Developing a National-Level Road Transportation Sustainability Plan – Case Study of Namibia

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ABSTRACT
This paper describes a recently-completed initiative to develop a National-Level Road Transportation Sustainability Plan for the country of Namibia, and specifically for the Namibian Roads Authority. The goal of the process was to define how sustainability issues can be addressed in a broad-based, strategic manner. The process was driven by the local needs, the existing context, and informed by stakeholder input. Namibia faces unique transportation sector challenges, and these factors were considered in developing the plan. After conducting a needs assessment, and developing a sustainability statement, a set of sustainability goals, and specific objectives, performance measures and actions were identified. The actions and measures identified in the plan are envisioned to have a two-way relationship with the existing transportation sector plans in Namibia, such as the Roads Authority’s Strategic Plan, Namibia’s Integrated Transport Master Plan, the Regional Master Plans, Windhoek’s Urban Transport Master Plan, etc. This sustainability plan was developed by stakeholders with knowledge of these various plans and initiatives, to be consistent with the direction and goals of these plans. It is also envisioned that future updates of these plans can be informed by the goals, objectives, performance measures, and actions listed in this plan. Through the implementation of this sustainability plan, it is expected that Namibia can not only position itself to address a broad range of transportation issues in a strategic manner, but emerge as a leading nation in Africa with regard to sustainable transportation.
INTRODUCTION
The Republic of Namibia is a nation of over 2 million in Southern Africa that faces several unique transportation challenges that are different from many other developing nations. The transportation challenges faced by developing nations are often framed in the context of urban transportation and mass transit or transportation needs. Sustainable transportation initiatives generally highlighted as success stories in developing nations often include programs such as bus rapid transit or mass transit solutions, high speed rail for interurban travel, urban place-making, etc. Namibia’s large landmass and very low population densities are very different from this context. However, the nation still faces infrastructural challenges when it comes to establishing and maintaining a well-functioning, effective and efficient transportation network. Namibia plays a key role in the economy of the region, as a port hub and trade corridor, providing access to interior landlocked countries.

The Roads Authority of Namibia (RA) recently established a Technology Transfer (T2) center in collaboration with the U.S. Federal Highway Administration (FHWA), with a view of promoting research, technology transfer, and shared learning for transportation professionals and public agencies in Namibia.

This paper describes the recent development of a Road Transportation Sustainability Plan for Namibia, conducted through a collaborative process with the RA, T2 Center, and other transportation sector stakeholders. As discussed in later sections of the paper, the concept of sustainability is closely held to the mission and vision of the RA. The intent in developing this Sustainability Plan was to help the RA/T2 Center further define how sustainability issues can be addressed in a broad-based, strategic manner. In doing so, Namibia can not only position itself to address a broad range of transportation issues in a strategic manner, but also take advantage of international funding opportunities for sustainable transportation projects, and emerge as a leader in Africa with regard to sustainable transportation.

The development of this plan included a study of background information and relevant literature, training sessions for key T2 Center staff, as well as stakeholder interaction through a workshop session, as discussed in following sections of the paper.

APPROACH AND KEY CONCEPTS

Overall Approach
The overall approach to the development of a sustainability plan is based on the Guidebook for Sustainability Performance Measurement for Transportation Agencies that was developed by the authors under the National Cooperative Highway Research Program (NCHRP) (1). The framework prescribed in this work uses a set of general sustainability principles as a starting point, which is then applied through transportation-sector specific goals and performance measures. The principles of sustainability were elaborated in the guidebook as follows:

“Sustainability entails meeting human needs for the present and future, while:

- Preserving and restoring environmental and ecological systems;
- Fostering community health and vitality;
- Promoting economic development and prosperity; and
- Ensuring equity between and among population groups and over generations.”
These principles of sustainability not only reflect the three dimensions—economic, social and environmental— but also incorporate equity and human needs. A visual illustration of the sustainability principles are shown in FIGURE 1, and emphasize the role of equity in reinforcing the other dimensions of sustainability.

![Figure 1: Sustainability Principles Used as Starting Point for the Plan (1).](image)

**FIGURE 1 Sustainability Principles Used as Starting Point for the Plan (1).**

### Application to the Namibian Context

The development of the sustainability plan was facilitated through an interactive process that engaged relevant stakeholders, including a core team of T2 Center staff who were involved in the preliminary planning and facilitation of the workshop. These staff also received training on basic concepts relating to sustainability and performance measures. A literature review was also performed to gather relevant background information and understand the overall context in which the sustainability plan is being developed. Important transportation stakeholder groups to be involved in the development of the sustainability plan were also identified and invited to participate in the process. The workshop and the plan development process are described in a separate section further in this paper.

The authors also reviewed several examples of sustainable transportation plans and broader sustainability initiatives (2,3,4,5,6,7) for developing countries to provide insight for the Namibian context and to understand how sustainable transportation actions and strategies are being implemented in various contexts around the world. As noted previously, the conditions in Namibia are unique compared to some other developing nations, because the transportation sector covers a vast landscape with a low population density. Therefore, while existing plans and strategies provide a useful reference, several strategies applicable to highly populated, dense urban conditions are found not to be entirely applicable in the Namibian context.
BACKGROUND AND LITERATURE REVIEW

Namibia’s Transportation Sector

Namibia’s position along the coast and location in Southern Africa provides key transportation links for interior landlocked African countries. Namibia’s transportation system links several Southern Africa countries including three landlocked countries (Botswana, Zimbabwe, and Zambia). Namibia serves as a key trade route for moving goods from ports throughout Southern Africa. Namibia’s transportation sector including freight and its ports serve as a vital resource for moving goods throughout the continent.

According to Namibia’s Fourth National Development Plan, Namibia’s infrastructure is in good condition including the national transportation infrastructure, electricity distribution lines, dams, telecommunications, and mobile communication infrastructure. However, Namibia faces challenges in maintaining and improving infrastructure as its infrastructure revenue levels are not at the level of finance needed for growth and maintenance needs (8). Namibia’s transportation sector faces other hurdles such as a growing population, high accident numbers, limited extent of network and limited transportation planning (9). There are several stakeholders involved in the transportation sector including government ministries, government agencies, regional and local government, legislative and judiciary, and state-owned enterprises (10).

Governance Structure

The Namibian government has three branches of government—executive, legislative, and judiciary—with the president presiding over all branches. Within the executive cabinet are Government Ministries, which are responsible for various government services. The Ministry of Works and Transport is comprised of four departments – the Department of Government Air Transport Services, the Department of Transport, the Department of Works, and the Department of Administration and Centralized Support Services. Additionally, in 1999 as part of road sector reform in Namibia, three State-Owned Enterprises—the Roads Authority, Road Fund Administration, and Roads Contractor Company—were established within the Ministry of Works and Transport to assist in conducting functions relating to the control of the national road network. The Roads Authority operates under the purview of the Department of Transport and the Ministry of Works and Transport.

The Roads Authority

The Roads Authority Act of 1999 established the Roads Authority and gave the newly created organization the responsibility of managing of the national road network such as the planning, construction and maintenance of all national roads (11). A map of the road and transportation network of Namibia is shown in Figure 2.
The Roads Authority’s core function is to construct and maintain Namibia’s road sector through the growth and expansion of the road network and infrastructure. The Roads Authority is divided into six technical divisions, shown in FIGURE 3, as well as various other sections that provide the Authority with administrative support (12). The Roads Authority’s mission is “to manage a safe and efficient national road network to support economic growth” and the vision is “to be a sustainable road sector, which is ahead of national and regional socio-economic needs in pursuit of Namibia’s Vision 2030” (13).
The Roads Authority and the Road Fund Administration use a Road Management System (RMS), which is an integrated management framework encompassing management of the road network. The development of the RMS was included in the Roads Authority Act of 1999. The purpose of the RMS is to identify needs, quantify needs, prioritize needs, and assist in planning and management of the road network. Many road management sub-systems are included in Namibia’s RMS such as road referencing, information management and control, traffic surveillance, maintenance management, and geographical information as well as many others.

The Roads Authority has periodically developed strategic plans with objectives for each division within the organization. The strategic plan for 2008-2010 included a three-year timeframe with strategic goals, strategies, measurable outputs, and action plans and the first strategic goal was to provide a safe, sustainable, and efficient management of the national road network. The strategic plan for 2012-2015 outlines a framework for the Roads Authority to focus on strategic objectives within two themes—Governance and Leadership and Manage the Road Network. Some of the strategic objectives listed in the plan identified as relevant to a sustainability plan include those related to assuring a safe road network, managing traffic and transport operations, and managing road infrastructure.

Road Fund Administration

The Road Fund Administration is responsible for managing the funding of transportation projects and programs through a road user charging system (through licenses fees, fuel taxes, fines for abnormally-loaded vehicles, etc.) and a road fund. The Road Fund Administration allocates funds to projects that sustain and improve the national road network system and major urban arterials. It also funds projects that maintain urban roads, traffic information, safety, and research and law enforcement.
Roads Contractor Company
The Roads Contractor Company’s responsibilities include constructing and maintaining any of the roads. Construction work includes building bridges, dams, tunnels, canals, reservoirs and railway infrastructure. The road maintenance includes the construction of gravel, bitumen and salt roads, and also improving paved roads (17).

Namibia’s Fourth National Development Plan
The Namibian Fourth National Development Plan for 2012-2017, outlines the government’s development goals for the next five years. The development plan outlines the three main goals—faster and sustainable economic growth, the creation of employment opportunities, and enhanced income equality. The development plan highlights the role of infrastructure as a basic enabler to the country’s economic development. The plan highlights the sector’s challenges and proposed strategies to address them, outlined in TABLE 1. The outlined strategies are high-level economic infrastructure approaches intended to assist the country in “becoming the most competitive tourist destination in sub-Saharan Africa and increase the manufacturing sector’s contribution to GDP” (18). The Development Plan notes the Ministry of Environment and Tourism is the main stakeholder responsible for implementing these strategies as well as the Ministry of Agriculture, Water and Forestry; Ministry of Regional and Local Government, Housing and Development; and Ministry of Information, Communication and Technology.
### TABLE 1. Summary of Public Infrastructure Challenges and Proposed Responses

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Implication if Challenge is not Addressed</th>
<th>Strategy to Address Challenge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underinvestment in core infrastructure</td>
<td>Reduced international competitiveness</td>
<td>Invest further in core infrastructure</td>
</tr>
<tr>
<td>The Port of Walvis Bay continues to operate near its full capacity</td>
<td>Reduced efficiency may impact on the case put forward to develop Namibia as a logistics hub</td>
<td>Expand the port in good time</td>
</tr>
<tr>
<td>The core rail network is old and dilapidated</td>
<td>Safety and reliability of rail transport are compromised, which will also affect industry</td>
<td>Fix the core rail network</td>
</tr>
<tr>
<td>Road maintenance has been neglected</td>
<td>Safety and reliability of road transport are compromised, which will also affect industry</td>
<td>Restore the balance between expansion of new roads versus maintenance</td>
</tr>
<tr>
<td>Current airport infrastructure is not sufficient to support aviation expansion as well as of other modes of transport</td>
<td>Reduce the Walvis Bay’s ability to perform at full capacity and compromise synergy between air transport and other modes of transport</td>
<td>Expand airport infrastructures to support development of other modes of transport</td>
</tr>
<tr>
<td>Dependency on imported electricity continues</td>
<td>Industry will be negatively affected by power shortages</td>
<td>Establish base load capacity requirement and address the demand side during the NDP4 cycle</td>
</tr>
<tr>
<td>Scarcity of water resources in Namibia limit industrialization in the country</td>
<td>Industrialization will not achieve its full potential</td>
<td>Ensure water security by 2017 and address demand issues by establishing additional infrastructure</td>
</tr>
<tr>
<td>The majority of Namibians have no access to affordable formal housing</td>
<td>Impacts negatively on social cohesion and social conduct</td>
<td>Increase efforts to provide affordable housing to all</td>
</tr>
<tr>
<td>Inadequate ICT infrastructure</td>
<td>Impacts negatively on business efficiencies</td>
<td>Maintain and improve existing ICT infrastructure, with a focus on rural penetration</td>
</tr>
</tbody>
</table>

*Source: The Fourth National Development Plan, July 2012 (18).*
The development plan outlined strategic goals and priorities for long-term development by 2030, shown in FIGURE 4. The sustainability plan could help address goals for the strategic areas of public infrastructure and institutional environment.

![FIGURE 4 Namibia’s Long-Term Development Goals.](image)

**Namibia’s Existing Transportation Plans**

Several transportation plans were reviewed to gain an understanding of how the sustainability plan development can be linked to these plans. The Integrated Transport Master Plan for Namibia was developed as an integrated, multi-modal, transportation plan for Namibia and the Southern African Development Community (SADC) region. The transportation plan also includes the development of four main regional corridors in Namibia—Trans Cunene, Trans Caprivi, Tran Kalahari, and Trans Oranje (19). The Master Plan focuses on four modes of transportation—road, rail, ports, and aviation. The plan outlines transportation priorities in short- and long-term development plans. The short-term plan is projected for 3-5 years ahead and long-term is for the next 5-15 years.

Regional Master Plans are prepared for different regions of Namibia. The COOKE (Caprivi, Omaheke, Otjozondjupa, Kunene, and Eron) Roads Master Plan is one such example, focusing on road development for rural areas (20). The plan discusses the funding needs of rural access roads in terms of labor-based development activities, and various scenarios and mechanisms for
funding rural roads, recommending the optimal funding solution for funding rural roads in the
study areas, and identifying and recommending medium and long-term priority programs.

The Medium to Long-Term Roads Master Plan for Namibia (21) was developed to:
- Address the backlog in road preservation in Namibia;
- Achieve long-term sustainability concerning the levels and levying of road user
  charges;
- Expand the strategic planning horizon to a period of between 10 and 15 years;
- Achieve the integration of development, rehabilitation and maintenance project
  management and funding in one package, for project analyses and for road network
  asset management;
- Provide for funding of rural access in parallel in the development portion of capital
  expenditures; and,
- Meet its obligations in terms of the enabling legislation and agreements with the
  RFA.

It also discusses the approach to the development of the long-term plan, and how it fits
into the overall capital expenditure programs, maintenance plans, rural access programs, etc.

The City of Windhoek (Namibia’s capital city) in collaboration with the Ministry of
Works and Transport developed the Sustainable Urban Transport Master Plan for Windhoek
(22). The plan’s objectives are to:
- Produce a clear and realistic vision for the development of a sustainable urban
  transport system for the next 20 years;
- Generate strategies and policies to help make that vision a reality;
- Maximize the efficiency and safety of the existing public and non-motorized transport
  system;
- Recognize the role that public and non-motorized transport system shall have in
  contributing to different needs of user groups, in particular the urban poor;
- Help the transportation system to contribute to environmental and climate change
  related issues;
- Serve as an example for regional and local public transport master plans in Namibia
  to follow; and
- Serve as a basis for a national public transport master plan for Namibia.

STAKEHOLDER WORKSHOP AND PLAN DEVELOPMENT PROCESS
The stakeholder workshop for the development of the Sustainability Plan was conducted in
Windhoek, Namibia in March 2014. Stakeholders to be involved in the development of the plan
through the workshop process and follow-up activities were selected by Roads Authority
leadership. They included representatives from different divisions of the Roads Authority,
universities and consultants, other government ministries (such as the Ministry of Environment
and Tourism), city and local governments, the National Road Safety Council, and corridor
groups/coalitions. The workshop was conducted as a 2-day process, which included the entire
stakeholder group participating in the identification of road sector needs and the development of
a sustainability statement and sustainability goals to frame the plan. The consultant team then
worked with a core group of Roads Authority staff members to flesh out the remaining elements
of the plan (objectives, performance measures, and actions). The draft plan was then circulated to all the stakeholders for feedback and input before finalizing.

SUMMARY OF KEY ROAD TRANSPORTATION SECTOR NEEDS

As a first part of this workshop, attendees identified transportation sector issues and needs that could be included in the sustainability plan. These included the following.

- **Improvement of Road Safety:** Participants discussed the overall need to improve traffic and pedestrian safety in general. Participants noted that there were many areas where safety could be improved in Namibia, such as: aggressive public safety campaigns and driver education; enforcement of road rules (especially truck load limits); improvement of roadside signage, lighting and fencing; and engagement of stakeholders to work together where National roads pass through town/cities to improve safety measures. The forum noted that there may be a need to revisit the design of old roadways in order to ensure that vertical and horizontal curves and other design elements meet current standards or improved safety standards.

- **Improvement of Accessibility:** The forum stressed the need to improve accessibility in rural areas in terms of access to critical social and economic services such as schools, workplaces, hospitals/clinics, and access to the main road network. Attendees noted that accessibility during unfavorable weather conditions, especially rainy seasons, is critical. Improving accessibility also ties in with the NDP’s intent of making Namibia a transport hub for Southern Africa. It was further noted that there is also the possibility of building more roads/broadening network connectivity by using alternative materials to build cheaper roads.

- **Promoting Equity:** Participants noted equity concerns especially between the northern and southern regions of Namibia. The distribution of resources is skewed towards the southern region because of the trading hubs located in the south rather than the north. Furthermore, the cost of transport is increasing, especially for taxis in urban areas. In terms of affordability, buses will be required to serve lower income groups as transport costs increase. A commuter rail can be considered to serve the labor force coming in and out of Windhoek, which can also reduce traffic volumes on roads during peak hours.

- **Promoting Technological Innovation:** Technology can be applied to improve and address transport needs in Namibia. The forum noted that technological innovations can provide solutions such as construction of low-cost roads through innovative stabilizers that can enhance the performance of local materials to perform more efficiently and effectively. Technology can be used for route mapping, intelligent transport system (ITS) applications, and for other transport planning uses.

- **Improvement of Freight Transport:** It was stated that currently in Namibia a vast majority of freight moves through trucks, and there is a need to resolve the issues of abnormal trucks through better enforcement of abnormal load limits, optimization of the location of weighbridges, or eliminating excess loads in some cases. The use of railways for abnormal loads was discussed as a possible solution to limiting abnormal loads on roads. Railways have potential to move a larger percentage of freight, therefore reducing truck traffic and abnormal loads on the road network. However, it was noted that origins and destinations of some of these loads can make using the railways difficult, and
additionally, railways also do not have the capacity to handle certain types of goods. The need for network connectivity and corridors was emphasized as Namibia is developing itself as a logistics hub. This includes the vision for a freight hub via Walvis Bay to serve landlocked/interior countries such as Botswana, Zambia, and Zimbabwe.

- **Reduction of Traffic Congestion:** Compared to other African countries, Namibia’s traffic congestion is low, and this is an issue mostly within the jurisdiction of the City of Windhoek.

- **Increasing Funding for Roadway Infrastructure:** It was pointed out that funding for transport infrastructure development and preservation, as well as transport integration planning, is a challenge as revenue from fuel levies that are the main source of funding have not been increased in line with transport infrastructure needs. Additionally, Namibia has faced an increase in vehicles registered in neighboring countries operating on its roads, which do not contribute to registration-based revenue. Therefore, the Roads Authority does not receive sufficient funding and support to address all needs. Innovative approaches, such as public-private partnerships and tolling for revenue collection could be used for the development and adequate preservation of the road network. Moreover, there is an urgent need to optimize the revenue collection from Mass-Distance Charges, as well as a need to adopt a system of levies that ensures users truly pay for damage caused to the road.

- **Protection of the Natural Environment:** Attendees described a need for ‘greener’ road construction methods and livability as important concepts for cities. Furthermore, concerns needing intervention included erosion control to protect road infrastructure from flooding and the phenomenon of shifting dunes.

- **Improvement of Transportation, Land Use, and Urban Planning:** The need to integrate transport and land use planning was discussed. The centralized nature of business in Namibia has everyone traveling to Windhoek, the capital city. Incentivizing development in other towns can reduce this burden. The need to integrate planning efforts was pointed out as an urgent planning exercise that has to be elevated to the highest levels of authority in order to address sustainability effectively. Currently Namibian development is being planned in silos, which makes addressing sustainability in a cross-cutting manner difficult if not impossible.

- **Promotion of Capacity Building and Workforce Development:** There is a need to improve local capacity in terms of transport planners, consultants, contractors, and engineers, because currently, a lot of the work is being performed by foreign entities. It was also noted that the RA is already very active in this area.

- **Enhancement of Infrastructure Preservation:** The need for infrastructure preservation was discussed at length. The serviceable life of pavement needs to be improved as road surfaces seem to deteriorate sooner than they should especially because of abnormal and overloaded trucks and the fact that the economy of Namibia moves mainly on wheels instead of a fair distribution between roads and railways. Quality of construction and workmanship seems to be more of an issue than design standards/specifications, and supervision at construction sites needs to be improved. Quality of materials and construction methods is a concern (i.e., hiring cheaper contractors due to funding
The RMS addresses some of these by testing pavements and maintaining data. Routine and preventative maintenance can help further, along with a sustainable asset management system to optimize where improvements are needed.

DEVELOPMENT OF A SUSTAINABILITY STATEMENT AND GOALS

As part of the stakeholder workshop, participants brainstormed and put forward a sustainability statement aimed at capturing the overall intent of the Sustainability Plan and to emphasize the Roads Authority’s approach to sustainability, as follows:

“The Roads Authority strives to achieve sustainability of the transportation system by providing a safe and efficient national road network, which supports economic growth and ensures access for all citizens and other road users while preserving the environment for current and future generations.”

In addition, the following seven sustainability goals were developed as the basis of the plan, informed by the needs identified in the previous section:

1. Improve Road Safety;
2. Enhance Preservation of Road Infrastructure;
3. Promote Capacity Building and Workforce Development;
4. Increase Funding for Road Transportation;
5. Optimize the Balance between Access and Mobility;
6. Preserve Namibia’s Environment and Ecological Systems; and

SUSTAINABILITY OBJECTIVES, PERFORMANCE MEASURES AND ACTIONS

The seven sustainability goals identified form the basis for the sustainability plan, which was then fleshed out as follows:

• Identification of a broad, high-level performance measure (termed as an outcome performance measure) linked to each of the goals, to provide a basis for measuring/tracking progress toward these goals;

• Identification of objectives (sub-goals) and allied performance measures that provide more specific and tangible steps towards achieving the broader goals; and

• Identification of potential actions that could be taken by the Roads Authority or other entities to help make progress toward the goals and objectives.

Table 2 lists the goals, objectives, performance measures, and outcome measures developed as part of the process. The actions identified as part of the plan are not listed here due to space constraints, but range from recommended programs to be implemented by the Roads Authority or its partner agencies, to changes to existing programs or processes, collection of data to support decision-making, etc. These goals, objectives, measures and actions were identified by a small group of stakeholder workshop participants who had knowledge of the overall context and limitations faced. These were developed with a view of providing practical measures and actions that could reasonably be adopted by the Roads Authority or its partner entities in the near future. Care was also taken to ensure that these measures and actions were complementary to or reinforcing of existing plans and policies.
<table>
<thead>
<tr>
<th>Goal</th>
<th>Objective(s)</th>
<th>Performance Measure(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Improve Road Safety</td>
<td>1.1 Institutionalize and improve the effectiveness of road safety audits</td>
<td>• Percentage of network that is audited</td>
</tr>
<tr>
<td></td>
<td>1.2 Protect vulnerable road users</td>
<td>• Number of fatalities of vulnerable road users</td>
</tr>
<tr>
<td></td>
<td>1.3 Promote awareness and education regarding traffic laws and regulations</td>
<td>• Percent of population exposed to awareness campaigns</td>
</tr>
<tr>
<td></td>
<td>1.4 Improve safety on major roads</td>
<td>• Number of fatalities on trunk, main and district roads</td>
</tr>
<tr>
<td>2. Enhance Preservation of Road Infrastructure</td>
<td>2.1 Optimize allocation of funding between infrastructure preservation and new construction</td>
<td>• Difference in allocated funds relative to needs for construction and preservation</td>
</tr>
<tr>
<td></td>
<td>2.2 Implement innovative and alternative low-cost maintenance techniques</td>
<td>• Percentage of annual maintenance expenditures used towards these low-cost and innovative techniques</td>
</tr>
<tr>
<td></td>
<td>2.3 Implement more effective control of abnormal vehicles</td>
<td>• Number of abnormal vehicles operating without a permit</td>
</tr>
<tr>
<td></td>
<td>2.4 Optimize freight transportation</td>
<td>• Percentage of truck freight moved to rail</td>
</tr>
<tr>
<td></td>
<td>2.5 Utilize the Road Management System Effectively</td>
<td>• Consideration of RMS data in preservation decisions (Y/N)</td>
</tr>
<tr>
<td>3. Promote Capacity Building and Workforce Development</td>
<td>3.1 Implement a more comprehensive training and mentoring program for Roads Authority technical staff</td>
<td>• Percentage of Roads Authority technical staff who have received adequate training</td>
</tr>
<tr>
<td></td>
<td>3.2 Increase retention of engineers in the public sector</td>
<td>• Turnover rate of transportation engineers in the Roads Authority</td>
</tr>
<tr>
<td></td>
<td>3.3 Implement comprehensive knowledge transfer from consultants</td>
<td>• Percentage of completed projects with all records transferred to Roads Authority</td>
</tr>
<tr>
<td></td>
<td>3.4 Facilitate Small and Medium Enterprises (SMEs) to Graduate beyond SME Classification</td>
<td>• Percentage of active projects where adequate knowledge transfer is occurring</td>
</tr>
<tr>
<td></td>
<td>3.5 Implement Tender System that is Based on Contractor/Consultant Levels and Types</td>
<td>• Number of SMEs that graduate beyond SME Classification</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Successful Implementation of such as system (Y/N)</td>
</tr>
<tr>
<td>4. Increase Funding for Road Transportation</td>
<td>4.1 Increase appropriated funds from Road Fund Administration</td>
<td>• Amount of Funds ($)</td>
</tr>
<tr>
<td></td>
<td>4.2 Pursue innovative funding methods</td>
<td>• Percentage of road project funds that come from innovative sources</td>
</tr>
</tbody>
</table>
5. Optimize the Balance between Access and Mobility

**Outcome Performance Measure – Percentage of the road network that functions to its intended functional class**

| 5.1 Improve rural accessibility | • Percentage of people within 2 km of an all-weather road |
| 5.2 Ensure appropriate land use and transportation interaction | • Percentage of the road network that functions to its intended functional class |
| 5.3 Support public transportation modes | • Percentage of total trips using public transportation |

6. Preserve Namibia’s Environment and Ecological Systems

**Outcome Performance Measure – Namibia’s ranking on the Yale Environmental Performance Index**

| 6.1 Minimize the impact of the road transportation system on the natural environment and the human environment | • Percentage of new transportation projects for which an environmental assessment is required |
| 6.2 Use sustainable materials and green construction practices during road construction | • Percentage of projects employing sustainable practices |

7. Pursue New Innovations and Technologies

**Outcome Performance Measure – Roads Authority’s Classification per the Technology Adoption Life Cycle Curve**

| 7.1 Implement Latest Technologies and Innovations | • Roads Authority’s Classification per the Technology Adoption Life Cycle Curve |
| 7.2 Increase collaboration with Universities, Academic Institutions, and Think-Tanks | • Number of joint initiatives with such institutions |
IMPLEMENTATION OF THE PLAN
The vision for implementation of the sustainability plan is for Namibia’s transportation sector to support the goals through actions identified in the plan. The implementation of this sustainability plan is envisioned as a multi-year, iterative approach, in which this plan not only informs the actions and initiatives undertaken by the Roads Authority, but also forms the basis for performance measurement practices and applications to be institutionalized.

Figure 5 shows how the various elements of this sustainability plan can be viewed as relating to each other and to broader transportation sector actions.

FIGURE 5 Relationship between Sustainability Plan Elements and Transport Sector Actions.

Further, this plan is envisioned to have a two-way relationship with the existing transportation sector plans in existence in Namibia, such as the Roads Authority’s Strategic Plan, Namibia’s Integrated Transport Master Plan, the Regional Master Plans, Windhoek’s Urban Transport Master Plan, etc. This sustainability plan was developed by stakeholders with knowledge of these various plans and initiatives, to be consistent with the direction and goals of these plans. It is also envisioned that future updates of these plans can be informed by the goals, objectives, performance measures, and actions listed in this plan.

The RMS is a framework currently used by the Roads Authority in the management of the road network, including the determination and optimization of economically warranted projects, programs, strategies, and budgets for both project development and maintenance. The RMS is expected to play a key role in sustainable decision making and in the implementation of this plan by being an important source of data for performance measures and other applications. While the RMS does not cover the entire spectrum of goals and measures identified as part of this plan, it is an excellent starting point to an incremental approach to implementing the plan.

As indicated in the figure, the sustainability statement and the goals and objectives identified form the basis from which key actions and performance measurement processes can be undertaken in parallel with each other. Several of the actions identified in this plan can be implemented based on a prioritized order to accomplish specific goals and objectives,
considering factors such as time, cost/resources needed, ease of implementation, level of control
the Roads Authority has over such actions, etc. As noted in the diagram, several of these actions
(and corresponding goals and objectives) may also be implemented through other plans and
initiatives, involving stakeholders inside and outside of the Roads Authority. Ideally, at least one
action should be implemented for a selected objective.

While undertaking actions outlined in the sustainability plan, the simultaneous implementation of
a performance measurement approach can help to not only measure efficacy of actions taken but
also track progress toward selected goals and objectives. Performance measurement efforts will
include an aggregate “outcome measure scorecard” reported for the outcome measures
associated with each of the seven goals. This can provide a high-level overview of progress
toward sustainability for the Roads Authority.

Additionally, customized approaches for selected goals, objectives, and performance measures
can be deployed for different applications (such as reporting, evaluation, or decision making) by
relevant groups or units within the Roads Authority. This can include setting of targets for
specific performance measures, collecting or assembling relevant data, tracking measures over
time, and analyzing how key actions undertaken influence the performance measures. As noted,
the use of goals, objectives and performance measures can influence data-collection and decision
making, and vice-versa.

**SUMMARY AND CONCLUSIONS**

The development of the sustainability plan for Namibia’s road transportation sector was a
process driven by the local needs, the existing context, and informed by stakeholder input. It also
demonstrated the successful application of a generalized sustainability framework originally
developed in the context of transportation agencies in the United States. It was interesting to note
that despite the vast differences, the basics of the framework (understanding sustainability
principles, and developing context-specific goals and measures) translated well. It was also
found that while Namibia does not fit the traditional “developing nation” mold, there are several
actions that can be taken by the transportation sector to promote a holistic and integrated
approach to sustainability. The sustainability plan developed identified broad goals, and more
specific actions and performance measures. The plan is viewed as a living document that will be
updated periodically based on changing needs and context. Similarly, the content of this plan
will be used as the basis for actions and performance measurement practices by the Roads
Authority and its partners. This includes integration with other initiatives and plans, including
the RMS, which serves as an excellent resource for basic data to feed into the performance
measurement process. Comprehensive implementation of this plan will ensure that the Roads
Authority is on the forefront of sustainable transportation by measuring progress toward
sustainability and implementing actions to meet the sustainability goals.

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