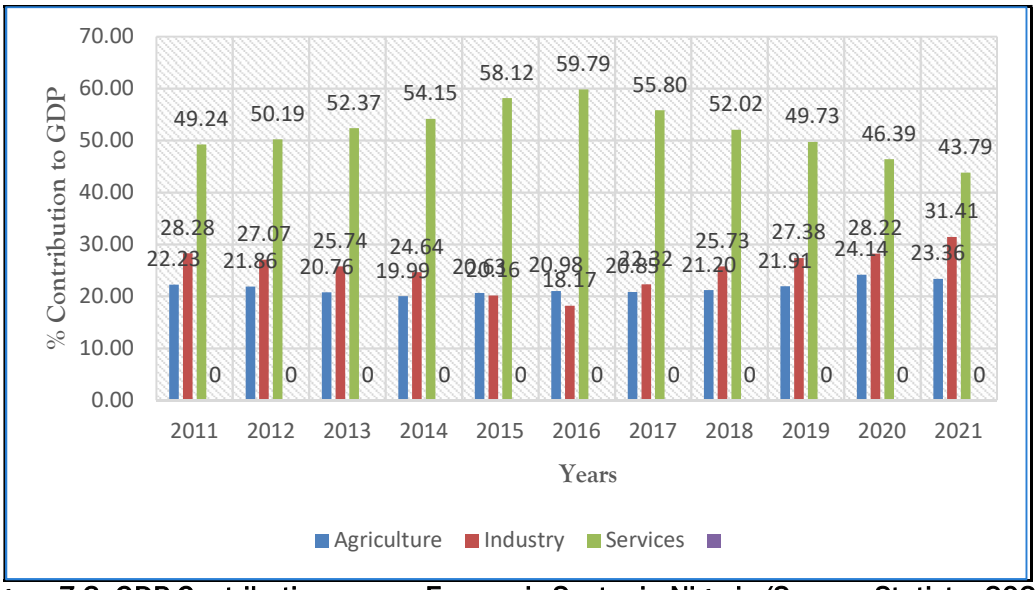


Figure 7.3: GDP Contribution across Economic Sector in Nigeria (Source: Statista, 2023)

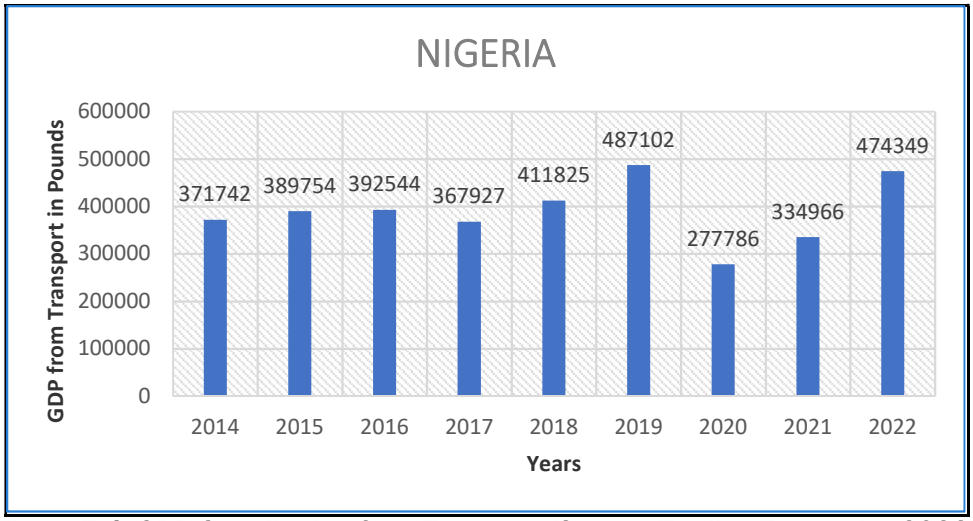


Figure 7.4: GDP Contribution from Transport (Source: Trading Economics 2022)

According to (The Report, Nigeria 2022), transport activity in Nigeria is overseen by the Federal Ministry of Transport, which includes dedicated bodies such as the Nigerian Airspace Management Agency, Nigerian Ports Authority (NPA), Nigerian Railway Corporation (NRC), Nigerian Civil Aviation Authority, Nigerian Shippers' Council and the Federal Airports Authority of Nigeria (FAAN). Development plans for the sector are incorporated into the Nigeria Integrated Infrastructure Master Plan (NIIMP), a 30-year roadmap established in 2014. Four modes of transportation which continues to play very significant roles in the social and economic development of Nigeria as noted by (Onakola and Olajide, 2020) are railways, roads, airways

and the ports/waterways which collectively handle over 99% of transportation in the country. Figure (7.5) shows the Nigerian transportation distribution channels.

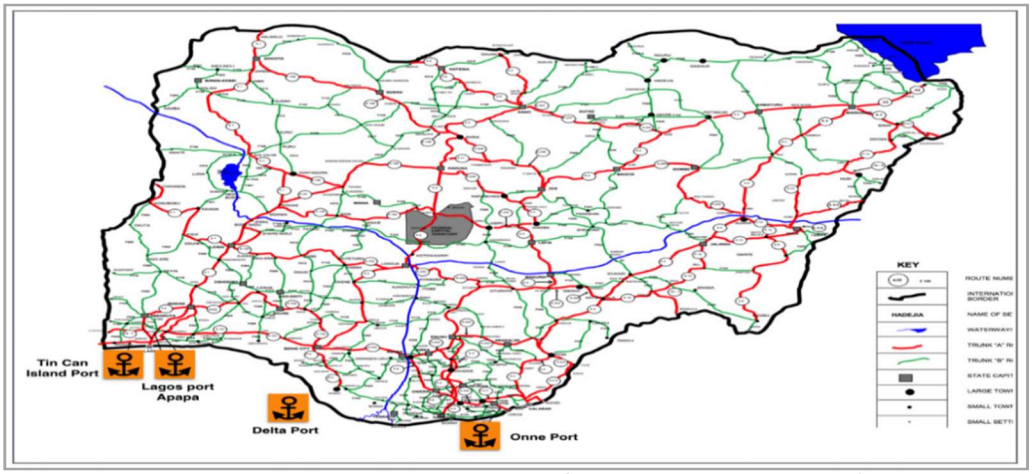


Figure 7.5 Nigeria Transport Distribution channels (Source: Federal Ministry of Power, Works & Housing).

According to the (NIIMP), Nigeria's roads and highways form the backbone of the country's transport network. Road transport is the largest segment and the most commonly used mode of transportation in Nigeria, accounting for more than 90 per cent of the sub-sector's contribution to the Gross Domestic Product (see Figure 7.6). Figure (7.7) below, also, illustrate the Nigeria Road Network, based on data from Logistic Capacity Assessment report, Nigeria has the largest road network in West Africa. It has an estimated length of 200,000km of which 18% is owned by the federal government, 16% owned by the state government and 66% (mostly earth roads) are owned by the local government. The federal roads constitute only 18% of the road network but carry over 70% of the vehicular traffic.

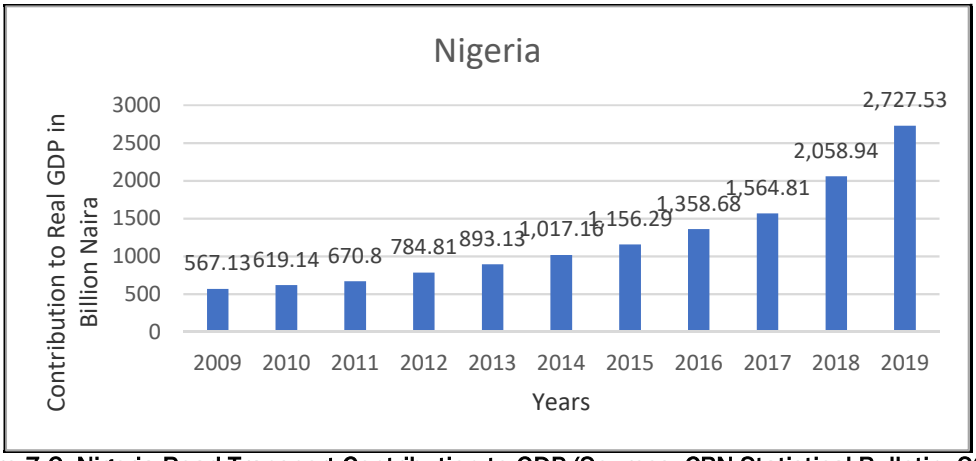


Figure 7.6: Nigeria Road Transport Contribution to GDP (Sources: CBN Statistical Bulletin, 2019)

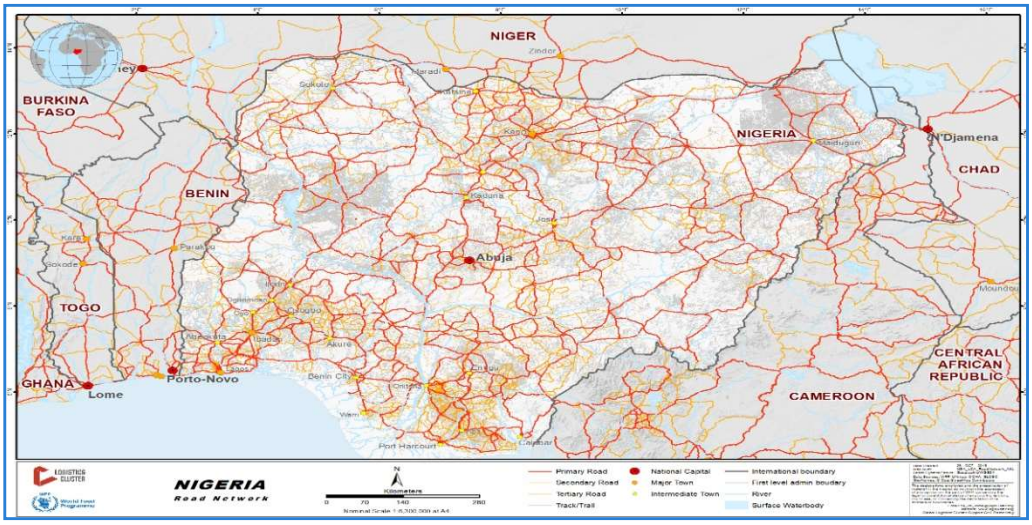


Figure 7.7 Nigeria Road Network (Source: Logistics Capacity Assessments, 2022)

7.2 General Issues and Sustainability Risk Challenges in Nigerian Transport Sector

Driven by rapid population growth (see figure 7.8 and 7.9), urbanisation, and increased per capita incomes, the number of vehicles in Nigeria is strongly growing and this will contribute to increase fossil fuel demand and resulting CO_2 emissions increase (see figure 7.10). It has been reported that Nigerian transport sector is dominated by gasoline and diesel (Gujba et al., 2013). In Nigeria, inspection and maintenance of vehicles are usually absent or insufficient. Moreover, a significant share of Nigeria's vehicle fleet consists of used imported vehicles (Haq and Schwela, 2012).

According to (Fidelis *et al*, 2019) there were about 6.6 million vehicles registered to drive on the Nigerian highways in 2010. In 2015 and 2016, the vehicles were estimated to have increased to 9.8 and 10.6 million, respectively (VPN, 2020). Similar research from (UNEP, 2019) noted that Nigeria had an urban population of 100 million residents with Lagos alone having an estimated population of about eighteen (18) and an annual growth rate at six (6%) percent. Consequently, urban transportation challenges like traffic congestion, under-investment in critical transport infrastructure, accidents and environmental pollution as depicted in (Figure 7.11) are brought on by the rising urbanisation.

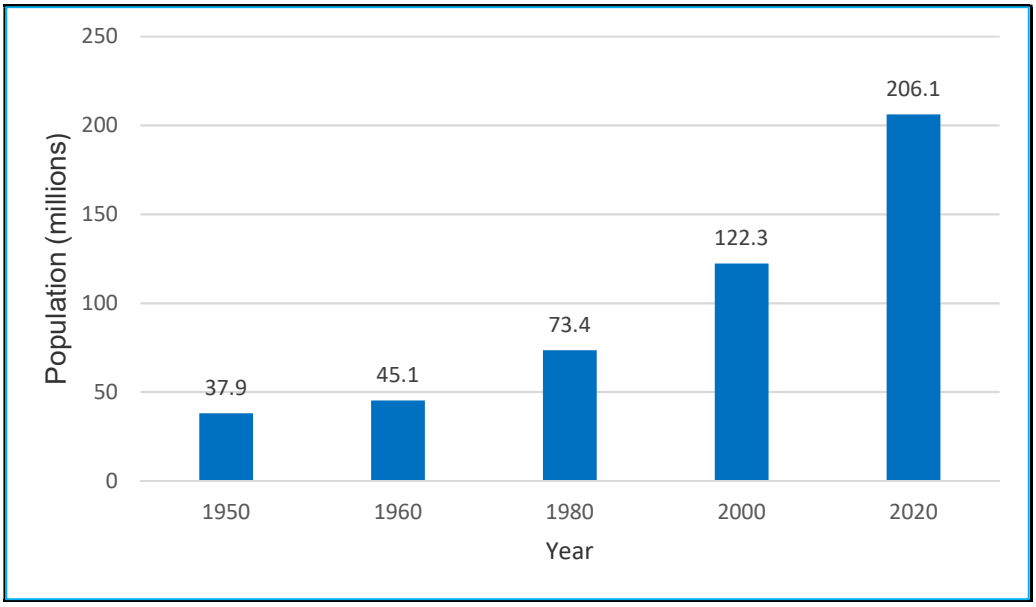


Figure 7.8: History of Nigeria Population (1950-2020) (Source: Statistical, 2020)

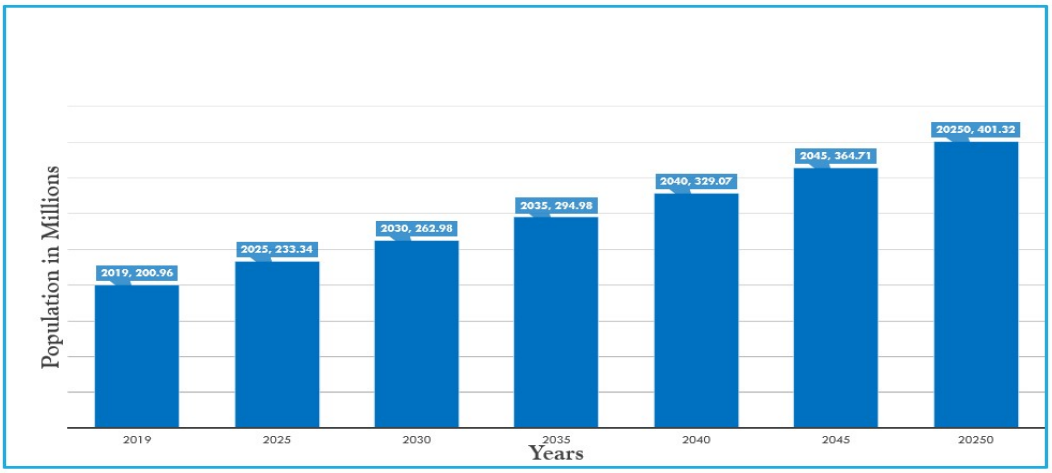


Figure 7.9: Nigeria Population Forecast (2019 and 2050) (Source: Statistical, 2022)

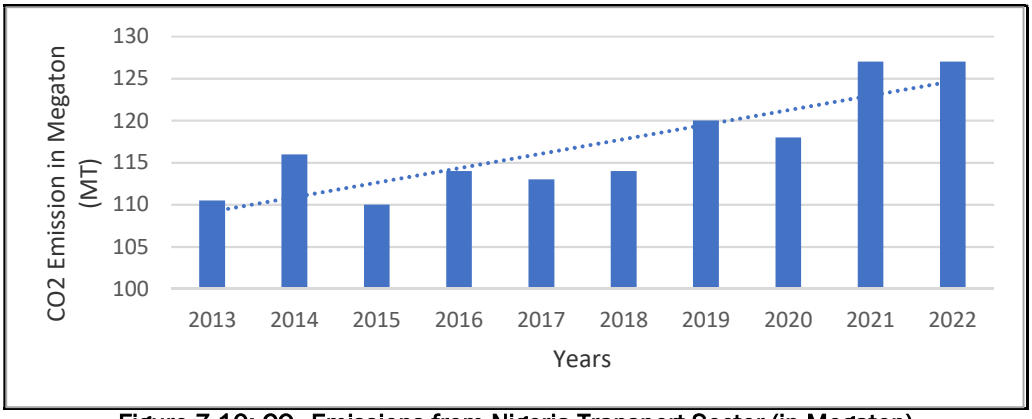


Figure 7.10: CO_2 Emissions from Nigeria Transport Sector (in Megaton) (Source Trading Economics. com)

Figure 7.11: State of Nigeria Roads (Source: Edema, 2019)

Moreover, (Fidelis *et al*, 2021) noted that, although, 30% of Lagos' mobility is on foot or by bicycle, the interaction between pedestrian and motorized vehicles in Lagos is unplanned and dangerous. The authors acknowledged that, historically, there has been no recognition of Non-Motorized Transport (NMT), with few segregated traffic facilities for pedestrians (such as walkways, zebra crossings, footbridges, underpasses and signs), and bicycle lanes. As a result, pedestrians and cyclists share the roadway with motorized transport. Where efforts have been made to provide facilities, these are under-used because of poor enforcement; many walkways are used as parking lots, trading and storage areas for abandoned material.

On the energy consumption side, the transport sector accounts for around 20% of global energy consumption and the sector is highly dependent on fossil fuels like gasoline and diesel (Prasad and Raturi, 2018). It has been reported that Nigerian transport sector is dominated by gasoline and diesel (Gujba et al., 2013). Inspection and maintenance of vehicles are usually absent or insufficient and a significant share of Nigeria's vehicle fleet consists of used imported vehicles (Haq and Schwela, 2012).

It is crucial to determine ways of saving energy in the Nigerian Transport Sector (NTPS) and reduce carbon emission for a sustainable environment. Table (7.1) below summarised some of the challenges in the Nigeria transport sector as noted by many academics and international body. Also, some of the key challenges in ERM implementation are as discussed below the table.

Table 7.1: Transportation risk challenges in Nigeria

Authors	Title	Key Transportation Challenges
Onakola &Olajide (2020)	Problem and Challenges facing Nigeria Transportation Sector	▪ Under-investment in critical transport infrastructure, ▪ Lack of maintenance and ▪ Lack of diversity in modes of transportation
United Nation- (2020)	Global Reports on Human Settlements - UN-Habitat	▪ Coordination with different stakeholders ▪ Lack of appropriate best practice examples, ▪ Bureaucratic constraints on transport infrastructure project delivery ▪ Limited human resources and funding capacity ▪ Culture that consider inefficiencies in transport system as normal. ▪ Historical legacy and recent conflicts
Edema (2019)	Risk management framework for safe transportation of petroleum products	▪ Poor road network, regulatory framework, accident reporting-investigating culture and poor coordination with stakeholders ▪ Corruption and rent-seeking culture ▪ Traffic congestion, Increasing population growth
Mishal Alajmi (2018) Abah and Esq (2019)	Strategic Enterprise Risk Management Alignment The Importance of Enterprise Risk Management to Public Sector Organisations in Nigeria	▪ Lack of proper industry-specific guidance material; ▪ Adverse climate conditions ▪ Lack of leadership commitment, ▪ Consideration of (Internal and External) context ▪ Poor risk awareness culture ▪ Corruption and rent-seeking culture ▪ Poor regulatory policy ▪ Resources/Budget constraints

7.3 Limited Enterprise Risk Management (ERM) Practices in Nigeria

The practice of ERM is an evolving practice among public sector organisations globally (Hendy, 2018). In Nigeria, the absence of adequate project management practices including compliance and risk management in the public sector has been a long-standing issue and it has cost the country a lot in various ways (Abah and Esq, 2019). Furthermore, According to Nzekwe *et al*. 2015; Amade *et al.,* 2015) all highly ranked factors leading to project failure in Nigeria were project management related risk issues.

ERM is mainly practised in the private sector organisations with inadequate levels of implementation in the public sector as argued by (Abah and Esq, 2019) in their research work focused on the importance of ERM to public sector Organisations in Nigeria, the authors noted that the absence of a specific legal framework for the establishment of project and programme management practices in the public sector may be responsible, they recommended that public sector organisations needs to establish ERM processes, cadres for project and program management officer, and compliance and risk management officers.

Some ERM practice evidence in Nigeria include: Adekunlt *et al* (2011)- focusing on the challenge of risk management in Nigerian banks in the post consolidation era; Ugwuanyi and Ibe, (2012) who studied ERM and performance in the Nigerian brewery industry by sampling (375) respondents. According to the author, 93 percent (%) of the respondents strongly agreed that ERM could improve the performance of companies in the brewery industry in Nigeria because the framework of an integrated approach to managing all risk is more effective than the fractional (silo) approach within the organisation. Other evidence includes: Dabari and Siadin (2015)- Determinants influencing the implementation of ERM in the Nigerian banking sector; Derenyielo and Joseph, (2018)-Risk Management and ERM in Nigeria: Implications for National Development and Growth); Iwedi *et al*, (2020)-ERM Practice and Shareholders value: evidence from selected quoted firms in Nigeria); Ade *et al*, 2020- ERM Practices and Survival of Small and Medium Scale Enterprises in Nigeria.

Most of these studies highlight the scenarios in the private sector. The researcher acknowledged that section 6.0 of the Code of Corporate Governance for Banks and Discount Houses in Nigeria (CBN 2014) provides for risk management, it was not very detailed on the risk management approach but rather encouraged clear roles and responsibilities for the Board, Board Risk Management Committee, Management, and Internal Audit.

8. CONCLUDING REMARKS

The initial findings revealed both a growing need and interest in the development of enterprise-wide risk management approaches in the transport sector. Concerns have been raised that ERM is a critical determinant of the success of effective risk resiliency for organisations in the transport sector. Based on Althonayan (2003) matrix of evaluating literature, most of the contributions made to the literature relating to ERM are mainly descriptive rather than implementational. Reviewed archival data (from public domain) revealed that there is generally an under-representation of GS countries in ERM and transportation risk management literature. In Nigeria, in particular, no sector's specific ERM Framework for Transport organisations is developed yet. Available Literature discussing ERM and transportation risk and mitigation issues in Nigeria has focused mainly on the general challenges of transportation as noted above.
This Literature provides some limited insights on the adoption and implementation of ERM to address transportation risk management based on Nigeria's context as noted in Chapter two (Section 2.11) which leads to the gaps identified, which are consequently used in the construction of the sustainable ERM theoretical model.

9. CONTRIBUTIONS TO KNOWLEDGE

The proposed research contributions are as noted below:

- Development of a sustainable ERM framework complemented with ST/SD for enhancing transport sector performance in the Global South using Nigeria as a case study.
- Provide informed knowledge regarding ERM practical implementation guidance, which is intended to improve decision making, planning and prioritisation in the transport sector by providing comprehensive and structured understanding of key ERM components.

- The Paper can serve as a basis to motivate prospective research and further critical initiatives to promote the development of truly sustainable transport system in the GS

10. RECOMMENDATIONS:

Based on GN practices, there should be legal policies recommending that public sector organisations establish ERM processes, cadres for project and program management officers as well as compliance and risk management officers. There is a crucial need for research collaboration and funding gear towards sustainable transport systems in the Global South (GS)

REFERENCES

1. Abah, R. C., & Esq, E. C. O. (2019). The Importance of Enterprise Risk Management to Public Sector Organisations in Nigeria. *Public Policy and Administration Research*, *9*(3), 132-139. [Viewed 19 July 2022], Available from: https://www.researchgate.net/profile/Roland-Abah/publication/332159333_The_Importance_of_Enterprise_Risk_Management_to_Public_Sector_Organisations_in_Nigeria/
2. Albastaki, O., & Shaukat, A. (2023). Enterprise Risk Management and Stakeholders: An Integrating Framework and Application. [viewed, 27 Aug 2022], Available from: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4338419
3. Althonayan, AA. (2003) Integrating technology strategy with business strategy in the airline industry. University of Brunel. PhD Thesis.
4. Anton, S. G., And Nucu, A. E. A., (2020). Enterprise Risk Management: A Literature Review and Agenda for Future Research. Journal of Risk and Financial Management [online]. 13(11), pp.281. [viewed 20 September 2021]. Available from: https://www.proquest.com
5. Apanisile S. Temitope (2018): Enterprise Risk Management Practices in Nigeria: Online [Viewed 5 June 2022], Available from: https://www2.erm-academy.org/publication/risk-management-article/erm-practices-nigeria/
6. Committee of Sponsoring Organizations of the Treadway Commission (COSO, 2017): Enterprise Risk Management Integrating with Strategy and Performance [Online]. [Viewed, 7 July 2022]. Available from: https://www.coso.org/Shared%20Documents/2017-COSO-ERM-Integrating-with-Strategy-and-Performance-Executive-Summary.pdf
7. COSO ERM Framework Overview: [Online]. [Viewed, 22 July, 2022]. Available from: https://www.coso.org/Shared%20Documents/2017-COSO-ERM-Integrating-with-Strategy-and-Performance-Executive-Summary.pdf
8. Curtis, J. A., D'Angelo, D., Hallowell, M. R., Henkel, T. A., & Molenaar, K. R. (2012). Enterprise Risk Management for Transportation Agencies. Transportation Research Record, 2271(1), 57–65. [viewed, 14 Apr 2022]. Available from: https://doi.org/10.3141/2271-07
9. Edema E. J., (2019). Poor Public Transport Infrastructure in Lagos Nigeria, How Sustainable Improvement could enhance well-being of the people and provide environmental benefits [online]. Degree thesis. Novia University of Applied Sciences / Yrkeshögskolan Novia.
   [viewed 10 September 2021]. Available from: https://www.theseus.fi/bitstream
10. Energy Information Administration (2017): Today in Energy. Online. [viewed 22 May, 2022]. Available at: https://www.eia.gov/todayinenergy/detail.php?id=32912
11. Institute of Risk Management (IRM). (2018b). A Risk Practitioners Guide to ISO 31000: 2018. Institute of Risk Management, London. Online: [Viewed, 5 March 2022]. Available from: https://www.theirm.org/news/standard-deviations-a-risk-practitioner-guide-to-iso-31000/
12. Institute of Risk Management (IRM). https://www.theirm.org/

13. International Energy Outlook (2017) – EIA. [Viewed 5 June 2022]. Available from: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.eia.gov/outlooks/ieo/pdf/0484(2017) pdf
14. International Standards Organisation (ISO: 2009), "ISO 31000: Risk management – principles and guidelines", Viewed 22, June 2022]. Available from: (www.iso.org).
15. International Standards Organisation: ISO 31010- Risk Assessment Techniques: [Viewed 22, June 2022]. Available from: https://practicalrisktraining.com/iso31010
16. Donohue Jessica (2022): Enterprise Risk Management vs. Traditional Risk Management: Which One Is Best for You? Online. [viewed, 15 July, 2022]. Available from: https://www.diligent.com/insights/grc/enterprise-risk-management-vs-traditional-risk-management/#:~:text=TRM%20tends%20to%20focus%20on,on%20opportunity%20alongside%20pure%20risk.
17. Kaplan, R. S. And Mikes, A. (2014). Towards a Contingency Theory of Enterprise
18. Risk Management', Harvard Business Review, January, [Online]. [Viewed, 7 July 2022]. Available from:
19. https://www.hbs.edu/ris/Publication%20Files/13-063_5e67dffe-aa5e-4fac-a746-7b3c07902520.pdf
20. Kaewunruen, S., Sussman, M. & Matsumoto, A. (2016). Grand Challenges in Transportation and Transit System, Frontiers in Built Environment. [online] 2, pp4 [viewed 7, January 2022] Available from: https://www.frontiersin.org/article/10.3389/fbuil.2016.00004
21. Keith, J. L. (2014) Developing a strategic ERM alignment framework-finance sector. PhD. Brunel University London. [Viewed 2nd September 2022] Available at: http://bura.brunel.ac.uk/handle/2438/10981
22. Map of Nigeria showing the six geopolitical zones (2023): [Online]. [Viewed 2nd June, 2023]. Available from: https://maps-nigeria.com/map-of-nigeria-showing-the-six-geopolitical-zones
23. Mikes, A. (2009) Risk Management and Calculative Cultures', Management
24. Accounting Research, 20 (1), pp.18-40. [Viewed, 5 March 2022]. Available from: https://doi.org/10.1016/j.mar.2008.10.005
25. Mikes, A. and Kaplan, R.S., 2015. When one size doesn't fit all: Evolving directions in the research and practice of enterprise risk management. Journal of applied corporate finance, 27(1), pp.37-40. [viewed, 18 June, 2022]. Available from: https://doi.org/10.1111/jacf.12102
26. Mishal Alajmi (2018). Enterprise Risk Management: Development of Strategic ERM Alignment Framework for Oil and Gas Industry in Kuwait: PhD Thesis: Brunel University London (Doctoral dissertation, Brunel University London).
27. National Cooperative Highway Research Program (NCHRP, 2016): Managing Risk Across the Enterprise: Final Quick Guide for State Departments of Transportation. [online]. [Viewed 21st June 2021] Available at: https://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP08-93_QuickGuide.pdf

28. Nationally Determined Contribution (NDC) to the Paris Agreement: Nigeria. [Online]. [Viewed, 25th June 2022]. Available from: https://www.iea.org/policies/11784-nationally-determined-contribution-ndc-to-the-paris-agreement-nigeria
29. New York City, Enterprise Risk Management Initiative report (NC, 2018). Key Infrastructure Elements for a Successful ERM Program. [Online]. [Viewed, 8 July, 2023]. Available from: https://strategicdecisionsolutions.com/3-key-erm-infrastructure-elements/
30. Nigeria GDP from Transport: Online: [viewed, 25 Nov 2022]. Available from: https://www.fxempire.com/macro/nigeria/gdp-from-transport
31. Olaniyi, T. K., 2008. Decision support systems for sustainable energy planning in a developing economy, London: Ph.D. thesis: London South Bank University
32. Onokala, P. C. and Olajide, C. J. 2020 Problems and Challenges Facing the Nigerian Transportation System which affect their Contribution to the Economic Development of the Country in the 21st Century. [online]. [viewed 12 October 2021]. Available from: https://www.sciencedirect.com/science/article
33. Oxford Business Group (2022) : Multi-modal transport links to boost Nigeria's competitiveness. [viewed, 7 Jan 2023]. Available from: https://oxfordbusinessgroup.com/reports/nigeria/2022-report/economy/road-to-expansion-a-focus-on-multi-modal-connections-to-improve-efficiency-and-boost-competitiveness-while-relieving-strain-on-existing-systems
34. Rubino, Michele. (2018). A Comparison of the Main ERM Frameworks: How Limitations and Weaknesses can be Overcome Implementing IT Governance. International Journal of Business and Management. [Online] 13(12): pp203-214. [Viewed, 5 March 2022]. Available from: DOI:10.5539/ijbm.v13n12p203
35. Rubino, M., Vitolla, F., & Garzoni, A. (2017a). The impact of an IT governance framework on the internal control environment. Records Management Journal, 27(1), 19-41. [Viewed 3 September 2022], Available at: https://doi.org/10.1108/RMJ-03-2016-0007
36. Samuel Temitope Apanisile (2022): ERM Practices in Nigeria. [Viewed, 29 August 2022], Available from: https://www2.erm-academy.org/publication/risk-management-article/erm-practices-nigeria/
37. Schein, Edgard, Schein, Peter. Organizational Culture and Leadership. Jossey-Bass. 2016
38. Shaaban, K., Elamin, M. And Alsoub, M., (2021). Intelligent Transportation Systems in a Developing Country: Benefits and Challenges of Implementation. Transportation Research Procedia. [online] 55, pp.1373-1380. [viewed 25, November 2021] Available from: https://doi.org/10.1016/j.trpro.2021.07.122.
39. Shigeru Kawasaki (2015): The challenges of transportation/traffic statistics in Japan and directions for the future, IATSS Research, Volume 39, Issue 1, pp 1-8 [Viewed, 7 July 2022]. Available from: https://doi.org/10.1016/j.iatssr.2015.06.002.
40. Sustainable Development Goals (SDGs) Knowledge Platform (2021): Sustainable Transport. [Viewed, 5 March 2022]. Available from: https://sustainabledevelopment.un.org/topics/sustainabletransport

41. Transport for London Strategic Risk Management Update (2018) [Online] [Viewed, 7 July 2022]. Available from: https://content.tfl.gov.uk/aac-20180607-part-1-item14-strategic-risk-update.pdf
42. The Online BRT Planning Guide. [Viewed 6 July 2023]. Available from: https://brtguide.itdp.org/branch/master/guide/
43. The BRT Planning Guide (2017): [Online]. [Viewed 25th June 2022]. Available from: https://www.itdp.org/2017/11/16/the-brt-planning-guide/
44. The Report, Nigeria 2022: Transport and Logistic. [viewed 9Jan, 2023]. Available from: https://oxfordbusinessgroup.com/reports/nigeria/2022-report/transport-and-logistics
45. The VUCA experience and IRM Agenda 2025: An exploration of the importance of the future risk manager in understanding the impact of risk leadership in a VUCA world. [viewed, 16 June 2022], Available from: https://www.theirm.org/news/an-exploration-of-the-importance-of-the-future-risk-manager-in-understanding-the-impact-of-risk-leadership-in-a-vuca-world/
46. The Future of Mobility, (2019): A time of unprecedented change in the transport system. UK, Government Office for Science: [Viewed, 7 July 2022]. Available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/780868/future_of_mobility_final.pdf.
47. The Federation of European Risk Management Associations-FERMA, (2021): The Contribution of Enterprise Risk Management (ERM) to Sustainability. [Viewed 8 July 2022]. Available at: https://www.ferma.eu/publication/ferma-issues-first-sustainability-risk-guide-for-european-risk-managers/
48. The Risk Management Society (RIMS, 2011): [Viewed 6 June 2022]. Available from: https://www.rims.org/about-us/annual-reports/rims-2011-annual-report
49. The Geography of Transport Systems: Transportation, Sustainability and Decarbonization, [Viewed, 7 July 2022]. Available from: https://transportgeography.org/
50. Trading Economics (2022): GDP from Transportation Forecast (2022/23). [Viewed, 6 July 2022]. Available from:
51. https://tradingeconomics.com/forecast/gdp-from-transport?continent=europe
52. Transportation in Nigeria: Understanding the Distribution Channels. [viewed, 7 Jan 2023]. Available from: https://kpakpakpa.com/distribution-channels-understanding-transportation-in-nigeria/
53. UK Departments for Transport, agencies and public bodies, [Viewed, 7 May 2022]. Available from: https://www.gov.uk/government/organisations#department-for-transport
54. US Department of Transport (2021): Synthesis Report: Federal Highway Administration, Office of International Programs Successes of International Exchange from the 1990s to 2020 [Online] [Viewed, 7 July 2022]. Available from: https://international.fhwa.dot.gov/pubs/pl21025/pl21025.pdf
55. Ugwuanyi, U.B. and Ibe, I.G., (2012). Enterprise risk management and performance of Nigeria's brewery industry. Developing Country Studies, 2(10), pp.60-67. [Viewed 09 June 2022], Available from: https://web.actuaries.ie/sites/default/files/erm-resources/02_Enterprise_Risk_Management_and_Performance_of_Nigerias_Brewery_Industry.pdf.pdf

56. United Nations-HABITAT. (2018). Planning and Design for Sustainable Urban Mobility. Retrieved from USA & CANADA UN-report on world population projection: [Online]. [Viewed, 4 June 2022]. Available from:
57. https://www.un.org/development/desa/en/news/population/2018-revision-of-world-urbanization-prospects.html
58. World Economic Forum, WEF (2014) Global Risks Report 2014. 19th edition. Geneva, Switzerland: World Economic Forum
59. Willis Towers Watson Transportation Risk Index 2016: Navigating risk in the transportation sector, [Online]. [Viewed, 7 July 2022]. Available from:
60. https://www.ahcusa.org/uploads/2/1/9/8/21985670/transportation_risk_index_willis_tower_watson.pdf
61. World Bank (2022): Transport. [viewed, 27 Aug 2022], Available from: https://www.worldbank.org/en/topic/transport/overview#1
62. World Economic Forum (2022): Policies to make transport more sustainable in cities, [online]. [Viewed, 5 March 2022]. Available from: https://www.weforum.org/agenda/2022/03/five-transit-policies-cities-should-prioritize-to-become-more-sustainable/
63. World Summit on Sustainable Development, (2002), Johannesburg. [Viewed, 5 Nov 2021]. Available from: Available at: https://www.un.org/en/conferences/environment/johannesburg2002
64. World Business Council for Sustainable Development (2017): Sustainability and enterprise risk management: The first step towards integration: [viewed, 27 Aug 2022], Available from: https://www.wbcsd.org/Archive/Assess-and-Manage-Performance/Resources/Sustainability-and-enterprise-risk-management-The-first-step-towards-integration
65. Yin, R. K., (1981). The case study as a serious Research Strategy. Washington DC. USA: The case study Institute.