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An investigation on the Influence of Institutional Capacity and Applicability of Technology in Implementation of URRAP: The cases study of Tigray Region.

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Acknowledgment

First and for most, We Glorify and Thank the Omnipotent and Omniscience God for shaping our way on the right direction as He planned.

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Description of Acronyms

AADT	Average Annual Daily Traffic
AASHTO	American Association State Highways and Transport Officials
ADT	Average Daily Traffic
EBT	Equipment Based Technology
GTP	Growth and Transformation Plan
ILO	International Labor Organization
LBT	Labor Based Technology
LVR	Low Volume Roads
MCTS	Multiple Correlation Technic System
NGOs	Non -Governmental Organizations
RARP	Rural Access Road Program
SADC	South Africa Development Community
SME	Small and Medium Enterprise
TRCE	Tigray Road construction Enterprise
TRL	Transport Research Laboratory
URRAP	Universal Rural Roads Access Program
VPD	Vehicle per Day

Definition

- Tigray: One of the regional governments in Ethiopia suited in north direction.
- Wereda: Administrative division with in the region
- Kebele (Tabiya): The lowest administrative level which form the wereda.

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Abstract

Under Low Volume Road, (LVR), Universal Rural Roads Access Program, (URRAP) is a new program in Ethiopia aimed to access the rural community and to afford all season access road to markets and public services. The program was introduced in 2012 throughout Ethiopia and specifically in Tigray in 34 weredas, it was planned to have at least one completed project per wereda in that year.

The aim of the paper was to find the influential factors which affect the implementation of the program as case study in the region more targeting the technology applicability and institution capacity. Questionnaires, interviews and site visit were used to find the degree of influence of the 11 major factors by dividing to 45 sub factors which can describe the major factor.

The collected data was analyzed using Relative Important Index (RII) and multiple correlations to find which factors were highly influential in implementation of the program. The mean of the major influencing factor was tabulated and geometric design influence (RII=0.78), influence due to poor coordination between the stake holders (RII=0.69) and lack of community participation were the main influencing factors which affect the implementation of the program. The top influential factors in different sites were quite different which shows one fit for all principle was not valid in the program.

Keywords: Low volume road, URRAP, Relative important index

1. Introduction

1.1. Background

Construction of infrastructure is one of the fundamental pillars for the success of the development plan of one country since it reinforces the economic growth (Araya, 2011). To have good exchange of goods between the inhabited people of the country and to foster the development of the people, road construction will play a great role. For such interest, the road construction program of Ethiopia is highly synchronized on the road development program in which four sages are attained yet.

In all parts of the country it is emphasized on road construction by the responsible office Ethiopian Road Authority [ERA] in different modes like High Volume Roads, [HVR] with Average Annual Daily Traffic, [AADT] greater than 300 and Low Volume Roads [LVR] with AADT less or equal to 300. Parts of the fourth road sector development program, Universal Rural Roads Access Program [URRAP] is introduced which is a new and unique approach for the road sector in Ethiopia to attain the maximum benefit in the Growth and Transformation Plan one [GTP-1] of the country with providing access to all kebeles (smallest administrative organs).

Under LVR, URRAP is merely designed to give access for the isolated community to markets, schools and health centers with maximum of AADT 75 (ERA,n.d). The main principles which govern implementation of URRAP are institutionally possible, technologically applicable and practical, economically viable, socially accepted, politically supported and financially visible.

The institutional capacity in the program includes factors like contract administration in the program, community mobilization and participation, coordination between the parties, wereda road sector concern and labor availability; while the second principle technological applicability encompasses the general technological approach for example geometric design of the road, the construction material availability, water crossing structures and general planning of the program.

The road density of the country per 1000 sq. km (including community roads) was 136.6 Km and per 1000 Population (including community roads) was 1.83 km in 2010 and in the GTP-1 about 75,000 Km of community road was planned to construct via URRAP throughout the country (ERA,n.d.).

In Tigray region 80.5% of the people are living in the rural areas and 38.7% of the regional economy is reliant on agriculture (ERA,n.d.). For this fact, the region had planned to construct about 2,500 Km of road up to 2015 to connect all 34 weredas[1] and 666 kebeles with each other by access road through URRAP to deliver the agricultural products as fast as possible to consumers, to the domestic industry and export market, and to help the scattered people to have contact (ERA,n.d.).

From the 34 weredas which were included in the program, Erob, Gulemekeda and GantaAfeshum have achieved averagely 35% technically and 30% financially in the mentioned year but not even possible to finalized these projects till 2015. In Erob Wereda the program has failed and totally terminated and transferred to Tigray Road Construction Enterprise [TRCE] after two years while the GantaAfeshum site was transferred after four years of delay. Other sites like Hintalo-Wajrat, Endamehoni and Wolqayt are giving service for the community starting 2013.

URRAP aims creating work opportunity to the community and giving access to all kebeles with labor based methods by roads of a standard that provides all weather, year round access, to meet the needs of the rural communities, and are affordable and maintainable but there was a gap to achieve the mentioned goal in some sites due to different motives.

1.2. Objective of the Study

Investigating the influencing factors that challenge implementation of URRAP targeting the institutional set up and technological appropriateness is the body of the paper. On the program comparing and contrasting of the influencing factors such as terrain of the road, labor availability, soil and geology type of the route,

[1] Administrative division

community participation of the project and coordination between the parties will be addressed as the core point of the paper to check how much these factors are influential on the implementation of the program and how much they are correlated each other.

The objective of this paper is to investigate the influence of technological applicability and institutional set up on successfulness implementation of URRAP in the case study and to show where the successful implementation of URRAP were highly dependent.

2. Literature Review

A road is a route, or way on land between two places, which has been paved or otherwise improved to allow travel by some conveyance, including a horse, cart, or motor vehicle.

Development is highly dependent in the transport infrastructure. Currently as Kantharajappa, (1998,) is agreed that if a community is primitive and stagnant, the inadequacy of their roads will indicate the fact and economically advanced communities shall necessarily possess an efficient and sufficient road system.

According to Lebo and Schelling (n.d.), basic access means reliable access at least cost, and should be considered as human right. All roads with less than 50 vehicles per day should be built to basic access standard.

According to Pinard and Greening (2004), unpaved LVR with gravel road surface can be appropriate and cost effective in the following situation: Sufficient quantities of gravel are available that meets the required surfacing specifications, haul distances are relatively short, longitudinal road gradients are less than about 6%, etc. In addition they have described the following principles for provision of low volume sealed roads in the SADC zone:

- Institutionally possible
- Technological Appropriate and practical
- Financially Supported
- Socially right
- Politically supported
- Economical Viable

As stated by Thagesen (1996) Rural Access Road Program (RARP) in Kenya was the first in Africa where labor intensive construction methods were implemented on a large scale whereas the rural transport sector in many developing countries is characterized by the dominance of large construction enterprises using capital intensive methods for construction and maintenance works high overhead costs.

According to Giang, Duc and Pett (2007) Small and Medium Enterprises (SMEs) are generally poorly developed and have limited opportunities to penetrate the market. However, if encouraged, SMEs would be particularly well suited to carrying out rural road construction of the alternative surfacing options due to:

- Possibility to be based in the rural areas with low mobilization costs.
- Low capital and set-up requirements.
- Good market entry point for small entrepreneurs
- Possibility to use local labor skills
- Less corrupt practices, as they are part of the local community,
- Low overhead costs.

According to Johannessen and Edmond (1996) labor is recommended if the following right conditions are available:

- Sufficient numbers of under or unemployed persons in the areas where the work is required plus local availability of construction materials;
- Low wage levels (under US$4.00 = 80 birr per day according to World Bank studies);
- Government commitment to the development of employment and generation of income in the rural areas;
- Small contractors skilled in labor-based technology and capable of supervising the work efficiently; and

A study undertaken in Egypt by Gadallah and Mahgoub (2012) has categorized clearly works acceptable for labor as follows:

a) High Labor Components (90 - 50 %): includes: site preparation, stone extraction and crushing, earth work, and shoulders stabilization, in addition to sand mix layers and double surface treatment.

b) Medium Labor Components (50 - 30 %): includes: base course works, side slope patching, and pipe lines work.

c) Low Labor Components (less than 30 %): includes: asphalt course work, signals and signs work, curbs, and sidewalks.

As the study by World Bank and ILO in developing countries the LBT could be fully competitive with Equipment Based Technology (EBT) as long as workers were provided with adequate tools, good incentives, and there was effective management. As the experience of ILO with labor based construction in countries as diverse as Ghana, Lesotho, Madagascar, Rwanda, Zimbabwe, Cambodia, Laos, and Thailand showed that the labor-based option is about 10-30% cheaper than the capital intensive equivalent, reducing foreign exchange requirements by 50-60%, while creating between three to five times the amount of employment for the same investment (Islam and Majeres, 2001).

According to Ali, Smith and Pitt (n.d) in their study towards the delay factors for road construction in Malaysia, contractor related , consultant related and client related are the three main factors which are expressed as delay contributing for road construction projects. They also conclude that late payment was the second factor for project delay and identified poor site management and poor coordination between the construction parties as they are the leading factors for project delay. Study done in Uganda has shown that delayed payment for construction is one among the first five factors for project delay (Apolot, Alinaitwe and Tindiwensi, n.d.).

A study done in India infrastructure has identified the coordination between the parties as the main factor for project delay (Patil,Gupta,Desai and Sajane,2013).

Poor planning is mistake number one in project management (Ali et al, n.d) and as it is described in best management practices field guide a well-planned, located, designed, constructed, and maintained LVR system is essential for community development, flow of goods and services between communities, and resource management activities. However, roads and particularly road construction can create more soil erosion than most other activities that occur in rural areas. (Keller and Sherar, 2003).

Shortage of material and shortage of equipment are the sixth and seventh delay factors in construction projects in Malaysia respectively and late martial delivery is the main cause for project delay in Nigeria (Ali et al., n.d).
As study by Stiedl (1998) the hardness of the soil strata will affect the implementation of the project by factor of four or grater.

A study done in Kenya by Seboru (2015) shows that both consultants and contractors agreed late payment by the client is the top delay factor with RII 0.759 and research in Uganda has shown that late payment is the fifth factor for road construction delay (Ruth et al, n.d) .

As the study done by Ali, (2013) in Nigeria, Enugu state, inappropriate use of technology in relation to topography/terrain and deficiency in managerial capacity are the second and third factors for deterioration of the Road Transport Infrastructure [RTI] respectively.

3. Methodology

3.1. Study Area.

Tigray regional state is situated in the northern of the country in which 34 independent weredas was in the program. At least one project in one wereda was introduced in the first implementation year 2012.

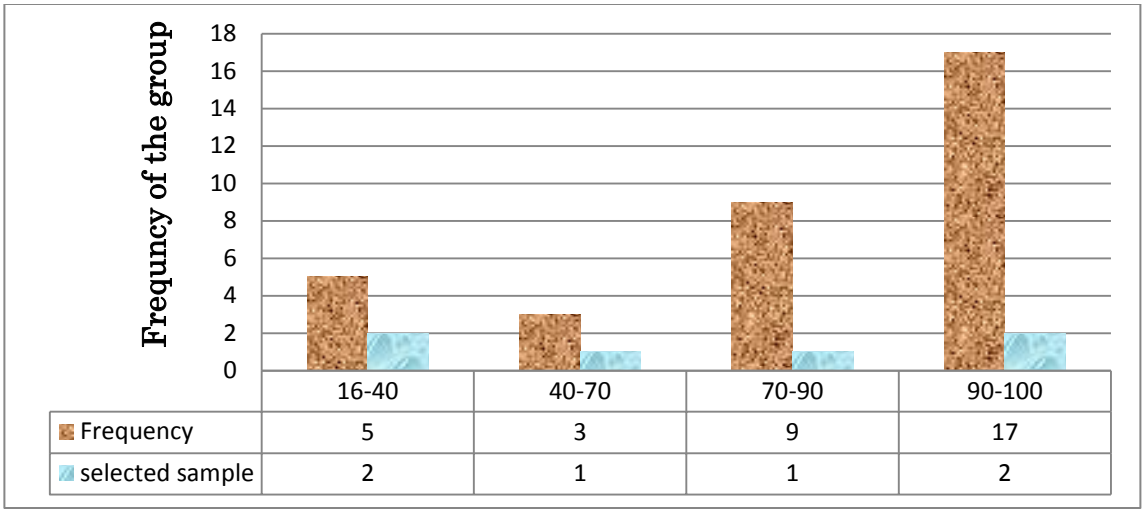
Based on the report (both Technical and Financial) from construction and transport bureau of Tigray regional state for 2012and half of 2013 some weredas were in remarkable success like Hintalo-Wajrat and some of them like Erob were far below from the expected. In 2013 in Erob wereda the program was terminated and given to TRCE since it was difficult to proceed and weredas like GantaAfeshum were still suffering even to finish the plan of 2012 in the year 2015 and finally the project in GantaAfeshum wereda was given to TRCE in 2015 as it was burden for the wereda and for all stake holders in the past years.

Samples were selected deliberately to evaluate causes of success and failure in implementation of the program in the six weredas both in successful and failed projects. These weredas (successfully completed projects) represents the climatic classification of the region that is the ''Dega'' (Cool zone), ''Weynadega'' (Semi-Tropical) and ''Kola'' (Tropical) in the study area.

3.2. Methodology

3.2.1. Sampling

From the 34 projects of the region, 6 projects in different weredas which are: Wolqayt, Erob, Gulemekeda, Ganta-Afeshum, Hintalo-Wajrat and Endamehoni were selected for study using purposive or non-probability sampling method as it has been used by Seboru (2013)but based on the grouping formed from the sorted regional report data for 2012.



	16-40	40-70	70-90	90-100
Frequency	5	3	9	17
selected sample	2	1	1	2

Figure 3-1: Grouped data with selected sample

3.2.2. General study approach

A literature survey was carried out on international experience on researches of LVRs with special emphasis on studies in developing countries like Kenya, Uganda, SADAC zone, Malaysia, and Nigeria etc. Case studies studied by ILO in different African countries were also good bases for literatures in labor based issues in addition to locally ERA standard for LVR and manuals for implementation of URRAP.

In this paper, based on the sample size described above questionnaires were delivered to participants in person, interviews were done with selected representatives and site visit were undertaken to obtain the primary data.

Participants filled in the questionnaires in their own time without any assistance from the researcher. They were collected in a minimum of a week but there were which takes about one month to return. This approach gives them full of freedom to fill the questionnaires as truthful as possible.

A questionnaire was prepared having 11 broad category with 45 variables which are referred from literature and the influencing degree was adopted from the likert scale (little influential=1, medium influential=2 and highly influential=3) with the higher

the number the greater the influence (Wade M, 2006). One project was evaluated from all sides (contractor, client and consultant) with total of 15 respondents whom have a direct contact with the projects. The returning percentage of the questionnaires was 67.7%.

To investigate in depth the influences of the qualitative data a structured interview was done with representatives from all the stake holders independently. Regional officer of the program, Wereda expert of the program, manager of contractors and consultants were targeted in the interview. They were asked to express in detail the top influencing factors of the program with their strong recommendations in the issue.

Site visit were done to see the real fact in the ground and to address the communities whom are end users of the program. The activities which are done in the site visit were like subgrade soil classification, terrain visualizations, discussion with the community representative etc.

The influencing factors which can be not touched with the mentioned methods and needs additional explanations like terrain and gradient of the road were assessed in office work with the help of the GIS software tools and was classified based on the ERA geometric manual 2013 standard.

4. Results and Discussions

According to the methodologies described in part three of the paper, the analysis is incorporated on the bases of the questionnaires, site visit, interviews and the desk study. The results obtained from questionnaires are tested with the help of GIS in the desk study for factors like terrain and gradient while interview and site visit was used to test for the other remaining factor results.

4.1. Analysis from Questionnaires.

The returning percentage of the questionnaires differs from site to site but is averagely 67.77%. Some of the expected respondents (especially from the contractor side) were not cooperative as they were busy in site works luck of attention to research.

To analyzed the total returned questionnaires Relative Important Index (RII) with a range of (-1< 0<1) was used to find which factor was highly influential in implementation of the program. The common formula for RII which was used by different researchers like Seboru (2015), Magha and Rajiv (2013), and Muhwezi (2014) was adopted in this research. The Three-point likert scale was used and transformed to relative important index (RII) for each factor as follows:

$$\mathbf{RII} = \mathbf{\Sigma W}/(\mathbf{A} * \mathbf{N}) \text{ ---------- Equation 4-1}$$

Where 'W' is the weighting influence given by the respondents to each factor (ranging from one to three); 'A' is the highest weight (3 is in this case); and 'N' is the total number of respondents. The higher the value of RII, the more influential is the factor.

4.1.1. Relative Important Index of Major Factors

The 45 influencing factors are categorized in to 11 major factors which are given below in table.

Table 4-1: Major influencing factors in implementation of URRAP.

Label	Major Variable Description
X1	Planning issue influence
X2	Geometric Design influence
X3	Subgrade Soil Influence
X4	Influence related with Equipment
X5	Construction Material related influence

X6	Structure related influence
X7	Labor Availability influence
X8	Community participation related influence
X9	Wereda Road desk Related influence
X10	Influence with contract Administrations
X11	Influence related with Capacity of contractors and consultants

To check the degree of influence of each, they are tested by RII and, the average relative important index and the major influencing factor in each site is tabulated below.

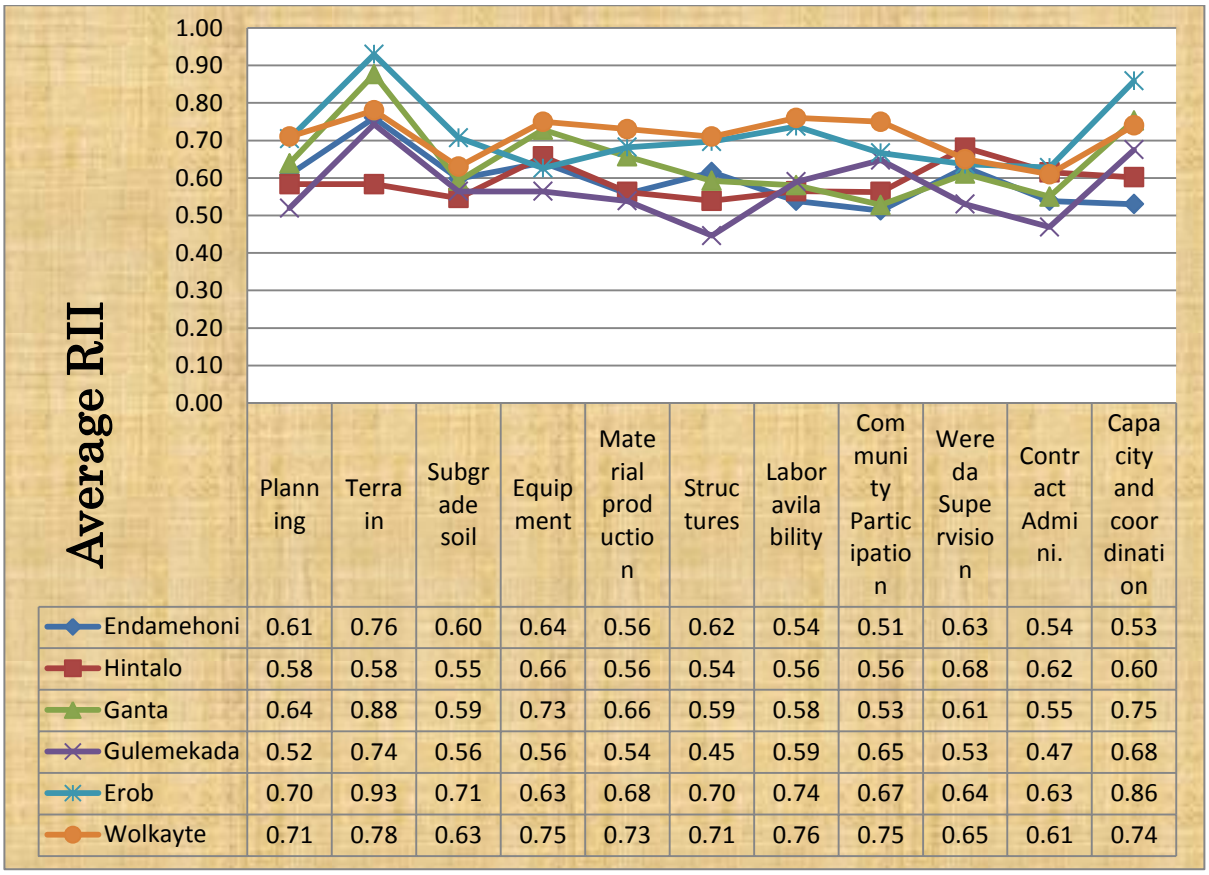
Table 4-2: Average RII of the major factors in each project

Name of Wereda / Major Factors*	Endameh oni	Hintalo - Wajrat	Ganta-Afeshum	Guleme kada	Erob	Wolqayt	Total Average
1	0.61	0.58	0.64	0.52	0.70	0.73	0.63
2	0.76	0.58	0.88	0.74	0.93	0.78	0.78
3	0.6	0.55	0.59	0.56	0.71	0.63	0.61
4	0.64	0.66	0.73	0.56	0.63	0.75	0.66
5	0.56	0.56	0.66	0.53	0.68	0.73	0.62
6	0.62	0.54	0.59	0.45	0.70	0.70	0.60
7	0.54	0.56	0.58	0.59	0.74	0.76	0.63
8	0.51	0.56	0.53	0.65	0.67	0.75	0.61
9	0.63	0.68	0.61	0.53	0.64	0.64	0.62
10	0.54	0.62	0.55	0.46	0.63	0.62	0.57
11	0.53	0.60	0.75	0.67	0.86	0.741	0.69

* The name of the major factors is listed in Table 4-1 and the average RII is described in figure 4-1.

When average of each item is calculated, the graph in figure 4-1 shows that, the terrain is with highest RII and coordination between the party and the equipment related are its successors approximately in all sites.

The two leading factors (geometric design related and coordination between the parties) as shown in table 4-2 represents the two targeted principles (technological applicability and institutional set up) respectively. As it can be seen in table 4-2, the importance of the factor is very close each other whereas the influence from contract administration is recorded as the least of the all.



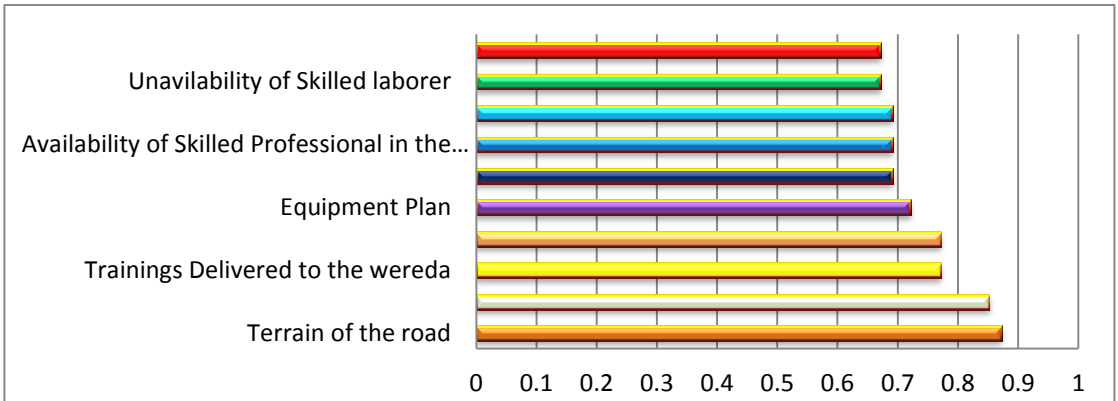
	Planning	Terrain	Subgrade soil	Equipment	Material production	Structures	Labor availability	Community Participation	Weredа Supervision	Contract Admini.	Capacity and coordination
Endamehoni	0.61	0.76	0.60	0.64	0.56	0.62	0.54	0.51	0.63	0.54	0.53
Hintalo	0.58	0.58	0.55	0.66	0.56	0.54	0.56	0.56	0.68	0.62	0.60
Ganta	0.64	0.88	0.59	0.73	0.66	0.59	0.58	0.53	0.61	0.55	0.75
Gulemekada	0.52	0.74	0.56	0.56	0.54	0.45	0.59	0.65	0.53	0.47	0.68
Erob	0.70	0.93	0.71	0.63	0.68	0.70	0.74	0.67	0.64	0.63	0.86
Wolkayte	0.71	0.78	0.63	0.75	0.73	0.71	0.76	0.75	0.65	0.61	0.74

Figure 4-1: Average RII of each Site

In addition to the average RII for the major factors described above, it is also done for the 45 specific factors in which the RII of the top ten are described below with sample of graphs for both divisions (successful and failed site) in figure 4-2 and 4-3 below respectively.

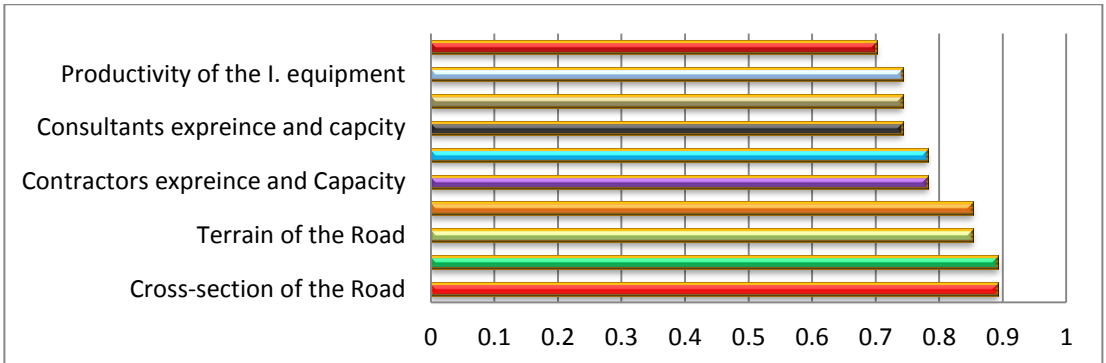
As it can be seen in the figures 4-2 and 4-3 the top ten influential factors are not identical in each site which implies the influencing factors are not common in different sites. The one fit for all principle may not work in such sites which have quite different influential factors. Terrain of the road is listed as first important factor

in two sites one from the successful and one from the failed, and almost the second important factor in the remaining sites which can be taken the important element related with this program.



	Terrain of the road	proper construction of open ditch	Trainings Delivered to the wereda	Crossection of the Road	Equipment Plan	Durability of the equipment	Availability of Skilled Professional in the wereda	Time Schedule	Unavilability of Skilled laborer	Untimely responces of the reports
RII	0.87	0.85	0.77	0.77	0.72	0.69	0.69	0.69	0.67	0.67

Figure 4-2: RII of the top ten factors in Endamehoni Wereda.



	Cross-section of the Road	Width or Carriage way of the road	Terrain of the Road	Durability of the Equipment	Contractors expreince and Capacity	Rocky Soil	Consultants expreince and capcity	Coordination b/n cont. and consul.	Productivity of the I. equipment	Supply of the material from Wereda
RII	0.89	0.89	0.85	0.85	0.78	0.78	0.74	0.74	0.74	0.7

Figure 4-3: RII of top ten factors in GantaAfeshum wereda

To check the relationship between the factors, a correlation test was done by Multiple Correlation Techniques System [MCTS] for the average RII of the 11

As study done in Nigeria by Ali (2013), based on the result obtained in this study, factors X6 [Number and Type of structures] has great correlation with the factor X1 [planning issues]. In addition X9 [supervision of the wereda road desk] shows strong correlation with X10 [Contract Administration] which is to mean that their correlation will have strong impact on the implementation of the program. Variable X11 [Coordination between the parties] and Variable X9 [Wereda supervision related] has a correlation of -0.056, in which their relation does not have any impact on the projects.

4.2. Results from Desk Study (GIS), Site Visit, and Interviews**.**

To cross check the results above in 4.1, analysis with the help of GIS tools, site visit and interviews were done. After the contour of each road is generated with help of GIS and counted in one Km, the terrain was classified based on the ERA manual 2013 and the influence in construction by terrain type is calculated as follows:

Table 4-3: Terrain type with degree of influence

Terrain Type	Degree of influence[2]
Flat	1
Rolling	2
Mountainous	3
Escarpment	4

Based on the given assumption above the following results were generated with one example as representative.

[2] *It is assumed based on the construction simplicity for labor based.*

Table 4-4: Sample calculation of terrain influence [Maichew to Shimta]

Terrain Type	Total Length=7Km	% / Total	(1*0.71+2*0.29+3*0+4*0)/10 = **0.129**
Flat length (km)	5	0.71	
Rolling length(km)	2	0.29	
Mountainous	0	0	
Escarpment	0	0	

Table 4-5: Analyzed terrain of each road

Name of project	Wereda	Length (km)	Weighted average Terrain influence
Maichew to Shimta	Endamehoni	7	0.129
Adigudem to Haroka	Hintalo-Wajrat	26.3	0.123
Maiaba to Gahogot	GantaAfeshum	14	0.24
Kerseber to Hayelom	Gulemekada	12	0.125
Dawhan to Yahudega	Erob	20	0.295
Dejena to D/Mariam	Wolqayt	19.6	0.212

The two failed projects (GantaAfeshum and Erob) and one of the successful projects (Wolqayt) are the sites which are highly influence by terrain orderly. But the latter was helped by machineries and become successful.

In addition to the cross-sectional slope, the longitudinal grade and its percentage coverage in the length of the road has direct influence in implementation of such labor based projects. In some sites like in GantaAfeshum construction was hindered by higher grade as loaded dump trucks was sliding down while they try to climb up. In addition in rainy season, roads having high percentage of grade suffers by erosion if the material was not well compacted. The ERA has put standards for gradients for LVR in the manual prepared in 2011 which is described in Table 4.8.

Table 4-6 : Gradient standards for unpaved DC2 and DC1 (ERA, 2011)

DC2 Unpaved (AADT 25 - 75					
Design Element	Unit	Flat	Rolling	Mountain	Escarpment
Max desirable gradient	%	4	6	6	6
Max gradient	%	6	9	9	9
DC1 (AADT 1- 25					
Max desirable gradient	%	4	6	6	6
Max gradient	%	12	12	12	12

The minimum standard for basic access related to gradient is 14% to open to all vehicles and 16 % for only to cars and pick-ups (ERA, 2011). But grades of all roads were tabulated with the help of GIS and DEM, considering the R^2 to approach to unity, the average grade in Gantafeshum was 44.4% beyond the limit in ERA manual which in turn highly influences the implementation.

One of the projects in the failed site in gulemekada wereda was tackled by the rock soil in the middle of the project even it was more flat and rolling terrain.

Table 4-7: Sample calculation of subgrade soil influence

Soil Type	**Length covered(m)**	**% influence of each soil**	**Weighted Average of Soil Influence**
Ordinary soil	6900	57.50	(1*0.57+3*0.42)/6 = **0.308**
Rocky soil	5100	42.50	
Expansive soil	0	0.00	
Total length	12,000		

Table 4-8 Subgrade soil influence of each site

Name of road	**Wereda**	**Length (km)**	**Weighted average of Subgrade soil influence**
Maichew to Shimta	Endamehoni	7	0.167
Adigudem to Haroka	Hintalo-Wajrat	26.3	0.198
Maiaba to Gahagot	GantaAfeshum	14	0.17
Kerseber to Hayelom	Gulemekada	12	0.308
Dawhan Yahudega	Erob	15.5	0.171
Dejena to Debremariam	Wolqayt	19.6	0.167

Most of LVRs are generally considered to have strong community participation in their implementation starting from planning up to execution. Generally in Ethiopia, and specifically in Tigray 70% of URRAP works was planned to be executed by labor of the end user community for free.

Having common understandings in this issue; the availability of the working age in the end users, means of mobilization and strong commitment of the politicians (wereda and tabiya) around the project to make clear the program for the community and work habit of the community can be factors for the successful participation of the community.

Based on ILO in Kenyan RARP experience, the recommended productivity is listed below (ILO, 1998)

Table 4-9: Excavation norms – recommended values [ILO, 20]

Average Productivity by soil classification M^3 per worker day					
	Soft	Medium	Hard	Very Hard	Rock
Country Median	5	3.5	2.75	2	0.75
Site Trials	3.6	3.2	3.45	2.2	0.8
RARP	3.5	4	3	2	
Recommended Value	**5**	**3.5**	**3**	**2**	**0.8**

In the study roads area, though it was difficult to have the productivity data, the total population, the availability of the working age, the total number of persons participated in each site and percentage of persons per day was calculated in table 4-11 as the data source from wereda.

Table 4-10: Community participation of each site

Name of weredas	Hintalo-Wajrat	GantaAfeshum	Gulemekada	Erob	Endamehoni	Wolqayt
Total population	10101	20363	10408	10010	4687	18222.00
Working age (%)	0.49	0.49	0.47	0.49	0.51	0.514
working age population	4995	9978	4892	4921	2390	9366
Total participant	27,460	38,000	28,000	77,000	12,550	16,100
Day of participation	15	25	40	90	20	15
Average community participated /day	1831	1520	700	856	628	1007
percentage of participant/day	36.65	15.23	14.31	17.39	26.25	11.46

But based on the data from consultant the ratio of the community to contractor was 16.7%.

Table 4-11: Average % community work to contractor work

Summary of cost comparison between community work and contractors work			
work of community	Endamehoni	H/Wajrat	Wolqayt
Population participated	12,550	27,460	13100
Cost/worker day	40	35	70
Total community cost	502000	961100	917000
Total community cost+ vat	577300	1105265	1054550
Total project cost for contractor	4,386,200.42	11,231,324	3,854,572
% of community cost/Contractor	0.132	0.098	0.273
Total Average of community cost /contractor cost	**16.78 %**		

The equipment planned for the project was not properly stated especially the compacting mechanism does not match with the sciences described by researchers like '*Compacting is not merely dependent on the weight of the compacting equipment but on major factors like: soil moisture content, lift thickness, number of passes used, ground pressure and compactor speed*' *(Nunnally,2001).* All stake holders specifically the contractors agreed that in their interview, the compacting principle of the equipment was not in the known reality as it was planned to compact by the weight of the drum and sand only.

The major body of the program relies on labor as it is considered 70 % labor based, and its availability was aimed as a key factor for the success of the projects. From the three pillars which was targeted by URRAP (job creation, giving access to kebeles and Labor based) (ERA,n.d.) the labor based approach does not meet as planned. Most projects, especially reported as successful, were not rely in labor specifically in material production, level to level formation etc. rather supported by heavy machines. In interview period with contractors and wereda road experts the following points were figured out. In the failed projects, the main reason was unrealistic terrain and soil subgrade which were difficult to execute by labor.

The wereda was not mobilizing the labor targeting the community works to achieve the 70 % rather; it collects birr from the community and executes the work by renting machineries. In the successful weredas almost all the community works was done by the help of machinery except the ditch excavation.

5. Conclusions and Recommendations

5.1. Conclusions

In this research, the main objective was to find where does the implementation of URRAP highly dependent focusing on the two major principles technology related and institutional set up. There were 45 sub factors with 11 major factors were extracted from literature.

Geometric design, mainly related to terrain, from the technological part and coordination between the stakes holders from the institutional set up part are the two leading factors respectively.

Less Community participation and misunderstanding was aggravating influential factor in implementation as the portion was not bind by agreement.

The one fit for all principle was not valid in the program since the leading factors in different site were quite different

5.2. Recommendations

- To introduce 70% community based programs at least a preliminary geometric design /terrain/ and subgrade soil study of the stretch of the road should be done and a well-planned work schedule should be prepared.
- The coordination between the parties (contractors and consultants, between the contractors themselves) should be well treated as it is influential in implementation of the program.
- Even if the community participation is free of charge, it should be tied by legal document, when is going to start and to finish or when should they delivered the site for the contractors.

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