JIMMA UNIVERSITY
JIMMA INSTITUTE OF TECHNOLOGY
SCHOOL OF GRADUATE STUDIES
FACULTY OF CIVIL AND ENVIRONMENTAL ENGINEERING
CONSTRUCTION ENGINEERING AND MANAGEMENT CHAIR

CAUSES OF DELAYS IN UNIVERSAL RURAL ROAD ACCESS PROGRAM: A CASE OF KAFFA ZONE, SOUTHWESTERN, ETHIOPIA

A Thesis submitted to School of Graduate Studies, Jimma University, Jimma Institute of Technology, Faculty of Civil and Environmental Engineering in Partial Fulfillment of the Requirements for the Degree of Master of Science in Construction Engineering and Management

By

FASIKA DEGEFU GEBRE

May 2021

Jimma, Ethiopia

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FASIKA DEGEFU GEBRE

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DECLARATION

I declare that this research entitled **"Causes of Delays in Universal Rural Road Access Program: A Case of Kaffa Zone, Southwestern, Ethiopia**" is my original work and has not been submitted a requirement for the award of any degree in Jimma University or elsewhere.

Fasika Degefu Gebre _____ _____

NAME SIGNATURE DATE

As research Adviser, I hereby certify that I have read and evaluated this thesis paper prepared under my guidance by Fasika Degefu Gebre entitled "Causes of Delays in Universal Rural Road Access Program: A Case of Kaffa Zone, Southwestern, Ethiopia" and recommend and would be accepted as a fulfilling requirement for the Degree of Master of Science in Construction Engineering and Management.

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ABSTRACT

Universal Rural Road Access Program (URRAP) was launched to connect all Kebele and Wereda considering the rural population's voice who demands and have a basic right to access transport, social and other services. The delay has limited the level of agricultural activities as most farmers found it difficult to transport their agricultural products to the urban areas and prevent rural population from access to services like social, health and education. The various researchers conducted a study on the causes of delay in Ethiopia and in the rest of the world and identified different number factors that cause a delay with their extent of contribution towards the construction projects.

Many construction projects that have been carried outfaced the problem of non-completion during the specified time. URRAP road project in Kaffa Zone is one of the projects that have been subjected to delay repeatedly. The construction projects' delays have a significant financial and social impact on all parties involved in the projects, including the project's end-user.

Therefore, this study was aimed to identify the causes of delay in URRAP road projects in the Kaffa Zone, southwestern Ethiopia. This was done through identifying and ranking the most critical factors on an individual and category basis. The study has adopted a comprehensive literature review to identify various factors from scholars' points of view that suit the study area's context. A quantitative survey research method through a structured questionnaire was administered on a sample. The data was obtained from focus group discussion, interview and questionnaire survey. A total of 42 questionnaires from clients, contractors, and consultants were collected, and a desk study of 4 completed, 7 suspended and 11 ongoing URRAP road construction projects were analyzed. The data were analyzed using MS EXCEL and SPSS software in which Relative Importance Index (RII), ranking, and simple percentages were computed and tested for the agreement among parties on the result through spearman's correlation. Ranking of factors and categories was demonstrated according to their importance level on delay.

From all parties combined result of RII, the following are some of the most critical factors causing a delay in URRAP projects in the study area late payment (RII=0.90), Weather conditions (RII=0.88), Delays in site mobilization (RII=0.73), Inconvenient site access (RII=0.72) Cash-flow problems (RII=0.70). The study concluded that the contractor-related category is the most prominent delay factor with a relative importance index value of (RII=0.61), followed by clients related (RII=0.59). Consultants related (RII=0.55) and external related delay causes exhibited the least aggregated relative importance index (RII=0.48).

Keyword: *Delay, Causes of delay, universal rural Road access program, Relative importance index*

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ACRONYM

ERA	Ethiopian Road Authority
EOT	Extension of Time
IMT	Intermediate Means of Transport
MDG	Millennium Development Goal
PBS-LIG	Protecting Basic Service – Local Investment Grant
RII	Relative Importance Index
RSDP	Road Sector Development Program
SPSS	Statistical Package for the Social Science
URRAP	Universal Rural Road Access Program

CHAPTER ONE

INTRODUCTION

1.1 Background

As part of the RSDP-IV, Government is embarking on a Universal Rural Road Access Program (URRAP) that sets out to connect all Kebele by roads of a standard that provides all-weather, year-round access, meets the needs of the rural communities, are affordable, and maintainable. It also intended to "join up" and harmonize all rural road infrastructure interventions under a single umbrella. The program, therefore, unifies all efforts that provide improved road access or support to Wereda road offices. This would include Wereda block grants, the Productive Safety Nets Program, PBS-LIG financing, and other Rural Development Programs; agricultural programs such as the Agricultural Growth Program, Regional and Local Government Rural Roads Programs, and Regional and Local Government initiatives on improved service delivery. Voluntary and community contributions will make up a substantial financial component of the program. The program recognizes the challenges faced by isolated communities and their constraints in our economic growth. The program responds to the rural poor's voice who demand and have a basic right to access transport, social and other services (E.R.A., 2010). Along with the government's plan to improve rural road access, there is a need to embark upon interventions beyond roads to enhance rural transport and logistical infrastructure and services.

The Road Sector Development Program (RSDP) Performance and Millennium Development Goals (MDGs) Transport Indicators Annual Reports show that the largest proportion of the rural population is adversely affected by poor accessibility and mobility. This is particularly evident because of the small size of the motor vehicle fleet and the limited role, to date, of IMTs. With the anticipated increase in agricultural productivity and production in rural Ethiopia, transport demand will grow. Agricultural inputs and surplus will need to be moved far more cost-effectively.

Delay is the actual postponement of time from the original estimated completion time, which might be caused by contractor, owner, or consultant and external factors (Alaghabari et al., 2007). According to Sweis, et al., (2008), delays often occur due to poor project management related to project owners, contractors, and consultants.

The delay in completing construction projects is a global problem (Assaf S.A. and Al-Hejji S., 2006). Many studies have been carried out regarding the effects of delay and studies by (Aibinu AA. and Jagboro GO., 2002) and (Sambasivan M. and Yau W.S., 2007), found many effects of these, the most common identified were: cost overrun, an extension of time (EOT), damage to a company, lost productivity and efficiency of the laborers and abandonment or termination of the contract.

Even though this program was launched to meet the government's various goals, including access to market, social and other services, it has been facing delay in the study area. And the people need on-time completion of these planned URRAP roads to access them for their day-to-day activity. This study is thus undertaken to identify the most critical causes of delay to minimize the reasons by delivering necessary recommendations for all stakeholders responsible for the cause to consider those delays causing factors to prevent from reoccurring during the execution of the entire construction activities.

Hence, in Kaffa Zone, there hadn’t been any study on identifying causes of delay and its remedial measure in URRAP road projects. Thus, this study aims to fill this gap through a detailed investigation, which could help that area and the nation.

1.2 Statement of the Problem

Even though URRAP is established to meet the needs of the people through the vision to free the country’s rural peoples from their access constraints, reduce rural poverty, improve welfare and opportunity, stimulate agro-productivity and share growth - a growth in which poor people benefit by connecting all Kebele with roads of a standard that provides all-weather, year-round access, still the peoples haven’t been satisfied with delay from the planned schedule.

According to Ahmed, et al., (2003), delays in construction projects are a universal phenomenon. Cost overruns usually accompany them. Delay has a negative effect on clients, contractors, and consultants in terms of growth in adversarial relationships, mistrust, litigation, arbitration, cash-flow problems, and a general feeling of trepidation toward one other (Ahmed, et al., 2003). This problem is not unique to developed countries but is also experienced in most developing economies (Kaliba, 2009).

Table 1.21 Extent of delay on some URRAP projects in the study area

projects	contractors	total length Km	wereda/zone	date of commencement	contractual period	project status	delay in %
ufa-shobograwa	bemi	9.2	Ginbo/kaffa	28/2/2004	365	accepted 2/5/2011	618%
kor-tachib	MAS	8.876	Sayilem/kaffa	14/3/2005	365	Under Construction	722%
emirki-shunga	goh	7.88	Sayilem/kaffa	21/3/2005	365	Under Construction	720%
deka didifo	sam	5.301	Gesha/kaffa	6/4/2005	365	Under Construction	715%
hibret-chereba	jewate	5.3	Gimbo/kaffa	14/2/2010	365	Under Construction	229%
kochi-gechiti	biruh tesfa	4.722	Sayilem/kaffa	11/2/2010	365	Under Construction	229%
nechiti-diribedo	saron	6.345	Gesha/kaffa	17/2/2010	365	Under Construction	228%
diri-shocha	GTMM	12	Ginbo/kaffa	5/3/2004	365	suspended since 2010	566%
washa-atta	omo	5.5	Tello/kaffa	8/4/2005	365	suspended since 2011	456%
shunga-agaro	finot	6.132	Sayilem/kaffa	8/4/2005	365	suspended since 2010	456%
senterya-tura	30begna	8.98	Gewata/kaffa	18/4/2005	365	suspended since 2011	454%

Source: URRAP office document review

The above table shows how much effect the URRAP had on time extension which was organized from document review of some of the projects. From the data of URRAP roads all the projects have experienced higher level of time extension ranging from 722% to 228%. This time extension led to the relation of the population and the government to be rough. And regrowth of grasses and bushes has brought the road to deteriorate and to reconstruct which incur additional cost extending the public desire to access the road.

Figure 1.21 URRAP Road under reconstruction due to delay

The Delay of the URRAP project in the study area has significantly affected the rural population from losing access to markets to bring their products, losing access to social and other services even though it is resourceful. It also inhibits the population from gaining poverty reduction programs, such as sector programs in agriculture, health, and education, requiring reliable transport services and all-year access. It has limited the level of agricultural activities as most farmers found it difficult to transport their agricultural products to the urban areas. The projects in this area are also subjected to rework due to bushes and grasses' growth on the delayed road, leading to extra cost and time extension.

According to Shambel and Patel, (2018), the study conducted on ten completed road construction projects in Addis Ababa; all the projects has suffered from time overrun ranging from a minimum of 25% to a maximum of 264.38%. Werku & Jha (2016) concluded that only 8% of construction projects were finished on the originally targeted completion date in Ethiopia, and the other 92% of the project delays beyond the planned completion date.

Therefore, delays in road construction projects are critical and should be studied more, and delay-causing factors should be identified to reduce this problem. This study determined the most important factors that cause URRAP project delay with recommendations.

1.3 Research Questions

Within the view of accomplishing the study objectives, the research has posed the following questions, which are to be addressed by the selected research instruments

- Which delay factors are the most critical delay causing factors per each parties and combined perspective in the study area?
- Which category of delay is the most critical one as per each parties and combined point of view?
- To what extent the client, the contractor, the consultant and the combined result agree on ranks of the causes of project delay?

1.4 Research Objectives

1.4.1 General Objective

The general objective of this study is to identify the causes of delays in URRAP road projects in Kaffa Zone, Southwestern, Ethiopia.

1.4.2 Specific Objectives

Based on the problem stated, the research is carried out given achieving the following specific objectives:-

1. To identify the most critical delay causing factors as per each parties (client, consultant, contractor and combined) point of view
2. To rank the cause of delay on a category basis as perceived by client, consultant, contractor and combined perspective
3. To examine the level of agreement on the causes of delay among client, contractor, consultant and combined view

1.5 Scope of the Study

The scope of this research is to undertake study to identify causes of delay on URRAP projects in kaffa zone south western Ethiopia. The study was conducted on 11 ongoing, 4 completed and 7 suspended URRAP projects in kaffa zone. It had aimed to assess the causes of delays induced by the main project players such as clients, contractors and consultants involved in URRAP road projects to identify the most critical cause of delay in the study area.

1.6 Significance of the Study

This research has significant importance in understanding the extent of delay in URRAP road construction projects in Kafa Zone. It will also help us know the most critical causes of delay in the URRAP road construction project and the allocation of these causes to the major stakeholders in this road construction project. Once the most vital delay-causing factors are identified, the projects' stakeholders focus on these issues through all necessary resources to reduce delays to the projects. It also recommends controlling and mitigating project delay causes and providing inputs for all stakeholders to take corrective actions and make informed decisions to promote on-time completion of projects. Besides, it will add theoretical and practical knowledge to me on how to conduct research. It may also be significantly important to scholars and researchers who require a basis for further research in this area.

CHAPTER TWO

LITERATURE REVIEW

This section covers the literature review from different scholars and authors reviewed in construction project management, focusing on road projects. It deals with theoretical, empirical, and conceptual findings of various researchers' concepts related to road construction project delays. It deals with reviewing related literature gathered from different secondary sources such as published books, articles, and related websites. In this regard, efforts were exerted to include as much significantly related literature as possible by reviewing available documents that exhibit points, targeting the research objectives' attainment.

2.1 Theoretical Concept

Various researchers have put their definition regarding the delay. Aibinu AA. And Jagboro GO. (2002) Delay is when a contractor and the project owner jointly or severally contribute to the project's non-completion within the original, or the stipulated or agreed contract period. Lo, Fung, and Tung (2006) define delay as slowing down work without stopping construction entirely. That can lead to time overrun either beyond the contract date or beyond the date that the parties have agreed upon for the project's delivery. Delay in construction is a global phenomenon (Sambasivan and Soon, 2007) affecting not only the construction industry but the overall economy of countries as well (Faradi and El-Sayegh, 2006). Delay in government construction projects, especially the road sector, has significantly impacted its economic activities. Construction delays are more likely to happen in almost all projects due to miscommunication between contractors, subcontractors, property owners, or any other reasons.

In many cases, construction projects are delayed because of the inaccurate estimate of time and project cost initially presented to the clients or project owners. Delays and cost overruns are the most common problems causing a delay in the construction industry in developed and developing countries (Enshassi et al., 2009).

Time delay is critical in developing countries exceeding 100 % of the estimated time while constructing a project (Muhammad A. et al., 2017). In practice, delays occur in every construction project, and the magnitude of these delays varies significantly from project to project and country to country (Wael et al., 2007). Cost and time overruns are the key problems of any construction project. These issues are causing a negative impact on the country's economic growth and prosperity (Raj K. Shah., 2016).

Construction delay is a common problem in Ethiopia's construction projects and occurring in every type and phase of construction projects. In Ethiopia, the construction industry is booming, and road networks are increasing from time to time all over the country. However, the historical data of completed road projects shows that none of the projects was completed as planned and within the estimated cost (Shambel and D. Patel., 2018).

According to Werku and Jha, (2016), Construction delays occur in every phase of a construction project. They are common problems in Ethiopia's construction projects, which are the major cause of project failure. In this study, they stated that "if the delay is not identified and the corrective project management decision is not taken in time a project may incur extra cost and extension of project time, which gives rise to dissatisfaction to all the parties involved and nowadays it's becoming a major obstruction for their development for developing countries like Ethiopia." Construction project delays also result in conflicts and mistrust among concerned parties (designer, contractor worker, and consultant) (Khattri et al., 2016). Even with today's advanced technology, and management understanding of project management techniques, construction projects continue to suffer delays, and project completion dates still get pushed back (Stumpf, 2000).

In general, the definitions imply that project delays are circumstances in which the genuine advancement of a project's performances is slowed either by one of the parties or external factors than the initially arranged plan for completion. Consequently, the delay is when the agreed project schedule date of completion is compelled to be conveyed. Anyway, delay in many cases results in the additional cost of a project.

2.2 Types of Delays

Muhammad A. et al. (2017) classified time overrun (delay) based on the two methods: Excusable delay and Inexcusable delay (Non-Excusable delay).

Excusable delays Excusable delay is a delay that is caused due to an unforeseeable event beyond the contractor's or the subcontractor's control. There are two types of excusable delays:

- **Non-compensable delays:** It is a delay caused by third parties or incidents beyond the owner and contractor's control. These delays are commonly called **"**acts of God**"** because they are not the responsibility or fault of any particular party. Examples include natural calamity, unhealthy weather, and wrongdoing by the masses (strikes, fires, government acts in its sovereign capacity, etc.). The contractor gets an extension in a tie and does not pay any compensation to the owner and contractor for delayed damages.
- **Compensable delays:** It is a delay that is caused by the owner or the owner's agents. N. Hamzah et al. (2011). An example of non-completion of drawings in the required time by the architect of the owner leads to the extension of the schedule. It imposes economic damages to the owner by the contractor. The contractor will have to face extra indirect costs for both extended field office and home office in this condition.

Non-excusable delays Non-excusable delays are caused by a lack of performance of the contractor on the construction project, such as a contractor's failure to provide adequate material to complete their job. These delays can be caused by underestimating productivity, improper project planning, scheduling, poor site management and supervision, wrong construction methods, equipment breakdowns, unreliable subcontractors, or suppliers. Therefore, it is the contractor's responsibility to continue their work with no entitlement to claim an extension of time or delay damages until they complete the project.

Concurrent Delay: S. Mubarak (2005) defines Concurrent delay as a combination of two or more independent causes of delay occurring within the same time frame. According to Trauner et al., (2009), concurrent delays are defined as separate delays to the critical path that appears at the same time.

Simultaneous delays, commingled delays, and intertwined delays are other names given for concurrent delays (Nguyen, 2008). Overlapping delays is another name for concurrent delays name used by (Levy 2006).

Ahmed et al. (Syed M. Ahmed 2003) grouped the causes of delay by responsibility and delay type. The study's result as per ranking order includes: Building permits approval, Change order, Changes in drawings, incomplete documents, Inspections, Changes in specifications, Decisions during the development stage. In their study, N. Hamzah et al., (2011), Cause of Construction Delay in Malaysia, a theoretical framework: they also grouped the causes of delay by responsibility and types of delay.

2.3. Causes of Construction Projects Delay

Ahmed et al. (2003) studied two kinds of cause for delay in construction projects:

1. External causes
2. Internal causes

Internal causes of delay include causes arising from three parties involved in the project. These parties have the owner, contractors, and consultants. Other delays, which do not occur from these three parties, are based on external causes, such as governments, materials suppliers, or weather conditions.

Various studies have been conducted concerning delays in construction projects, with scholars advancing various factors and groups of factors that contribute to causing delays. The literature reviewed indicates categorization of the different factors in groups of up to eleven (11) categories of consultant-related, contractor-related, design-related, equipment-related, external-related, labor-related, material-related, owner-related, project-related, engineer-related, and human-behavior related among others (Gündüz et al., 2013) and (Hemanta et al., 2012). However L. Muhwezi et al., (2014) they grouped into four broad categories of causes of schedule delays in construction projects as clients-related, consultant-related, contractors-related and external factors related.

This study, therefore, re-clustered these factors into four (4) broad categories of client-related, consultant-related, contractor-related, and external-related factors.

2.3.1 Consultant Related Delay Factors

Aibinu and Odeyinka (2006) assert that incomplete drawings, late issuance of instructions, and inadequate supervision critically impacted the consultant-related group of delays.

Al-Kharashi and Skitmore (2009) identified delays in approving major changes in the scope of works, the consultant's inadequate experience, and late reviewing design documents as critical. Assaf and Al-Hejji (2006) identified the consultant related delay factors as; delay in performing inspection and testing by the consultant, delay in approving major changes in the scope of work by consultant, inflexibility (rigidity) of consultant, poor communication and coordination between consultant and other parties, late review and approval of design documents by consultants, conflicts between consultant and design engineer, the inadequate experience of the consultant. Assaf et al. (1995) identified design errors made by designers, changes in types and specifications during construction, insufficient communication between owner and consultant during the design stage is critical. Ashraf and Ghanim (2016) identified that errors in design and contract documents, changes in the original design, drawings are not efficient enough, non-availability of consultant's staff on-site as the consultant-related delay factors in the construction sector in Jordan.

In a separate study, El-Razek et al., (2008) concluded that design changes during construction, changes in material types and specifications during construction, and design errors made by designers contributed to delays. Gündüz et al., (2013) identified delays in performing inspection and testing, poor communication and coordination with other parties, and conflicts between consultant and design engineer as the most significant in causing delays. In a study analyzing factors affecting delays in Indian construction projects, (Hemanta et al., 2012) concluded that lack of commitment and Architect' reluctance for change contributed to delays. Iyer and Jha (2005) identified the factors of inadequate project formulation initially and reluctance in the consultant's timely decision as key causes of delay. Ling and Hoi (2006) looked at the causative factors in terms of technical risks that included design failure, estimation error, and new technology failure.

Mansfield et al. (1994) highlighted poor contract management problems, mistakes and discrepancies in contract documents, and inspection and testing of completed portions of work as key causes of consultant-related delays. Sambasivan and Soon (2007) identified contract management, preparation and approval of drawings, quality assurance, control, and waiting time to approve tests and inspections as factors causing delays under the consultant-related categories.

2.3.2 Contractor Related Delay Factors

Available literature contends that proper project planning, availability of materials, equipment, and adequate labor are key critical success factors for successfully implementing building construction projects. Some studies have been carried out in those key critical dimensions to assess their relative contributions to schedule delays in the construction industry.

Kang (2010) identified delays in sub-contractors work, poor communication and coordination, inadequate contractor's work, ineffective planning and scheduling of the project, conflicts in subcontractors' schedule, improper construction methods implement, frequent change of subcontractors, rework due to errors during construction, conflicts between the contractor and other parties, and difficulties in financing project as the top delay causing factors. Ashraf and Ghanim (2016) concluded that inadequate management and supervision by the contractor, inadequate planning and control by the contractor, rework due to mistakes during construction, low level 23 productivity, technical problems faced by the contractor, incorrect construction methods followed by the contractor, cash flow problems suffered by the contractor and delay due to subcontractor's works as contractors related delay factors in the construction project in Jordan.

Assaf and Al-Hejji (2006) identified that difficulties in financing project, conflicts in subcontractors schedule in project executions, rework due to errors, conflicts between the contractor and other parties (consultant and owner), poor site management and supervision, poor communication and coordination with other parties, ineffective planning and scheduling of the project, improper construction methods implemented by contractor, delays in subcontractors work, inadequate contractor's work, frequent change of sub-contractors, poor qualification of the contractor's technical staff, delay in site mobilization as the contractor's related delay factors.

Al-Khalil and Al-Ghafly (1999) observed that financing and cash flow challenges, poor project management, and inadequate manpower were key considerations. Al-Kharashi and Skitmore (2009) contend that poor contractor technical staff's poor qualification, poor site management and supervision, and difficulty in financing the project were critical. Assaf et al. (1995) identified inadequate contractor finance, shortage of manpower, slow delivery of materials, and errors committed during construction works that affected the projects' delivery.

Hemanta et al. (2012), using factor analysis, conclude that site accident due to lack of safety measures, improper or obsolete construction methods, and delay in material delivery contributed to the highest impact. In a separate study, Iyer, K. C., and Jha, K. N., (2005) identified the factors of poor human resource management and labor strike and uniqueness of the project activities requiring high technical know-how as causes of delay during the construction process. In a separate study, Ling, F. Y. Y., and Hoi, L., (2006) assessed the vulnerability of Singaporean firms undertaking construction projects in India in terms of economic risks (materials supply, labor supply, and equipment availability), financial risks (relating to credit rating, capital supply, and cash flow), managerial risks (relating to productivity, quality assurance, cost control and human resource management) and technical risks (relating to equipment and systems failure, collision and accidents.

Several studies have identified material-related delay factors as one of the key dimensions in contractor-related delays that have contributed significantly to causes of schedule delays in construction projects. Chan and Kumaraswamy (1997) concluded that shortage of material and poor procurement of material topped as contributors to causes of delays.

In a separate study, Assaf and Al-Hejji (2006) identified the material related delay factors as; shortage of construction materials in the market, changes in material types and specifications during construction, delay in material delivery, damage of sorted material while they are needed urgently, delay in manufacturing special building materials, late procurement of materials, late in the selection of finishing materials due to availability of many types in the market.

2.3.3 Client Related Delay Factors

Several studies have identified owner-related delay factors to cause schedule delays. Aibinu and Odeyinka (2006) concluded that Clients' cash flow problems, variation orders, and slow decision making were critical. Kang (2010) identified late in revising and approving design documents, change orders by the owner, delay in agreeing shop drawing and sample materials, slowness in the decision-making process, poor communication and coordination, conflicts between joint-ownership of the project, delay to furnish and deliver the site, suspension of work by owner, delay in progress payments as client-related delay factors. Ashraf S., Ghanim (2016) concluded that client's changes of the design, using lowest bid that leads to low performance, changes in the extent of the project, delay in progress payments by the client, lack of cooperation between client and contractor, delay of approval contractor submittals as client-related delay factors construction projects in Jordan.

In a separate study, Hemanta et al. (2012) observed that lack of incentive for contractors for an early finish and slow decisions from owners were critical. Al-Khalil and Al-Ghafly (1999) considered a delay in making progress payments by the client as critical. Al-Kharashi and Skitmore (2009) identified a lack of finance to complete the works and slow decision-making by having the greatest impacts on delays.

Assaf and Al-Hejji (2006) identified the owner related delay factors as; delay in progress payments by the owner, delay to furnish and deliver the site to the contractor by the owner, change orders by the owner during construction, late in revising and approving design documents by the owner, delay in approving shop drawings and sample materials, poor communication and coordination by the owner and other parties, slowness in the decision-making process by the owner, conflicts between joint-ownership of the project, unavailability of incentives for the contractor for finishing ahead of schedule and suspension of work by the owner.

Faridi and El-Sayegh (2006) identified slowness in the owner's decision-making process and changes in materials type and specification during construction by the owner as factors contributing to causes of delay under this category.

Gündüz et al. (2013) identified change orders, delay in site delivery, and slowness in decision making as the most significant factors under this category. Iyer and Jha (2005) identified the factors of the vested interest of the client's representative as not getting the project completed in time, project completion date specified but not yet planned by the owner, and urgency emphasized by the owner while issuing tenders as key causes under this category. Mansfield et al., (1994) identified the factors of financing and payment of completed works and design changes by the client as key causes of delays. Nkado (1995) identified specified completion sequence factors, prioritizing construction time, financial ability, and possible initial design changes as the major causes of delay under this category.

2.3.4 External Related Delay Factors

Several studies have identified external related delay factors category as one of the groups o causes of schedule delays in construction projects. Aibinu and Odeyinka (2006) observed that price escalation, inclement weather, labor disputes and strikes, government regulations, slow permits by government, civil disturbances, and acts of God consecutively were critical. Arditi et al., (1985) identified unfavorable weather conditions as the major cause of externally related delays. Assaf and Al-Hejji (2006) identified the external related delay factors as; effects of subsurface conditions (e.g., soil, high water table, etc.), delay in obtaining permits from the municipality, hot weather effect on construction activities, rain effect on construction activities, unavailability of utilities in site (such as water, electricity, telephone, etc.), the effect of social and cultural factors, traffic control and restriction at the job site, accident during construction, differing site (ground) conditions, changes in government regulations and laws, delay in providing services from utilities (such as water, electricity), delay in performing final inspection and certification by a third party. Chan and Kumaraswamy (1995) identified unforeseen ground conditions and long waiting times to approve drawings as critical factors. Faridi and El-Sayegh (2006) identified the factors of subsurface soil conditions and unfavorable weather conditions as contributors to delays. Gündüz et al., (2013) identified delay in obtaining permits, global financial crisis, and unexpected surface and subsurface conditions as the key factors.

A study conducted by Hemanta et al., (2012) revealed that extreme weather conditions and obtaining permission from local authorities were critical in causing delays.

Ling and Hoi (2006) assessed externally related delays in terms of natural risks (weather systems and geological systems) and political risks that include war, civil disorder, and industrial relations actions that affect the project's progress. Lo, et al., (2006) identified the factors of environmental restrictions, slow coordination and seeking approvals from concerned authorities, uncontrollable external factors, and inclement weather, which were key in causing delays within this category. Mansfield et al., (1994) identified the factors of changes in site conditions and inclement weather as causes of externally related delays. Nkado (1995) identified the factors of unfavorable weather and regulations are key causes of delays.

Arya A. and Kansal R. (2016) conducted a study on their research "Analyzing causes and effects of delays of construction projects in India": they summarized the importance of delay factors from the contractors' consultants' perspectives. Late progress payment, the owner's financial problems and improper study of design, and three project-related characteristics {poor qualification of the contractor technical staff and project team, poor site arrangement, management, poor terrain condition, and supervision} were in the top-10 lists of combined consultants and contractors.

Many studies have been carried out to determine the causes of delay in construction projects. Assaf and Al-Hejji (2006) surveyed-time performance of different project types in Saudi Arabia to determine the causes of delay and their importance according to each project participant, i.e., the developer, consultant, and the contractor. The field survey conducted included 23 contractors, 19 consultants, and 15 developers. Seventy-three cases of delay were identified during the research. 76% of the contractors and 56% of the Consultants indicated that the average time overrun is between 10% and 30% of the original duration. The most common cause of delay identified by all three parties is ''change order''. Surveys concluded that 70% of projects experienced time overrun and found that 45 out of 76 projects considered were delayed.

Motaleb and Kishk (2010) investigated the causes and effects of construction project delays in the United Arab Emirates (UAE). They revealed that even though the construction industry's contribution to GDP is estimated to be 14 percent, about half of all construction projects in the UAE encounter delays. Client factors are the most significant causes of delay, followed by

project manager factors and other financial factors the contractor faces. Also, time and cost overrun were the most important delay effects.

Ogunlana and Promkuntong (1996) examined critical challenges faced by the construction industry in Thailand. They identified shortages in industry infrastructure, problems caused by clients and consultants, and contractor's incompetence/inadequacies as principal delay factors.

Shebob et al. (2011) studied the impact of delay in Libyan construction projects by identifying and ranking the delay factors. According to the survey result: low-skill workers, rise in the price of material, delay in materials delivery, and changes in the project's scope were the most critical delay factors in the Libyan construction industry based on contractor point of view. From owners' views, the essential factors of delay were the low skill of manpower, delay in delivering site project to contractor, modifications (replacement and addition) of new work to the project, and changes in material specifications. Moreover, in the views of consultants, the survey exposed that the critical delay factors in the Libyan construction industry were delay in making decisions and slow supervision, poor planning, slowness in giving instruction and poor qualification of consultant engineer's staff and waiting time for approval of drawings and test samples of materials. Haseeb et al. (2011) research the causes of delay in large construction projects in Pakistan, where the following factors are reported to be the most influential: natural disaster; financial and payment problems; improper planning; poor site management; insufficient experience; shortage of materials and equipment. Doloi et al. (2012) report the factors affecting project delays in Indian construction projects by surveying construction professionals in India. After the factor analysis, the most influential project delay factors were identified: lack of commitment; inefficient site management; poor site coordination; improper planning; lack of clarity in project scope; lack of communication; and substandard contract.

Alaghbari et al. (2007) studied the significant factors causing the delay of building construction projects in Malaysia and found out that the major causes of delay were: owners' financial difficulties and economic problems, contractors' financial problems, late supervision, and slowness in making decisions, consultants' slowness in giving instructions, and lack of materials on the market. Concerning category-based causes, this study concluded that the major factors causing a delay in construction projects are factors due to the contractor, followed by factors due

to the consultant, factors due to the owner, and finally, external factors. From this implication, the study depicted that the financial factor is the most influencing factor in causing a delay in construction projects in Malaysia. Coordination problems are considered the second important factor was causing a delay in construction projects, followed by materials problems.

Abdullah Alhomidan (2013), The study was based on the 41prime factors causing the overrun of cost in road projects and conducted a survey to determine the most influencing factors. He concluded internal administrative problems, payment delays, poor communication between the project parties, delays in decision making were the most influencing factors for cost overrun.

Ibrahim Mahamid (2013), His study was based on the 45 factors that might cause construction delays in the West Bank of Palestine from contractors. By means of a questionnaire, he conducted a survey. He found that contractors' financial status, payment delays by the owner, political situation and segmentation of Western Bank, lack of interaction between parties of project, lack of equipment efficiency, high competition in bids were the prime factors for the time overruns in Palestine.

The study by (Shambel and Patel, 2018) on factors influencing time and cost overruns in road construction projects in Ethiopia identified six main sources of delay. They include financial problems, improper planning, land acquisition, construction delay, design changes, fewer materials and equipment supply by contractors, incomplete design. Similarly, Tsegay G. & H. Luo's (2017) study on the analysis of delay impact on construction project identified six critical factors of delay in the Ethiopian construction project, most from the overall respondent's point view. These are sequentially ranked as corruption, unavailability of utilities at site, inflation or price increases in materials, lack of quality materials, late design and design documents, slow delivery of materials, late in approving and receiving of complete project work, poor site management, and performance, late release budget/ funds, and ineffective project planning and scheduling. According to Tilahun, S. (2016), in the case study "Cause and Effects of Delay on Educational Building Projects in Addis Ababa University," he identified Mistakes and discrepancies in design documents by the Consultants and delay in material delivery by Contractors with RII=0.864 as the most important factor causing delay on building construction projects.

Followed by an external factor of shortage of construction materials in the market with RII=0.859. Frequent change and Variation Order, unclear and inadequate details in drawings, and slow response and inspection with RII=0.855, 0.836, and 0.823 by the Consultants as 4th, 5th, and 6th potential causes of delay, respectively. Furthermore, the Consultant identified the Client's financial arrangement and inadequate fund allocation, and an inaccurate site investigation identified as 7th and 8th with RII=0.809. The client's change and variation order is a potential cause for cost overrun as 9th with RII=0.805 and followed by Inefficient planning and scheduling by Contractor with RII=0.800.

Sweis et al. (2008), in their research on the causes of construction delay in Jordan, concluded that the contractor's financial problems and the client's inability to the finalized decisions are the primary causes of project delay.

According to Werku and Jha (2016), Delayed payments of work done by clients on construction projects in the Ethiopian construction industry are considered a factor that causes delay. It causes severe cash-flow problems to contractors, which can have a devastating effect on the contractual payment chain. According to Al-Kharashi and Skitmore (2009), Finance issues are of much concern, as evidenced by the study results. These are related to the lack of finances, non-payments, and delay in payments by the clients. Sambasivan M. and Yau W.S. (2007) established poor planning, poor site management, inadequate supervisory skills of the contractor, material shortage, labor supply, equipment availability and failure, poor communication, and rework as the most important causes of delays in Malaysia.

L. Muhwezi et al. (2014) identified the most significant factors of construction delays as (1) delay in assessing changes in the scope of work by the consultant; (2) financial indiscipline/dishonesty by the contractor; (3) inadequate contractor's experience; (4) design errors made by designers; (5) inadequate site investigation by the consultant. The study concluded that consultant related category had the highest impact (RII = 0.745), followed by the client related (RII = 0.698), then contractor related (RII = 0.697) and external related (RII = 0.615) exhibited the least impact.

Gündüz et al. (2013) ranked the contractor-related group of delay factors as the most important group to cause delays with (RII=0.773) due to the level of contribution of factors under contractor related factors such as inadequate contractor experience (RII =0.863), ineffective project planning and scheduling (RII =0.844), and poor site management and supervision (RII =0.844). The owner-related group is the second most important group with (RII=0.730) due to the level of importance of factors under owner-related factors such as change orders (RII= 0.778), delay of onsite delivery (RII= 0.778), and slowness in decision making (RII = 0.775). Consultant related delay factors as the third most important group with (RII=0.723) due to the level of importance of factors under consultant related factors such as delay in performing inspection and testing (RII =0.784), poor communication and coordination with other parties (RII=0.756), and conflicts between consultant and design engineer (RI =0.741) on the study conducted on Quantification of Delay Factors Using the Relative Importance Index Method for Construction Projects in Turkey.

Al-Kharashi and Skitmore (2009) pointed out that the wide difference in the level of involvement and participation of each party in the construction process reduces the client's ability to make decisions that may facilitate the construction process. Also, poor daily communication between the client and consultant and the client's technical staff's lack of experience exacerbates Saudi Arabia delays.

Kadir et al. (2005) stated as a lack of coordination among the parties will lead to delay. Coordination is very important to guide and instruct laborers to perform their work correctly; without coordination, the project will be delayed due to rectifying defective works and laborers' low productivity. This study has identified and ranked those factors that affect construction labor productivity as the five most important factors as follows: material shortage at the project site, non-payment (financial problem) to suppliers causing the stoppage of material delivery to site, change the order by consultants causing project delay, late issuance of construction drawing by consultants and incapability of contractor’s site management to organize site activities. Sambasivan and Soon (2007), stated that the overall ranking of group causes may not consistent with other studies as, “The effects of delays in construction projects can be country-specifi” none of the studies is comparable to any other and each study has different rankings for the causes of delay and the groups as project characteristics are unique and may even be region-specific.

CHAPTER THREE

RESEARCH METHODOLOGY

As discussed in Chapter 2, Delay has various sources responsible for every construction project non-completion as scheduled. URRAP projects in Kaffa Zone are of those projects subjected to delay. Thus, this research is carried to identify the factors responsible for delay in the study area and rank their contribution level. Hence, this chapter of the thesis dealt with the methodology, comprising the research strategy, research design, and data collection. The method used is aimed at collecting and analyzing appropriate data that identified the causes and factors of delay of URRAP roads construction projects in the Kaffa Zone

3.1 Research Area

This study was conducted in Kaffa Zone. In South Regional State, the Zone was located 738km to the south regional state and 460km apart from Addis Ababa. The Zone has a maximum latitude and minimum longitude of 7^{O}16'N 36^{O}14E' with an average elevation of 1714 meters above sea level. Based on Ethiopia's central statistical agency in 2007EC, Kaffa Zone has an estimated total population of 874,716, of whom 431,778 are male, and 442,938 are female.

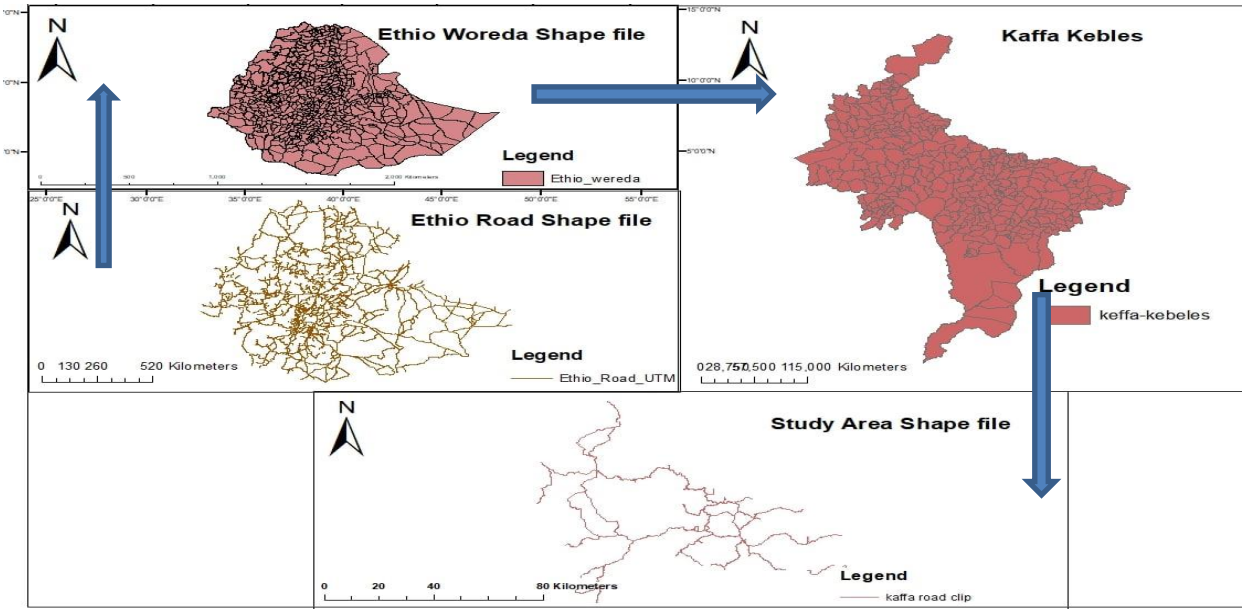

Figure 3.1 Location of Study Area

3.2 Research Design

This study adopted a descriptive research design which is used to provide quantitative or numerical and qualitative description of attitude, or opinions of participants to evaluate the perception of parties involve in the construction process. Literature review, focus group discussion, interview and questionnaire survey were designed and employed to assess the knowledge and practice of participants on the causes of delay. In this study quantitative and qualitative research methods were employed.

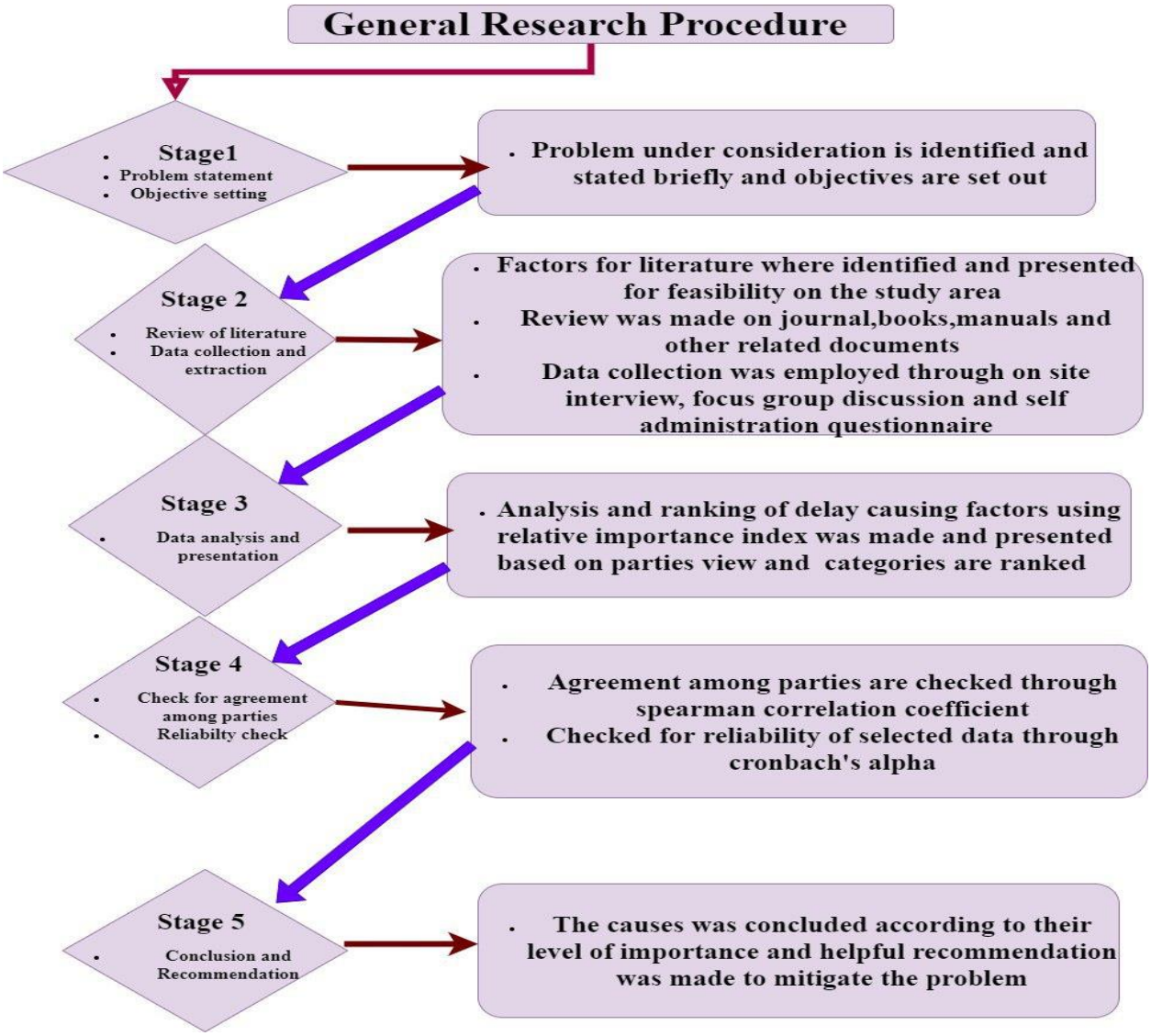

Figure 3.2 Research Design Flow chart

3.3 Study Variables

3.3.1 Dependent Variable

- Delay of URRAP road construction

3.3.2 Independent Variables

- Factors related with the contractor
- Factors related to client
- Factors related to consultant
- external factors

3.4 Study Population

This study's target populations are all active and stopped but not terminated total of 34 URRAP road projects in Kaffa Zone including terminated projects with the major stakeholders of the URRAP road construction projects such as client (Kaffa Zone road and transport office), contractor, and consultant.

3.5 Sample Size and Sampling Technique

The projects selected for the study were using the purposive (nonprobability, deliberate) sampling technique, with which 4 completed projects, 11 ongoing projects and 7 suspended projects were taken to be included in the study. Engineers under owners, consultants, and contractors representatives involved in those selected projects were taken to participate in the questionnaire. This method was used because of the limited number of primary data sources who can directly contribute to the study and it was believed that the selected respondent knows most about the subject matters since they are well experienced experts in this department. Accordingly, respondents who have direct involvement in the projects were selected for this study.

3.6 Sources of Data and collection technique

Both primary and secondary data were used concerning the topic under discussion. The primary source of data was focus group discussion, interview and questionnaires.

A focus group discussion and interview was made qualitatively from purposely selected respondents from client, consultant and contractor to identify factors those are the most critical and responsible for delay in the projects.

Twenty-nine (29) causes of delay were identified from literature review. Site visit to observe the situation of the project and pilot survey to check the validity of the questionnaire that was obtained from literature review was carried out to make it ready for distribution. Some contractors, client and consultants were met to conduct pilot study to test the validity and reliability of the instruments. The respondents of whom the piloting was done were some of parts of the study sample. The pilot sample consisted of 6 (those who have got more experience on this sector) respondents involved in road construction.

The tested questionnaires were returned with some constructive suggestion and feedback by totally confirming that all factors listed conforms the cause in the study area. And it was modified and compiled based on the suggestion: to be short and precise, some of the factors to be clearly understandable and to be modified to avoid ambiguity.

A questionnaire was then made ready to assess clients, contractors, and consultants' perceptions on the relative importance of causes of delays in URRAP road construction projects. Quantitative data was obtained through a questionnaire. The data collected through these methods was analyzed, and the results are presented quantitatively and qualitatively.

Secondary data was collected from secondary sources of data such as books, journals, reports, and related articles from the internet. The data sources were the main parties in the construction, namely, owner/ client, contractor, and consultant.

3.7 Data Collection Procedure

The research methodology for this study was implemented through literature review, focus group discussion, interview and questionnaire.

The literature review was conducted through books, the internet, and various journals review related to this study. As the outcome of this phase, some causes of delays for URRAP construction projects are identified.

Figure 3.3 on site interview and desk study of focus group discussion pictures

In the focus group discussion, descriptive qualitative data were obtained from selected group discussion and sharing of their perception on the introduced objective of the study by letting them identify and prioritize the main causes.

Interview with some of the stakeholders directly involved in department were employed to identify and prioritize the main causes.

The questionnaire was prepared based on two approaches: the first one had general information about the respondents and their roles, experience, and types of construction they are involved in to explore the amount of delay they experienced. The second part, and the most important one, focused on the causes of construction delay. The respondents were requested to indicate their response to identifying the most critical construction delay factors used for giving ranking to causes of delay in URRAP construction projects using a five-point Likert scale (5 =Very High, 4 = High, 3 = Moderate, 2 = Low, 1 = Very Low).

Table 3.1 Likert Scale

Numerical Scale	1	2	3	4	5
Weight of each scale	Very Low	Low	Moderate	High	Very High

3.8 Data Presentation and Analysis

The data that was obtained from focus group discussion and interview were presented and discussed qualitatively in descriptive way. The questionnaire through a Likert scale ranging from 1 (very low) to 5 (very high) was analyzed using SPSS software and MS EXCEL by Relative Importance Index (RII) formula, which is used for ranking of causes of delay.

Based on the result obtained from the RII calculation, ranking of the attributes in terms of their criticality as perceived by the respondents was done to establish the relative importance of various factors contributing to construction delays. Divya, R., S. Ramya (2015), Muhwezi, L. *et al.* (2014), and Tsegay, G., Hanbin Luo (2017) used the RII method to determine the relative importance of the various causes of delays for construction projects. The same method was employed in this study.

Analysis of data consists of the following:

- Calculating the Relative Importance Index (RII)
- Ranking of factors in each category based on the Relative Importance Index(RII)

$$RII = \frac{\sum WiFi}{A*N} \quad \text{…….. Equation 3.1}$$

Where:

RII = is the Relative Importance Index

Wi = weighting given to each factor by the respondents (ranging from 1 to 5)

Fi = The frequency of respondent for each weight

A = highest weight (i.e. 5)

N = total number of respondents

The values of RII ranges from 0 to 1 (0 not inclusive); the higher the RII, the more important the cause of delay is. The RII value was ranked, and the results are presented using tables.

3.9 Spearman Rank Correlation

Spearman‟s rank correlation coefficient used to assess the relationship between two different parties to show their agreement or disagreement in the ranking of the variables. The spearman‟s rank correlation coefficient, rs was used to measure and compare between the rankings of clients consultants, contractors and combined view for a single cause of delay. Therefore spearman rank correlation is use to consolidate the responses from the three stake holders to a single cause of delay. The value of Rs ranged from -1 to 1and indicated as;

- ✓ if -1 or +1 perfect negative or positive agreement /correlation,
- ✓ between -1 to -0.5 or 1 to 0.5,strong negative or positive correlation /agreement,
- ✓ between -0.5 to 0 or 0 to 0.5, weak negative or positive correlation and
- ✓ 0 no correlation /agreement (Fallahnejad, 2013).

Spearman‟s rank was Computed using MS EXCEL through CORREL function

3.10 Reliability test

The reliability of the data collected from each stakeholder was tested for internal consistency using the Cronbach α coefficient. The data's reliability can be referred to as the consistency or dependability of a measure over time, over questionnaire items, or observers/raters (Allen and Bennett, 2010). The reliability test indicates the consistency level of the data collected.

The data collected (total respondents and contributing factors) in this study was analyzed using SPSS to calculate the value of Cronbach's alpha of the survey results.

The study carried out by Enshassi et al. (2009), and Abdullah et al. (2010) used the Cronbachα to calculate the accuracy of the data obtained. Cronbach α was calculated using SPSS.

Ideally, Cronbach's α should be greater than 0.9, but anything above 0.7 is considered acceptable for most research purposes (Allen and Bennett, 2010).

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1Causes of delay compiled for questionnaire

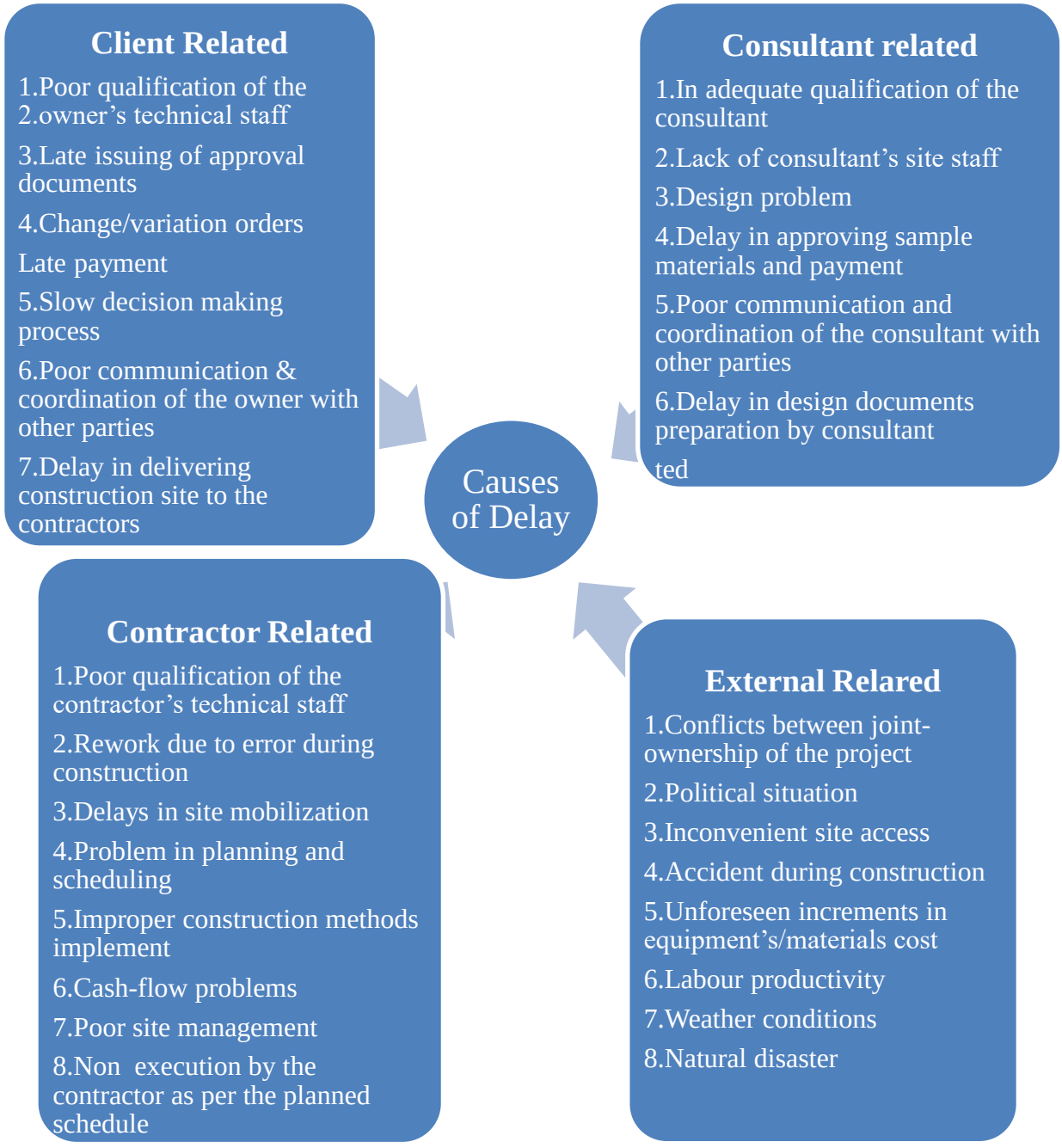

Figure 4.1 Classification of cause of delay from identified from literature review

4.2. Description of respondents

4.2.1 Questionnaire Response Rates profile

This chapter is dealt with an analysis of the data collected and a discussion on results obtained. The data obtained from focus group discussion and interview which is qualitative data was discussed here. Detailed questionnaires were designed and distributed to assess causes of delay on URRAP projects in the Kaffa Zone. For this purpose, the questionnaires were distributed to major stakeholders in this construction industry; are Contractors, Consultants, and Clients. In order to make the analysis more comprehensive, a total of 50 questionnaires were distributed to consultants, contractors, and clients, out of which 42 questionnaires were filled and returned. Table 4.1 below shows the number of questionnaires distributed to clients, consultants, contractors' representatives, and the number of questionnaires returned from these stakeholders, including their percentage response rate.

Table 4.1 Summary of Number and Percentage of Questionnaires Distributed

No	Respondents	Questionnaire distributed		Questionnaire Returned		Response Rate
		No	%	No	%	%
1	Client Representative	13	26	11	26.19	84.61
2	Contractor Representative	22	44	19	45.24	86.36
3	Consultant Representative	15	30	12	28.57	80
	Total	**50**	**100**	**42**	**100**	**84**

4.2.2 Study Participants background

Concerning the respondent's profession, 26.19% of the respondent are from client representative, 45.24% from contractor representative, and 28.57% are from consultant representative, as shown in Table 4.2. And all of them had previous experience in URRAP projects.

Table 4.2 Respondents Organization

Organization of the Participants	N (n = 42)	%
Client's Representative	11	26.19
Contractor's Representative	19	45.24
Consultant's Representative	12	28.57
Total	42	100.00

4.2.3 Gender Distribution

The gender distribution under this study is tabulated as shown in Table 4.3. The majority of the respondents of 83.33% are male respondents while 16.67% are female population.

4.2.4 Educational Level

As shown in Table 4.4, the respondents' education level is taken from the questionnaire and presented in this study.

Table 4.4 Academic Qualification of Respondents

Education	Level Frequency	Percentage
Vocational Training	-	-
Diploma	8	19.05
Degree	27	64.28
Masters	7	16.67
Total	**42**	**100**

Most of the respondents' education level was degree at 64.28%, and those with diploma and masters follow at 19.05% and 16.67%, respectively.

4.2.5 Work Experience

Respondents' percentage years of work experience shown in Table 4.5, that 28 (66.67%) of the respondents have 1-5 years of work experience and 14 (33.33%) of the respondents have 6-10 years of work experience in URRAP.

Table 4.5 Experience of Respondents

Experience	Frequency	Percentage
1-5yrs	28	66.67%
6-10yrs	14	33.33%
Total	**42**	**100**

4.3 Identification of the most critical delay factors and ranking of factors in category basis as perceived by client, consultant, contractor and combined

The data collected from the questionnaire were analyzed using simple descriptive analysis and presented in various sub-sections in relationship with the objectives of the study and the items asked in the questionnaire. The data was analyzed based on all stakeholders' points of view which are clustered from the contractor, client, consultant and combined point of view since it is essential to compare the cause of delay as perceived by all parties. It also tests the agreement of respondents (clients, contractors and consultants) with correlation of the ranks using spearman's coefficient. The analysis results are presented in the following sections by listing and ranking factors and identifying the most critical delay factors, by taking the top ten of the listed delay causes with their designated relative importance index.

Table 4.6 RII of factors obtained from perception of client, consultant, contractor and combined

most critical causes of delay	Contractor view		client view		consultant view		average	
	Rank	RII	Rank	RII	Rank	RII	RII	Rank
Late payment	1	0.9579	2	0.8545	2	0.8333	0.8952	1
Weather conditions	2	0.8737	1	0.9091	1	0.8500	0.8762	2
Delays in site mobilization	6	0.6947	3	0.8182	8	0.7000	0.7286	3
Inconvenient site access	5	0.7053	7	0.6727	4	0.7833	0.7190	4
Cash-flow problems	7	0.6842	9	0.6364	4	0.7833	0.7000	5
Problem in planning and scheduling	11	0.6211	5	0.7273	6	0.7667	0.6905	6
Non execution by the contractor as per the planned schedule	12	0.6000	6	0.7091	3	0.8000	0.6857	7
Delay in delivering construction site to the contractor	3	0.8000	15	0.4909	10	0.6667	0.6810	8
Delay in approving sample materials and payment	4	0.7158	10	0.6000	9	0.6833	0.6762	9
Delay in design documents preparation by consultant	10	0.6421	4	0.7636	12	0.6500	0.6762	9
late issuing of approval documents	9	0.6526	12	0.5455	7	0.7500	0.6524	11
Poor site management	15	0.5474	8	0.6545	10	0.6667	0.6095	12
Political situation	8	0.6632	21	0.3818	12	0.6500	0.5857	13
slow decision making process	13	0.5895	17	0.4364	12	0.6500	0.5667	14
Poor qualification of the contractor's technical staff	16	0.5053	14	0.5091	15	0.6333	0.5429	15
Design problem	14	0.5579	16	0.4727	18	0.5500	0.5333	16
Poor communication and coordination of the consultant with other parties	18	0.4947	13	0.5273	18	0.5500	0.5190	17
Conflicts between joint-ownership of the project	16	0.5053	19	0.4182	17	0.6000	0.5095	18
Rework due to error during construction	21	0.4842	11	0.5636	25	0.4333	0.4905	19
poor communication and coordination of the owner with other parties	18	0.4947	24	0.3091	16	0.6167	0.4810	20
In adequate qualification of the consultant	18	0.4947	17	0.4364	24	0.4500	0.4667	21
Improper construction methods implement	23	0.4421	20	0.4000	20	0.5167	0.4524	22
Lack of consultant's site staff	22	0.4526	23	0.3273	21	0.5000	0.4333	23
change/variation orders	24	0.4105	22	0.3636	23	0.4833	0.4190	24
poor qualification of owner's technical staff	24	0.4105	25	0.2909	21	0.5000	0.4048	25
Unforeseen increments in equipment's/materials cost	26	0.3895	27	0.2545	26	0.4000	0.3571	26
Labour productivity	26	0.3895	26	0.2727	29	0.2500	0.3190	27
Accident during construction	28	0.2000	28	0.2364	26	0.4000	0.2667	28
Natural disaster	28	0.2000	29	0.2000	28	0.3500	0.2429	29

4.3.1 Identification of the most critical delay factors and ranking of causes in category basis as perceived by client

Delay factors are here identified as per client perception based on their level of contribution as the most critical delay factors and ranked based causes in category basis

4.3.1.1 Identification of the most critical delay factors as perceived by client

Figure 4.1 shows the study analysis results on causes of URRAP project delay as per respondents under the client representative point of view. Factors were ranked based on the relative importance index.

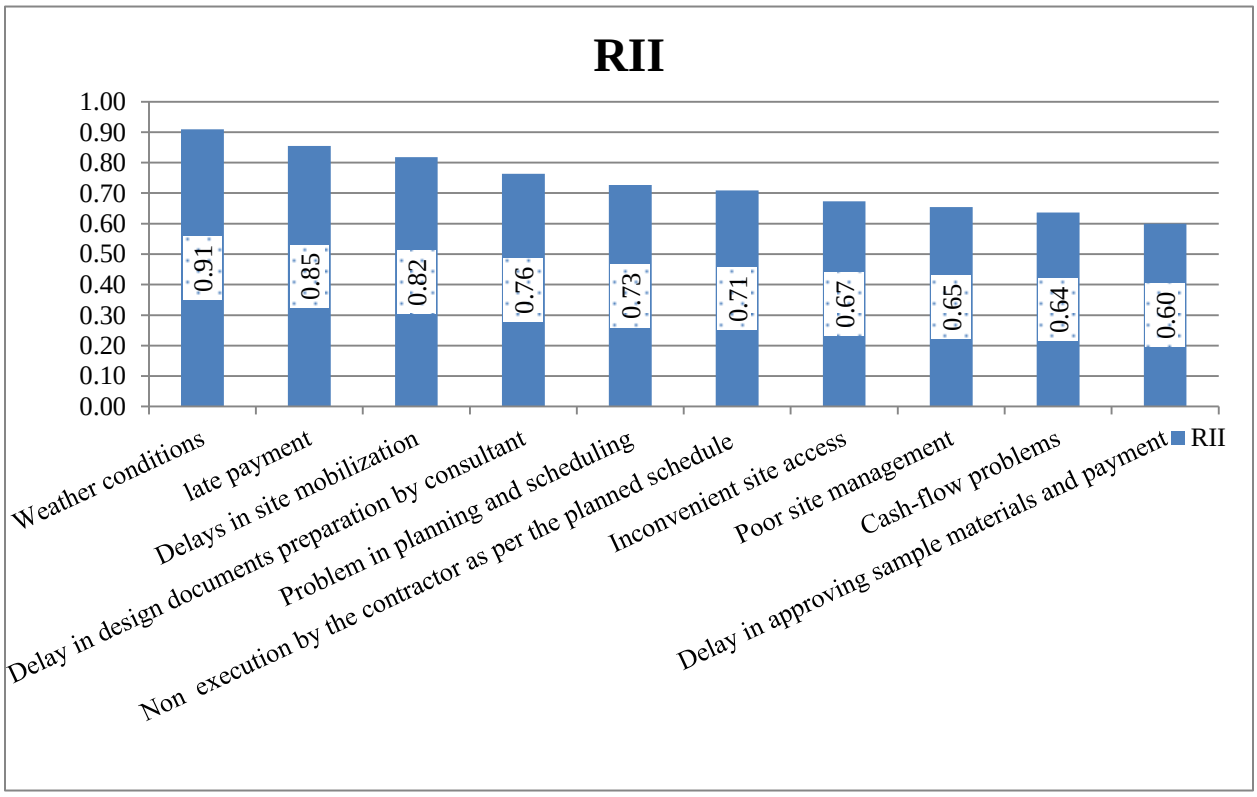

Figure 4.1 Identification of the most critical delay factors by client

Based on the survey results shown in Figure 4.1, the client ranked “Weather conditions” which is categorized under external related delay factors, as the major factor that causes a delay in URRAP road construction projects in the study area with a magnitude contribution of (RII= 0.91). Followed by “late payment” as the secondly ranked factor with (RII=0.85). The factor “Delays in site mobilization” by the contractor is ranked as the third factor that causes a delay in URRAP road construction projects with the magnitude of RII=0.82.

The client respondents ranked the delay in design documents preparation by a consultant, the problem in planning and scheduling, the non-execution by the contractor as per the planned schedule, the inconvenient site access, the poor site management, the cash-flow problems, and the delay in approving sample materials and payment based on their contribution on delay with their respective magnitude shown in Table above.

Based on the client respondents view, one of the most critical delay factor for the URRAP road construction projects on the study area identified as “weather condition” is agreed with the study carried out by (Sambasivan, M., and Soon, Y.W., 2007) on the causes and effect of delays in the Malaysian construction industry which identified “weather condition” as one of the main causes of delay under externally related delays.

Clients representative on the interview identified the most critical delay factors and prioritized as long rainfall season, contractors non execution as per the schedule and late mobilization to the site, late design document preparation

4.3.1.2 Ranking of causes in category basis as perceived by client

Moreover, based on the client respondents' view, the delays are also ranked and presented their contribution level on the category basis, as shown in Figure 4.2.

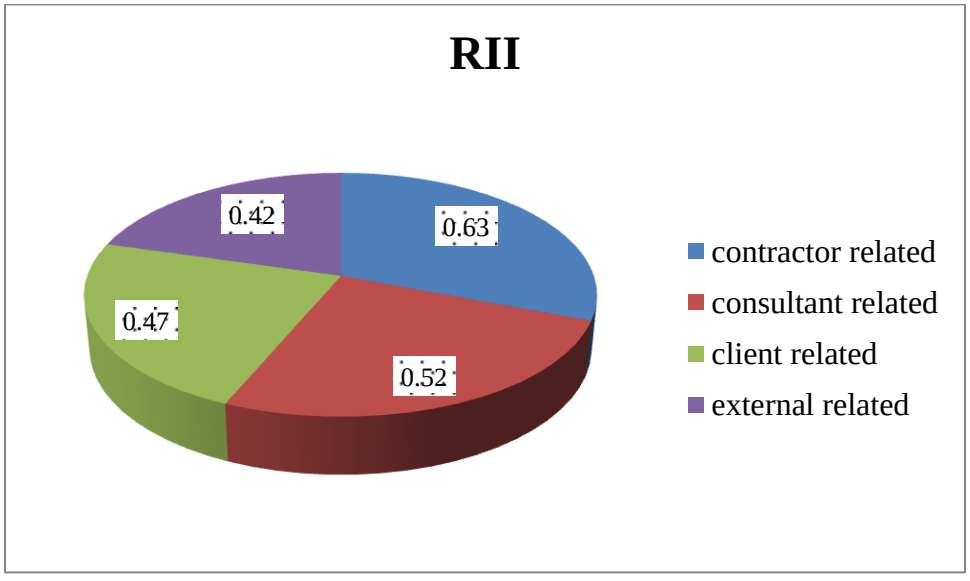

Figure 4.2 Category Based Ranking of the Causes of Delay by the Client

As shown in Figure above from the client respondents' result, delay factors categorized under “Contractor related delay” are identified as the major contributing delay category with a weighted average RII=0.63. “Consultant related delay” ranked as the second contributing delay category with the magnitude of weighted average RII=0.52. “Client related delay” and “External related delay” ranked as the third and the least contributing delay categories perceived by client respondents with weighted average RII=0.47 and RII=0.42, respectively.

Figure 4.2 shows client ranked most of the delay factors as contractor-related and consultant-related with a little level of contribution by the client and external related factors.

Generally, from client respondents’ point of view, it was induced that 31% of causes of delay is due to contractor related factors, 26% are due to consultant related factors, 23% due to client-related factors, and 20% of causes of delays are due to external related factors.

4.3.2 Identification of the most critical delay factors and ranking of causes in category basis as perceived by consultant

Delay factors are here identified as per consultant perception based on their level of contribution as the most critical delay factors and ranked based causes in category basis

4.3.2.1 Identification of the most critical delay factors as perceived by consultant

Consultants involved in URRAP road construction projects in the study area have put their perspective towards causes of delay. This data was analyzed and ranked based on their contribution level through the relative importance index discussed below.

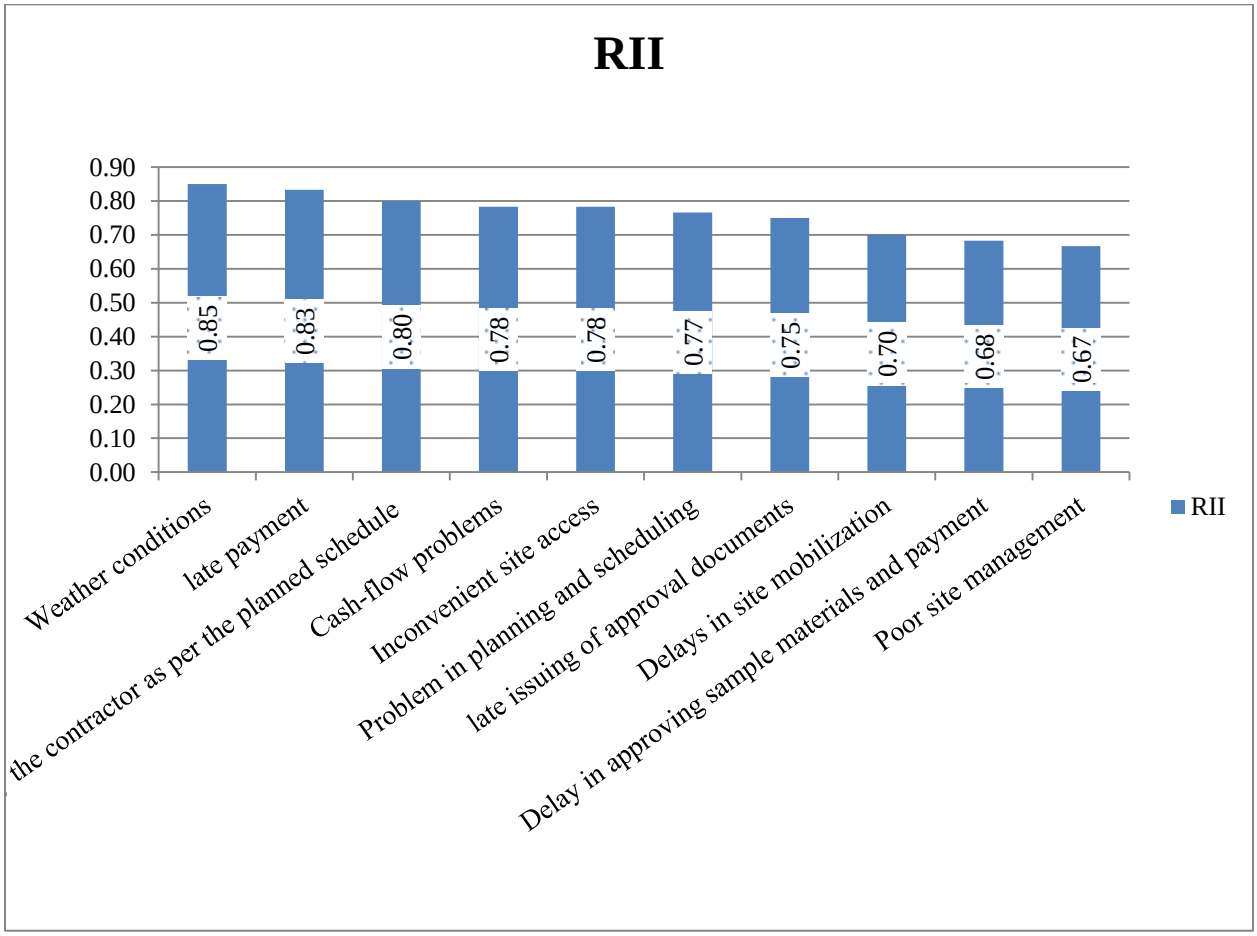

Figure4.3 identification of the most critical factors of Delay by consultant

From the consultant respondents, Figure4.3, responsible for the causes of delay in URRAP road construction projects, the above analysis was obtained. According to the analysis presented above client, the respondent ranked "weather condition" as the primary cause of delay in the study area with a magnitude of contribution (RII=0.85). "Late payment" by the client is ranked as the second major delay causing factor by the level of contribution (RII=0.83). "Non-execution by the contractor as per the planned schedule" is ranked by the consultant respondents as the third most contributing delay factor with the level of importance (RII=0.80). The delay factors such as "Inconvenient site access" and "Cash-flow problems" ranked fourth most critical. "Problem in planning and scheduling," "late issuing of approval documents," "Delays in site mobilization," "Delay in approving sample materials and payment," and "delay in delivering construction site to the contractor" ranked from six to ten based on their level of contribution.

4.3.2.2 Ranking of causes in category basis as perceived by consultant

The categorized cause of delay is analyzed and ranked in Figure 4.4 through a weighted average of relative importance index as perceived by the consultant.

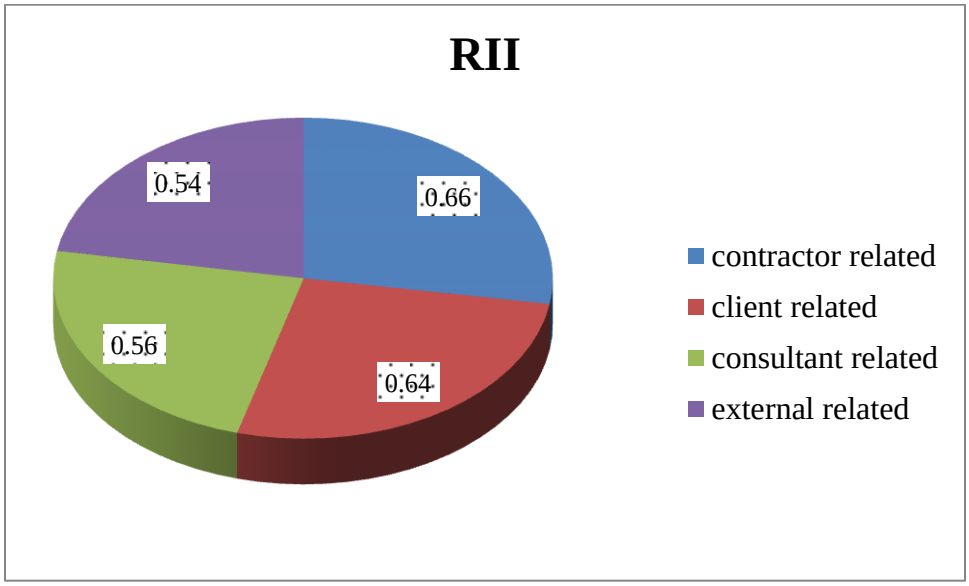

Figure 4.4 Category Based Ranking of the Causes of Delay by the Consultant

Figure 4.4 shows the weighted average relative importance index of consultant respondents. It was delineated that; delays factors categorized under "Contractor related delay" are identified as the major contributing delay category with the magnitude of weighted average RII=0.66. "Client related delay" ranked as the second contributing delay category with the magnitude of weighted average RII=0.64. "consultant related delay" and "External related delay" ranked as the third and the least contributing delay categories as perceived by client respondent with weighted average RII=0.56 and RII=0.54 respectively.

The consultant respondent ranked most of the factors with a high level of contribution as contractor-related and client-related factors, except two factors, ranked first under external related factors; the other ranked ninth under consultant-related factors. Accordingly, from the consultant respondents' point of view, the percentage in contribution was induced to be 28% of causes of delay are due to contractor related factors, 27% of causes of delay are due to client-related factors, 23% of causes of delay are due to consultant related factors and 22% of causes are due to external related factors.

4.3.3 Identification of the most critical delay factors and ranking of causes in category basis as perceived by contractor

Delay factors are here identified as per contractors perception based on their level of contribution as the most critical delay factors and ranked causes in category basis

4.3.3.1 Identification of the most critical delay factors as perceived by contractor

As one of the stakeholders, the contractor gave their perception of causes of delay in URRAP road construction. Their response is analyzed by the relative importance index method to rank their contribution level, as shown in figure 4.5.

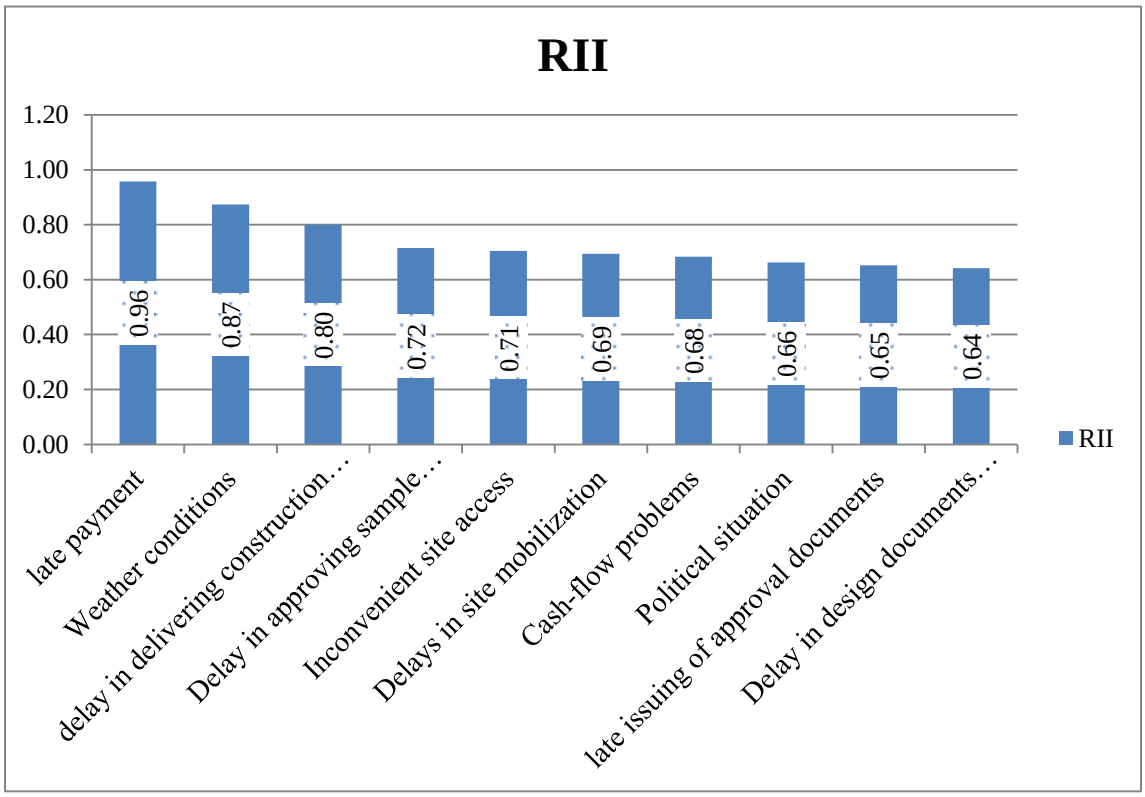

Figure 4.5 Identification of the most critical factors of Delay by contractor

Analysis of contractor respondents' perception of causes of delay in URRAP designated that the most important delay cause from the identified lists “Late payment” by the client is ranked first by the contribution level (RII=0.96).

Also shown in Figure 4.5, from those factors, contractor respondents ranked “weather condition” as the second most important cause of delay by the level of contribution (RII=0.87).

"Delay in delivering construction site to the contractor" is ranked as the third most important cause of delay, contributing to the level of importance (RII=0.8).

The most critical delay causing factor ranked first by the contractor as "late payment" by the client is consistent with a related study undertaken in Zambia by C. Kaliba *et al.* (2009) in their study Cost escalation and schedule delays in road construction projects in Zambia they concluded that delayed payments as one of the major causes of schedule delays in road construction projects.

4.3.3.2 Ranking of causes in category basis as perceived by contractor

The categorized cause of delay is analyzed and ranked in Figure 4.6 through a weighted average of relative importance index as perceived by the contractor perception.

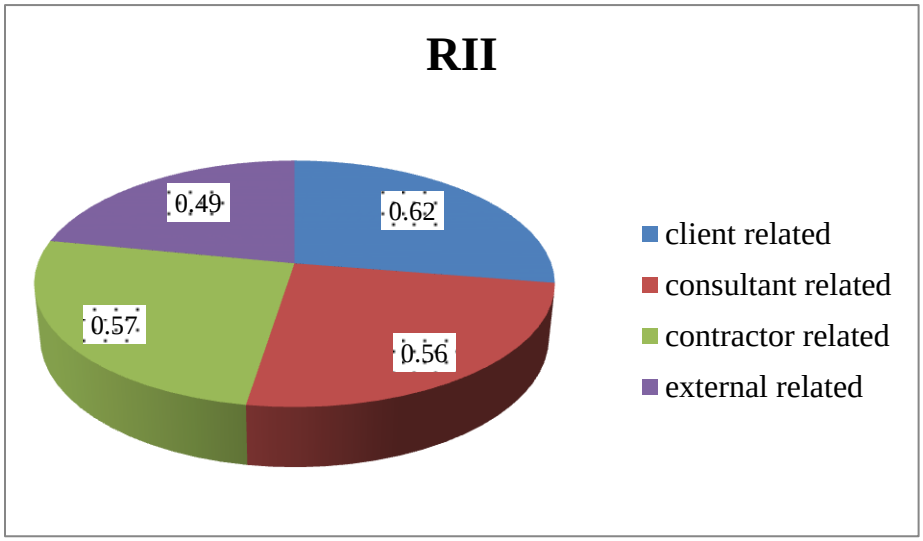

Figure4.6 Category Based Ranking of the Causes of Delay by the Contractor

From the result obtained in Figure 4.6, the contractor ranked "client-related factors" as the primary cause of delay with the weighted average contribution level (RII=0.62). They were followed by "contractor-related factors" that contribute to delaying the level of weighted level of importance (RII=0.57). "Consultant related factors" is identified as the third most important category of cause of delay with the average weighted level of importance (RII=0.56). And the least contributing category of cause of delay with the average weighted level of importance (RII=0.49) ranked by contractor respondents was "External related factors."

Generally, from contractor respondents' point of view, it was concluded that 27% of causes of delay is due to client-related factors, 26% of causes of delay are due to contractor related factors, 25% of causes of delay are due to consultant related factors, and 22% of causes are due to external related factors.

4.3.4 Identification of the most critical delay factors and ranking of causes in category basis as perceived by combined view

The overall or the combined perspective of all parties participating in the URRAP road construction projects in the study area was computed and discussed based on the RII ranking as presented in Figure 4.7.

4.3.4.1 Identification of the most critical causes of delay by combined view

The most critical causes of delay was analyzed and identified as per combined view of all parties based on their level of contribution as follows

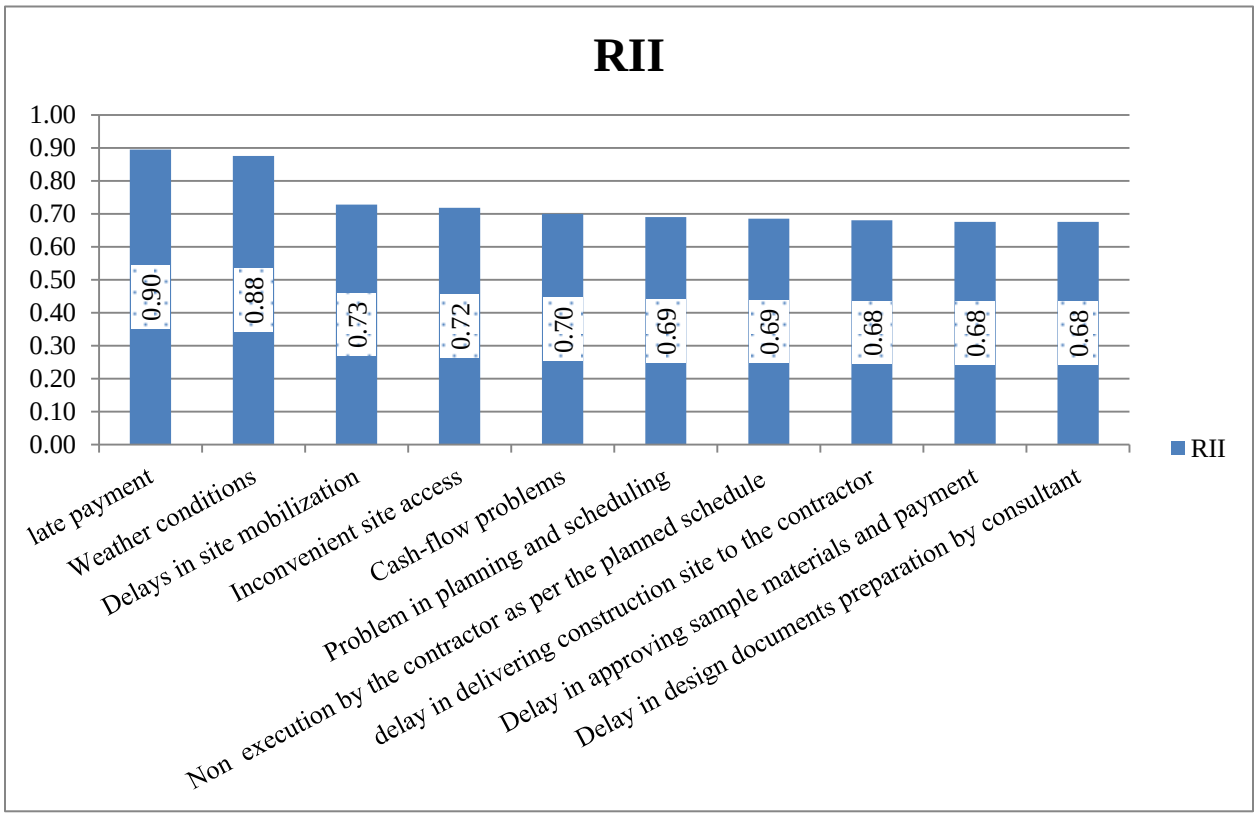

Figure 4.7 Overall' Ranking of the Causes of Delay

Figure 4.7 summarizes the factor according to the category perceived by all parties. Accordingly, the overall results show that all stakeholders ranked the top most important delay causing factors.

The client's late payment is ranked as the major delay causing factor on URRAP road in the study area with the contribution level (RII=0.9). Even though the client and consultant ranked this factor second most critical cause of delay and the contractor as the prominent factor, the average RII value ranked it as the first most critical factor. Weather condition is delineated as the second most important delay causing factor with the level of contribution (RII=0.88).

Client and consultant ranked this factor as the first most critical factor and ranked as the second most critical factor by the contractor. The third most important cause of delay was the delay in site mobilization, which contributed to the level of importance (RII=0.73). Consultant and contractor ranked this factor as the eighth and sixth most critical delay factors, respectively and client ranked as the third most critical factor. Inconvenient site access, Cash-flow problems, Problem in planning and scheduling, Non-execution by the contractor as per the planned schedule, delay in delivering construction site to the contractor, Delay in approving sample materials and payment, and Delay in design documents preparation by the consultant are causes of delay ranked from four to ten by all parties as the top ten delay causing factors with the level of importance shown in Figure 4.7.

Late payment by the client is found to be the major delay factor on URRAP projects. This factor determines most of the other delay factors to occur. It affects contractor cash flow because the financial resource is one of the influential inputs to run every construction project.

This view is supported by Werku and Jha (2016); they stated that delayed payments of work done by clients on construction projects in the Ethiopian construction industry causes severe cash-flow problems to contractors, and this can have a devastating effect down the contractual payment chain.

If there is a financial problem in construction projects, it creates further challenges in this sector. Poor site management and Problems in planning and scheduling will affect the progress of the whole works, resulting in project delays. Studies conducted by Kadir et al., (2005) supported this view, which concluded that contractors' effective and efficient site management is very important to ensure project completion on time.

4.3.4.2 Category based ranking of causes of delay as perceived by combined view

Causes of delay in category basis was analyzed and ranked by combined view of all parties as follows

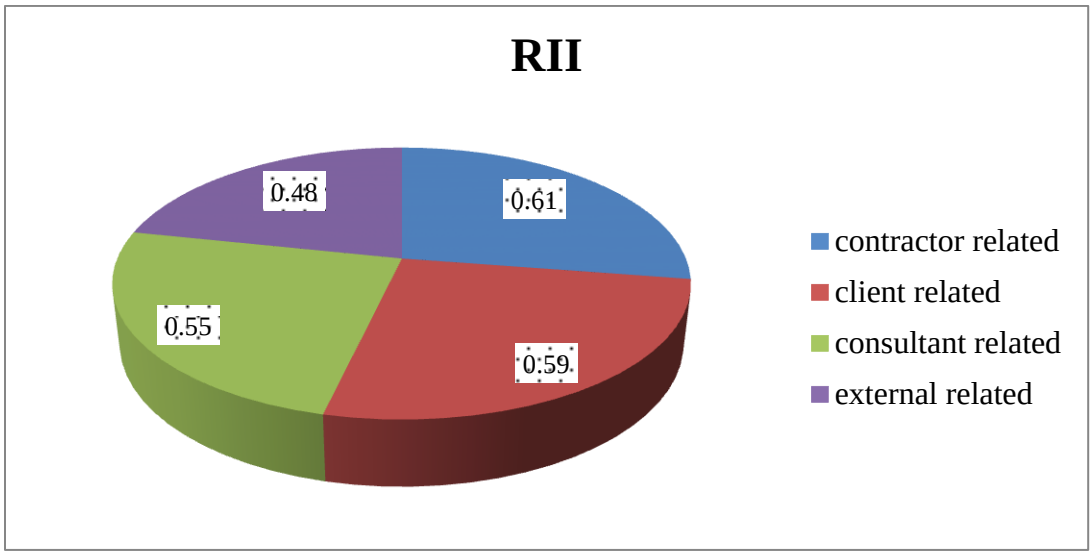

Figure 4.8 Category based Ranking of the Causes of Delay by combined view

From the perception of all parties involved shown in Figure 4.8, the overall analysis was carried out to identify and rank delay factors on a category basis. The delay factors categorized under "Contractor related delay" are identified as the major contributing delay category with the magnitude of weighted average RII=0.61. "Client related delay" ranked as the second contributing delay category with the magnitude of weighted average RII=0.59. "Consultant related delay" ranked by respondents as the third contributing delay category with the average weighted level of importance (RII=0.47). The least contributing category of delay-causing factors was external related delay factors with an average weighted level of contribution (RII=0.42).

The contribution from all parties' perception in percentage was designated that 27% of causes of delay is due to contractor related factors, 26% of causes of delay are due to client-related factors, 25% of causes of delay are due to consultant related factors, and 22% of causes are due to external related factors.

Late payment by clients affects the completion of works on time because Construction works involve high daily expenses that can't be met only by the contractors.

This result is supported by Mahamid I. (2013). Again this late payment from the client has an adverse effect on the other stakeholders; for example, contractors' financial difficulties, which means not having sufficient funds to carry out the construction works. It affects contractors' cash flow which creates problems to run the project as planned. Hence, Payment on time is very important to minimize delays.

4.4 summary of Parties' Point of View

Summary of each of the parties' perceptions on the causes of delay is shown in Table 4.7, which indicated their level of agreement on the causes taking the top ten most critical factors. This table also aimed to present the comparison among the parties.

Table 4.7 summary of Parties' View on the Causes of Delay

Most critical cause of delay	Contractor view		Client view		Consultants view		average	
	Rank	RII	Rank	RII	Rank	RII	RII	Rank
Late payment	1	0.958	2	0.855	2	0.833	0.895	1
Weather conditions	2	0.874	1	0.909	1	0.850	0.876	2
Delays in site mobilization	6	0.695	3	0.818	8	0.700	0.729	3
Inconvenient site access	5	0.705	7	0.673	4	0.783	0.719	4
Cash-flow problems	7	0.684	9	0.636	4	0.783	0.700	5
Problem in planning and scheduling	11	0.621	5	0.727	6	0.767	0.690	6
Non execution by the contractor as per the planned schedule	12	0.600	6	0.709	3	0.800	0.686	7
Delay in delivering construction site to the contractor	3	0.800	15	0.491	10	0.667	0.681	8
Delay in approving sample materials and payment	4	0.716	10	0.600	9	0.683	0.676	9
Delay in design documents preparation by consultant	10	0.642	4	0.764	12	0.650	0.676	9

Generally, from all parties' perspectives shown in Table 4.7, the contractor have ranked late payment as the first most critical factor with RII=0.96. The consultant and client have ranked this factor as the second most important factor with RII=0.83 and RII=0.85. But the averaged weighted result put this factor as the first most critical factor with RII=0.9.

Weather condition is ranked by consultant and client as the first most critical factor with RII=0.85 and RII=0.91 respectively and ranked second most critical factor by the contractor with RII=0.87. But the average weighted result put this result as the second most critical factor causing a delay with RII=0.88. Delay in site mobilization is ranked the third most critical factor by the client, sixth and eighth by contractor and consultant. But the average weighted result ranked this factor as the third most critical factor with RII=0.73.

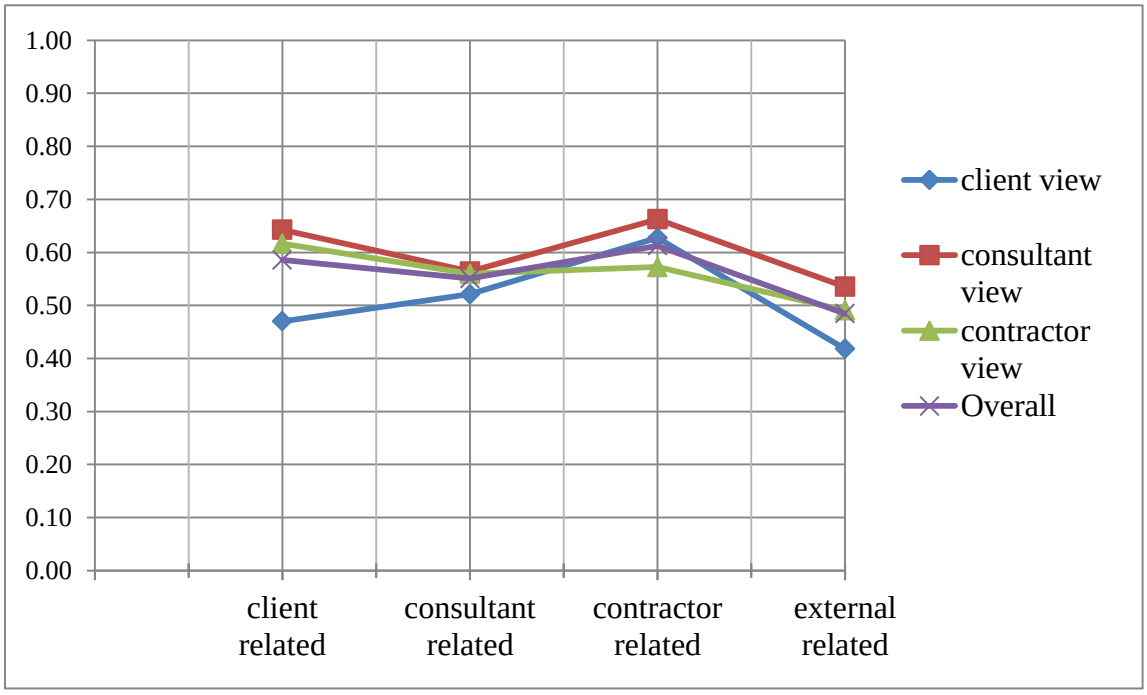

Figure 4.9 comparison of parties view on category based causes

Concerning group-related cause identification as shown on the above table, the Contractors group of causes ranked first by consultants and clients and second place by themselves. But the average relative importance index value of (RII=0.61) placed this group in the first place. Client group causes ranked first by contractor, second by the consultant, and third by themselves; however, the average values (RII=0.59) placed this group in the second place.

Therefore, according to the survey result, the contractor group of causes is the most influential cause of delay, followed by the client group. This result is consistent with the findings of Werku and Jha (2016), and Aziz (2013), even though Aziz (2013) grouped delay causes into nine major groups.

However, the overall ranking of group causes may not be consistent with other studies. As Sambasivan and Soon (2007) stated, "The effects of delays in construction projects can be country-specific" none of the studies is comparable to any other. Each study has different rankings for the causes of delay and the groups as project characteristics are unique and may even be region-specific. As a project is an individual endeavor, delay attributes to projects and their ranking may differ from country to country, region to region, even project to project. Therefore the ranking of the causes and groups in this study also does not compare with other studies. Ahmed *et al.* (1999) emphasized this issue by making this statement; Construction projects vary in complexity in nature, location, type of contract, communication between parties.

4.5 Test on agreement of ranking of causes of delay among clients, consultant and contractors

4.5.1 Spearman rank correlation among the three parties

As depicted in Chapter 3 section 3.9, spearman‟s rank correlation coefficient used to assess the relationship between two different parties to show their agreement or disagreement in the ranking of the variables. Therefore spearman rank correlation is use to consolidate the responses from the three stake holders to a single cause of delay.

Accordingly, If the **rs** value lies in the range -1 or +1there exist perfect negative or positive agreement /correlation, if between -1 to -0.5 or 1 to 0.5, strong negative or positive correlation /agreement exists, if between -0.5 to 0 or 0 to 0.5, weak negative or positive correlation and 0 no correlation /agreement exists between the responding parties (Fallahnejad, 2013). Hence, to test the agreement and disagreement among the responding parties (client, consultant and contractor) and the combined view, the rank correlation coefficients between two parties for all combinations for the selected category groups of factors are depicted in Table 4.8: Correlation Coefficient ($\mathbf{r}_s$) among respondents‟ in category ranking

Table 4.8 spearman's coefficient among the parties result on category of delay

correlation coefficient of client, consultant, contractor and combined						
	client vs consultant	**client vs contractor**	**consultant vs contractor**	**client vs combined**	**consultant vs combined**	**contractor vs combined**
category related cause of delay	0.8	0.4	0.8	0.8	1	0.8

And the correlation coefficient for overall ranking of the delay causes in all categories is presented in the below table 4.9 as following:

Table 4.9 spearman's coefficient among parties result on causes of delay

correlation coefficient overall rank						
	client vs consultant	**client vs contractor**	**consultant vs contractor**	**client vs combined**	**consultant vs combined**	**contractor vs combined**
overall ranking for cause of delay	0.834	0.812	0.911	0.922	0.955	0.954

Table 4.8 and 4.9 shows spearman rank correlation coefficient (r_s) between client, contractor, consultant and combined result for category ranking and overall ranking of causes of delay respectively.

In the category group tanking, all the respondents' correlations are in the range "strong up to complete agreement". However, the client vs contractor with correlation coefficient of 0.4 is in a weak agreement that indicated the clients and contractor had some sort of variation between their perceptions. And consultant has completely agreed with combined view.

Finally when the overall ranking coefficient of correlation is investigated, the value lies in the range between +0.5 to +1.0. This correlation indicates the respondents are strongly correlated to the overall ranking table 4.11.

Summary of the methodological tool is presented as follows: from interview of some of sample from the each parties has indicated the following findings: from interviewees from client representatives it was induced that the main causes of delay as: High rainfall intensity with longer rainy season was one of the main cause of delay and non-execution of contractor as per the schedule, late mobilization to the site, shortage of budget and late design document

submission as the most critical delay causing factors. Even though, the area have been experiencing higher rainfall intensity due to longer rainfall season, client representative depicted the contractors failing to arrange their construction schedule to be launched in this workable season and mobilize to the site, let them to be responsible for causes of delay in the area. It was also stated, late release of budget has been raising complain from contractors.

From contractor representative interviewees it was found that the most critical delay causing factors as late payment, long rainfall season, delay in delivering site, delay in approving payment and sample and inconvenient site access respectively. It was also discovered that due to late payment from the client, the contractor noticed that their cash flow has been affected and it prevents them not to execute the activity as scheduled.

From consultant representatives interviewees it was found out that longer rainfall season, contractors' non execution as per schedule, late payment, contractors' problem in planning and scheduling and inconvenient site access the most critical factors.

Result from focus group discussion who are constituted from each parties introduced with objective of the study to share their perception and make discussion to identify the agreed most critical factors and responsible parties for delay. Thus, it is found out that long rainfall season as the primary cause of delay and late payment, cash flow problem, late mobilization of contractor to site and inconvenient site access as the most critical factors.

From the questionnaire, interview and focus group discussion results it can be concluded that the results obtained from each parties shows some sort of resemblance across those methodological tools to each other. This has indicated the validity of the methodological tools possessed for this study. It can also found that from the perception of each party they are considering one another responsible for the causes (criticizing and blaming each other).

4.6 Reliability

The reliability of the data collected from each stakeholder was tested for internal consistency using the Cronbach α coefficient. The reliability test indicates the consistency level of the data collected. The data collected (total respondents and contributing factors) in this study was analyzed using SPSS to calculate the value of Cronbach's alpha of the survey results. Table 4.10 shows that Cronbach's Alpha Coefficient for all variables.

Table 4.10 Cronbach Alpha Coefficient for All Variables

Items	Cronbach's Alpha	No. of Items
Overall	0.984	29

The alpha coefficient ranges in value from 0 to 1. The higher the score, the more internally reliable the generated scale is. Cronbach's coefficient alpha value over 0.7 is believed to be an acceptable reliability coefficient (Pallant, 2005).

Table 4.11 Cronbach Alpha Coefficient for Each Variable

	No. of Items	Cronbach's Alpha (Total Sample)
Client Related	7	0.941
Consultant Related	6	0.950
Contractor Related	8	0.959
External Related	8	0.912

Table 11 shows the values of Cronbach's Alpha for the fields; the values Cronbach's Alpha ranged between 0.912 & 0.959. It is a range considered high. Hence, the result ensures the reliability of each field of the questionnaire. Cronbach's Alpha for the entire questionnaire equals 0.984, which indicates very good reliability. Therefore, it can be said that the above questionnaire is adequately reliable.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATION

5.1 Conclusion

The study found out the views of clients, consultants, contractors and combined on the relative importance of the factors and category responsible for delay according to their level of importance. And this are tested for agreement among parties.

Accordingly, based on the clients' respondent, the following delay factors are identified as the top delay factors: Weather conditions, Late payment, Delays in site mobilization, Delay in design documents preparation by the consultant and Problem in planning and scheduling. And ranked on category basis as: contractor related, consultant related, client related and external related respectively

According to consultants, the most critical delay factors which took the highest rank are the following: Weather conditions, Late payment, Non-execution by the contractor as per the planned schedule, Inconvenient site access and Cash-flow problems. And ranked on category basis as: contractor related, client related, consultant related and external related respectively.

According to the contractors' point of view, the most critical are identified as the top delay causes as: Late payment, Weather conditions, Delay in delivering construction site to the contractor, Delay in approving sample materials and payment and inconvenient site access. And ranked on category basis as: client related, contractor related, consultant related and external related respectively.

According to the combined view, the most critical factors identified as the top factors causing a delay in the study area based on the perceptions of all the three main parties combined are the following: “late payment,” “Weather conditions,” “Delays in site mobilization,” “Inconvenient site access,” “Cash-flow problems.” And ranked on category basis as: contractor related, client related, consultant related and external related respectively.

The result from all parties regarding the cause of delay on the URRAP construction project in the study area were checked for agreement through spearman correlation and the result shows prevalence of strong agreement among the parties except contractor and client had weak agreement. The result from focus group discussion and interview showed the presence of resemblance among the data collection tools. This indicates the reliability of the methodology undergone.

5.2 Recommendation

As can be observed from the combined or overall perceptions, the most critical delay factors arise from all the participating parties (clients, consultants, and contractors). The recommendations made in general and particularly to all the parties for mitigating factors causing delay by compiling the expert opinion are the following:

For client:

- Before launching URRAP projects, the client should possess a comprehensive financial plan and enough cash flow to finance the URRAP projects to avoid project financing problems.
- Owners should issue on-time advance and interim payment requested by the contractor for early site mobilization of the contractor and the work being carried and the payments of finished activities as per the contract.
- The client should provide a quick response and approval whenever requested by the parties and sufficient supervision on the consultant for quick preparation of design document.

For consultants:

- Consultants should give quick response to contractors request to approve sample material and payments to minimize or avoid the delay caused by delay in agreeing with sample materials and payment
- The consultant should prepare and submit the design document in advance according to the schedule
- The consultant should make regular supervision on the contractor to execute the activities as per schedule and contract agreement considering convenient season for weather condition

For contractors:

- Should mobilize to the site and should start commencement of works immediately after possession of the site.

- Should establish proper planning and scheduling that considered the convenient season for executing activities as planned to complete the project on time as per the schedule. Since the highest rainfall intensity inhibits them from execution which leads to delay.
- Should set up strong project management techniques and systems led by professionals to achieve maximum output with minimum input and to solve any difficulties that may cause delay technically with effective managerial skill.

Finally, Commitment to the project is the responsibility of all stakeholders involved in the URRAP project in the study area; similar studies can also be conducted in this area, and stakeholders in this sector also have to consider such issues and utilize them the findings of such studies. I also suggest that future studies focus on the magnitude of the effects of causes this on projects.

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APPENDICES

Appendix 1 Data Computation

	clients' view							
Factors	high(5)	high(4)	moderate (3)	low(2)	very low(1)	sum(N)	$\frac{\sum WiFi}{A*N}$	Ranks
Poor qualification of the contractor's technical staff			7	3	1	11	0.5091	14
Rework due to error during construction		4	2	4	1	11	0.5636	11
Delays in site mobilization	5	2	4			11	0.8182	3
Problem in planning and scheduling	2	4	4	1		11	0.7273	5
Improper construction methods implement		3		2	6	11	0.4000	20
Cash-flow problems	3		4	4		11	0.6364	9
Poor site management		5	4	2		11	0.6545	8
Non execution by the contractor as per the planned schedule	3	3	2	3		11	0.7091	6
Conflicts between joint-ownership of the project			4	4	3	11	0.4182	19
Political situation		3		1	7	11	0.3818	21
Inconvenient site access		4	7			11	0.6727	7
Accident during construction				2	9	11	0.2364	28
Unforeseen increments in equipment's/materials cost				3	8	11	0.2545	27
Labour productivity				4	7	11	0.2727	26
Weather conditions	6	5				11	0.9091	1
Natural disaster					11	11	0.2000	29
poor qualification of owner's technical staff			1	3	7	11	0.2909	25
late issuing of approval documents		4	3	1	3	11	0.5455	12
change/variation orders			3	3	5	11	0.3636	22
late payment	5	4	2			11	0.8545	2
slow decision making process			5	3	3	11	0.4364	17
poor communication and coordination of the owner with other parties				6	5	11	0.3091	24
delay in delivering construction site to the contractor		3	3	1	4	11	0.4909	15
In adequate qualification of the consultant		3		4	4	11	0.4364	17
Lack of consultant's site staff		1	1	2	7	11	0.3273	23
Design problem		2	4	1	4	11	0.4727	16
Delay in approving sample materials and payment		4	3	4		11	0.6000	10
Poor communication and coordination of the consultant with other parties			7	4		11	0.5273	13
Delay in design documents preparation by consultant	4	3	2	2		11	0.7636	4

	consultants' view							
Factors	very high(5)	high(4)	moderate (3)	low(2)	very low(1)	sum(N)	$\frac{\sum WiFi}{A*N}$	Ranks
Poor qualification of the contractor's technical staff	3	3	2	1	3	12	0.6333	15
Rework due to error during construction		3	2	1	6	12	0.4333	25
Delays in site mobilization	3	3	3	3		12	0.7000	8
Problem in planning and scheduling	3	6	2		1	12	0.7667	6
Improper construction methods implement		3	3	4	2	12	0.5167	20
Cash-flow problems	3	6	2	1		12	0.7833	4
Poor site management		6	4	2		12	0.6667	10
Non execution by the contractor as per the planned schedule	3	6	3			12	0.8000	3
Conflicts between joint-ownership of the project		3	6	3		12	0.6000	17
Political situation		6	3	3		12	0.6500	12
Inconvenient site access	4	5	2		1	12	0.7833	4
Accident during construction			3	6	3	12	0.4000	26
Unforeseen increments in equipment's/materials cost			3	6	3	12	0.4000	26
Labour productivity				3	9	12	0.2500	29
Weather conditions	6	3	3			12	0.8500	1
Natural disaster			3	3	6	12	0.3500	28
poor qualification of owner's technical staff		3	3	3	3	12	0.5000	21
late issuing of approval documents	3	3	6			12	0.7500	7
change/variation orders	3	1		2	6	12	0.4833	23
late payment	4	6	2			12	0.8333	2
slow decision making process	3	3	3		3	12	0.6500	12
poor communication and coordination of the owner with other parties	3		5	3	1	12	0.6167	16
delay in delivering construction site to the contractor	3	2	4	2	1	12	0.6667	10
In adequate qualification of the consultant	3			3	6	12	0.4500	24
Lack of consultant's site staff		6			6	12	0.5000	21
Design problem			9	3		12	0.5500	18
Delay in approving sample materials and payment	3	3	4		2	12	0.6833	9
Poor communication and coordination of the consultant with other parties	3		3	3	3	12	0.5500	18
Delay in design documents preparation by consultant	3	3		6		12	0.6500	12

contractors' view								
Factors	very high(5)	high(4)	moderate (3)	low(2)	very low(1)	sum(N)	$\frac{\sum WiFi}{A*N}$	Ranks
Poor qualification of the contractor's technical staff		5	7		7	19	0.50526	16
Rework due to error during construction		4	7	1	7	19	0.48421	21
Delays in site mobilization	5	4	5	5		19	0.69474	6
Problem in planning and scheduling	6	4		4	5	19	0.62105	11
Improper construction methods implement		5	4		10	19	0.44211	23
Cash-flow problems	4	5	5	5		19	0.68421	7
Poor site management		5	9		5	19	0.54737	15
Non execution by the contractor as per the planned schedule	5		9		5	19	0.6	12
Conflicts between joint-ownership of the project		5	5	4	5	19	0.50526	16
Political situation	4	4	5	6		19	0.66316	8
Inconvenient site access		10	9			19	0.70526	5
Accident during construction					19	19	0.2	28
Unforeseen increments in equipment's/materials cost			9		10	19	0.38947	26
Labour productivity			6	6	7	19	0.38947	26
Weather conditions	10	6	3			19	0.87368	2
Natural disaster					19	19	0.2	28
poor qualification of owner's technical staff	5				14	19	0.41053	24
late issuing of approval documents	8		5	1	5	19	0.65263	9
change/variation orders			10		9	19	0.41053	24
late payment	15	4				19	0.95789	1
slow decision making process		9	5		5	19	0.58947	13
poor communication and coordination of the owner with other parties	5		4		10	19	0.49474	18
delay in delivering construction site to the contractor	5	9	5			19	0.8	3
In adequate qualification of the consultant	5		4		10	19	0.49474	18
Lack of consultant's site staff		4	6		9	19	0.45263	22
Design problem		10		4	5	19	0.55789	14
Delay in approving sample materials and payment	5	5	5	4		19	0.71579	4
Poor communication and coordination of the consultant with other parties	6			4	9	19	0.49474	18
Delay in design documents preparation by consultant		10	5	2	2	19	0.64211	10

	combined view							
Factors	very high(5)	high(4)	moderate (3)	low(2)	very low(1)	sum(N)	$\frac{\sum WiFi}{A*N}$	Ranks
Poor qualification of the contractor's technical staff	3	8	16	4	11	42	0.54286	15
Rework due to error during construction	0	11	11	6	14	42	0.49048	19
Delays in site mobilization	13	9	12	8	0	42	0.72857	3
Problem in planning and scheduling	11	14	6	5	6	42	0.69048	6
Improper construction methods implement	0	11	7	6	18	42	0.45238	22
Cash-flow problems	10	11	11	10	0	42	0.7	5
Poor site management	0	16	17	4	5	42	0.60952	12
Non execution by the contractor as per the planned schedule	11	9	14	3	5	42	0.68571	7
Conflicts between joint-ownership of the project	0	8	15	11	8	42	0.50952	18
Political situation	4	13	8	10	7	42	0.58571	13
Inconvenient site access	4	19	18	0	1	42	0.71905	4
Accident during construction	0	0	3	8	31	42	0.26667	28
Unforeseen increments in equipment's/materials cost	0	0	12	9	21	42	0.35714	26
Labour productivity	0	0	6	13	23	42	0.31905	27
Weather conditions	22	14	6	0	0	42	0.87619	2
Natural disaster	0	0	3	3	36	42	0.24286	29
poor qualification of owner's technical staff	5	3	4	6	24	42	0.40476	25
late issuing of approval documents	11	7	14	2	8	42	0.65238	11
change/variation orders	3	1	13	5	20	42	0.41905	24
late payment	24	14	4	0	0	42	0.89524	1
slow decision making process	3	12	13	3	11	42	0.56667	14
poor communication and coordination of the owner with other parties	8	0	9	9	16	42	0.48095	20
delay in delivering construction site to the contractor	8	14	12	3	5	42	0.68095	8
In adequate qualification of the consultant	8	3	4	7	20	42	0.46667	21
Lack of consultant's site staff	0	11	7	2	22	42	0.43333	23
Design problem	0	12	13	8	9	42	0.53333	16
Delay in approving sample materials and payment	8	12	12	8	2	42	0.67619	9
Poor communication and coordination of the consultant with other parties	9	0	10	11	12	42	0.51905	17
Delay in design documents preparation by consultant	7	16	7	10	2	42	0.67619	9

Category ranking by all parties and combined

delay category	client view			consultant view			contractor view			Overall		
	RII	%age	RANK	RII	%age	RANK	RII	RANK	%age	RII	%age	Rank
client related	0.47	23.08	3	0.64	26.73	2	0.62	1	27.53	0.59	26.22	2
consultant related	0.52	25.59	2	0.56	23.45	3	0.56	3	24.99	0.55	24.66	3
contractor related	0.63	30.80	1	0.66	27.55	1	0.57	2	25.56	0.61	27.42	1
external related	0.42	20.53	4	0.54	22.27	4	0.49	4	21.92	0.48	21.69	4

Appendix 2 Reliability Test Result

Cronbach's Alpha for Client Related

Reliability

```
[DataSet1] C:\Users\user\Documents\client related .sav
```

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	42	100.0
	Excluded[a]	0	.0
	Total	42	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.941	7

Cronbach's Alpha for Consultant Related

Reliability

```
[DataSet3] C:\Users\user\Documents\consultant related.sav
```

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	42	100.0
	Excluded[a]	0	.0
	Total	42	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.950	6

Cronbach's Alpha for Contractor Related

Reliability

[DataSet4] C:\Users\user\Documents\contractor related.sav

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	42	100.0
	Excluded[a]	0	.0
	Total	42	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.959	8

Cronbach's Alpha for External Related

Reliability

[DataSet5] C:\Users\user\Documents\external related.sav

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	42	100.0
	Excluded[a]	0	.0
	Total	42	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.912	8

Cronbach's Alpha for All Causes of Delay Related

Reliability

[DataSet1] C:\Users\user\Documents\overall.sav

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	42	100.0
	Excluded[a]	0	.0
	Total	42	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.983	29

Appendix 3 Questionnaires

JIMMA UNIVERSITY

JIMMA INSTITUTE OF TECHNOLOGY

SCHOOL OF GRADUATE STUDIES

FACULTY OF CIVIL AND ENVIRONMENTAL ENGINEERING

CONSTRUCTION ENGINEERING AND MANAGEMENT CHAIR

Dear participants, this questionnaire is developed to assess causes of delay in universal rural road access program road projects: in case of Kaffa Zone, south western Ethiopia, which is going to be conducted as partial fulfillment of Master of Science in Construction Engineering and Management. The main objective of this research was to identify the main causes/factors/ that lead to delay of URRAP roads in Kaffa Zone, south western Ethiopia. Your response, in this regard, is highly valuable and contributory to the outcome of the research. All feedback will be kept strictly confidential, and will be utilized only for this academic research purpose. The questionnaire is divided into two parts. The first part of the questionnaire includes the background of the respondent. The second part includes the list of the identified factors that might cause delay in URRAP road construction projects in Kaffa Zone. The respondents are asked to assess the degree of impact of the delay factors. At the end of the second part of the questionnaire, an open-ended question is provided to list any other delay factors in a specified area and other comments for improvement, suggestions or recommendations to prevent the delays, if any.

Thank you in advance,

Fasika Degefu Gebre

Post graduate student in Construction Engineering and management,

Jimma University, Jimma Institute of Technology, Faculty of Civil and Environmental Engineering, Construction Engineering and Management Chair

Phone: +2519-209-580-76 **Email:** fasika_degefu@yahoo.com

Part I- respondent background

1. Gender: Male ( ) Female ( )
2. Profession: _____Name of company / Organization: _____
3. Title or Position(s) of respondent:_____ Address of respondent: _____
4. Level of education: Secondary ( ) Vocational Training ( ) Diploma ( ) Degree ( ) Masters ( )
5. Which of the stakeholder are you? (Please choose one). Contractor ( ) Client ( ) Consultant ( )
6. Have you participated in URRAP projects previously? ( ) No ( ) Yes, please specify year of experience _____

Part II: Causes of Delay in URRAP Road Construction projects in Kaffa Zone

1. Are there any delays in this URRAP project? ☐ **Yes** ☐ **No**
2. Some causes of delay were categorized under their mutual factors (i.e. Client, Contractor, Consultant & External factors) as tabulated in the following Table 1. If there are any other factors unmentioned in the table, you are kindly requested to list them on empty space provided in the table. And rank their importance among each of these factors.

Please tick ✓ the extent to which you believe that the following factors that may contributes to causes of delays of URRAP road construction projects in Kaffa Zone, south western Ethiopia. Using the following Likert scale rating approach: 1= very low; 2= Low; 3= Moderate; 4 =High and 5= very high.

Table 1: Causes of delay

A	Client factor	1	2	3	4	5
	Poor qualification of the owner's technical staff					
	Late issuing of approval documents					
	Change/variation orders					
	Late payment					
	Slow decision making process					
	Poor communication & coordination of the owner with other parties					
	Delay in delivering construction site to the contractors					

You are kindly requested to put your recommendations and comments for **client** to prevent the delays in URRAP road construction projects in Kaffa Zone, _____

_____

_____

B	Consultant factors	1	2	3	4	5
	In adequate qualification of the consultant					
	Lack of consultant's site staff					
	Design problem					
	Delay in approving sample materials and payment					
	Poor communication and coordination of the consultant with other parties					
	Delay in design documents preparation by consultant					

You are kindly requested to put your recommendations and comments for **consultant** to prevent the delays in URRAP road construction projects in Kaffa Zone, _____

_____

_____

C	**Contractor factors**	**1**	**2**	**3**	**4**	**5**
	Poor qualification of the contractor's technical staff					
	Rework due to error during construction					
	Delays in site mobilization					
	Problem in planning and scheduling					
	Improper construction methods implement					
	Cash-flow problems					
	Poor site management					
	Non execution by the contractor as per the planned schedule					

You are kindly requested to put your recommendations or comments for **contractor** to prevent the delays in URRAP road construction projects in Kaffa Zone, _____

_____

D	**External factors**	**1**	**2**	**3**	**4**	**5**
	Conflicts between joint-ownership of the project					
	Political situation					
	Inconvenient site access					
	Accident during construction					
	Unforeseen increments in equipment's/materials cost					
	Low labor productivity					
	Weather conditions					
	Natural disaster					

You are kindly requested to put your recommendations and comments regarding **external factors** to prevent the delays in URRAP road construction projects in Kaffa Zone,

_____

_____