

Post-Training Report

Regional Seminar and Course on Road Asset Management for Senior Executives and Decision Makers

for

Tanzania Roads Association (TARA)

Arusha International Conference Centre (AICC), Tanzania

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ACRONYMS AND ABBREVIATIONS

AICC	Arusha International Conference Centre
AM	Asset Management
APAs; PA	Annual Performance Agreements; Performance Agreement
ARMFA	African Road Maintenance Funds Association
CEO	Chief Executive Officer
CERAM	Centre of Excellence for Road Asset Management
DART	Dar es Salaam Rapid Transit Agency
EDMS	Records & Document Management System
GIS	Geographical Information System
GPS	Global Positioning System
HDM-4	Highway Development and Management Model, ver. 4
ISO	International Organization for Standardization
IRF	International Roads Federation
IT	Information Technology
KENHA	Kenya National Roads Authority
KRB	Kenya Road Board
KURA	Kenya Urban Roads Authority
LTIP	Long-term Investment Planning
MoWT	Ministry of Works and Transport
NRA	Namibia Road Authority
OPRC	Output & Performance-based Road Contracts
PORALG	President's Office Regional Administration and Local Governments
RA	Road Authority
RAM	Road Asset Management
RAMS	Road Asset Management System
RFB	Road Fund Board
TANROADS	Tanzania National Roads Agency
TanT ²	Tanzania Transportation Technology Transfer Centre
TARA	Tanzania Roads Association
TARURA	Tanzania Rural and Urban Roads Agency
ZINARA	Zimbabwe National Roads Administration

EXECUTIVE SUMMARY

This report presents a post-training report following the successful completion of the *“Regional Seminar and Course on Road Asset Management for Senior Executives and Decision Makers”* conducted for TARA at the Arusha International Conference Centre (AICC), Tanzania on 6th – 11th June 2022.

The course had the primary goal to introduce and develop practical understanding and application of road asset management system. The course focused on highlighting the critical impact of the resource allocation process, especially the use of advanced optimization and trade-off analysis in long-term and strategic planning on the sustainability of the road network conditions and effectiveness of the road agency. The course also consisted of a demonstration and presentations of case study of the Namibia Roads Authority and presentations on the status of current practice of Road Asset Management System (RAMS) in TANROADS, TARURA and the RFB.

The course emphasized on the advantages of using full optimization across all asset types of the road authority to support senior management in making optimal decisions that will ensure the best road conditions and the most cost-effective use of available funds. The impact of each investment decision (on maintenance or new projects) can be evaluated and readily communicated to all stakeholders using colour-coded geographical maps (GIS).

The course also introduced the ISO-55000 as the new international standard defining the requirements of comprehensive of asset management. Among other things, the ISO Standard requires agencies to manage all asset types, including intangible assets such as HR, IT and corporate good will. It also requires agencies to manage risks by adopting business process automation, etc. The course also introduced the key concept of planning at the strategic level across multiple types of assets (road pavements, bridges, culverts, and other road furniture). The course collected feedback from the participants through in-class quizzes and post-course questionnaire survey. This feedback will be useful to identify potential areas for further enhancement.

The course was very successful in meeting the intended objectives. Based on the feedback from the course participants, the overall assessment is that the goal and objectives of course were achieved at the highest level.

Information was gathered from pre-course questionnaire administered on the first day of course and post-course questionnaire to quantify the level of success of the course and draw key recommendations.

Key Recommendations

From the Regional Seminar and Course on road asset management that was conducted for a total of 61 participants from three sub-Saharan Africa countries the following recommendations were drawn from the pre- and post-course questionnaire surveys, and the round table discussions held on the last day.

- (1.) The most common barriers impacting on the adoption and maturity of asset management practice include (i) inadequate funds or limited budget for maintenance and inadequate resources to implement/develop RAM; (ii) Political Interference – especially the push for new roads at the expense of preservation of existing assets; and (iii) Lack of awareness, knowledge and capacity in Road asset management in staff and decision-makers. It is therefore recommended that the initiatives agreed during the round-table seminar should urgently be implemented. These initiatives include:
 - (A) Conducting frequent capacity building training courses in RAM;
 - (B) Establishing a Regional Centre of Excellence for Road Asset Management (CERAM);
 - (C) Designing and implementing an ongoing Communication Strategy for sensitisation & dissemination on awareness, importance and best practices of RAM to policy-decision makers and for the public at large.
- (2.) Furthermore, it is recommended that TARA and Road Fund Boards, Development Partners, Partner States (Governments) and ARFMA should establish a sustainable financing for the proposed regional Centre of Excellence for Road Asset Management (CERAM), its related activities and interventions.
- (3.) It was also recommended that the capacity building training courses in RAM should be based on proper research findings drawn from a study to bench-mark specific knowledge gaps in RAM within the region. The trainings should also incorporate climate change matters in Road Asset Management.
- (4.) It was recommended that Asset Management trainings should be extended to include all agencies' staffs to bring awareness of road asset management. It was also recommended that future RAM Trainings need to be given to line ministries and agencies responsible for civil infrastructure assets in order to bring value to the government and the tax payers.
- (5.) It is recommended that political leaders especially, those involved in decision making must be well given awareness on the benefit of Asset Management so that they may consider the asset management approach rather than giving priority to the construction of new roads.

- (6.) The course participants acknowledged the high importance of road agencies in the region becoming ISO 55000 certified in Asset Management. It was recommended to organize study tours to the countries which has already achieved ISO 55000 certification in asset management to allow the opportunity to learn and exchange practical experience and secrets for success.
- (7.) It was recommended that this types of RAM Trainings should continue. It was observed that the RAM training is very needed and valuable to our countries, however in the future, there is a need to increase time allotted for the training and/or shorten the length of the topics.

1.0 INTRODUCTION

1.1 An Overview

The Tanzania Roads Association (TARA) in collaboration with the Tanzania Transportation Technology Transfer (TanT²) Centre, TANROADS, TARURA, the Ministry of Works, Transport and Communication in Tanzania, the International Road Federation (IRF) Geneva, the World Road Association (PIARC) and other local and international institutions organized a 4 days ***Course on Road Asset Management for Senior Executives*** followed by a one day ***Regional Seminar on Road Asset Management for Decision Makers*** held at AICC, Arusha, Tanzania from 6th – 10th June 2022. The 5th day was used for a tour to Tarangire National Parks. The final day, Saturday the 11th June 2022, was a Round Table Discussions Delegates focusing on action steps for future capacity building, training and research for the practice of road asset management.

To ensure quality design and delivery of the Regional Seminar and Course on Road Asset Management for Senior Executives and Decision Makers, the Tanzania Roads Association (TARA) retained the services of Prof. Donath Mrawira to be the Lead Facilitator. The regional seminar and course were successfully held on 6th – 11th June 2022 at the Arusha International Conference Centre. This report presents a post-course evaluation report following the successful completion of the course.

1.2 General Objective of the Course

The primary objective of the regional seminar was to share experience and best practices on Road Asset Management. For this purpose, current statuses and practice of asset management were presented from the Namibia Roads Authority, TANROADS, TARURA and the RFB.

The course among other things, introduced the concepts of strategic management for road networks and optimization of capital and maintenance works. The training course also dealt with optimization and trade-off analyses to answer questions such as where to spend the available funds to ensure maximum best condition of roads (i.e., best value for money). The course explored justified techniques for developing agency-wide (network-wide) strategic plans and setting achievable performance measures and targets to allow effective monitoring of progress, etc. The course also dealt with the trade-off between preservation of existing road infrastructure versus needs to build new ones, i.e., how should the road agencies objectively decide between maintenance vs. capital works. Also, extensive coverage was being given to the best practices from other agencies on the value of proactive preservation strategies. Unlike the previous offering of the course, this time around the course introduced the ISO-55000 as the new international standard defining the requirements of comprehensive of asset management. Among other things, the ISO Standard requires agencies to manage all asset types, including intangible assets such as

HR, IT and corporate good will. It also requires agencies to manage risks by adopting business process automation, etc.

1.3 Specific Objectives of the Course

The specific objectives of the senior executives' course were to introduce and develop the participants understanding of the following concepts:

- Understand the fundamentals of road asset management system;
- Appreciate why using road asset management system is important to agencies;
- Visualize how the framework and principles of road asset management fit into their agencies' core mandate;
- Develop a basic understanding of related technical concepts such as long-term planning, prioritization and optimization in resource allocation and performance measurements and setting KPIs;
- Introduce ISO-55000 as the new comprehensive definition of asset management. The course outlined the key emerging implications of ISO-55000 in implementing Asset Management. Appreciate the key elements and requirements of the ISO 55000 standard;
- Acquire basic appreciation of strategic planning, budgeting; trade-off between preservation vs. capital expansion;
- Learn best practices of maintenance and preservation strategies for roads;
- Understand the role of and key elements of Performance measurement and monitoring progress in road agencies;
- Develop some awareness on the role of location referencing systems (managing a comprehensive inventory of assets), data and databases and related issues in road asset management;
- Acquire basic understanding of key enabling or supporting technologies that enhance road asset management, including mathematical optimization, Geographic Information Systems (GIS), Global Position System (GPS), etc.; and
- Appreciate the basics issues of developing an implementation plan.

1.4 Course Sessions

The Regional Seminar and Course on Road Asset Management for Senior Executives and Decision Makers was presented in 19 sessions over four-days as shown in Table 1. Approximately three to four sessions were covered every day, with a typical day running from 8:30 am to 5:30 pm, with two refreshment breaks and a lunch break.

TABLE 1. Description of Course Sessions

SEMINAR/COURSE SESSION	FACILITATOR
(1.1) Welcome, Introductions & Seminar and Course Expectations.	Prof. Donath Mrawira
(1.2) Case Study – An Overview of Asset Management Practice in UNRA & life demonstration of dTIMS	Eng. Isaac Menya
(1.3) Case Study of Road Management System – NRA	Eng. Sophie Tekie
(1.4) Live Demonstration of NRA's Road Management System	Eng. Fergusson Paulse
(2) Framework & Principles of Road Asset Management.	Prof. Donath Mrawira
(3) Implications of ISO 55000 to Implementation & Practice of Asset Management	Prof. Donath Mrawira
(4) Break away session #1: What steps will you take in your agency in response to ISO 55000?	All Delegates
(5) Best Practices in Asset Preservation	Prof. Donath Mrawira
(6) Key Considerations in Implementing an Asset Management System	Prof. Donath Mrawira
(7) Break away session #2: Asset Management Decision – The Farmer's Choice Example	All Delegates
(8) Role of Analytics in Resource Optimisation & Long-term planning – Introduction to Linear Programming	Prof. Donath Mrawira
(9) Role of Analytics in Resource Optimisation & Long-term planning – An Example of Using Business Analytics – Excel Solver Optimisation	Prof. Donath Mrawira
(10) Break Away session #3 – Priority Planning for a sub-county's road network	All Delegates
(11) Role of Analytics in Resource Optimisation & Long-term planning – Other Tools versus Optimisation	Prof. Donath Mrawira
(12) Break Away session #4 – Priority Planning for a sub-county – wrap up and presentations of results	Prof. Donath Mrawira
(13) Implementing a Robust Risk Management System for Asset Management.	Eng. Charles K. Kizito
(14) Digital Transformation Journey - TANROADS' experience, lessons, challenges and benefits	Rickson M. Joseph
(15) Geographical Information System (GIS) as a decision-support and communication tool – UNRA's experience	Ms. Immaculate Katutsi
(16) Performance Measurement & Monitoring.	Prof. Donath Mrawira
(17) Course Summary and Conclusions	Prof. Donath Mrawira
(18) Post-Course Evaluation	Prof. Donath Mrawira
(19) Closing Ceremony & Presentation of Certificates	Guest of Honour

2.0 PARTICIPANTS AND ATTENDANCE

A cumulative total of one hundred and eleven (**111**) participants registered for the course. The attached attendance register indicates that daily attendance varied from **76** to **82** during the four-days training course, with an average of 78 per day. The round table discussions held on the sixth day (June 11, 2022) was attended by a total of **73** participants. **Appendix A** is the course and seminar attendance register. The registered participants represented three (3) countries, including 88 registered participants from Tanzania, 9 participants from Kenya, 5 participants from Zimbabwe. The registered participants from Tanzania are mainly from TANROADS (32), TARURA (20), Road Fund Board (9), TARA (9), Ministry of Works and Transport (5) and Dar es Salaam Rapid Transit (8).

3.0 PRE-COURSE SURVEY RESULTS

3.1 Overall Evaluation Goal

The overall goal of conducting pre-course evaluation was to capture in a quantitative way the existing level of awareness and readiness for road asset management. The survey provides a baseline of information on how each participant is *technology-ready* or “*comfortable*,” how he/she perceive the importance of road management system, role of analyses in decision-making; and also identify some perceived areas of need in their agencies. The course participants were also asked to give comments on key barriers or challenges that may negatively impact on growth of road management system; and to identify areas that need improvement.

3.2 Pre-Course Quantitative Results

The responses to the first six questions of the pre-course questionnaire – that were all asking for a numerical rating [in a scale of 1 – 10, for questions 1 to 5], are summarized in Figure 1 below.

As seen in Figure 1, when the participants were asked, if they were “*very comfortable in using information & communication technologies (e.g., computers, Internet, etc.) at work*” the average response was **8.93**. This suggests that the participants had a relatively good confidence on their skills in the use of computers. However, this is simply a personal “perception” and may not reflect the real level of fluency in day to day use of computers and information technologies to improve their decision-making or work productivity.

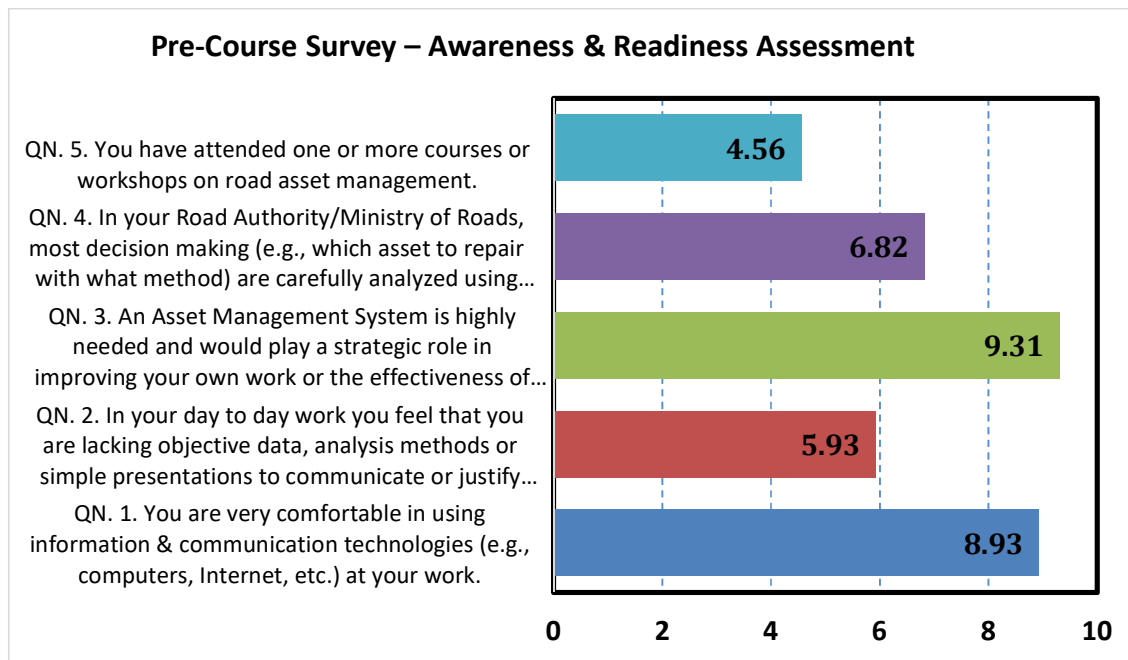


FIGURE 1. Summary of pre-course questionnaire responses

In response to Question 2, when the participants were asked if they were “*lacking objective data, analysis or presentations methods to communicate or justify their decisions to higher management,*” the average response was 5.93 [on the scale 1-10]. This suggests that most participants recognize that there is need for improved tools, analysis methods and the like to enhance their ability to support decisions and communicate them to higher level. This is noteworthy, given that the opinion was before being exposed to the road asset management course content.

In response to Question 3, when they were asked if, “*Asset management system (AMS) has an important role to play in improving their work or the effectiveness of your agency,*” the average response was **9.31**. This is a good indicator that all participants place a very high importance on the role of Road Asset Management System in their agencies. This relatively high score suggests that the participants will be open and supportive to any future steps to improve or even fully implement a comprehensive road asset management system in their road agencies/authorities.

In response to Question 4, which asked, if “*Most decision making (e.g., which road to repair with what method) are carefully analysed using data and systematic followed once decided,*” the average response was **6.82** [on the scale 1-10]. This, middle of the scale score, suggests that participants see a need for more systematic approach to support decision-making based on analysis of data. Again, this is notable, given that it is a perception voiced by the participants even before they undertook the course.

Figure 1 also shows that the average response to Question 5, (asking if participants had a prior exposure to road management system), was a low score of **5.56**. This is an indication that many staff in the Eastern Africa and the SADC region do not have a good exposure to concepts of road asset management. This suggests that there is a need of more elaborate and extensive programs of training and capacity building of the technical staff in road agencies to disseminate the important concept of road asset management system.

3.3 Pre-Course Identified Barriers and Areas for Improvement

The pre-course questionnaire included two “free form” questions that asked the participants to comment or write out their ideas. Question 7 asked the participants to identify three main barriers or challenges that may limit maturity of road management system at their agencies. Key barriers identified are summarized in Table 2. The most common barriers raised include:

- Inadequate funds, Limited budget for maintenance and/or Inadequate resources to implement/develop RAM. *(Raised by 25 respondents out of 59).*
- Political Interference – push for new roads. *(Raised by 20 respondents out of 59).*
- Lack of awareness/knowledge/capacity on Road asset management in staff and decision-makers *(Raised by 20 respondents out of 59).*
- Lack of data/equipment & analysis tools for asset management *(Raised by 12 respondents out of 59).*
- Inadequate technical capacity in road authorities.

TABLE 2. Barriers or Challenges Limiting the Maturity of Road Management System

QN6. Briefly mention or list three key issues or challenges that may be limiting or impacting the maturity of road asset management system in agency or country:
1. Source of funds from the Government. 2. Knowledge of decision makers on understanding the importance of Road Asset Management and 3. Willingness of user department on using Asset Management System due to lack of knowledge on Asset Management.
1. Capacity Building. 2. Funding. 3. Political interferences.
1. Insufficient Fund. 2. Roads Asset Management System is non-existence in some places. 3. Low Level of Technology.
1. Lack of Budget/Budget. 2. Government Interferences.
1. Lack of enough fund. 2. Lack of good knowledge in Asset Management to the decision makers.
1. Lack of clarify on role differentiation and responsibility between Road Fund and Road Authorities on quality of roads. 2. Lack of Road analytical tool. 3. Lack of integrated budgeting tool between Road Fund and Road authorities who maintain the road.
1. Low level of using software like HDM4. 2. Interference with politician in making technical decision. 3. Low investment/budget set aside for improvement of deteriorated infrastructure. 4. Lack of priority in maintaining road asset.

QN6. Briefly mention or list three key issues or challenges that may be limiting or impacting the maturity of road asset management system in agency or country:

1. Sensitization to the general public (to build sense of ownership). 2. Provision of education to drivers - Road signs (frequently).

1. Inadequate Funds for maintenance and repairs of roads infrastructures. 2. Frequency occurrence of accidents by carelessness drivers.
3. Thieves on Road assets especially where the security part is not well involved. 4. Project ownership especially where the community was not properly involved.

1. Insufficient Fund.
2. Political Matters.
3. Lack of Knowledge about RAM.

1. Limited Resources (Financial & Human).
2. Pressures from the political interference of plans.
3. Lack of awareness of the people on the concept of Road Asset Management.

1. Inadequate road fund.
2. Lack of updated technology.
3. Lack of training to staff responsible.

1. Poor Internet network.
2. Lack of equipment for taking data
3. Shortage of capital.

1. Insufficient Fund.
2. Agency or Country Priority.
3. Limited Expertise on Road Asset Management System.

1. Vandalism.
2. Lack of awareness to people.
3. Overloading.

1. Political Interface.
2. Lack of enough budget.
3. Lack of advanced technology.

1. Staffing (Quality and Quantity).
2. Supervision support gear.
3. Road Management Software.

1. Lack of Technology Capacity.
2. Financial Capacity.
3. Political Interference in decision making.

1. Lack of RAM System.
2. Training on RAM.
3. Integration of the different types of data that is usable in decision making.

1. Inadequate Data.
2. Political Influences.
3. Lack of Knowledge on Road asset management to technical staff.

1. Lack of consistence collection of Road Asset Data and Analysis mechanism to enable decision making.
2. Inadequate funding toward Road Asset Management.
3. Life cycle planning for Road Asset. i.e., Lack of enough tools to enhance Plan, Design, Construction and Maintenance.

1. Inadequate Budget.
2. Political Interference.
3. Manual approach to Road Industry and condition survey and

1. Inadequate Fund for roads maintenance activities.
2. Political Interference.
3. Lack of effective road management system.

1. Lack of sufficient or adequate Trainings.
2. Lack of enough equipment.
3. Lack of enough fund from Government.

1. Lack of Resources.
2. Little Awareness.
3. Political decisions.

1. Funds availability.
2. Proper planning for maintenance cycle.
3. Prioritization of available funds.
4. Roads usage, overloading etc.

1. Inadequate Budget.
2. Lack of tools for road asset management.

QN6. Briefly mention or list three key issues or challenges that may be limiting or impacting the maturity of road asset management system in agency or country:

3. Insufficient number of personnel.

1. Increase of economic, i.e., political setting.
2. Demanding is of greater value for less overall cost.
3. Environmental Impact.

1. Environmental Impacts.
2. Safety on Roads, streets and motorways.
3. Economy and Cost effectiveness.

1. Lack of Maintenance.
2. Lack of Fund.
3. Inadequate key personnel required.

1. Lack of high level willingness towards maturity of the system.
2. Inadequate Budget.
3. Lack or inadequate capacity on how to use the road asset management system.

1. Lack of National high analytical in resources optimization for long-term planning for Road Asset Management.
2. Limited capacity among the technical experts to implement AM in the country.

1. Political Decisions.
2. Lack of Technology Devices in offices.
3. Lack of Software to Design and management of roads.

1. Unavailability of technological advanced equipment which determine current and future road management needs.
2. A huge gap between technical experts in RAMS and beginners as there is little decreasing number of personnel.

1. Tools for road asset management system.
2. Technology used for Road Asset Management System.
3. Methods used for Roads Asset Management System.

1. Inadequate Funds for road maintenance.
2. Service not clearly defined to road user e.g., Weigh bridge services.
3. Road Management Systems are sometimes non-existence.

1. Mind change for those responsible.
2. Knowledge on RAM and associated support system.
3. Inadequate resources to implement/develop RAM.

1. Limited Analytical Capacities.
2. Political Interference - more push for new roads.

1. Lack of Knowledge by staff on Road Asset Management.
2. Minimal Compliance Road Asset Management methods.
3. Little Exposure on the available and utilization of Road Asset Management Software packages.

1. Education of Stakeholders.
2. Policies of our government.
3. Funds allocated for the same are not adequate.

1. Fund.
2. Lack of Knowledge on how to use and implement the system.
3. Internet (most of rural area) will hinder information and communication between road inspector and maintenance.

1. Supervision car & Inventory facilities.
2. Test instruments and laboratories.
3. Late disburse/flow of funds.

1. Political issue.
2. Lack of adequate funds.
3. Poor collection of data in an accurate and timely manner.

1. Funding.
2. Willingness of Decision makers.
3. Lack of knowledge on the subject.

1. Inadequate awareness on the necessity of road asset management.
2. Shortage of fund (Limited budget).
3. System integration not being fully implemented.

1. Lack of high level intervention (Political Will).
2. Lack of proper planning.
3. Lack of financial support.

1. Lack of Fund.
2. Lack of sustainable training and learning from other road asset management.
3. Lack of reliable network at work places.

1. Funding.
2. Integrity.

QN6. Briefly mention or list three key issues or challenges that may be limiting or impacting the maturity of road asset management system in agency or country:

3. Politics.

1. Money.

2. Effective knowledge and skill personal.

3. Political willingness.

1. Financial Constrains.

2. Lack of knowledge about Road Asset Management.

1. Effective Outcome.

2. Transparency of the process in the highway maintenance.

3. Little research on how to align the decision areas when applying asset management principle and this may be caused by financial or budget constraints.

1. Budget.

2. Acceptability.

3. Commitment by top management

1. Political Pressure.

2. Financial Cost.

3. Senior Managers Awareness.

1. Political & Strategic Direction.

2. Long range planning.

3. Operation Planning and budget.

1. Slow implementation.

2. Level of awareness on the importance of Road Asset Management.

1. A coordination of road management system in the road sector.

2. Failure by Decision Makers to give an RMS a priority.

1. Difficult in Decision making.

2. Lack of enough information on AM.

3. Political intervention against professionalism.

1. Indicators.

2. Adequate Resources.

4.0 POST-COURSE SURVEY FINDINGS

4.1 Goal of the Post-Course Evaluation

The post-course evaluation had two primary goals:

- (a) The first part of the questionnaire was deigned to evaluate the quality and effectiveness of transfer of knowledge on session by session basis. Comments were also solicited to identify areas of the course that may need improvement in the future.
- (b) The second part of the questionnaire was designed to ascertain the overall impression about the seminar and course. The focus was to try and quantify how useful the course & seminar was to the participants and to road agencies, etc.

Specific questions in the second part of the questionnaire dealt with opinions on valuable aspects of the course, impact the course may have on participants' work/actions, any new skills gained, and new perception on the role of road asset management system in their agencies. Other questions dealt with the quality of the interaction between instructors and participants, and if asset management system will improve work at their agencies. Finally, participants were asked to identify areas of the course that may need improvements.

4.2 Session by Session Course Assessment

Figure 3 presents a summary of session by session evaluation by participants during the last day of the course. A total of 35 participants completed the post-course evaluation questionnaire. It is seen from the figure that the overall ratings for the course sessions are generally very good. The overall average rating is **8.4** on the scale of 0 – 10, where 10 is the highest. This is equivalent to **84%** and shows that the participants had a relatively very good impression of the regional seminar and course. It is worth noting that the sessions that received the highest rating is Session #2 – the Framework and Principles of Asset Management with rating equivalent to **90%**. Session #18 – Course Summary & Conclusions received an average rating of **89%**, while Session #6 – Key Considerations in Implementing Asset Management received a rating of **87%**. This is very significant since these are the most important and foundational elements of the course that could bear lasting impacts in the agencies that participated in the course. The relatively high ratings of the foundational topics on “*the Framework and Principles of Asset Management*,” and the wrap up “*the Course Summary and Conclusions*,” are very encouraging and indicate that in overall the participants acquired the basics of asset management that may translate to some follow up actions in their agencies.

It is interesting to observe that the sessions with lowest rating were Sessions #15 and 16, with rating equivalent to 79%. These sessions were dealing with rather technical contents – *What steps are you taking in your agency to address (a) Risks Management and (b) Need for Digital Transformation*, and *Geographical Information System (GIS) as a decision-support and communication tool*. The obvious explanation for the low ratings is the highly technical concepts of the sessions hence making them less easily assimilated by the participants. Besides the above sessions (15 & 16) the other relatively technical sessions – Sessions #11 (*Role of Analytics in Resource Optimisation & Long-term planning – Other Tools versus Optimisation*) and Session #12 (*Break Away Session on Priority Planning for a sub-county*) the rest of the course sessions were rated at an average rating of **83%** or above. Needless to point out that the majority of participants were middle to senior management staff hence less interested in the academic/technical aspects of RAM.

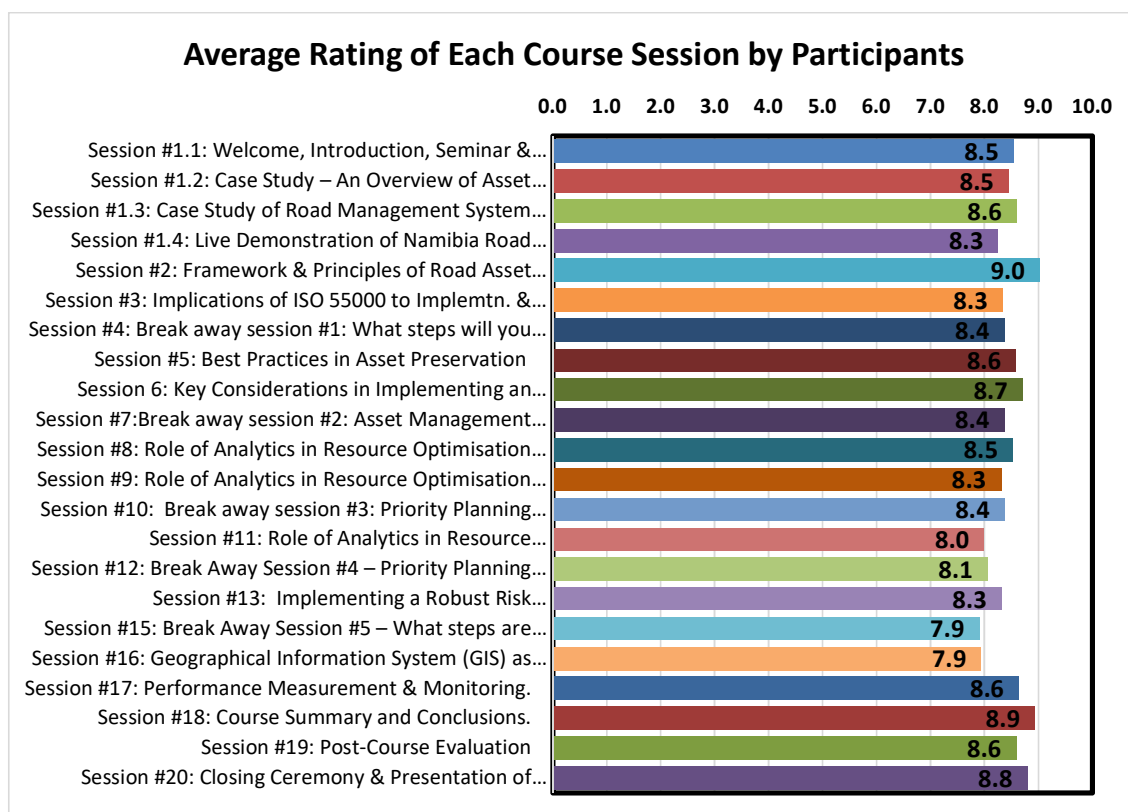


FIGURE 3. Summary of post-course session by session evaluation by participants

4.3 Part II Post-Course Evaluation: Overall Impression

4.3.1 Comments on Individual Course Sessions

Appendix B presents a summary of comments made by participants on each individual session of the course alongside their numerical rating of the session. In overall, these are valuable suggestions that need to be considered and captured in future offerings of such seminar/course. Some of the comments are worth review in determining follow-up action items for road asset management in the region.

4.3.2 Participants' Comments on the Overall Impression of the Course

Appendix C presents the detailed comments from the Part II of the post-course questionnaire. Each table presents the results or response of the participants to a given question. In this section, the report summarizes the most important comments. The importance was judged by how frequently they were repeated.

As seen from Table D1, from the participants' point of view, the most valuable aspect of the course includes: (1) The emerging best practice in asset management, i.e., implications of the ISO 55000 standard; (2) All course content, including digital transformation. Asset management need to be practical in our agency at the earliest; (3) Strategic level

Investment planning, digital transformation journey; asset management principles, GIS overview in Uganda, risk management, RAMS and live demonstration; (4) Training is very useful for increasing value of our assets in the Roads; (5) All sections of the course were very important from technical presentations to the breakaway sessions; (6) Best practice in asset management presentation; and (7) Changing in mind-set from review of what other organisation are doing and from new knowledge.

Table C2 presents comments on the least valuable aspects of the training that include: (1) Lack of Enough time; the course was supposed to be trained at least two weeks; (2) Role of analytical in research optimization long-term planning. Most of participants scored NIL or None (15 mentions).

Table C3 shows comments on possible *follow up actions* by participants. Some of the comments include: (1) Steps toward ISO 55000; Carry of RAM implementation to target ISO 55000; Implementing Asset Management in my organization to reach into ISO 55000 (2) Policy revised toward strategic level investment plans; (3) Become a change agent ambassador in my organisation; To be part of RAM; (4) To use road asset as source of income to road authority; (5) To encourage the cultural change to my colleague; (6) Get Stakeholders buy in and preach awareness and importance of RAM; (6) To share with my fellows at work station and enhance the asset management section by being cooperative and initiative; To train other colleagues at my office when get back in order for them to have these contents of the given skills; and (7) Training my colleagues about the importance of Asset Management for our economic growth and convince by agency to implement the ISO 55000 and be certified as member of Asset Management System.

Table C4 presents comments on how the training has equipped participants with new skills that can be used in their daily activities. Some interesting comments include: (1) Yes. The training has equipped me with new skills for example conducting analytic decision for Asset Management. (2) Yes, the training shows the way on how we real need to implement RAM to reach requirements of ISO 55000. (3) Yes. The training has helped me very much in realizing the importance of Asset Management concept in relation to day activities of my institution. (4) YES, for the better road asset management are to be within the framework of RAM as defined within ISO 55000. (5) Yes, it has equipped me with skills on asset management, use of technology on managing asset and maximize keeping and presenting the value of asset in existence. (6) Yes, Knowing the importance of managing our asset I will be designing and advising about considering long life construction of our roads and its asset i.e., bridges, culverts etc. to eliminate costs and save our economy.

Table C5 is a list of comments of the participants on how has the training affected the view of the role of road asset management system in serving their agencies. Some of the comments include: (1) It will enhance systemic approach in conduct activities regard Road Asset Management. (2) It will enhance reliable records which will help in decision making for asset management. (3) I am now managing my roads assets and putting more effort on

research for building capacity. (4) Improved of my view of the road asset management system. (5) In our institution, I think we need to create asset management system and to move from manual to digital on how to deal with or customer. (6) It has help me to know where as our institution is and where it has to be for the “*betterness*” of value from asset. (7) It has shifted my mind-set on how as an organisation we can manage our assets it made me realize the gaps that exist and how the organisation can go about plugging them. (8) There is a lot to be done. The training has exposed us to best practices. (9) We need to improve in our Asset Management Procedures in our institution.

Table C6 shows comments on the Question, “Did the trainers respond adequately to your questions?” The Average Rating was **8.71** [on the scale 0 to 10]. This is equivalent to **87%**. Some of the related comments include: (1) Perfectly; (2) Trainers continued with the spirit of responding to questions so that the trainees were equipped with what is being taught; and (3) Trainers were very Open and helped us to understand all things we wanted to know.

The relatively short Table C7 presents the results on Question 7. In response to the question, “How would you rate the overall quality of the workshop?” The average rating of all the respondents was **8.58** [on the scale 0 to 10]. This is equivalent to **85.7%**

Table C8 is very short. It shows a summary of the responses to the question that asked if road asset management system will improve their work and or effectiveness their agencies. A total of **34** out of 35 Participants responded, “Yes.” One participant left the question blank.

Table C9 is a summary of post-course response by the participants on Question 9: “Now that you received this training on road asset management, what is your estimation of the value/benefit of your agency becoming ISO 55000 Certified in Asset Management?” The average rating of all the respondents **7.65** [on the scale 0 to 10]. In other words, more than **76%** of the participants acknowledge the high importance of road agencies becoming ISO 55000 Certified in Asset Management.

Table C10 shows the comments on the question, “List three key areas of asset management that you feel need to be improved in the short term to make Road Asset Management System better at your agency.” A sample of the comments include: (1) Asset Data & information management system. (2) Operational planning & budget management. (3) Monitoring & Feedback. (4) Improvement of Budgeting / Budget Estimation/ Fund/ Budget or resource allocation. (5) Support from Stakeholders. (6). Capacity Building on RAM of Staff/ Send Engineers to more trainings (6) Change current culture. (7) To use professional Data rather than political intervention in RAM. (8) To shift from manual to digital transformation on dealing with customer; (9) Graphical Information System / Implement GIS in Regions. (10). Start a RAM Department.

Table 11 is list of the participants' responses to the Question "Give any other general comment." Some of the responses include the following:

- Asset Management trainings should be extended to include all agencies' staffs to bring awareness of road asset management.
- Organizing tour to the countries which has already certified ISO 55000 for more learning and sharing. We as African to have single integrated system and modelling technology for managing our Roads Assets.
- Political leaders especially, are involved in decision making must be well given awareness on the benefit of Asset Management so that they may consider the issue rather than giving priority to the construction of new roads.
- Whenever there will be the other training on asset management, it is advised all the trainers to be physically present to make interaction easy.
- Excellent analytical of Asset Management principle and the need to incorporate with practical with Road sector.
- I suggest the training should not be only for seniors executive and decision makers but all responsible people in construction industry based on highway.
- The RAM Trainings need to be given mostly to the ministries and agencies in order to be well understood and bring big results to the government.
- The seminar should continue.
- The course was genuine, useful and profitable. In future such training also conducted to expertise in institutions. More reference from other best read countries in future training.
- The training was very good but for the next time. TARA need to increase time of training and shortening the topic.

5.0 FINDINGS ROUND TABLE DISCUSSIONS FOR DECISION-MAKERS'

The last day, 11th June 2022, was dedicated to a half-day round table discussions focusing on assessing the status of training and research in Asset Management in the Region and discussing and making recommendations on possible action items. Appendix D presents the Recommendations & Resolutions from the round table discussions. The key recommended interventions are summarized as follows.

Key Intervention #1: Organize & facilitate awareness training courses and seminars.

Key Intervention #2: Conduct Capacity building courses on Road Asset Management.

Strategic activities and/or steps:

- Conduct a research to bench-mark the specific knowledge gaps in RAM;
- Conduct Capacity building courses on Road Asset Management (RAM);
- Avoiding buttering on Road Asset Management;
- Incorporate climate change matters in Road Asset Management.

Key Intervention #3 (A): Establish a Regional Centre of Excellence to perform the following key functions:

- Provide capacity building and knowledge transfer in road asset management by conducting regular short-term courses in RAM, dissemination of best practices and capacity building programs.
- Develop curriculum and provide training (diploma, under-graduate & graduate level) in road asset management.
- Accreditation of practitioners of various disciplines in road asset management.
- Spearhead policy formulation and dissemination applicable to road asset management.
- Conduct needs-driven and applied research & development and graduate level training in transportation asset management. This include identifying priority areas, develop and implement long-term research program – addressing real/practical challenges facing the sub-sector.

Key Intervention #3 (B): Strategic activities and/or steps for Establishing Centre of Excellence for Road Asset Management (CERAM):

- Write Concept Note for the CERAM.
- Consult existing institutions to establish capability.
- Review / improve existing curriculum and finalized the Concept Note.
- Develop a detailed institutional setup, strategic plan & implementation plan, high-level cost estimates (capital and operation), and recommend short-term and long-term sources of funds to sustain the centre.
- Discussions / Engagement of MoWT and DPs on funding sources.
- Start the establishment and operation of the centre.

Key Intervention #4: Funding of Capacity Building Programmes in RAM. The Capacity building in RAM is proposed in two categories: (a) short-term; (b) long-term [3 to 5 years].

Key Intervention #5: Conduct Publicity & Mainstreaming Campaigns of Road Asset Management.

Strategic activities and/or steps:

- Design and sustain lobbying of senior decision-makers (e.g., infrastructure committee of member of parliament, ministers responsible for roads, etc.)
- TV, Radio and newspaper advertising and newsletters, etc.
- High-level meetings and seminars targeting key stakeholders & decision-makers.

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The report presents a post-course evaluation of training and seminar conducted at AICC, Arusha from June 7th – 12th, 2021. The course, titled the “Regional Seminar and Course on Road Asset Management Systems for Senior Executives and Decision Makers” was facilitated by Professor Donath Mrawira as the Lead Resource Person.

The course and seminar had the goal of introducing and developing practical understanding and the application of road asset management concepts to a road agency. Emphasis was directed towards highlighting best practices in key function areas such as resource allocation, strategic level planning, the use of modern analysis tools, especially mathematical optimization in long-term strategic planning. Specific course objectives included understanding the fundamentals of road asset management; understanding related technical concepts such performance measurement; learn best practices of maintenance and preservation of road infrastructure; and acquiring a basic understanding of requirements for implementation of asset management.

A total average of sixty (60) participants registered and attended the six-days course and seminar sessions. The attendance varied from a high of 61 to a low of 59 participants attended over the four course days. The Saturday decision-makers' seminar was attended by a total of 44 participants.

A pre-and post-course evaluations were conducted at the beginning and at the conclusion of the course. The goal of the pre-course evaluation was to quantify the existing level of awareness and readiness (or support) for road asset management.

6.1.1 Findings & Conclusions from the Pre-Course Survey

The report presents a post-course evaluation of training and seminar conducted at AICC, Arusha from June 6th – 11th, 2022. The course, titled the “Regional Seminar and Course on Road Asset Management Systems for Senior Executives and Decision Makers” was facilitated by Professor Donath Mrawira as the Lead Resource Person.

The course and seminar had the goal of introducing and developing practical understanding and the application of road asset management concepts to a road agency. The course introduced the emerging best practice is asset management, the ISO 55000 Standard and its implications. Emphasis was directed towards highlighting best practices in key function areas such as resource allocation, strategic level planning, the use of modern analysis tools, especially mathematical optimization in long-term strategic planning. Specific course objectives included understanding the fundamentals of road asset management; understanding related technical concepts such performance measurement; learn best practices of maintenance and preservation of road infrastructure; and acquiring a basic understanding of requirements for implementation of asset management.

A pre-course questionnaire survey conducted at the beginning of the course generated a number of useful observations. The goal of the pre-course evaluation was to quantify the existing level of awareness and readiness (or support) for road asset management.

The survey indicated that participants (and most staff in the road sub-sector) have a relatively good confidence on their skills in the use of computers.

Most participants recognized that there is need for improved tools, analysis methods and the like to enhance their ability to support decisions in road asset management, and communicate them to higher level.

The survey results also showed that the participants placed a very high importance on the role of Road Asset Management System in their agencies.

When the participants were asked, if “Most decision making (e.g., which road to repair with what method) are carefully analysed using data and systematic followed once decided,” the average response was **68.2%**. This, middle of the scale score, suggests that participants see a need for more systematic approach to support decision-making based on analysis of data.

It was not from the pre-course survey that, many staff in road agencies in the Eastern Africa and the SADC region do not have a good exposure to concepts of road asset management. This suggests that there is a need of more elaborate and extensive programs of training and capacity building of the technical staff in road agencies to disseminate the important concept of road asset management system.

When the participants were asked to identify three main barriers or challenges that may limit maturity of road management system at their agencies, the responses included: (1) Inadequate funds, Limited budget for maintenance and/or Inadequate resources to implement/develop RAM; (2) Political Interference – i.e., push for new roads; (3) Lack of awareness/knowledge/capacity on Road asset management in staff and decision-makers; (4) Lack of data/equipment & analysis tools for asset management; and (5) Inadequate technical capacity in road authorities.

6.1.2 Findings & Conclusions from the Post-Course Survey

The post-course evaluation had two primary goals. First to evaluate the quality and effectiveness of teaching/presentation on session by session basis. Comments were also solicited to clarify specific areas of the course that may need improvement in future offerings. The second part of the questionnaire was designed to ascertain how useful the course was to the participants and to their agencies, and also gather comments that could form part of recommendations for actions in road agencies and stakeholders.

With respect to the overall quality of the teaching of course, the participants gave an overall session by session average score of 8.4 [on the 0 – 10 scale], equivalent to **84%**. This shows that the participants had a very good impression of the course. From participants' point of view, all the sessions were considered valuable and important.

The session by session rating showed that the sessions that received the highest rating is Session #2 – *Framework and Principles of Asset Management* with rating equivalent to **90%**. Session #18 – *Course Summary & Conclusions* received an average rating of **89%**, while Session #6 – *Key Considerations in Implementing Asset Management* received a rating of **87%**. This is very significant since these are the most important and foundational elements of the course that could bear lasting impacts in the agencies that participated in the course.

It is interesting to observe that the sessions with lowest rating were Sessions #15 and 16, with rating equivalent to 79%. These sessions were dealing with rather technical contents – *What steps are you taking in your agency to address (a) Risks Management and (b) Need for Digital Transformation, and Geographical Information System (GIS) as a decision-support and communication tool*. The obvious explanation for the low ratings is the highly technical concepts of the sessions hence making them less easily assimilated by the participants.

From the questionnaire comments, the participants identified the most valuable aspect of the course include: (1) The emerging best practice in asset management, i.e., implications of the ISO 55000 standard; (2) Asset management need to be practical in agency at the earliest; (3) Strategic level Investment planning, digital transformation journey; asset management principles, GIS overview and risk management; (4) Training is very useful for increasing value of our assets in the Roads; (5) Best practice in asset management presentation; and (6) Changing in mind-set from review of what other organisation are doing and from new knowledge.

Regarding course areas that could be improved, the participants pointed out the following: (1) Lack of enough time; the course was supposed to be trained at least two weeks; (2) Role of analytical in research optimization long-term planning.

When asked what specific follow up actions they will take as result of the course, the most prevalent response of the participants included: (1) Steps toward ISO 55000; Carry of RAM implementation to target ISO 55000; Implementing Asset Management in my organization to reach into ISO 55000 (2) Policy revised toward strategic level investment plans; (3) Become a change agent ambassador in my organisation; To be part of RAM; (4) To use road asset as source of income to road authority; (5) To encourage the cultural change to my colleague; (6) Get stakeholders buy in and preach awareness and importance of RAM; and (6) To share with my fellows at work station and enhance the asset management section by being cooperative and initiative; To train other colleagues at my office when get back in order for them to have these contents of the given skills

When asked if the course has equipped the participants with new skills, the response was predominantly “yes.” Furthermore, the participants listed the following specific benefits or skills: The training has equipped me with new skills for example conducting analytic decision for Asset Management. (2) Yes, the training shows the way on how we real need to implement RAM to reach requirements of ISO 55000. (3) Yes. The training has helped me very much in realizing the importance of Asset Management concept in relation to day activities of my institution. (4) YES, for the better road asset management are to be within the framework of RAM as defined within ISO 55000. (5) Yes, it has equipped me with skills on asset management, use of technology on managing asset and maximize keeping and presenting the value of asset in existence.

It was observed that the course has impacted on the participants’ point of view with respect to the role of road asset management. Interesting comments were given, including: Some of the comments include: (1) It will enhance systemic approach in conduct activities regard Road Asset Management. (2) It will enhance reliable records which will help in decision making for asset management. (3) I am now managing my roads assets and putting more effort on research for building capacity. (4) Improved of my view of the road asset management system. (5) In our institution, I think we need to create asset management system and to move from manual to digital on how to deal with or customer. (6) It has help me to know where as our institution is and where it has to be for the “*betterment*” of value from asset. (7) It has shifted my mind-set on how as an organisation we can manage our assets it made me realize the gaps that exist and how the organisation can go about plugging them.

It was noted that almost all the questionnaire respondents (34 out 35), stated that road asset management system will improve their work and/or the effectiveness their agencies. Furthermore, the post-course opinion, more than **76%** of the participants acknowledged the high importance of road agencies becoming ISO 55000 Certified in Asset Management.

Another post-course comments from the participants were directed towards identifying key areas of asset management that need to be improved in the short term. The most dominant theme raised by the participants include: A sample of the comments include: (1) Asset Data & information management system. (2) Operational planning & budget management. (3) Monitoring & Feedback. (4) Improvement of Budgeting / Budget Estimation/ Fund/ Budget or resource allocation. (5) Support from Stakeholders. (6). Capacity Building on RAM of staff/ Send engineers to more trainings (6) Change current culture. (7) To use professional Data rather than political intervention in RAM. (8) To shift from manual to digital transformation on dealing with customer; (9) Graphical Information System / Implement GIS in the regions.

The final survey question on other general comment attracted the following interesting comments: (1) Asset Management trainings should be extended to include all agencies’ staffs to bring awareness of road asset management. (2) Organizing tour to the countries which has already certified ISO 55000 for more learning and sharing. We as African to

have single integrated system and modelling technology for managing our Roads Assets. (3) Political leaders especially, those involved in decision making must be given awareness on the benefit of Asset Management so that they may consider the issue rather than giving priority to the construction of new roads. (4) The training should not be only for seniors executive and decision makers but all responsible people in construction industry based on highway. (5) The RAM Trainings need to be given mostly to the ministries and agencies in order to be well understood and bring big results to the government; and (6) TARA need to increase time of training and shortening the topic.

6.1.3 Conclusions and Recommendations from the Round Table Discussions

The last day of the regional seminar was dedicated to a half-day round table discussions focusing on assessing the status of training and research in Asset Management in the Region and discussing and making recommendations on possible action items.

It was noted that road transportation is the back-bone of economy of most countries. Road transport contributes up to 90 to 95% of all movement of goods and services. Consequently, to grow the economy, our countries require sustainable road assets, well maintained and in good serviceable conditions.

For most countries in the region, road assets lack appropriate attention with consistent maintenance culture and a robust expertise in the application of asset management practice to sustain road asset values.

On the other hand, international best practice in the practice of Road Asset Management has been advancing at an increasing rate in the recent years. One such best practice is the ISO 55000 standard. ISO 55000 standard series represents a global consensus on what Asset Management (AM) is and what it can do to increase the value generated by agencies. ISO 55001 can help road agencies to create a world class asset management system, build long-term resilience, achieve value for money goals, and meet regulatory requirements.

The current status of Asset Management practice in the region is at varying levels of maturity. Some road authorities are in early stages of implementing RAMS; and yet other countries have road management systems that are relatively mature – yet not aware of the ISO 55000 requirements.

The Round Table Discussions noted a significant lack of training and adequate awareness in road asset management in the region. There is lack of knowledge and awareness of RAM at all levels of staff and decision-makers in the road sector. A subjective assessment noted that no university or college in SSA is offering training in asset management. Consequently, research & innovation for the road sector is also very limited.

The Round Table Discussions noted that the road sector staff and decision-makers lack awareness on the importance of Road Asset Management. The first key intervention recommended was to: Organize & facilitate awareness training courses and seminars. The key role players for this intervention would be TARA and development partners.

The Round Table Discussions secondly noted that the SSA region faces a significant gap in knowledge, skills and expertise in Road Asset Management. In response, the second key intervention recommended was to: Conduct capacity building courses on Road Asset Management. This intervention will involve a number of strategic activities, including: (i). Conduct a research to bench-mark the specific knowledge gaps in RAM; (ii). Conduct Capacity building courses on Road Asset Management (RAM); (iii). Avoid buttering on Road Asset Management; and (iv). Incorporate climate change matters in Road Asset Management. The key role players for this intervention would be TARA and development partners.

Thirdly, the Round Table Discussions noted that there is no existing regional or national institution within the SSA region that conducts training and/or accreditation of the practice of Road Asset Management (RAM) for civil infrastructure. In response to this, the key intervention recommended was to establish a Regional Centre of Excellence to perform a number of key functions in training, building capacity, research & development and accreditation in civil infrastructure asset management. The key role players for this intervention would be Ministry of Works and Transport (MoWT), National Institute of Transport, High learning Institutions, ARMFA, TARA and Development Partners.

Fourthly, the Round Table Discussions noted that there is no stable or sustainable funding to undertake capacity building programs in road asset management. In this regard, the key intervention recommended was to establish financing framework for capacity building in Road Asset Management (RAM) in two stages (i) short-term courses & training, and (ii) long-term. The key role players for this intervention would be TARA and its Collaborators, the Road Fund Board, Development Partners (e.g., JICA), research institutes and fixed deposits.

Finally, the Round Table Discussions noted that there is lack of awareness and support by decision-makers at all levels for Road Asset Management. To address this situation, the key intervention recommended was to conduct publicity and mainstreaming campaigns of Road Asset Management. This intervention would involve a number of strategic activities such as: (i) Design and sustain lobbying of senior decision-makers (e.g., infrastructure committee of member of parliament, ministers responsible for roads, etc.), (ii) TV, Radio and newspaper advertising and newsletters, etc. and (iii) High-level meetings and seminars targeting key stakeholders & decision-makers, etc. The key role players for this intervention would be TARA, Road Fund Boards, and Development Partners.

In summary, Recommendations & Resolutions from the round table discussions consist of the following five key interventions:

- (1.) The first key intervention is to continue to Organize and facilitate awareness training courses and seminars on Road Asset Management.
- (2.) The second key intervention is to Conduct Capacity building courses on Road Asset Management. Unlike awareness training under Intervention #1, this intervention shall focus on developing specific technical expertise and capacity on the subject matter of Road Asset Management in the Eastern & Southern Africa region.

Strategic activities and/or steps to achieve this second intervention will include:

- Conduct a research to bench-mark the specific knowledge gaps in RAM;
- Conduct Capacity building courses on Road Asset Management (RAM);
- Avoiding buttering on Road Asset Management; and
- Incorporate climate change matters in Road Asset Management.

(3.) The third Intervention is to Establish a Regional Centre of Excellence in Road Asset Management (CERAM) to perform the following key functions:

- (a) Provide capacity building and knowledge transfer in road asset management by conducting regular short-term courses in RAM, dissemination of best practices and capacity building programs.
- (b) Develop curriculum and provide training (diploma, under-graduate & graduate level) in road asset management.
- (c) Accreditation of practitioners of various disciplines in road asset management.
- (d) Spearhead policy formulation and dissemination applicable to road asset management; and
- (e) Conduct needs-driven and applied research & development and graduate level training in transportation asset management. This include identifying priority areas, develop and implement long-term research program – addressing real/practical challenges facing the sub-sector.

(4.) The fourth intervention is to establish a Fund for Capacity Building Programmes in RAM. The Capacity building in RAM is proposed in two categories: (a) short-term; (b) long-term [3 to 5 years].

(a) Short-Term sources of funds:

- (i). Course and Seminar and participation fees
- (ii). Donations
- (iii). Subscriptions
- (iv). Reserved funds

(b) Long-Term sources of funds:

- (i). Consultancy
- (ii). Road/ bridge tolls
- (iii). Training Levies
- (iv). Support from Development Partners
- (v). Road Fund Board
- (vi). Government subvention
- (vii). Development budget
- (viii). Fixed Deposits (by Road Fund Boards, etc.).

(5.) The fifth intervention is to Conduct Publicity & Mainstreaming Campaigns of Road Asset Management.

Strategic activities and/or steps to achieve this final intervention will include:

- Design and sustain lobbying of senior decision-makers (e.g., infrastructure committee of member of parliament, ministers responsible for roads, etc.)
- TV, Radio and newspaper advertising and newsletters, etc.
- High-level meetings and seminars targeting key stakeholders & decision-makers.

6.2 Recommendations

From the Regional Seminar and Course on road asset management that was conducted for a total of 83 participants from three sub-Saharan Africa countries the following recommendations were drawn from the pre- and post-course questionnaire surveys, and the round table discussions held on the last day.

- (1.) The most common barriers impacting on the adoption and maturity of asset management practice include (i) inadequate funds or limited budget for maintenance and inadequate resources to implement/develop RAM; (ii) Political Interference – especially the push for new roads at the expense of preservation of existing assets; and (iii) Lack of awareness, knowledge and capacity in Road asset management in staff and decision-makers. It is therefore recommended that the initiatives agreed during the round-table seminar should urgently be implemented. These initiatives include:
 - (A) Conducting frequent capacity building training courses in RAM;
 - (B) Establishing a Regional Centre of Excellence for Road Asset Management (CERAM);
 - (C) Designing and implementing an ongoing Communication Strategy for sensitisation & dissemination on awareness, importance and best practices of RAM to policy-decision makers and for the public at large.
- (2.) Furthermore, it is recommended that TARA and Road Fund Boards, Development Partners, Partner States (Governments) and ARFMA should establish a sustainable financing for the proposed regional Centre of Excellence for Road Asset Management (CERAM), its related activities and interventions.
- (3.) It was also recommended that the capacity building training courses in RAM should be based on proper research findings drawn from a study to bench-mark specific knowledge gaps in RAM within the region. The trainings should also incorporate climate change matters in Road Asset Management.
- (4.) It was recommended that Asset Management trainings should be extended to include all agencies' staffs to bring awareness of road asset management. It was also recommended that future RAM Trainings need to be given to line ministries and agencies responsible for civil infrastructure assets in order to bring value to the government and the tax payers.

- (5.) It is recommended that political leaders especially, those involved in decision making must be well given awareness on the benefit of Asset Management so that they may consider the asset management approach rather than giving priority to the construction of new roads.
- (6.) The course participants acknowledged the high importance of road agencies in the region becoming ISO 55000 certified in Asset Management. It was recommended to organize study tours to the countries which has already achieved ISO 55000 certification in asset management to allow the opportunity to learn and exchange practical experience and secrets for success.
- (7.) It was recommended that this types of RAM Trainings should continue. It was observed that the RAM training is very needed and valuable to our countries, however in the future, there is a need to increase time allotted for the training and/or shorten the length of the topics.

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APPENDICES

APPENDIX A: Course and Seminar Attendance Register

REGIONAL SEMINAR AND COURSE ON ROAD ASSET MANAGEMENT FOR SENIOR EXECUTIVES AND DECISION MAKERS

ARUSHA INTERNATIONAL CONFERENCE CENTRE (AICC) ARUSHA, TANZANIA 7TH - 12TH JUNE 2021

SN	Full NAME	POSITION/JOB TITLE	ORGANISATION	Mon	Tue	Wed	Thu	Sat
1	ISAIAH JAPHET ONSONGO	DEPUTY DIRECTOR- ROADS	KENYA NATIONAL HIGHWAYS AUTHORITY	✓	✓	✓	✓	✓
2	ALBERT R SEMUTWA	DEPUTY DIRECTOR- ROADS	KENYA NATIONAL HIGHWAYS AUTHORITY	✓	✓	✓	✓	✓
3	JAMES K KARIUKI	REGIONAL DIRECTOR	KENYA NATIONAL HIGHWAYS AUTHORITY	✓	✓	✓	✓	✓
4	CHRISTOPHER MUTUNGA NZIOKA	ASSISTANT DIRECTOR	KENYA NATIONAL HIGHWAYS AUTHORITY	✓	✓	✓	✓	✓
5	VENESIA MANKA JUMA	ASSISTANT ENGINEER	KENYA ROADS BOARD	✓	✗	✓	✓	✓
6	WILSON KIPSANG KOSGEY	MANAGER RURAL & COUNTRY ROADS DIRECTORATE	KENYA ROADS BOARD	✗	✗	✓	✓	✗
7	JULIUS NYAGAH MWABU	BOARD MEMBER	KENYA ROADS BOARD	✗	✗	✓	✓	✗
8	ANNE MAGIRI KARANJA	DEPUTY MANAGER FINANCE	KENYA ROADS BOARD	✓	✓	✗	✗	✓
9	JOHN O. ORWA	ENGINEER	KENYA URBAN ROADS AUTHORITY	✓	✓	✗	✓	✓
10	ENG. MOSES CHIGONYATI	TECH DIRECTOR	ZIMBABWE NATIONAL ROADS ADMINISTRATION (ZINARA)	✓	✓	✓	✓	✓
11	ENG. WISHES MAUWA	REGIONAL ENGINEER	ZIMBABWE NATIONAL ROADS ADMINISTRATION (ZINARA)	✓	✓	✓	✓	✓
12	MR. ADAM ZVANDASARA	FINANCE DIRECTOR	ZIMBABWE NATIONAL ROADS ADMINISTRATION (ZINARA)	✓	✓	✓	✓	✓
13	STRAUSS TEMBO	MANAGER FINANCE	ZIMBABWE NATIONAL ROADS ADMINISTRATION (ZINARA)	✓	✓	✓	✓	✓
14	ENG. MARONE TATENDA PASIPAMIRE	DEPUTY DIRECTOR	MINISTRY OF TRANSPORT, ZIMBABWE	✓	✓	✓	✓	✗
15	ENG. NEDRICK GODFREY	PLANNING & MONITORING ENGINEER	ROAD FUND BOARD	✓	✗	✗	✗	✗
16	CPA, JOHN REUBEN ASWILE	DEPUTY MANAGER FINANCE AND ADMINISTRATION	ROAD FUND BOARD	✓	✓	✓	✓	✓
17	ELIUD T NYAUHENG	0	ROAD FUND BOARD	✗	✗	✓	✓	✗
18	ENG.RASHID KALIMBAGA	DEPUTY MANAGER	ROAD FUND BOARD	✓	✓	✓	✓	✓
19	GODLOVE STEPHEN	0	ROAD FUND BOARD	✓	✗	✗	✗	✓
20	ENG.JACOB D MUKASA	PE	ROAD FUND BOARD	✓	✓	✗	✗	✗
21	ENG. GLORIA RWEYENDELA	PPME	ROAD FUND BOARD	✓	✓	✓	✓	✓
22	ENG. JONAS MAKYARA	SPME	ROAD FUND BOARD	✓	✓	✓	✓	✓
23	DR. EDWIN PAUL MHEDE	CE	DART	✗	✗	✗	✗	✗
24	CPA DEUSDELITY CASMIR DEUSDELITY	DFBD	DART	✓	✓	✓	✗	✗
25	DR. KAZIWARD PHILEMON MZEE	DOIM	DART	✓	✓	✓	✗	✗
26	ENG. AHMED WAMALA	IMM	DART	✗	✓	✓	✓	✓
27	ENG. FANUEL O.S KALUGENDO	DTD	DART	✓	✓	✓	✗	✗
28	MOUSTON MWAKYOMA	PRINCIPAL VALUER	DART	✗	✗	✗	✗	✓
29	EMMANUEL MADUHU BRAXTON	ACCOUNTANT	DART	✓	✓	✓	✓	✗
30	ABDULRAHMAN QASSIM	ENGINEER	DART	✓	✓	✓	✓	✓
31	ENG. SEKIDIA RIZIKI	ENGINEER	DART	✗	✗	✗	✗	✗
32	CHRISTIAN CHRISTOPHER KIWELU	SENIOR ENGINEER	ERB	✗	✗	✗	✗	✓
33	JAMHURI JUMA MSABILA	PRINCIPAL ENGINEER	ERB	✗	✗	✗	✗	✓
34	PATRICK BALOZI K	REGISTRER	ERB	✗	✗	✗	✗	✗
35	FRANK GODSON LAWUO	MANAGING DIRECTOR	HARADALI BUILDING & CIVIL WORKS CONTRACTORS CON	✗	✗	✗	✗	✓
36	PAUL HENRY NYANGA	0	ICOT	✗	✗	✗	✗	✗
37	LAURIAN JOACHIM MUNNA	ECONOMIST	MOWT	✓	✓	✓	✓	✓
38	LADISLAUS MKAMA BIGAMBO	ENGINEER	MOWT	✓	✓	✓	✓	✓
39	NEEMA JULIUS MHONDO	BOARD MEMBER	RFB	✓	✓	✓	✗	✓
40	HERMAN METHOD ZELAMULA	ENGINEER	MOWT	✓	✓	✓	✓	✓
41	MOIKANI MOLLEL M.	ENGINEER	MOWT	✗	✗	✗	✗	✓
42	PHILIP STEPHEN DWESE	ENGINEER	MOWT	✓	✓	✓	✓	✓
43	IGNAS SUKWA	ENGINEER	MOWT	✓	✓	✓	✓	✓

REGIONAL SEMINAR AND COURSE ON ROAD ASSET MANAGEMENT FOR SENIOR EXECUTIVES AND DECISION MAKERS									
ARUSHA INTERNATIONAL CONFERENCE CENTRE (AICC) ARUSHA, TANZANIA 7 TH - 12 TH JUNE 2021									
SN	Full NAME	POSITION/JOB TITLE	ORGANISATION	Mon	Tue	Wed	Thu	Sat	
44	JOHN F NGOWI	ASSIT. DIRECTOR	MOWT	✓	✓	✓	✓	✓	
45	MATIVILA ROGATUS HUSSEIN	CEO	TANROADS	✓	✗	✗	✗	✗	
46	VICTOR S. NASSARI	ENGINEER	TANROADS	✓	✓	✓	✓	✓	
47	LAURENCIA L. MAMSERI	MATERIALS TECHNICIAN	TANROADS	✓	✓	✓	✓	✓	
48	MOHAMED ATHMAN NTUNDA	DIRECTOR OF MAINTENANCE	TANROADS	✓	✓	✓	✓	✗	
49	CECILIA KALANGI	ENGINEER	TANROADS	✓	✓	✓	✓	✓	
50	VICENT TARMO	WEIGH BRIDGE EXPERT	TANROADS	✓	✓	✓	✓	✓	
51	ENG. MOHAMEDI ATHUMANI MAKHA	ENGINEER	TANROADS	✓	✓	✓	✓	✓	
52	ENG. BONIFACE BERNARD MATONYA	ENGINEER	TANROADS	✓	✓	✓	✓	✓	
53	SULEIMAN MUSA MSUYA	ENGINEER	TANROADS	✓	✓	✓	✓	✓	
54	JESCA JOHN GONDE	PROJECT ENGINEER	TANROADS	✓	✓	✗	✗	✓	
55	NEEMA TWALIB KANYIKA	ENGINEER	TANROADS	✓	✓	✓	✓	✓	
56	NDOLIKI LEONARD NTAPARA	QUANTITY SURVEYOR	TANROADS	✓	✓	✓	✓	✓	
57	KITWANA JUMA RASHID	ENGINEER	TANROADS	✓	✓	✓	✓	✓	
58	BONIFACE MBEU MKUMBO	0 TANROADS	TANROADS	✓	✓	✗	✓	✗	
59	MSAMA KOSANI MSAMA	RM - SINGIDA	TANROADS	✓	✓	✓	✓	✗	
60	GREYSON GREAD NDYAMUKAMA	ENGINEER	TANROADS	✓	✗	✗	✗	✓	
61	FAISWARY HAMZA	ENGINEER	TANROADS	✓	✓	✓	✓	✓	
62	SAXTUS JONAS	ENGINEER	TANROADS	✗	✗	✗	✓	✓	
63	JOHN ABIHUD MKUMBO	ENGINEER	TANROADS	✓	✓	✓	✓	✗	
64	FILBERT M. BISEKO	ENGINEER	TANROADS	✗	✗	✓	✗	✓	
65	SALEHE JUMA	HPL	TANROADS	✗	✗	✗	✓	✓	
66	LEONARD CHIMAGU	ENGINEER	TANROADS	✗	✓	✓	✓	✓	
67	BASHIRI RASHIDI RWESINGISA	RM - MANYARA	TANROADS	✗	✗	✗	✗	✗	
68	REGINALD MASAWA	RM - ARUSHA	TANROADS	✗	✗	✓	✓	✓	
69	MOTTA REUBEN KYANDO	RM - KILIMANJARO	TANROADS	✓	✓	✓	✓	✗	
70	ENG. JOHN R. MAHENGE	SENIOR ENGINEER	TANROADS	✗	✗	✗	✗	✓	
71	ENG. FULGENCE M. LENDO	ENGINEER	TANROADS	✓	✓	✓	✓	✓	
72	RICKSON JOSEPH MAEDA	SICTO	TANROADS	✓	✓	✓	✗	✗	
73	ENG. BRIGHT KIANGI	ENGINEER	TANROADS - ARUSHA	✓	✓	✓	✓	✓	
74	ENG. CHRISTOPHER	ENGINEER	TANROADS - ARUSHA	✗	✓	✓	✓	✗	
75	F T. RWEKIZA	REGIONAL MANAGER	TANROADS	✓	✓	✓	✓	✗	
76	ENG. EPHATAR LUCAS MLAVI	REGIONAL MANAGER	TANROADS	✓	✓	✓	✓	✗	
79	JOSEPH O. HAULE	CHAIRMAN ORGANISING COMMITTEE & CHAIRMAN, TARA	TARA	✓	✓	✗	✗	✗	
80	ENG. HAGAI KUENDEKA BISHANGA	TARA HONORARY SECRETARY	TARA	✓	✓	✓	✓	✓	
81	ENG. SEVERIN MATERU	TARA EXCO	TARA	✓	✓	✓	✓	✓	
82	MWANAISHA ALLY MHALULE	TARA EXCO	TARA	✓	✓	✓	✓	✓	
83	ELIZABETH SERF CHINGALAME	TARA EXCO	TARA	✓	✓	✓	✓	✓	
84	ENG. SWALEH KASSERA	TARA EXCO	TARA	✗	✓	✓	✓	✓	
85	ALOYCE ANTHONY MHILIWA	PROGRAMME OFFICER	TARA	✓	✓	✓	✓	✓	
86	LAURENT ATHANAS	ASS. PROGRAMME OFFICER	TARA	✓	✓	✓	✓	✓	
87	JACQUELINE LEONARD NDABAVUNYE	ADMINISTRATIVE ASSISTANT	TARA	✓	✓	✓	✓	✓	
88	ENG. LAYNAS LAWREAN SANYA	RM	TARURA	✓	✗	✗	✗	✗	

REGIONAL SEMINAR AND COURSE ON ROAD ASSET MANAGEMENT FOR SENIOR EXECUTIVES AND DECISION MAKERS

ARUSHA INTERNATIONAL CONFERENCE CENTRE (AICC) ARUSHA, TANZANIA 7TH - 12TH JUNE 2021

SN	Full NAME	POSITION/JOB TITLE	ORGANISATION	Mon	Tue	Wed	Thu	Sat
89	ENG. ALBERT KYANDO	DM	TARURA	✓	✓	✓	✓	✗
90	Eng. IZIDORY B. WILLIAM	ENGINEER	TARURA	✓	✗	✓	✓	✓
91	ENG. MSETU NAIDYE MADARA	ENGINEER	TARURA	✓	✓	✗	✓	✓
92	ENG. MOHAMED MSTAFI BAKARI	ENGINEER	TARURA	✓	✓	✓	✓	✓
93	ENG. BARAKA FRANCIS LIBUNGO	ENGINEER	TARURA	✓	✓	✓	✓	✓
94	ENG. BARAKA A. SANGA	ENGINEER	TARURA	✓	✓	✓	✓	✗
95	Eng.WILLIAM C. MBAWALA	ENGINEER	TARURA	✓	✓	✓	✓	✓
96	Eng. MELECK YEROBOAM SILAA	RM	TARURA	✓	✓	✓	✓	✓
97	Prof. DONATH MRAWIRA	ENGINEER	4M GLOBAL	✓	✓	✓	✓	✓
98	LAWRENCE GAMALIEL MSEMOM	DISTRICT MANAGER	TARURA	✓	✓	✓	✓	✓
99	Eng. PAULO I. MLIA		0 TARURA	✓	✓	✓	✓	✓
100	ENG. JANETH E. MKOREHA	DM- MONDULI	TARURA	✓	✓	✓	✓	✓
101	ENG. JULIUS G. KAAYA	DM-ARUMERU	TARURA	✗	✗	✓	✓	✓
102	ENG. AGATHA P. KESSY	ARUMERU DC	TARURA	✓	✓	✓	✓	✓
103	ENG. JADI MAGENI	ARUMERU DC	TARURA	✓	✓	✓	✓	✓
104	ALICE M. MUNGURE		0 TARURA	✗	✗	✗	✗	✗
105	JOHN MLUNDI		0 TARURA	✗	✗	✗	✗	✗
106	ENG. ELIFADHILI M. MOSES	ENGINEER	TARURA	✓	✓	✓	✓	✓
107	ENG. KILUSUU F. TERIAN	DM-NGORONGORO	TARURA	✓	✓	✓	✓	✓

APPENDIX B: PART I of the Post-Course Questionnaire – Comments of the Participants session by session

Session 1.1	<ul style="list-style-type: none"> • Clearly elaborated. • For the Zoom Presenters, let us improve the network system in order to save time. • If not conducted annually I propose such seminar course to be so. It will impact more knowledge and encountered problem could be so easily • It was well organized and summarized by presenter. • Late of starting the Seminar • The opening session clearly set the objectives of the conference and the appetite left me wanting to explore throughout the left of the sessions. • The seminar and course needed to improve all the organization in asset management so I suggest next time, the time for seminar to be in two weeks and TARA should invite all agencies under Tanzania Authority. • There was late of starting the Seminar due to the late arrival of the guest of honour. • There was no self-introduction for knowing each other. • Time has to be managed during Opening. • Time management should be improved as an asset. • Very good. • Very late to start. • Very organized and kindly. • Well presented. • Well-arranged and Communicated.
Session 1.2	<ul style="list-style-type: none"> • Demonstration of dTIMS is very interesting to me and it was given short time. • dTIMS as a decision support tool should be practiced in Tanzania's institutions to but be automated to meet our needs and requirements. • Increase time between the presenters and the participants. • Increase time. • Interesting. • It can only analyse the road data by using highly vehicle • It was a clear presentation. • More time is needed. • Not good picture, Sound and demonstration should be improved. • Satisfactory. • The system is good that require numerous data from different sources but Uganda is doing well. • Very good. • Well presented.
Session 1.3	<ul style="list-style-type: none"> • Clear with graphs to assist understanding. • Compelling. • Tanzania should also do it is best to comply with most updated and advance RMS tools

	<ul style="list-style-type: none"> • The showed how NRA are working to manage their network using acted strength they are falling • The road asset management is very perfect • Their System is good even splitting of the budget in specific road did not presented. Well done Namibia for being no 1 in Africa for good road network. • Very good • Very good. • Well-presented and a great example to the country not practising RAM.
Session 1.4	<ul style="list-style-type: none"> • Clear understood, good foundation to the topic understudy. • Internet problem should be improved the demonstration was stacking. • Poor internal transmission. • The network for presenters/outside was not much proper, this need to be improved for the future. • Well presented.
Session 2	<ul style="list-style-type: none"> • Improving procedures and principles of RAM. This is to enhance its sustainability and improving transport and key sectors to proper maintainable of roads. • It was a clear and well presented. • Most of the asset are not in well managed • Very good • Well presented • Well presented by Prof. Donath Mrawira. • Well presented.
Session 3	<ul style="list-style-type: none"> • Presentation is very clear • Too much notice, must be summarised and shortly presented the key importance issue. • Very good engagement • It was difficult to understand at the beginning. • Well presented • Well presented.
Session 4	<ul style="list-style-type: none"> • Needs more time interviewing that standards v/s our system of implementation in organisation. • Our Agency is in developing stage were looking forward to make the ISO 55000 known and its importance so as we can start using it and move to competence stage hence compliance. We need more knowledge on this. • Our Agency is in developing stage. More knowledge is needed on this. • Starting the new and combining the system to enhance • The group work did not work as per expectation since the subject was too long not summarized and the answer revile it. Too shallow. • Understood well about ISO 55000 after presentation. • Very good, Practical Approach. • Well delivered.
Session 5	<ul style="list-style-type: none"> • Enhance some monitoring ad evaluate • The Presentation was full equipped.

	<ul style="list-style-type: none"> • Very good, Eye Opening insights. • Very good. • We should practically learn the practices and advance in skills through research • Well presented • Well presented.
Session 6	<ul style="list-style-type: none"> • Presented Good and material well arranged. • Technical personnel especially those who practically use RAMS should acquire more knowledge, more training for best practice and performance. • Understood, however I had wanted risk to have been considered in order to have a holistic overview to information needed to make information decision. • Very good. • Well presented • Well presented.
Session 7	<ul style="list-style-type: none"> • It better to use a road related example in Road Asset Management. • It was very clear and well understood. • It will allow planners to earn results, barest more, budgeting, time management, which tools to use, careful analysis, know how to get certain value economically. It will assist management during planning before sank in a funds. • The lesson was not well understood because is too much theoretical. • Very good.
Session 8	<ul style="list-style-type: none"> • I have not completely understood the relation (of this session) to management of asset in real practice. • In this, presentation not clear on using linear programming toward the road asset management in concern. • The session and materials are adequate However planning of such kind is not through system rather manually. We need enhancement on improving technology. It will give pure results and save time, • This may need more time. I didn't fully understand. • Very good introduction on objective functions and constraints. • Well-presented and useful • Well presented.
Session 9	<ul style="list-style-type: none"> • A good reality check. • Ok. The presentation was full equipped. • On easy way. Again encouraging in overall reliance in technology. • Same comment as above (<i>I have not completely understood the relation (of this session) to management of asset in real practice.</i>)
Session 10	<ul style="list-style-type: none"> • The Content is well equipped. • Understood and well represented. • Same comment as above (<i>I have not completely understood the relation (of this session) to management of asset in real practice.</i>)
Session 11	<ul style="list-style-type: none"> • Good presented and is very important for road agencies. • It will improve quality of planning, managing resources for future needs a long with assets.

	<ul style="list-style-type: none"> • Same above, why don't it be relating to actual practice rather than theoretical and took too long? • Too technical. • Very good.
Session 12	<ul style="list-style-type: none"> • Enjoyed this session. • Good presentation and clear understood. • Interesting use of analytics, very engaging topic. • The presentation was full understood.
Session 13	<ul style="list-style-type: none"> • Good Presentation. • The Presentation was full equipped. • Very comprehensive and knowledgeable presentation on RAM. • Well presented.
Session 14	<ul style="list-style-type: none"> • For better Asset Management Digital Transformation is very important to all Road Authority. • Good Presentation from Rickson Maeda. • Good Presentation. • It was very interesting and TANROADS they have made big step in Asset Management. • The presenters were not competent enough for this kind of training. • Well presented. • Well presented.
Session 15	<ul style="list-style-type: none"> • Make sure no more paper works and to transform to digital documentation. • Need the delegated to participate themselves in the exercise. • Not done. • The agency is currently doing its best to get a long digital transformation. • To assess the risk and treat the risk.
Session 16	<ul style="list-style-type: none"> • There was lack of seriousness from this presenter. • Good Presentation, but to survey related to addressing RAM issue. • The content is well understood. • They are very advanced. We wish to have the same level of technology especially in inspections, conditions and future implementation of our networks. Also like presented said, it would be of help if we Tanzania Launch our satellite too. • Very best presentation from madam Immaculate from GIS Department. • Very well presented. • Well-presented and very useful.
Session 17	<ul style="list-style-type: none"> • Roads Authority should establishment proper mode of performance measurement and monitoring (Modern performance measurement and monitoring system). • TARA should advice the Road Authority within Tanzania to adopt the use of the GIS since it can collect a lot of information within short period of time which can help in deciding the planning for Asset Management. • Very good presentation. • was good presentation.

	<ul style="list-style-type: none"> • Well-presented and very important.
Session 18	<ul style="list-style-type: none"> • A course for anyone involved on RAM at the Strategic and tactical level. • Concluded well. • I get new knowledge in Asset Management and way for Qualification its value. • It was brief clear and well presented. • The course went well though it was squeezed. I propose two weeks could be enough. • Well done by the presenter. • Well Organized and presented. • Well summarized and reflected what transport the entire course.
Session 19	<ul style="list-style-type: none"> • Complete a good way for examine delegates and facilitator. • Fine. • Improving on group discussion at least on everyday sessions. • The Course was in general good and positive to the gain intended purpose.

APPENDIX C: PART II of the Post-Course Questionnaire – Participants Comments on the Overall Impression of the Seminar & Course

TABLE C1. Comments on the Most Valuable Aspects of the Course

QN1. What do you view as the most valuable aspect of the training?
<ul style="list-style-type: none"> ➤ To make road authority and decision makers change their culture on RAM; (2). Myself to be part of RAM; and (3). To use technical data in presenting issues to politicians. ➤ Training is very useful for increasing value of our assets in the Roads. ➤ All sections were very important from technical presentations to the breakaway sessions. ➤ Asset lifecycle pipeline. ➤ Asset Management. ➤ Best practice in asset management presentation. ➤ Changing in mind-set from review of what other organisation are doing and from new knowledge. ➤ Content which was excellent and well circulated. ➤ Excellent/10 ➤ ISO 55000 ➤ ISO 55000 ➤ Mostly all including digital transformation asset management need to practical in our agency at earliest. ➤ None ➤ Presenting value of an asset. ➤ Resource Optimisation ➤ Strategic level Investment planning, digital transformation journey we still have hope for the best in future, asset management, GIS overview in Uganda, risk management, RAMS and live demonstration ➤ The concept of Assets Management. ➤ The covered concept of Road Asset Management its totality ➤ The Trained courses are relevant to equip the participants with the knowledge on Roads Asset Management. ➤ The use of practical examples made it more understandable and applicable.

TABLE C2. Comments on the Least Valuable Aspects of the Training

QN2. What do you view as the least valuable aspect of the training?
<ul style="list-style-type: none"> ➤ Enough time (lack of?) (2 mentions) ➤ Enough time ➤ More time is needed for Training. ➤ NIL or None (15 mentions) ➤ Role of analytical in research optimization long-term planning. ➤ The course was supposed to be trained at least two weeks. ➤ Timing

TABLE C3. Comments on Possible Follow up Actions by Participants

QN3. What specific actions will you take as a result of this workshop?
<ul style="list-style-type: none"> ➤ 1). Steps toward ISO 55000; (2). Policy revised toward strategic level investment plans. (3). Become a change agent ambassador in my organisation. ➤ 1). To be part of RAM. (2). To use road asset as source of income to road authority. (3). To encourage the cultural change to my colleague. ➤ Am grateful and adopted to it. I will do my best to gain more technical knowledge especially in RAMS and GIS for better improvement in performance ➤ Asset Management Practice ➤ Best Practice in RAM. ➤ Best Practice in RAM. ➤ Carry of RAM to target ISO 55000. ➤ Continue learning about Asset Management and also implement what I have learned from this workshop in my organisation. ➤ Get Stakeholders buy in and preach awareness and importance of RAM. ➤ Implementing Asset Management in my organization to reach into ISO 55000. ➤ Improving existing asset management practice in our institution and engaging other key issues that were not practised. ➤ It is my aim to focus on the lessons learnt in this workshop. The next step should therefore be presentation of lessons to decision makers fast buy in and support for implementation. ➤ Making better decision upon our budget so as reach at better level of asset management. ➤ Share the awareness on Road Asset Management whenever I get opportunity to the colleagues at the working place. ➤ To implement all important aspects of Asset Management to achieve a good result of our organization under target. ➤ To share with my fellows at work station and enhance the asset management section by being cooperative and initiative. ➤ To train other colleagues at my office when get back in order for them to have these contents of the given skills. ➤ To try to convince my director on how to manage all asset especially in collecting of information of airports and how to maintained in order to maintain our airports and to provide good service to users. ➤ Training my colleagues about the importance of Asset Management for our economic growth and convince by agency to implement the ISO 55000 and be certified as member of Asset Management System. ➤ Try to mature our agency from developing on using AM to compliment through knowledge covered.

TABLE C4. Comments on how the training has equipped Participants with new skills that can be used in daily activities in Your Agency

QN 4. Has the training equipped you with new skills that you can use in your daily activities at your Institution? Please explain. [Name of Institution]
<ul style="list-style-type: none"> ➤ 1). Business analytical in planning. (2). Road Asset Management and fundamental. (3). The need for optimization of resources. ➤ 1). Evaluate what we have. (2). Managing Asset and Improvement initiations. (3). Protecting and Maintaining them. (4). Risk that can affect Asset Management. (5). Study or predict the weather Resilience. ➤ Department of Road Zimbabwe. Surely the workshop has given me skills that can be applied. ➤ KENHA, Certainly YES. ➤ Ministry of Works and Transport (Works), Yes the training has equipped me with new skills for example conducting analytic decision for Asset Management. ➤ TANROADS. Use Remote Sewing GPS ➤ TANROADS. The training in valuable as for now, we are under transformation to digital system. ➤ TANROADS. Yes, we actually use systems but I particular was unaware of how much and efficiency obtained through various sessions that is looking forward to improvements. ➤ TANROADS, Yes, the training shows the way on how we real need to implement RAM to reach requirements of ISO55000. ➤ TARURA. Yes. The training has helped me very much in realizing the importance of Asset Management concept in relation to day activities of my institution. ➤ TARURA. YES, for the better road asset management are to be within the framework of RAM as defined within ISO 55000. ➤ The Training has improved my capacity on how to manage asset and the important at asset management so as to save time and in economic way. ➤ Yes. In fact, I was practising RAM to some point without knowing but with course I come to understand what is it and how crucial to the agency. ➤ Yes, for the time being we utilize a minimal effort to value our assets. Management level they didn't pay full attention on maintenance area. ➤ Yes, it has equipped me with skills on asset management, use of technology on managing asset and maximize keeping and presenting the value of asset in existence. ➤ Yes, Knowing the importance of managing our asset I will be designing and advising about considering long life construction of our roads and its asset i.e., bridges, culverts etc. to eliminate costs and save our economy. ➤ Yes, some concepts are useful for further improvements. ➤ Yes-Important of Asset Management ➤ ZINARA. The training has equipped with new ideas in resource optimization which I can go back and put into practice at ZINARA. ➤ ZINARA. Very much.

TABLE C5. Comments on how has the training affected the view of the role of Road Asset Management System in serving their Agencies

QN 5. How has the training affected how you view the role of Road Asset Management System in serving Your Agency?
<ul style="list-style-type: none"> ➤ 1). It will enhance systemic approach in conduct activities regard Road Asset Management. (2). It will enhance reliable records which will help in decision making for asset management. ➤ Clarification of some issues. ➤ I am now managing my roads assets and putting more effort on research for building capacity. ➤ Improved of my view of the road asset management system. ➤ In our institution, I think we need to create asset management system and to move from manual to digital on how to deal with or customer. ➤ It has help me to know where as our institution is and where it has to be for the “betterness” of value from asset. ➤ It has shifted my mind-set on how as an organisation we can manage our assets it made me realize the gaps that exist and how the organisation can go about plugging them. ➤ Need more clarification. ➤ No, It has added a need to acquire more knowledge. ➤ The training gave me a broader view as far as asset management in concern. ➤ The Training has affected me positively, since I have acquired new skills on managing assets and maximizing value of assets in hand. ➤ There is a lot to be done. The training has exposed us to best practices. ➤ We need to improve in our Asset Management Procedures in our institution.

TABLE C6. Comments on the Question – Did the trainers respond adequately to your questions?

The Average Rating was: **8.71** [on the scale 0 to 10]

Comments on the Question: Did the trainers respond adequately to your questions?
<ul style="list-style-type: none"> ➤ Perfectly. ➤ Trainers continued with the spirit of responding to questions so that the trainees were equipped with what is being taught. ➤ Trainers were very Open and helped us to understand all things we wanted to know. ➤ YES

TABLE C7. Results on Question 7: How would you rate the overall quality of the workshop?

The average rating of all the respondents was 8.58 [on the scale 0 to 10]
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TABLE C8. Results on Question 8: “Do you feel that Road Asset Management System will improve your work and/or the effectiveness of Your Agency?”

A total of 34 out of 35 Participants responded, “Yes.” One participant left the question blank.

TABLE C9. Results on Question 9: “Now that you received this training on road asset management, what is your estimation of the value/benefit of your agency becoming ISO 55000 Certified in Asset Management?”

The average rating of all the respondents 7.65 [on the scale 0 to 10]

Note: The majority of the respondents (13 out of 29) were from RFB, TANROADS, TARURA & MoWT.

TABLE C10. Results on Question 10: List three key areas of Asset Management that you feel need to be improved in the short term to make Road Asset Management better at your Institution:

Comments: Three key areas of asset management that need to be improved in the short term
<ul style="list-style-type: none"> ➤ (1). Asset Data & information management system. (2). Operational planning & budget management. (3). Monitoring & Feedback. ➤ (1). Budget Estimation/Fund. (2). Support from Stakeholders. TARURA. ➤ (1). Budget or resource allocation. (2). Strategy. (3). Stakeholders Support. ➤ (1). Capacity Building of the Staff. (2). Improvement of Budgeting. ➤ (1). Change current culture. (2). To use professional Data rather than political intervention in RAM. (3). Capacity Building on RAM to many staff. [TANROADS]. ➤ (1). Framework of RAM. (2). GIS. (3). Analytical in Resource optimisation. ➤ (1). More Trainings for Building Capacity. (2). Utilizing limited resources, we have to maintaining our road asset to add its value. (3). Look for other source of fund in this aspect strengthen/adding value to our asset. ➤ (1). Operation planning and budget. (2). Policy and strategic direction. (3). Long range and technical planning. ➤ (1). Planning. (2). Monitoring & Evaluation framework. (3). Proper Design and implementation of the schemes. ➤ (1). Policy and Strategic direction (2). Long range and technical planning. (3). Operational, Planning and Budget. ➤ (1). Policy and Strategic Direction. (2). Operation planning & budget. ➤ (1). Policy. (2). Budget. (3). Optimization. ➤ (1). Risk Management. (2). In excel solver optimization; should consider more realistic limited factors. (3). Graphical Information System. [TANROADS]. ➤ (1). Star AM Department. (2). Implement GIS in Regions. (3). Send Engineers to more trainings. ➤ (1). To have policy for Asset Management. (2). To improve performance measure, monitoring and feedback. (3). To improve operational planning & budget without enforcing by politicians. ➤ (1). To shift from manual to digital transformation on dealing with customer. (2). To have system which will collect information in all contracts so to avoid the ministry to loss lot of money especially due to delay of payment. ➤ (1). Training of people. (2). Procurement of adequate technology.

Comments: Three key areas of asset management that need to be improved in the short term
<ul style="list-style-type: none"> ➤ All aspects need improvement. We however started yet. ➤ Awareness to Decision Makers, Budget Allocation, Training of all those Involved ➤ Integration of Various System within Agency. ➤ Records Management, Contract Management, Optimization for Software Road Asset Management use of HDM-4. [Institution: TANROADS] ➤ Use GIS in comparable with RAMS, (2). Improving considerations and prioritisation of projects, (3). Introduction of Trade off analysis and asset management through systems. [Institution: TANROADS]

TABLE C11. Results on Question 11: Give any other general comment

General Comments of the Course
<ul style="list-style-type: none"> ➤ Asset Management trainings should be extended to include all agencies' staffs to bring awareness of road asset management. ➤ (1). Organizing tour to the countries which has already certified ISO 55000 for more learning and sharing. (2). We as African to have single integrated system and modelling technology for managing our Roads Assets. ➤ (1). Political leaders especially, are involved in decision making must be well given awareness on the benefit of Asset Management so that they may consider the issue rather than giving priority to the construction of new roads. (2). Whenever there will be the other training on asset management, it is advised all the trainers to be physically present to make interaction easy. ➤ (1). Time for the Training is not enough to grasp all materials from the trainers. (2). The preparation of the Meeting in case of information to other institution came late. (3). The Seminar & Training was excellent congratulation to TARA. ➤ Arrange this course at another region next time e.g. Mwanza, Dar es Salaam, or Mbeya if not Dodoma. ➤ Congratulation to Organiser (TARA) as well as Professor and all Presenters. ➤ Congratulations to the Organiser (TARA) ➤ Excellent analytical of Asset Management principle and the need to incorporate with practical with Road sector. ➤ I suggest the training should not be only for seniors executive and decision makers but all responsible people in construction industry based on highway. ➤ Improve the service of the venue especially, addressing omission of some important facilities (Towel for cleaning ever something water) ➤ More time for attain more knowledge. ➤ The course was genuine, useful and profitable. In future such training also conducted to expertise in institutions. More reference from other best read countries in future training. ➤ The Course was well planned and really helped to evaluate our status as an organisation in RAM. ➤ The RAM Trainings need to be given mostly to the ministries and agencies in order to be well understood and bring big results to the government. ➤ The seminar to continue. ➤ The Training was very good but for the next time. TARA need to increase time of training and shortening the topic.

APPENDIX D.
RECOMMENDATIONS & RESOLUTIONS
FROM THE ROUND TABLE DISCUSSIONS –
Held On Saturday 11th June 2022



ABSTRACT

Key Recommendations from the Regional Seminar & Course on Road Asset Management for Senior Executives and Decision Makers Organised by the Tanzania Roads Association (TARA) and held on 6th to 11th June 2022 at AICC Arusha.

user
TARA

Action Plan for the Future of Road Asset Management Practice in the Region

Recommendations & Resolutions of the Regional Seminar & Course on Road Asset Management for Senior Executives and Decision Makers

Action Items for the Future of Road Asset Management Practice in the Region

1 BACKGROUND

On 6th –11th June 2022, the Tanzania Roads Association (TARA) organized a Regional Seminar and Course on Road Asset Management for Senior Executives and Decision Makers. The seminar and course was organized in collaboration with the Ministry of Works and Transport (**MoWT-Tanzania**), Tanzania Transportation Technology Transfer Centre (**TanT²**), International Road Federation (**IRF**), Road Fund Board (Tanzania) Tanzania Rural and Urban Roads Authority (**TARURA**) Tanzania National Road Agency (**TANROADS**) and **ARMFA**. The regional course and seminar was held at the Arusha International Conference Centre and was attended by a cumulative average of eighty-four (84) participants from Tanzania, Kenya, and Zimbabwe.

The last day, 11th June 2022, was dedicated to a half-day round table discussions focusing on assessing the status of training and research in Asset Management in the Region and discussing and making recommendations on possible action items.

2 STATUS OF THE PRACTICE, EXPERTISE & KNOWLEDGE AND RESEARCH IN ASSET MANAGEMENT

It was noted that road transportation is the back-bone of economy of most countries. Road transport contributes up to 90 to 95% of all movement of goods and services. Consequently, to grow the economy, our countries require sustainable road assets, well maintained and in good serviceable conditions.

For most countries in the region, road assets lack appropriate attention with consistent maintenance culture and a robust expertise in the application of asset management practice to sustain road asset values. This has resulted in premature failures of road assets and increased costs to the national economies in terms of major rehabilitation or re-construction of the roads.

On the other hand, international best practice in the practice of Road Asset Management has been advancing at an increasing rate in the recent years. One such best practice is the ISO 55000 standard. ISO 55000 standard series represents a global consensus on what Asset Management (AM) is and what it can do to increase the value generated by agencies. ISO 55001 can help the road agencies to create a world class asset management system, build long-term resilience, achieve value for money goals, and meet regulatory requirements. ISO 55001 helps to add value by providing agencies with an agile framework to help connect asset management with the achievement of corporate strategic goals.

The current status of Asset Management practice in the region is at varying levels of maturity. Some road authorities are in early stages of implementing RAMS; and yet other countries have road management systems that are relatively mature – yet not aware of the ISO 55000 requirements.

The Round Table Discussions noted a significant lack of training and adequate awareness in road asset management (RAM) in the region. There is lack of knowledge and awareness of RAM at all levels of staff and decision-makers in the road sector. A subjective assessment noted that A subjective assessment suggests that no university or college in SSA is offering training in asset management. Consequently, Research & Innovation for the road sector is also no-existence or very limited. Furthermore, there is no expertise and technical capacity related to implementing and operating Road Asset Management systems in most countries. There is therefore a serious need for training and tertiary level education on RAM – targeting the road sub-sector staff and stakeholders. In this regard, it was also noted there is a need for a proper curriculum for RAMS education and a sustained research to solve technical issues in the road sector.

3 DISCUSSIONS AND RESOLUTIONS

3.1 The Need for a Centre of Excellence in RAM

All discussions in groups anonymously agreed that, YES, there is a need to establish a Centre of Excellence in Road Asset Management. The discussions further justified the need by pointing out the following:

- ✓ There is a serious shortage or gap in knowledge and technical expertise on the area of asset management; hence need to build capacity at various levels.
- ✓ There is lack of capacity to undertake R&D in RAM, and hence absence of research, innovation, and improvement in the current practice.
- ✓ There is lack of curriculum for RAM at each appropriate levels, e.g., institute, college, university (undergraduate and graduate levels).
- ✓ The Centre should offer a pool of experts with knowledge in RAMS.
- ✓ Currently RAM there is no educational institutions (national or regional) offering courses/training in RAM. Lack of expertise in RAM poses a serious challenge to managing infrastructure assets.

3.2 Modalities and Approach for Establishing the Centre

The Centre should be regional. Let us heed the Swahili saying, “*Umoja ni nguvu; Utengano ni udhaifu*,” – learning from such initiatives as Centre of Excellence in Road Safety in Tanzania and Cameroon. A regional centre would be easier to pool resources like experts and funding. It is will also be a forum for exchange of experiences in the region. That is, we need to share/manage limited resources.

The regional approach may use regional blocks such as EAC, SADC, ECOWAS, etc. The blocks have departments/units that deal with infrastructure – and hence they can leverage resources towards such regional centers. The regional blocks could be used to set criteria or guidelines for appropriate host institutions for CERAM.

The recommended short-term approach for establishing the Centre of Excellence is to use existing facilities of an existing university or college (such approach was used for the Centre of Excellence Road Safety in Tanzania). It was also recommended that instead of silos, one Centre should centralize all components of Road Asset Management. In the long-term, the Centre can evolve into a standalone institution [similar to such institutions like, the Eastern and Southern African Management Institute (ESAMI)].

Suggested host institutions include, National Institute of Transport (NIT), University of Dar es Salaam (USDAM) in collaboration with other universities, University of Zimbabwe, and Dar es Salam Institute of Technology (DIT).

Initial steps for establishing the Center for Road Asset Management include the following:

- ✓ Write Concept Paper for the CERAM.
- ✓ Establish a forum /Think Tank for discussing concept and approach for the Centre.
- ✓ Survey existing educational/ R&D institutions to establish their capabilities.
- ✓ Develop, review / improve existing curriculum for each level of RAM Course.
- ✓ Complete a Feasibility Study: Develop a detailed institutional setup, strategic plan & implementation plan, high-level cost estimates (capital and operation), and recommend short-term and long-term sources of funds to sustain the centre.
- ✓ Sensitize & hold discussions or engagements with top leadership of line ministries for works / infrastructure (MoWT, etc.) and DPs on funding sources.
- ✓ Start the establishment and operation of the centre.

3.3 Priority Mandate and Functions of the Centre

- ✓ Provide capacity building and knowledge transfer in road asset management by conducting regular short-term courses in RAM, and dissemination of best practices.
- ✓ Develop curriculum and provide training (diploma, under-graduate & graduate level) in road asset management.
- ✓ Accreditation of practitioners of various disciplines in road asset management.
- ✓ Spearhead policy formulation and dissemination applicable to road asset management.
- ✓ Be a centre for Innovation and R&D. Conduct needs-driven and applied research & development and graduate level training in transportation asset management. This include identifying priority areas, develop and implement long-term research program – addressing real/ practical challenges facing the sub-sector.

3.4 Potential Sources of Funding for the Centre

The financing of the proposed Centre of Excellence in RAM and the above related activities is proposed in two categories short-term and long-term. The various sources are outlined in the Action Plan subsequently presented.

4 IMPLEMENTATION MATRIX / RECOMMENDED ACTION PLAN

SN	Intervention/Initiative/Action	Specific Steps/Tasks	Responsible Party
1	Conduct frequent capacity building training courses in RAM.	<ul style="list-style-type: none"> • Conduct a research to bench-mark specific knowledge gaps in RAM within the region • Conduct Capacity building training courses on Road Asset Management (RAM) to address the gaps • Incorporate climate change matters in Road Asset Management. 	TARA and Development Partners
2	<p>Establish a Regional Centre of Excellence for Road Asset Management (CERAM):</p> <p>Key functions of CERAM:</p> <ul style="list-style-type: none"> • <i>Conduct short-term capacity building training courses in RAM.</i> • <i>Develop curriculum, provide diploma, under-graduate & graduate level training course in asset management.</i> • <i>Accreditation of practitioners of various disciplines in road asset management.</i> • <i>Spearhead formulation policies, laws and regulations govern asset management. Active dissemination of laws & policies.</i> • <i>Conduct needs-driven applied research & development and innovation in road asset management.</i> • <i>Dissemination of best practices in RAM</i> 	<ul style="list-style-type: none"> • Write Concept Paper for the CERAM. • Establish a forum / Think Tank for discussing concept and approach for the Centre. • Survey existing educational / R&D institutions to establish their capabilities. • Develop, review / improve existing curriculum for each level of RAM Course. • Complete a Feasibility Study: Develop a detailed institutional setup, strategic plan & implementation plan, high-level cost estimates (capital and operation), and recommend short-term and long-term sources of funds to sustain the centre. • Sensitize & hold discussions or engagements with top leadership of line ministries for works / infrastructure (MoWT, etc.) and DPs on funding sources. • Start the establishment and operation of the centre. 	<ul style="list-style-type: none"> • Line Ministries of Works and Transport (MoWT); • National Institute of Transport; • High learning Institutions (Universities); • ARMFA; • TARA; and • Development Partners.

3	Design and implement an ongoing Communication Strategy for sensitisation & dissemination on awareness, importance and best practices of RAM to policy-decision makers and for the public at large.	<ul style="list-style-type: none"> • Design and sustain lobbying of senior decision-makers (e.g., infrastructure committee of member of parliament, ministers responsible for roads, etc.) • Advertisement programs on TV, Radio & newspaper, newsletters, periodicals, etc. • High-level meetings and seminars targeting key stakeholders & decision-makers, etc. 	<ul style="list-style-type: none"> • TARA, iRAP, etc. • ARMFA • Road agencies, Road Fund Boards, etc.
4	Establish a sustainable financing for the proposed Centre of Excellence for Road Asset Management (CERAM), its related activities and the above interventions.	<p>The financing of the proposed CERAM is proposed in two categories:</p> <ul style="list-style-type: none"> • <i>Short-term financing Sources:</i> <ul style="list-style-type: none"> ○ Road Fund Boards; ○ ARMFA; ○ Course and Seminar and participation fees; ○ Development Partners (DPs); ○ Partner States (Governments), Stakeholder Contributions. • Long-term financing sources: <ul style="list-style-type: none"> ○ <i>Contractors' and Consultants' levies (such as the Vocational Education and Training Levy imposed via The Vocational Education and Training Act, Cap. 82, 2006 in Tanzania). Such nominal rates as 0.1 to 0.25% for each civil works or consultancy contract can raise significant amounts of funds.</i> ○ <i>Special Road/ bridge tolls in Partner States.</i> ○ <i>Development Partners: WB, JICA, EU, AfDB, DFID</i> ○ <i>Road Fund Boards & Road Agencies /Authorities</i> ○ <i>Partner States Government subventions</i> ○ <i>Fixed Deposits (by Road Fund Boards, etc.)</i> 	<ul style="list-style-type: none"> • TARA; • Road Fund Boards; • Development Partners; • Partner States (Governments); • ARFMA