FILEXIABLE PAVEMENT VALUE CHAIN ANALYSIS









Sector:- Economic infrastructure

Sub sector:- road construction

Flexible Pavement value chain By:-Group 3

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OBJECTIVE

Generally, the study was conducted to determine the present road construction practices in flexible asphalt at debre tabor city.

Specifically, this aims to:

- ***Discuss the present road construction practices in flexible asphalt for highland.***
- ***Identify the Value Chain (AS IS) at debre tabor in flexiable asphalt***
- ***Compare the Value Chain (AS IS) to that of the benchmark.***
- ***Identify the gaps and constraints in attaining flexible asphalt***
- ***Identify and recommend technologies that will improve construction practice & increase road service.***

የዕድገትና ትራንስፎርሜሽን ዕቅድ ዘርፎች

1	ግብርና እንስሳት ሃብት ልማት
2	ኢንዱስትሪ ልማት
2.1	ጨርቃ ጨርቅና አልባሳት
2.2	ቆዳና የቆዳ ውጤቶች
2.3	ስኳርና ተጓዳኝ ምርቶች
2.4	ሲሚንቶ
2.5	ብረታ ብረትና ኢንጂነሪንግ
2.6	ኬሚካል (ፋርማሲቲዩካል፣ ህትመት፣.....)
2.7	አግሮ ኘሮሰሲንግ
3	ማዕድን
4	ኢኮኖሚ መሠረተ-ልማት
4.1	መንገድ ግንባታ (flexible pavement value chain)
4.2	ባቡር ትራንስፖርት
4.3	መንገድ ትራንስፖርት
4.4	ባህር ትራንስፖርት
4.5	አየር ትራንስፖርት
4.6	ኢነርጂ
4.7	ውሃና መስኖ
4.8	ቴሌኮሙኒኬሽንና አይሲቲ
4.9	ከተማ ልማትና ህንፃ ኮ/ን
5	ንግድ
6	ጤና
7	ባህል፤ ቱሪዝምና ስፖርት

Facts and figures

Road network size

rank	country	Road Network Size Both paved and unpaved.		
		Road length (km)	Expressway length (km)	Date of information
1	United States 	6,586,610	77,017	2013
2	India 	4,865,000	1,324	2014
3	China 	4,460,000	111,950	2014
4	Brazil 	1,751,868	11,000	2013
5	Russia 	1,396,000	929	2014
77	Ethiopia 	49,249		2013

Fact and figure

Flexible Pavement work in Ethiopia/Debr-Tabor City /

- Construct by using labor based & construction equipment
- less time management & quality management practice
- un proper mixing ratio
- Using unskilled workman ship
- Safety (PPE)requirements are not used properly
- Week waste management
- Is not apply kaizen and 5s principle

Fact and figure

Flexible Pavement work in china

- Construct by using high(modern) mechanical equipment.
- High time management & quality management practice
- Properly mixing ratio
- Using skilled workmanship
- less number of manpower
- Apply safety (PPE) requirement used properly
- High waste management
- Apply 5s principle and kaizen

Flexible pavement value chain (As is)

Input	Site investigation	Survey work	Earth work	Drainage structure
material (Row) •Aggregate •Water •Bitumen •paint	**ROAD PLANNING AND RECONNAISSANCE**	**Horizontal setting out and vertical** setting out. • using surveying instruments (fig)	**Clearing & grubbing** • by using grader, dozer pickaxes, shovel	**Prepare working area** •Cleaning by using rake
tools & equipment	**Select road** Alignment (criteria	**Cross section setting out** • by using surveying instrument	**Cut & fill operation** • by using grader, dozer ,excavator pickaxes, shovel	**Materials & tools preparations** •cement , sand, water and stone •Shovel , trawl , float ,striate ages , string
MANPOWER **•Using more un skill man power**	**Material test** **•Field test & laboratory test**		**Compaction** •By using roller, plate compacter, hand Ramer	(Mixing) **of materials** •Mixing cement & sand •Hand mixing •Ratio (1:4,1:5)
			field & laboratory test •	Structure activity (bridge), (pipe) •Check vertical &horizontal alignment (by using string) •Randomly Monitoring

Pavement (fig)

sub base preparation

- using selected material max
- Randomly Monitoring pavement strength

Base course construction (fig)

- Using local crushing aggregate

Surface operation & compaction

- **lack of compaction**
- **Using less quality of materials** (fig)
- Using prime coat
- Using local crushing aggregate

Monitoring_

- Randomly each activity

road marking

Prepare working area

- Cleaning road surface using broom

Materials & tools preparations

- paint
- Brush
- Some time using small marking equipment

marking operation (fig)

Clean up

Clearing working area

Clearing tools & equipment

Remove temporary traffic sign

Flexible pavement value chain (Bench mark) .. China

Input	Site investigation	Survey work	Earth work (fig)	Drainage structure
material •Aggregate •Water •Bitumen •Paint etc....	ROAD PLANNING AND RECONNAISSANCE (file)	Horizontal setting out and vertical setting out using serving instrument (fig)	Clearing & grubbing • by using by grader, dozer ,excavator ump truck	Prepare working area •Cleaning by using rake
Plant , tools (fig) & equipment	Material test •Laboratory Test (video) &field test.	Cross section setting out • by using modern serving instrument	Cut & fill operation • by using by grader, dozer ,excavator earth work & com paction	Materials & tools preparations •cement , sand, water and stone •Shovel , trawl , float ,striate ages , string
MAN POWER •Using more skill mane power	Select road Alignment (topo)		soil stabilization •Using mechanical & chemical stabilization method	Mixing of materials •Mixing cement & sand •Hand mixing •Ratio (1:3) •Concrete test (video)
	Prepare long time future design		Apply field (video ,video) & laboratory test (video)	Structure activity •Each activity Monitoring •Eg. Pipe (Installation, bridge construction (fig)

Pavement (fig)

Sanitary installation
using under ground activity (eclectic installation, water installation, etc……..

sub base preparation
- using selected material max
- Randomly Monitoring pavement strength

Base course construction
- Using local crushing aggregate

Surface operation & compaction (fig)
- Using prime coat
- Using local crushing aggregate
- Using bitumen (video)

Monitoring
- quality control Per day each activity (fig)

road marking

Prepare working area
- Cleaning road surface using broom & air comperaser

Materials & tools preparations
- paint
- Brush
- using small marking equipment & marking plant

marking operation (fig)

Clean up

Clearing working area

Clearing tools & equipment

Remove temporary traffic sign

Maintain plant, tools & equipment
- **Storing tools ,small equipment (apply kaizen principle)**

Store re-use road material

Flexible pavement value chain (gap)

Input	Site investigation	Survey work	Earth work	Drainage structure
material Quality & quantity of material	**Prepare long time future design (FIG)**	**Horizontal setting out and vertical setting out using serving instrument**	**compaction**	**Mixing of material** •Mixing cement & sand •Hand mixing •Ratio (1:3)
Lack 0f asphalt mixing plant & equipment	**Material test** •Laboratory Test	**Cross section setting out** • by using modern serving instrument	**soil stabilization** •Using mechanical & chemical stabilization method	Structure activity •Each activity Monitoring •
	Select road Alignment (topo)		**Apply field & laboratory test**	

Pavement (fig)

road marking

Clean up

Sanitary installation
using under ground activity (eclectic installation, water installation, etc……..(fig) (fig)

sub base preparation
•Per day Monitoring each activity .

Base course construction
•Using local crushing aggregate
•Max 8-10 cm thickness.

Surface operation & compaction (fig)
•Using prime coat
•Using local crushing aggregate
•Using MC3000 bitumen

Monitoring
•Per day each activity

Prepare working area
•Cleaning road surface using air comperaser

marking operation

Maintain plant, tools & equipment
•Storing tools ,small equipment (apply kaizen principle)

Store re-use road material

Key

Main Value Chain

Sub-Value Chain Gap

Gap

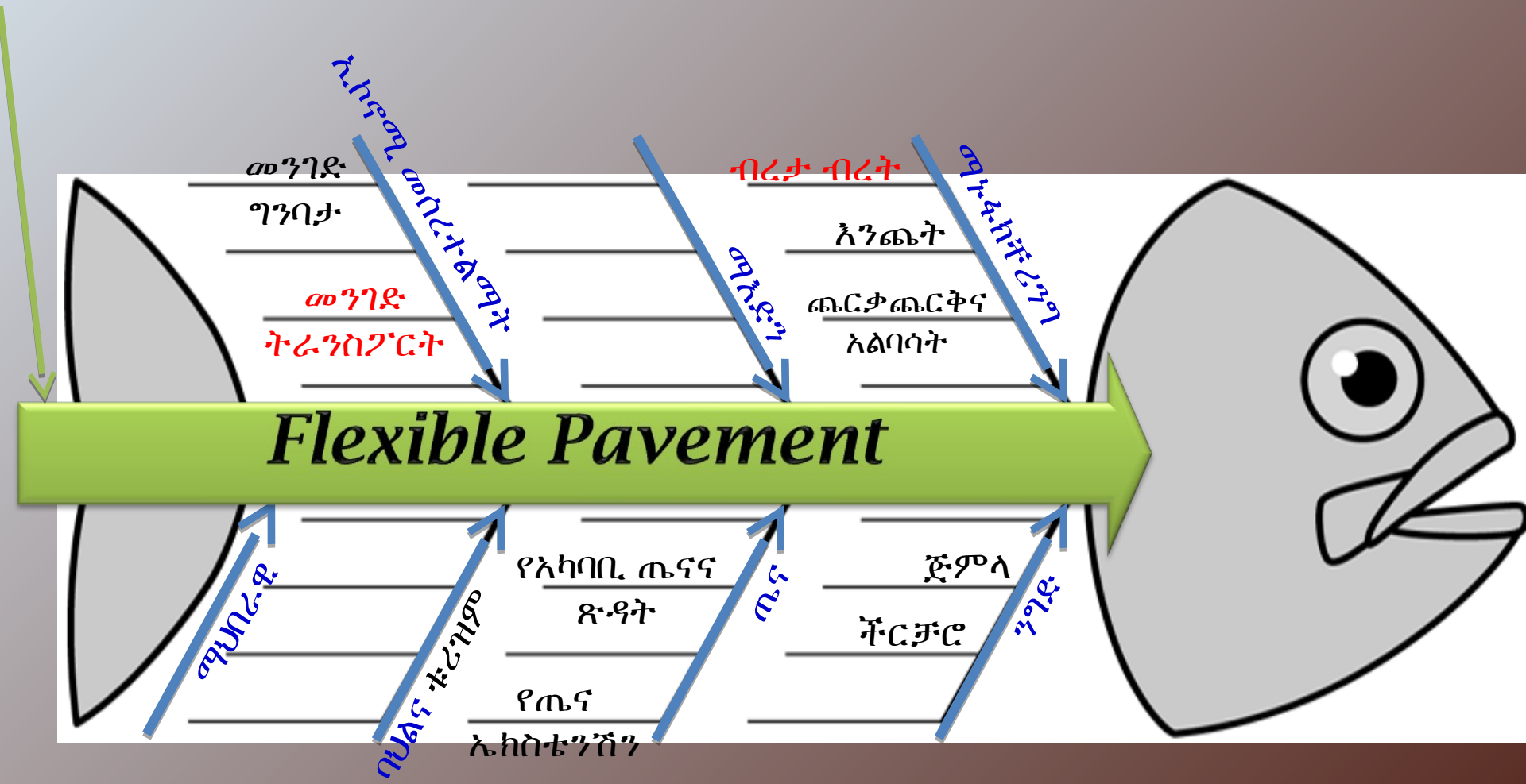
	TECHNOWARE	HUMANWARE	INFOWARE	ORGAWARE
Site investigation		**Site investigation technical knowledge**	• **road Site investigation technical manual**	
Survey work	1. hand healed GPS 2. hand healed radio	Road surveying **technical knowledge**	• Road serving **technical knowledge manual** • **Surveying instrument operational manual**	• **Surveying instrument storing method.**
Material testing	**3.Mechanical liquid limit device (fig)**	• **liquid limit test operational technical knowledge.**	• **Material testing apparatus functional Manual** • **Material testing apparatus operational** Manual	• **Material testing Training center.**
	4.Compression testing machine (fig)	•Compression testing machine operational **technical skill.**	• **Material testing procedure manual**	• **Training center**
	5.Nuclear density gage	.Nuclear density gage operational **technical skill.**		
Concrete mixing	**6.Concrete mixer (fig)**	**Concrete mixer** operational **technical knowledge**	• **Concrete mixer operational manual**	
compaction	**7.Small plant & Equipment (fig**	all compacter operational guide skill.	•all compacter operational guide manual •**Asphalt paving manuals (manual)**	
Road marking	**8. Thermoplastic-Road- marking Machine (fig)**	**Thermoplastic-Road- marking Machine operational technical knowledge**	**Road marking operational manual.**	• **Thermoplastic-Road-marking Machine Training center .**
Temporary Traffic control sign	**9.cone** **10.Trafic sign (fig)** **11. Flag**	• **Traffic control technical skill.**	• **traffic control** Manual • **Safety and health**	

Identified technologies and respective sectors responsibility

technologies

የእሴት ሰንሰለቶች ተመጋጋቢነት ከትኩረት ዘርፎች አኳያ

Flexible Pavement



Road construction:-Flexible asphalt pavement

Changes come by best practice

R.N	Indicators	Measurements	Bench Marks	As Is
1	High work service	Number of products	High	Low
2	Road durability	Strength	High Durability	Less Durable
3	Increase skills for the person	Ability	Skill full ability	Unskilled &skill man power
4	Save time and increase road service.	Time	High	Less
5	Quality service	Quality	High quality	Less Quality

The result that come by best practice

No.	ሲሰራ የሚመጣው (Outputs)	ውጤት (Outcomes)	ለውጥ (change /result)
1	*Increase road quality & Network Size*	*Increase road service*	*Reduce traffic hazard & load*
2	*Increase road duration of time with out maintenance*	*Decrees capital lose During maintenance.*	*Increase development country*