#### 2019 JICA

# How to Maintain the Rural Road by Ourselves

### **Civil Engineer Geotechnical Engineering**

Foundations, Tunneling, Retaining wall, New structures







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# Tokyo Sky Tree 634 m high Foundation Earthquake force, Wind force



# New technology - Knuckle wall method -



# New Structure for Viaduct





# Crossing Sahara by bicycle (1984) 274-86-85



## At the top of Mt. FUJI



# What is a road for you?

Transport No development without a road Life Access Very important Network To carry farming products Faida To see the friends Like water Communication

Above those are the answers from the group members. "What is a road for you?"

# SUSTAINABLE GOALS

#### 17 GOALS TO TRANSFORM OUR WORLD





引用: Africa Infrastructure Knowledge Program

# CORE IS INTERNATIONAL NGO.

Mission:

> Eradicate poverty in developing countries through road access improvement

Objectives:

- Empower local communities to improve road access to hospital, school, and markets
- Enhance self-reliance initiatives towards their own livelihood improvement

Strategy:

Train communities on local resource and labor-based technology for road works through actual construction at the problematic sections where they suffer from difficulty of access How do we repair rural roads without any machine ?

# What can I do for rural people as a Civil Engineer.

Challenges and Good Solutions





Vehicle per day < 50



September, 2007 Practical construction in East Uganda May, 2008

# WHAT CAN WE DO?









# COMMUNITIES SUFFERING

#### Poor access to school, hospital, and markets









## Problems in rural area (Cause of the poverty)







# Always waiting heavy machine !!



# How to empower rural communities?



# Approach to support communities to get better access to social services and markets



Better access To School, Hospital, Markets Road works utilizing local resources "Do-nou" technology With/to comm



#### **Opportunities**

To be self-reliance, motivated towards livelihood improvement

**Technical transfer** 

With/to communities, youth

### STANDARD CROSS SECTION VIEW WITH DO-NOU METHOD

#### **Do-nou: GEOTEXTILE** (Japanese term for soilbag)



# "Do-nou" technology!! Compaction

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TAPAN

DO-NONI

# How to Generate the Strength of the "Do-nou"?





The people can repair the road by themselves. (Kenya)



Repair the road we own by participation of community members.(Ghana)

#### Characteristics of "Do-nou" 40 cm x 40 cm, 10 cm, 20-25 kg

#### **Material**



Low cost material

Soil near

"Do-nou" bag - Bags for sugar/maize Material put inside the bag - the site

Construction





Labor based Simple

No curing period

Wooden mallet

Compressive pressure





Bearing Capacity (250 kN)

## 1952 Bridge construction in Japan



# 1957, National route 19th

#### Rehabilitation vs Spot Improvement

#### Not Maintainable

► Rehabilitation International standard LBT Year-round passable road

Spot Improvement
 Local Resource Based Approach
 Almost Year-round passable road

Contractor

USD 15,000 – 90,000 / km

Community US initiative 20, Micro & Small Enterprise

USD 5,000 – 20,000 / km

**Do-nou method (Tech.)** 



## ROAD IMPROVEMENT WITH LOCAL RESOURCE BASED APPROACH



Rehabilitation



Current





Time

# Voice of the people who experienced road maintenance using Do-nou

- Now I am confident I can maintain the road. Initially I was not very sure I could.
- I am very happy because the road has brought about good positive changes to our community.
- Initially I felt it was a difficult job needing a lot of energy but in the end I realized it was easy.
- In the beginning we did not have idea about maintaining roads but now we have learned.
- Big improvement of the road, I got knowledge.
- I have got technology, idea and murram road. I can do it by myself.
- I believed that the technology works on road maintenance.

# IMPACT OF THE ROAD MAINTENANCE USING DO-NOU TECHNOLOGY

- 1. The buyers come to the village more frequently.
- 2. The price of the crops, vegetable and passion fruits, have raised.
- 3. The income of the farmers has increased.
- 4. The farmers were motivated and expanded their farm.



- The farmers became able to reach the market more early in the morning, when the price was set more highly.
- 6. The extension officers visit the village more frequently, then the farmers get more skill and information of the markets from them.
- 7. The farmers started to new project for income generation, such as fish pond.

#### Matrix for traffic, material, maintenance and cost



### APPLICATIONS TO RURAL INFRASTRUCTURE







#### Retaining wall



#### Dam (water harvest)

#### With villager at 27 countries 165 km



#### Corre Community Road Empowerment















CORE's work in the worldwide, By Jun. 2019, 27 Countries



Region	Cent. A.	S. A	Africa	Asia	Pacific	Total
No. of Coun.	1	1	16	5	4	27
Length (m)	0	20	53,597	30,500	90,604	174,721
No. of trainees	200	30	9,822	3,338	3,225	<b>16,615</b> <sub>34</sub>

## Case of road improvement with Do-nou in Kenya

Training/demo of unpaved road maintenance L = 200 m W = 3 m, 25 person/day x 10 days, USD 9,000 /km







### Case of road improvement with Do-nou in Tanzania

Concrete pavement at the steep slope with communities L = 530 m W = 2.5 m, 30 person/day x 150 days, USD 100,000 /km




Standard cross section

Unit : m











# Case of road improvement with Do-nou in Burkina Faso

Repair the damaged sections where was improved with Do-nou



### Case of road improvement with Do-nou in Burkina Faso

Women willingly and proactively participated.

# Embankment built with "Do-nou" @ Myanmar



# Sustainability, Case at Shin Gu village in Myanmar



### Cemented backfill





Damaged surface



Repaired by communities 42

# Trainings at the field in Kenya







Road Problems to the Communities Irrawady Division in Myanmmer 1 Falling accidents in rainy season because of slippery and muddy road surface. 2 Bad road and bridge are Impassable for vehicles ③ No availability of suitable soil and stone for road maintenance because of Delta area.





# Khan Thar village, Pyapon, Irrawady



Project period : October 2013 – October 2014 Design : Tire Path Concrete Pavement (Thickness10 cm) Length · Unit Cost : 1,200 m · 13,000 Kyat/m (13 USD/m) Number of participants in average : 50 person/days Number of Working days : 64 days Traffic : Bike, Motorbike, Toraji







# Impact of the project

### Travel time

Traffic means	Before	After
Walk	45 min.	17 min.
Bicycle	Impassable	8 min.
Motorbike	Impassable	4 min.

The motivated and trained community has repaired the other road by themselves.



- 1. The road become passable even in rainy season.
- 2. The patients are transported to the hospital timely.
- 3. Students are no longer hampered going schools due to the road conditions.
- 4. Some villagers started bike taxi business.
- 5. The community themselves repaired the other road with the fund donated by the other NGO in February 2015.

### Bridge in Khan Thar

Project period : October 2014 - October 2015 Type of bridge : Reinforced Concrete Bridge Bridge Length : 20 m, 6 span, Maximum span length: 6 m Cost: 19,000,000 Kyat (18,900 USD) Number of participants in average : 40 person/days Number of Working days : 150 days Traffic : Bike, Motorbike, Toraji



This bridge was built with bamboos and very unstable. No motorbikes can pass.



Pedestrian bridge built with iron material

### Sounding with local auger



### Assembling steel bar



### Casting concrete for pile



### Form work for the beam



#### Before

### -View along bridge axis-

After





### Before –View from right-angle of bridge axis- After







Project period : October 2015 - October 2016 Design : Stone pavement with mortar Length • Unit Cost : 240 m • 60,791 Kyat/m (46.5 USD/m) Number of participants in average : 25 person/days Number of Working days : 60 days Traffic : 10 ton truck

### **Cross Section**



### Before

After



# The State of Construction and Impact



Laying pipe



After installation of culvert

- Good drain system remove the cause of the mud on the carriageway of road.
- 1. The community become more cohesive through the experience of working together on the road.
- 2. The repaired section become passable even in rainy season.
- 3. It takes fewer minutes to go to market and hospital than before.

# Sustainability (Kenya)





Training for "Do-nou" technology (CHARITY)

Recognition by the government <sup>54</sup>

Association formed for rural road maintenance Business Potential

Sustainable

maintenance

Improvement of f

rural road

MMM

CHARITY TO JOB CREATION

# Formation of Association and Registered Company



Farmer's groups
 Within 40km from Eldoret

Six Farmer's groups that acquired "Do-nou" technology (Horticulture, Peace building, etc)

They formed an association for improvement of rural road accessibility (October 2010)

Bottom -up : Empowerment both organisational structure and planning & management

**Top-down** : Recognition of "Do-nou" technology at the government level

Association registered as a company (September 2012)<sup>55</sup>

# Bottom-upTop-downApproachApproach

### Training and Practice Recognition by the Government



#### Empowerment of organizational aspect

- Executive committee, Accounting, etc
   <u>Empowerment of practical aspect</u>
- Cost estimation, construction planning
- Management of plans and materials
- Quality control



ROADS 2000 STRATEGIC PLAN 2013 - 2017



**NOVEMBER 2012** 









# Youth Employment for Sustainable Development



### Joint Project with International Labour Organization (ILO)



Community Road

**Empowerment** 

Chairperson: Makoto KIMURA Community Road Empowerment



# CORE's Involvement in the ILO projects

Country	Year	Project title
<u>Kenya</u>	2012	Youth Employment for Sustainable
	2014	Development (YESD)
Somalia	2014	Durable Solutions for Somali refugee
	2016	returnees through Repatriation,
		Assistance and Promoting Sustainable
		Livelihoods Project
Gambia	2018	Employment Creation for Youth to
		Build Sustainable Peace in The Gambia



# **Project Objective**

To empower and create employment for youth groups by initiating Do-nou Technology for rural access road maintenance in the selected counties.



# **Project Outcome Summary**

[From the youths] We have skills. Idle youths were reduced. We learned moral with working together. We got income.

Do-nou technology trainees	500 youths
Constructors trainees →No. of groups who registered as companies	20 youths (1 rep. from each group) → 11 groups
Distance of maintained roads (During trainings)	3,730 m

# **Project outcome – Improved roads**





### Before the training

After the training

The road situations were improved in 5 counties, 7 sites. (3,730m) <sup>64</sup>

# **Project outcome – Create Employment**

# Companies registered 1 1 (as of March 2014)



Youth groups acquired some work after the project

 Supervision work from Kenya Rural Roads
 Authority
 Construction work costs
 several millions in Kenyan
 shillings
 Culvert installation and
 regular road maintenance

Work

Part of work for 17 km paved road

The future of Africa hinges upon motivated young people who overcome difficulties through their own power.

Japan's Diplomacy towards Africa: "Strengthening Each Individual, One by One," Speech by Prime Minister Abe





# Trainings on Do-nou & at National training institute



Private donors' fund Grant assistance for Japanese NGO by G.O. J.

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### Bottom up & Top down approach

Policy proposals to Local Authorities & Road Administrators/Line Ministry
A. Do-nou Demo, B. Budget allocations to the trainings for the youth
C. Manual & Guideline of Do-nou technology to be certified









# AGPO Initiatives in Kenya

The Access to Government Procurement Opportunities (AGPO) initiatives is to enable youth, women and people with disability access 30% of Government Tenders through **the process of registering and pre-qualifying** Youths, Women and Persons with Disabilities owned enterprises.

Model: Series of Trainings on local resource based and labour intensive method to improve rural access roads to youth



What is a model? How effective?

Unemployment youth

# Youth employment promotion model through trainings on Do-nou technology



Solution to poor road/unemployment problem with benefit for all three sides

Inclusive business model developed through trainings to the youth on road maintenance using Do-nou technology



### **YOUNG LEADERS VOICE**



After the Do-nou technology training, my mind attitude changed. I am capable of working on construction sector. I can pay my basic needs, house rent and food for my family. (Paul Njahia ,Director, Eldo fist construction Co. Ltd)

I was jobless for 3 years and was hopeless to get job. During the Do-nou training, I was keen in learning the road skills. Now, awarded the tender from national and local government. I am happy man since I have married.

(Mike Kosgei, Director, Race-shine Co. Ltd)


### **DO-NOU TECHNOLOGY COMPANY**







Director: Simon Juguna

"When I was jobless, I got the chance to participate in the Do-nou training. That had changed my life."

After the training, he established his own company, which name is <u>"Do-nou technology company"</u>.

## **CORE Introduced in the Prime Minister's Speech** "Japan's Diplomacy towards Africa : Strengthen Each Individual, One by One"



Photo from Ministry of Foreign Affairs Japan, Homepage

His Excellency Mr. Shinzo Abe, Prime Minister of Japan (Bringing a bright future to youth)

A Japanese NGO called "CORE", provides an excellent illustration of this.....

## At HQ of African Union in JAN. 2014 74

#### **Further activities of CORE**

ILO project	Grant assistance	from GOJ for 2019	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
Mauritania	Burkina Faso	4 <sup>th</sup> phase		
	Uganda	1 <sup>st</sup> – 2 <sup>nd</sup> phase		
	Rwanda	2 <sup>nd</sup> – 3 <sup>rd</sup> phase		
	Myanmar	6 <sup>th</sup> phase		
	Kenya	World Bank etc.		
	Ethiopia	JICA/JST Researc	A/JST Research project	



Employment Creation for Youth to Build Sustainable Peace in The Gambia

Gambia Technical Training Institute <= >KTC (Kisi Training Institute) in Kenya

# Thankyou very much for your attention.



## Bridge constructions







# Field station 1 in Cameroon



# Structure system



#### Make a good road for rural peoples! Thank you for your attention!