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AUTHOR(S):

MATSUKUMA, Shunsuke; SATO, Sohei;
FUKUBAYASHI, Yoshinori

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DEMONSTRATION OF ROAD IMPROVEMENT BY LOCAL INHABITANTS AT THE BAYTSEMAL VILLAGE IN THE SOUTH OMO ZONE IN SOUTHERN ETHIOPIA

**Shunsuke MATSUKUMA
Sohei SATO
Yoshinori FUKUBAYASHI**

ABSTRACT The SATREPS-MNGD Project implemented a demonstration of participatory road improvement with local inhabitants at the Baytsemal village in the South Omo Zone in Southern Ethiopia from November 25th, 2019 to December 9th, 2019. The activity lasted for 12 days. The first five days were for the preparation, including measuring, designing, and information sessions for the local inhabitants to build consensus on work plan, whereas the remainder for the actual implementation.

Key Words: Rural road improvement, Participatory development, Community work

Backgrounds of the Demonstration

One of the aims of the SATREPS-MNGD Project is to establish an affordable and sustainable method for improving road accessibility in rural areas.⁽¹⁾ To achieve this aim, adopting a local-resource-based approach is the key such as using local materials or plants for soil additives or involving local inhabitants. While the participatory development approach has been common in the development field, several forms of actual practices in different places exist. Thus, it is important to find a suitable and effective approach to involve local inhabitants in community development services. In this study, to understand how community-based practices work in a project site, a project team demonstrated road improvement with a local community.

This study narrates the main activities involved in the preparation and implementation of road maintenance. Also, it delineates the team's experience in terms of achievements and the difficulties encountered. Thus, the results/feedback

obtained can further contribute ideas toward future participatory implementations at a project site.

This study, however, precludes details of prior consultations with the village chairperson and the explanatory meeting with the villagers. Before the development activity, a member of the project team consulted with the village chairperson, who then held a village meeting to disseminate the information. The prior negotiation and discussion with the local community is quite a potentially interesting topic in the aspect of anthropology and will be complemented in the next chapter.

Construction Site

The demonstration site is located at the Baytsemal village in Jinka, South Omo Zone of Southern Ethiopia (Figures 1 and 2). The Baytsemal village is connected to a pavement road, Airplane-marefiya road, by a 4-km-stretch unpaved road called “*Leize-Baytsemal village road.*” Among several options for the demonstration, the team decided on a 100-m stretch of a short path from *Leize-Baytsemal village road* to a primary school after discussing with the villagers. The path was unpaved and mainly used by school students. Figure 3. shows the condition of the site before the construction. Rainwater from the *Leize-Baytsemal village road* runs on the surface of the path, causing gullies in the middle of the path.



Figure 3. Condition of the Before the Construction



Figure 1. Site Map (wide)

(This map was created by authors based on the google maps data.)



Figure 2. Site Map (close)

(This map was created by authors based on the google maps data.)

Preparation

Day 1: November 25th, 2019 (Monday)

The project team, a local coordinator (*LC*), and a lecturer of Jinka University (*JU*) visited the site in the morning and were received by the village chairperson and other villagers. They observed the condition of the site and discussed the implementation plan considering the drain system and the way to lead water away from the side drains to the adjoining land with attention the land use and ownership (Figure 4). Since the selected path for the demonstration was connected to a primary school, they carefully considered constructing the drainage around the school entrance (Frontispiece 1).

In the afternoon, the project team visited the Technical and Vocational Education and Training (TVET) institutional office in Jinka with the *LC* to consult on the construction survey and request a set of the total station for the project. The TVET office agreed with the idea and promised to provide a “total station” on the following day.



Figure 4. Discussion at the Site

Day 2: November 26th, 2019 (Tuesday)

The team visited the village office with the *LC* to meet the village chairperson to explain their observations and plan (Figure 5). Also, present were the vice-chairperson, the village accountant, and the village secretary. They outlined their plan as follows:

- To eliminate the running of rainwater from the *Leize-Baytsemal village road* on the surface of the path, which caused gullies on the middle of the path, by constructing drainage along the path.
- To make sure that the neighboring inhabitants get agreement on the drain plan and road width.
- To lay *Do-nou* bags in deep gully areas for leveling.
- To gravel the path after leveling.

Also, the project team, through the chairperson, requested the villagers to come with their holes and shovels for the construction. The chairperson and other members agreed and promised to hold a village meeting to explain the construction.

The TVET Jinka office provided the needed total station as requested by the project team and two technicians. The items were picked up by the project team at the TVET Jinka office after the meeting at the village office. Afterward, they returned to the site and surveyed the longitudinal gradient and the cross-section at 10-m intervals.



Figure 5. Meeting at the Village Office

Day 3: November 27th, 2019 (Wednesday)

The team prepared the cross-sectional drawing and the section plan of the path based on the survey. They determined the amount of soil and gravel needed to fill up the gullies and finish the road, respectively.

In the afternoon, the project team and the *LC* purchased the construction tools, besides hoes and shovels, around Jinka town. Also, they went to a stone quarry (managed by a Bako Dawla woreda office), which was 12 km away from Baytsema, to select the gravel sand needed for the construction (Figures 6 and 7). They determined the required type of gravel sand, negotiated the transportation cost with the owner, and made a deal.



Figure 6. Stone Quarry Location

(This map was created by authors based on the google maps data.)



Figure 7. Stone Quarry

Day 4: November 28th, 2019 (Thursday)

The community work was organized by the Baytsemal village council and performed by the villagers. They divided themselves into two groups of around 20 people and engaged for about 3 h from 7:00 am to 10:00 am (Figure 8). The team observed the villagers' work on *Leize-Baytsemal village road* and was updated by the village chairperson daily. They excavated the drainage along the road and heaped the excavated mud on the main surface of the road, which made the road muddy, to fill the gullies and puddles (Figure 9).

In the afternoon, the team ordered compactors and templates of the road surface from the smith's shop, who promised to prepare the following day (Figure 10).

Day 5: November 29th, 2019 (Friday)

The team visited the head of the Department of Road and Transportation of South Omo Zone and the head of Southern Nations, Nationalities, and Peoples' Regional Office of ERA. The team briefed them at each office on the overview of the project and the current status. In turn, they welcomed the project and appreciated the project's contribution.



Figure 8. Villagers' Community Work



Figure 9. Mud Excavated from the Drainage onto the Main Surface



**Figure 10. Hand-made
Templates
and Compactors**



Implementation

Day 1: November 30th, 2019 (Saturday)

The villagers gathered at the demonstration site around 7:30 am. The work started at 8:30 am and 150 villagers were present at the site. Yellow strings were stretched by the project team and some villagers to mark the location and shape of the designed drainage (Figure 11). The villagers performed the community work for 2 h and excavated the trenches by using their shovels and hoes (Figures 12 and 13). In front of the primary school gate, a crossing trench was made to drain the water off from one point (Figure 14).



**Figure 11. Drainage Excavation Preparation
The Yellow String Indicates the Drainage Location**



Figure 12. Villagers Excavating the Drainage



Figure 13. Excavated Drainage



Figure 14. Crossing Drainage in Front of the Primary School Gate

Day 2: December 2nd, 2019 (Monday)

Since Sunday was a day off for the community, the villagers started the work on Monday at 8:30 am. Fifteen villagers and 40 students were involved in the work.

The excavated soil from the trench was put into Do-nou bags and used to level the gullies (Figures 15 and 16), by laying them in the gullies and compacting them using local compactors. The team expected that the leveling by Do-nou bags would be completed in one day, however, the villagers engaged in the work for just 1 h and completed only 30 m of the 100-m work.



Figure 15. Villagers Putting Excavated Soil into the Do-nou Bags



Figure 16. Villagers Putting the Do-nou Bags in Deep Gullies

Day 3: December 3rd, 2019 (Tuesday)

It was a rainy day, thus, only a few villagers showed up at the muddy site. However, they returned home due to the site condition. The team consulted the village chairperson about the plan and situation where they could not involve the villagers enough in the activity. They raised concern that the villagers did not fully understand the construction plan. Thus, the village chairperson held an information session for the villagers again to encourage them.

Day 4: December 4th, 2019 (Wednesday)

The villagers gathered at the site 7:30 am. They were 100 villagers because of the village chairperson’s call. They continued the activities of filling the deep gullies and leveling them afterward by using Do-nou bags filled with excavated soil for 2 h. Almost 50 m of the construction was completed, i.e., 80 m of the 100-m work was leveled.

Day 5: December 5th, 2019 (Thursday)

The villagers started construction work as early as 7:00 am. They finished filling the deep gullies and leveling the rest of the work (20-m of the 100-m work) for 1 h (Figure 17). After filling and leveling, they formed and smoothed the drainage (Frontispiece 2). The discarded soil from the drainage was scattered on the surface of the path or the Do-nou bags and compacted to level the surface (Frontispiece 3 and Figure 18). Afterward, the project team went to the Bako Dawla stone quarry in the afternoon and confirmed the type of gravel sand and its delivery time.

Day 6: December 6th, 2019 (Friday)

It rained heavily in the early morning, making it impossible to transport gravel sand from the Bako Dawla stone quarry. Hence, the villagers had no work. The rain stopped in the afternoon and the gravel was delivered. Two trucks were used to transport 32 m³ in total (16 m³ in each truck) (Figure 19). Carriers were fabricated from iron sheets by a local workshop due to the scarcity of wheelbarrows in the town (Figure 20).



Figure 17. Do-nou Bags Placed in Deep Gullies



Figure 18. Drainage Continues into the School



Figure 19. Trucks Arriving at the Site



Figure 20. Hand-made Carriers for Scattering the Gravel

Day 7: December 9th, 2019 (Monday)

Fifty villagers showed up at the site in the morning and they worked for 3 h from 7:30 am to 10:30 am. They scattered the gravel on the road and leveled the road surface (Frontispiece 4). The gravel was carried in pairs, while others compacted the surface with hand-made compactors (Figures 21 and 22). 70 m of the path was completed.

After the construction work, the President of JU proposed to discuss with the project team and the village council about the progress of the construction and the contribution from the Project. The *LC*, village chairperson, village secretary, and security were present during the discussion (Frontispiece 5). The content of the discussion is detailed in the latter part (the third point of challenges in Lessons Learned).



Figure 21. Gravel Pavement (1)



Figure 22. Gravel Pavement (2)

December 10th–13th, 2019

The *LC* took an initiative to finish the remaining work (leveling and with gravel pavement), which was completed on December 13th. The construction work lasted longer than the team expected. Table 1 shows the differences between the implementation plan and the actual implementation.

Table 1. Implementation Plan and Actual Implementation

	Plan	Actual
30th Nov	Determine the precise location and size of the drainage and excavate trenches. Make Do-nou bags filled with excavated soil to fill the gullies. Compact Do-nou bags to become leveled.	Determine the precise location and size of the drainage and excavate trenches. Make a crossing trench in front of the primary school gate.
1st Dec	Off	Off
2nd Dec	Excavate trenches. Make Do-nou bags filled with excavated soil to fill the gullies. Compact Do-nou bags to become leveled.	Make Do-nou bags with excavated soil to fill the gullies.
3rd Dec	Transport gravel sand.	Almost nothing was been done because of the bad weather.
4th Dec	Scatter the gravel on the road and compact the gravel sand. Level the surface of the road.	Make Do-nou bags with excavated soil to fill the gullies. Compact Do-nou bags to be leveled.
5th Dec	Scatter the gravel on the road. Compact the gravel sand. Level the surface of the road.	Make Do-nou bags with excavated soil to fill the gullies. Compact Do-nou bags to be leveled. Scatter the excavated soil from the trench for leveling. Visit a stone quarry for gravel sand.
6th Dec	Finishing of the surface and drainage. Cover the crossing trench with concrete.	Almost nothing was done because of the bad weather.
7th Dec	-	Off (Market day)
8th Dec	-	Off (Sunday)
9th Dec	-	Scatter the path with gravel sand and level the surface.
10th Dec	-	Complete the finishing touches.
13th Dec	-	Completed.

Lessons Learned

General comments and achievement

Although the construction work in this area was novel for the project team, they completed a 100-m rehabilitation in two weeks. The implementation method was based on the community-participatory approach. The project was finished with material costs and no labor cost. Since it was during the rainy season, construction was delayed due to bad weather, otherwise, most of the activities went smoothly.

Challenges

1. Community activity time

The team initially anticipated that participatory improvement would have been intensive and 6 or 7 h a day for a week could be enough to complete the construction. However, community activities were only conducted early in the morning for about 2 h, which was due to the trend among the villagers. The villagers regularly conduct community work, and thus, the convention affected the project demonstration. For the conventional community work, they gather once a week or once every two weeks and commit themselves to the activity for 2 or 3 h. They adopt this style to not make an impact against their businesses as farmers or small enterprises. The team, through the village chairperson, explained to the villagers that the participatory approach would be the adopted approach in the demonstration of road improvement. It could be assumed that the villagers considered the demonstration as one of the non-intensive community activities common to them. Also, other hindrances exist, such as market days every Saturday, other community workdays, or unpredicted events of village chairperson and leaders.

2. Procurement of sand and gravel

The stone quarry was located far away from the main town and it took a long time to make a round trip of the truck. Also, the access road to the quarry was not fully maintained and even a small amount of rain delayed gravel transportation. On December 3rd, the team requested to transport soil at 7:00 am the next morning, however, it arrived around 10:00 am after the community work of the day had elapsed due to the rain, which fell for hours the previous night.

Also, as shown in the Day 5 of the implementation, on December 5th, the team requested to convey gravel sand in the afternoon, but it rained for about 1 h in the afternoon, delaying the gravel arrival to the evening of December 6th.

3. Villagers' anticipation of the contribution from the project

During the participatory development, the villagers engaged in the project without any wages. The project team consulted with the President of JU about the villagers' contribution to the project and it was agreed that lunch is provided for them during the construction period. However, as mentioned above, since the community work was conducted only in the early morning, the project team could not serve lunch on any activity day. As an alternative, the team considered a plan to slaughter cows and have a lunch party on the last day of the activity. In response to this proposal, the villagers of Baytsemal requested gravel and quarry for repairing the *Leize-Baytsemal village road*, instead of a lunch party. The team discussed with the President of JU, the LC, and other village council members before the completion and decided to provide 18,000 Ethiopian birrs (which is equivalent to 650 USD in 2019) of gravel and quarry. Although it is uncommon to provide fees for materials or salary to villagers who participate in development programs, the team accepted the proposal from the village because their request matched the purpose of the project, which was the proposal of a sustainable operational model of road improvement in rural areas and encourage road improvement by the villagers themselves.

Note

- (1) See the previous edition of *ZAIRAICHI* about the overall goal and the overview of the Project. <https://repository.kulib.kyoto-u.ac.jp/dspace/handle/2433/251047>

Outline of Demonstration of the Road Improvement in 2019

- Construction distance: Approximately 5 m × 100 m
 - Figure 23 shows the cross section of the proposed plan.
- Construction period:
 - 5 days for surveying/design/resident explanation and enlightenment.
 - 7 days for construction.
- Surrounding environment:
 - The target path is from the main road, *Leize-Baytsemal village road*, to an elementary school.
 - The path is used by residents daily and students while commuting to school.
- Problem to be solved:
 - Drainage from *Leize-Baytsemal village road* flows in and severe erosion is formed in the middle of the road.
- Precautions for construction:
 - Obtaining the width of the roadway and gutters. A private house was situated on the roadside. Thus, it is necessary to explain to the residents when determining the width of the road and gutters.
 - The target road is a downhill road to the elementary school, so one must be careful about the drainage near the school.
 - The village of Baytsemal and the quarry are 12 km apart and it takes time to transport. Also, notably, it was impossible for the large trucks transporting the gravel to travel on unpaved roads in bad weather.
- Construction tools (Tables 2 and 3)
 - Compactors: For compaction.
 - Templates: Road crossing slope.
 - Shovels: Excavation of gutters for drainage.
 - Hoes and plows: Ditch excavation and leveling.
 - Carriers: Transportation of gravel.
- Do-nou construction tools
 - Do-nou bags.
 - String: String for binding the sandbag mouth.
 - Jerrycan: To determine the volume of sandbag-filling material.

- Construction method and procedure
 - Determine the position of the gutter and excavate.
 - Create a crossing ditch in front of the elementary school gate.
 - Fill Do-nou bags with the excavated soil from the ditch and lay them in the deep gullies. Then compact the surface for leveling.
 - Shape the gutter.
 - Excess soil was sprinkled on the surface of the roadway for leveling.
 - Scatter the path with the gravel and compact it.
 - Large-sized gravel was used for score checking of gutters
 - Add a slope in the crossing direction of the road (6%)
 - Paving the cross gutter near the elementary school with concrete.

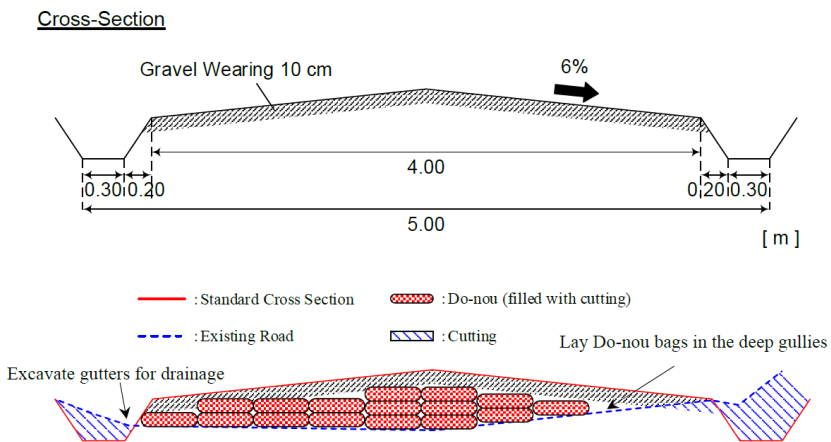


Figure 23. Proposed Plan

Table 2. Estimation of the Amount of Materials

	Gravel pavement		Concrete (for cross trench), Volume: 2.5 m ³		
	Do-nou bags [pc]	Gravel sand [m ³]	Gravel [m ³]	Sand [m ³]	Cement [kg]
	750 (750)	50.0 (48.0)	2.4	1.2	500
+5%	-	52.5	-	-	-

Table 3. Construction Instruments

Instruments					
Carriers	Compactors	Templates	Hoes*	Plows*	Shovels*
6	5	2	5-10	5-10	5-10
				Instruments for Do-nou	
				String	Jerrycan
				40 cm × 750 pc = 300 m	

*Villagers brought their own