



ADDIS ABABA UNIVERSITY
COLLEGE OF BUSINESS AND ECONOMICS
SCHOOL OF COMMERCE

**IMPACT OF RESOURCE MANAGEMENT ON THE SUCCESS OF
CONSTRUCTION PROJECTS OF ECWC: THE CASE OF AAPC MAINTENANCE
PROJECT**

By: Samrawit W/Tsadik

**Project work in Partial Fulfillment of the Requirements for the award of
Degree of Master of Arts in Project Management (MAPM)**

Advisor: Teklegiorgis Assefa (Asst. Prof.)

September, 2021

Addis Ababa, Ethiopia

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By: Samrawit W/Tsadik

Approved by members of the Examining Board

ADVISOR

SIGNATURE

DATE

INTERNAL EXAMINER

SIGNATURE

DATE

EXTERNAL EXAMINER

SIGNATURE

DATE

DECLARATION

I, the undersigned, declare that this project work entitled "*Impact of Resource Management on the Success of Construction Projects of ECWC: The Case of AAPC Maintenance Project*" is my original project work and it has not been submitted in partial or in full to any other institutions. All sources of materials are properly acknowledged before referred in the paper.

Declared by: Samrawit W/Tsadik

Signature_____

Date _____

This Project work has been submitted for examination with my consent as an assigned advisor.

Confirmed by Advisor: Teklegiorgis Assefa (Asst. Prof.)

Signature_____

Date _____

ENDORSEMENT

This is to endorse Samrawit W/Tsadik's project work entitled " Impact of Resource Management on the Success of Construction Projects of ECWC: The Case of AAPC Maintenance Project " done in partial fulfillment of the requirements for the degree of Masters of Arts in project management. It complies with the University's regulations and acceptable standards of novelty and quality.

Advisor

Teklegiorgis Assefa (Asst. Prof.)

Signature _____

Date _____

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I praise Holy Trinity for your righteousness and I am always grateful to Saint Virgin Merry for the miracles I witnessed by your Blessed name.

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Sincerely,

Samrawit W/Tsadik

Addis Ababa, Ethiopia

ACRONYMS

AAPC	Addis Ababa Police Commission
AACB	Addis Ababa City Construction Bureau
CEO	Chief Executive Officer
ECDSWC	Ethiopian Construction Design and Supervision Works Corporation
ECWC	Ethiopian Construction Works Corporation
EM	Equipment Management
FDRE	Federal Democratic Republic of Ethiopia
FRM	Financial Resource Management
HR	Human Resource
HRM	Human Resource management
MM	Material Management
MoPE	Ministry of Public Enterprises
PCAD	Planning and Corporate Affairs Division
PM	Project Management
PMBOK	Project Management Body of Knowledge
PMI	Project Management Institute
RM	Resource management
ROV	Return on Venture
SP	Success of Project
SPSS	Statistical Package for Social Sciences
TM	Time Management
WBS	Work break down structure

TABLE OF CONTENTS

ACKNOWLEDGMENTS	
ACRONYMS	i
TABLE OF CONTENTS	ii
LIST OF FIGURES	iv
LIST OF TABLES	v
ABSTRACT	vi
CHAPTER ONE	1
INTRODUCTION	1
1.1 Background of the Study.....	1
1.2 Background of the Project.....	3
1.3 Background of ECWC	4
1.4 Statement of the Problem.....	7
1.5 Research Questions	8
1.5.1. Basic Research Questions	8
1.5.2. Specific Research Questions.....	8
1.6 Objectives of the Study	8
1.6.1. General objective of the study	8
1.6.2. Specific objectives of the study.....	8
1.7 Operational Definition of key terms	8
1.8 Significance of the study.....	9
1.9 Scope of the study	10
1.10 Organization of the study	10
1.11 Delimitations of the study	10
CHAPTER TWO	11
LITERATURE REVIEW	11
2.1. Introduction.....	11
2.2. Theoretical Review	11
2.2.1. Project	11
2.2.2. Project Resource Management.....	12
2.2.3. Resource Based PM Knowledge areas.....	12
i. Human Resource Management	13
ii. Material Management	13
iii. Time (Schedule) Management	14
iv. Equipment Management	14
v. Financial Resource Management	14
2.2.4. Project Success.....	15

2.3.	Conceptual Framework.....	17
2.4.	Empirical Literature Review.....	17
CHAPTER THREE.....		20
RESEARCH METHODOLOGY.....		20
3.1	Introduction.....	20
3.2	Research Design.....	20
3.3	Population of the Study.....	20
3.4	Sample size, Sampling Technique and Participants.....	20
3.5	Source of data.....	21
3.6	Procedures of data collection.....	21
3.7	Methods of Data Analysis.....	21
3.8	Validity and Reliability.....	22
3.9	Ethical Considerations.....	23
CHAPTER FOUR.....		24
DATA PRESENTATION, ANALYSIS AND INTERPRETATION.....		24
4.1	Introduction.....	24
4.2	Findings of the study.....	24
4.2.1	Questionnaire screening.....	24
4.2.2	Respondents' profile.....	25
4.2.3	Resource management and Project success.....	28
4.3	Discussion of Findings.....	38
CHAPTER FIVE.....		41
SUMMARY, CONCLUSION AND RECOMMENDATIONS.....		41
5.1	Summary.....	41
5.2	Conclusion.....	41
5.3	Recommendations.....	42
5.4	Suggestions for Future Research.....	43
Reference.....		i
Appendix A: Questionnaire.....		iii
Appendix B: SPSS Outputs.....		ix

LIST OF FIGURES

Figure1. 1 ECWC workers at AAPC maintenance project site (Field survey, 2021).....	4
Figure1. 2 Construction Project Management Reform (Source: ECWC Planning and Corporate Affairs Division, 2021).....	7
Figure 2. 1 project Initiation Context (Source: PMI, 2017).....	12
Figure 2. 2 Project Management Competence and Project Success (Source: Cartwright, C. & Yinger, M, 2007)	16
Figure 2. 3 Conceptual Framework (Developed by researcher based on literature review, 2021).....	17
Figure 3.1 Case study structure (Source: John Atkinson, 2002).....	22
Figure 4. 1 Survey Response (Source: Clint Fontanella, 2021).....	25
Figure 4. 2 Gender of Respondent (Field Survey, 2021).....	26
Figure 4. 3 Profession of respondents (Field Survey, 2021).....	27
Figure 4. 4 Category of Resource in AAPC project (Field Survey, 2021)	28
Figure 4. 5 Resource management types and responsible personnel (Field Survey, 2021).....	29
Figure 4. 6 Resource management and responsible personnel (Field Survey, 2021)	30
Figure 4. 7 Major challenges in relation to Resources (Field Survey, 2021)	30
Figure 4. 8 Existence of Major Resources challenges and possible improvements (Field Survey, 2021).....	31

LIST OF TABLES

Table 3.1 Lee Cronbach's' Reliability Estimation Table (Field Survey, 2021)	23
Table 3. 2 Scale Reliability Result (Field Survey, 2021)	23
Table 4. 1 Research rate and response adequacy (Field Survey, 2021).....	24
Table 4. 2 Age of respondents (Field survey, 2021).....	26
Table 4. 3 Team of respondents (Field survey, 2021)	26
Table 4. 4 Qualification of respondents (Field survey, 2021)	27
Table 4. 5 Experience of respondents (Field survey, 2021)	28
Table 4. 6 Experience of respondents with the reform (Field survey, 2021).....	32
Table 4. 7 Mean values of the 6 new variables (Field survey, 2021)	33
Table 4. 8 Tests of Normality (Field survey, 2021).....	33
Table 4. 9 Tests of Normality for logEM (Field survey, 2021).....	34
Table 4. 10 Model Fitting Information for ordinal regression of SP and EM (Field survey, 2021).....	34
Table 4. 11 Goodness-of-Fit for ordinal regression of SP and EM (Field survey, 2021).....	34
Table 4. 12 Pseudo R-Square for ordinal regression of SP and EM (Field survey, 2021)	35
Table 4. 13 correlation of SP and EM (Field survey, 2021).....	35
Table 4. 14 linear analysis SP and HRM (Field survey, 2021)	36
Table 4. 15 ANOVA of linear regression of SP and HRM (Field survey, 2021).....	36
Table 4. 16 Model summary of linear regression of HRM, TM, and SP (Field survey, 2021).....	37
Table 4. 17 ANOVA of linear regression of SP, HRM, and TM (Field survey, 2021).....	37
Table 4. 18 coefficient of linear regression of SP, HRM, and TM (Field survey, 2021)	37
Table 4. 19 excluded variables of linear regression (Field survey, 2021)	38

ABSTRACT

This study presents impact of resource management for project success. The paper encompasses effect of Human, Time, Material, Equipment, and Financial resource managements on one of Ethiopian Construction Works Corporation projects. The case selected was Addis Ababa Police Commission maintenance project. For the study different theoretical and empirical literatures were reviewed. Afterwards, questionnaire was developed and a purposive sampling design was applied to spread 57 questionnaires to ECWC project team. Primary Quantitative data from 52 returned responses were analyzed in SPSS software version 26. Results from the descriptive analysis shows Human Resource Management scored higher influencing rate than the remaining management types. The regression score (R score) is 45.5% with 0.548 ANOVA value and 0.000 significance. Correlation of 0.675 revealed it has a moderate positive association with success of the project. 20.2% of the respondents agreed the practice of human resource related to organization culture threatens the project success. Moreover, mean value of Human Resource Management practice scored 3.147. This medium interpretation has to be improved to a higher score and Organization culture should be developed to ascertain a well-intentioned human resource management practice. The study recommended to develop a strong plan on manpower, provide trainings, fair motivation and appraisal. Lastly, the study recommends scholars to do further investigation on HRM and organize RM frame work for Ethiopia's construction industry.

Keywords: Project, Resource management, Human Resource management, Material Management, Time Management, Equipment Management, Financial Resource Management, and Project Success

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

According to PMI (2008) PMBOK Standard (Project Management Body of Knowledge), a project is an exerted effort to provide different outputs inside the constraints of Time, Cost and Quality.

A resource is an entity that contributes to the accomplishment of project activities (SK. Nagaraju et al., 2012). Projects require certain types of resources to attain the prime purpose and succeed at the end. These are Human, Material, Equipment, Time, and Financial resources. Companies can acquire project resources from their own division, purchase from suppliers, hire personnel, rent, or by outsourcing to third parties.

The construction industry is considered to be one of the most important industries in the economy. It interacts with nearly all fields of human endeavors (Nguyen et al., 2004). In the industry project tasks are inter-linked and chained to one another. SK. Nagaraju et al. (2012) stated that Construction projects are of high value, and they employ huge resources. This by itself and other restraints needs to be well managed. The inputs require a technical and tactical means of administration to create a system and avoid or minimize risks, shortcomings, and uncertainties in the project life cycle.

Resource Management (RM) is a very challenging task since it involves authorizing, availing, allocating, monitoring, and controlling those resources and deliver outputs. It involves planning, scheduling work frame and capital investment. RM process begins when the project is initiated and ends when the project is closed. Sometimes RM can go further to manage retained accounts, project employees, liquidated damages, Equipment and material shipping after the project is completed.

The scope of resource management is very wide. But for this specific case study focus is given to Resource management types; Human, Material, Equipment, Time, and Financial resources management; in relation to construction project success.

Abhishek A. et al., (2017) mentioned about significance of construction industry to national economy and creation of employment opportunities to number of people. These human resources play a bigger role if they are well managed and retained. The Human Resource management can be undertaken based on the Organizational structure of a company or on the project level. HRM handles workforces from Recruiting to termination or luckily retention.

Construction materials constitute a major portion of the total cost in a construction project (Jusoh & Kasim, 2017). Due to its role in construction projects, materials management has become a critical component and an essential function that improves productivity in construction projects (Caldas C.H. et al., 2014). Therefore, material management play an important role in project success.

In reference to David J. E et al., (2009) Equipment Management deals with maintenance, downtime productivity, health and safety, operator competence, optimization, machine control, and miscellaneous conditions. In the construction industry equipment is vastly applied and has to be well managed. Any risk can cost additional expenses. Thus, operators should be trained and supervised. Not only operators the equipment should be examined now and then for any maintenance requirement and obey legal obligation.

Every project has a time bound to begin, perform, and close a project. A specific number of days, commencement and end dates will be documented in the contract to control the schedule. Time is a precious resource, once gone never comes back. Any delay in construction project life will cause schedule over run. The reasons can be poor management of time, choice of procurement methods, inadequate participation of shareholders, poor planning of construction works, lack of participation of planner and lack of implementation of software and etc. Chin (2014). Thus a very wise use of it is undeniably important. Westland (2006) stated that time management is the process of recording and controlling time spent by staff on the project. Similarly, Crutsinger (1994) discussed on time management goal in relation to chronology of events by critical path and prioritizing them, time estimation, solving unexpected deficits, reassessing objectives, and evaluation in regular basis. If all these are applied it can ensure success by some extent.

Financial Management is all about utilizing company's budget to perform activities. This includes the use of cash and other assets. It relates to all resources utilized in construction project. Finance needs to be managed starting from project inception all over to the completion. To illustrate, it requires investment; money for purchasing and rental of resources, for employees related costs, additional cost to fasten schedule or cover overrun, and payments for subcontractors.

Construction industry is a very tough sector to engage in and succeed as intended. Shockingly, its natural characteristics incorporated complexity and instability. Most ventures make trouble for the owners/ consultants representing clients and contractors in terms of extended duration, scope change, quality doubts, and cost. A development venture is commonly recognized as effective when it is completed on time, within budget and in understanding with the critical determinations of stakeholders' satisfaction.

There are different opinions on what composes venture victory and criteria by which the project ought to be judged. Still, no common understanding on project victory has risen suitable for all projects (Pinto & Slevin, 1988).

There is still a need to search on the area of Resource management impact on the project success. There exists gap in knowledge on this specific knowledge area in Ethiopian context. Since Ethiopia is a developing country with bright future a head in the industry various studies should be conducted to create better applications.

In general, this chapter addresses different sections of introduction to the study. These are Background of the Project, Background of ECWC, Statement of the Problem, Basic Research Questions, Specific Research Questions, General Objectives of the Study, Specific objectives of the study, Operational Definition of key terms, Significance of the study, Scope of the study, Organization of the study, and Delimitations of the study.

1.2 Background of the Project

Addis Ababa Police Commission (AAPC) maintenance project is currently under construction. It is located near Sor amba Hotel. Project is contracted to ECWC at nearly above 95 million birr. The project is aimed to renovate existing building and add supplements to it. The project created job opportunities to daily based and contract employees. It also generates income to the corporation, and opens commercial opportunities to suppliers and subcontractors.

Ethiopian Construction Design and Supervision Works Corporation (ECDSWC) is assigned as consultant. The enterprise has assigned a Resident Engineer from Building and Urban Design Supervision Division to supervise the work.

The third party is Addis Ababa City Construction Bureau (AACB); the public body positioned as the client representative. Its purpose is to administer the project as client and pay the bills for both the consultant and contractor.

The project was commenced to ECWC in December 2020 with a contract period of 390 calendar days. The contract document is prepared to encompass seven different Bills with quantified and rated items. It also has a general expense bill to cover all costs related to consultant's site office and transportation expenses for consultant's resident engineer and client's representative.



Figure1. 1 ECWC workers at AAPC maintenance project site (Field survey, 2021)

1.3 Background of ECWC

Maruthi S et.al. (2015) stated, now days many construction projects are coming out due to high demand of infrastructure developments. Since Ethiopia is a developing country with promising opportunity regarding construction industry huge prospect is created to indigenous entities.

Ethiopian Construction Works Corporation is a newly established and lawfully certified Grade one contractor in Ethiopia. It is a public enterprise formed in 2015 with a capital of 20.3 billion birr. It is legalized by council of ministers' regulation No. 366/2015. The enterprise is governed by the public Enterprises Proclamation No. 25/1992.

ECWC is directed by the Ministry of Public Enterprises (MoPE). Federal Democratic Republic of Ethiopia (FDRE) appoints Board of the Corporation and the board forms the company's policy. Directly below the board hierarchy goes to Chief of Executive officer (CEO) who leads ECWC and answers to the board.

The corporation is formed by incorporation of three public enterprises. These are Ethiopian Prefabricated Building Parts Production Enterprise, Ethiopian Road Construction Corporation and Ethiopian Water Works Construction Enterprise. They are formed way back to the late 1940s and early 1950s.

ECWC works on construction of Water, Transport, Building Infrastructure, Irrigation Dams and Deep Water wells. ECWC has been a contractor to many projects and handed completed projects to the rightful owners.

ECWC has a vision to be a worldwide proficient construction corporation in 2026 and missioned to upgrade its contractor status using competent resources and technology to work both locally and abroad. The entity aims to own dams, manage, and get benefits by charging recipients of the output. Correspondingly the Corporation manufactures and assembles construction machineries and equipment, and produce spare parts.

The corporation has core values such as team work, quality first, always enhances, responds to demands, cost efficient, responsible and courageousness, and creating a safe working space and environment.

ECWC is currently under a reform in Construction Project Management. The PM system encompasses organization structure, information processing, decision making and procedures that facilitate integration of horizontal and vertical elements of the project organization. The reform has sixteen knowledge areas consolidated from different reading materials. These areas are highlighted below.

Scope Management deal with scope of works required to accomplish tasks within the project schedule. These works will also be scheduled and Time Management will aid projects attain successful project completion.

Project has to be staffed with skilled manpower and requires a strong Human Resource Management practice to critically deploy work force. The human capital should also be equipped by machineries whenever necessary. Equipment Management takes control over administering those machineries to create a smooth workflow and economic use of the technologies.

ECWC is a construction entity that has several staff and it is involved with a contractual relation to different stakeholders. It requires a strategic relation and communication. Thus the enterprise developed a Communication Management technique to facilitate the correlation.

The enterprise values its human capital. And to support this cause Occupational Health and Safety Management is included in the reform. By this possible risk on staff health can be consciously thought through and safety of their work place can be retained. Risk Management and Environmental Management also relates to the aforementioned issues and some other crucial situations related to the concepts.

The enterprise utilizes many types of materials in the projects. These inputs need to be inspected for qualifications. To strategically perform such administration Material Management and Quality Management are very essential and undeniably important to the enterprise and the reform.

Financial Management and Cost Management are super sensitive in application. The concepts require a very organized personnel and system in order to be employed. Every cost and financial transactions have to be quantified and audited. These managements will provide the entity with profitable revenue.

In construction there exist three main stakeholders namely Contractor, Consultant, and Client. As stated in this study paper ECWC is a Grade 1 contractor, thus the company involves in many contracts both with the client and subcontractors. Also the enterprise forms different types of tender. Thus, to manage these relations Procurement, Claim, and Stakeholders Management are organized in formal platform.

All the above types of managements can also be included in an Integration Management. This specific type of management will consolidate any of the fifteen management types whenever necessary.

From the sixteen knowledge areas highlighted below this paper will focus on Material, Time, Financial, Equipment, and Human resource management uniformly to Resource management and relate its application to impact on project success.



Figure 1. 2 Construction Project Management Reform (Source: ECWC Planning and Corporate Affairs Division, 2021)

1.4 Statement of the Problem

Studies on Resource management knowledge area of Ethiopia’s construction sector are scattered in subsections and not many are found to address the issue in relation to project success. Since the sector utilizes enormous amount of resource critical reviews must be done in order to enhance the success stories. Challenges in the industry mostly come from improper resource utilization. In order to identify these risks and fill the gap a well-established application is crucial.

From many licensed contractors in Ethiopia the study took one big enterprise to base its project work. Ethiopian Construction Works Corporation is one of the leading Grade one contractors in Ethiopia. The enterprise performs all over the country. The entity is a development organization employed to do governmental construction projects. Since the entity is organized nationally it provides wider views regarding the topic.

The enterprise is currently undergoing a Construction Project Management Reform. Since the corporation is new to the reform there is no perfect implication and application overall. The problems behind are staff’s inadequate knowledge about the reform, previous faulty trends, dispersed project locations, lengthy organizational procedures, and new ideology unfamiliar to most of the employees.

The reform has sixteen knowledge areas taken from different sources and combined it to fit with the enterprise. This paper particularly focuses on five of them namely; Human, Material, Equipment, Time, and Financial resources management. It illustrates application of those Resource managements and the impact on project success.

Thus this paper chosen AAPC maintenance project as a case study to investigate impact of Resource management on project success. Weak management applications are also studied to address the prime purpose of the study.

1.5 Research Questions

5.1.1. Basic Research Questions

- What is the current impact of resource management for success of AAPC maintenance project?

5.1.2. Specific Research Questions

- How well are the five Resource management knowledge areas in ECWC Construction Project Management Reform being practiced in AAPC maintenance project?
- Which of the five knowledge areas is very crucial to be applicable in the project and which needs to be enhanced to fit in with the project; in the minds of people working on the project?

1.6 Objectives of the Study

6.1.1. General objective of the study

The prime purpose of the study is to assess the impact of resource management for success of AAPC maintenance project.

6.1.2. Specific objectives of the study

The study points to address particularly the following targets:

- Assess to date application of resource management in AAPC maintenance project.
- Identify the crucial knowledge area from the five management divisions applied in the project
- Find the knowledge area poorly applied in the project
- Study on weak applications aforementioned and recommend possible solution applicable for the project.

1.7 Operational Definition of key terms

- **Project** is a temporary endeavor undertaken to create a unique product, service or result (PMI, 2008a, p. 5)

- **Resource management** is a process to identify, acquire, and manage the resources needed for the successful completion of the project. (PMI, 2017).
- **Human Resource management** deals with staffing project with employees having the right skill by assigning them at the right place and time. (PMI, 2017).
- **Material Management** is processes involving planning, procurement, handling, stock and waste control, and logistics surrounding materials on construction projects (Kebede T., 2016).
- **Time (Schedule) Management** is the processes required to manage the timely completion of the Project (PMI, 2017).
- **Equipment Management** is managing, monitoring, and maintaining motorized and non-motorized equipment. (Anitipov L. et. al, 2018)
- **Financial Resource Management** is frame work to manage capital, liquidity, revenue, costs, and risks. (Russell E., 2019)
- **Project Success** is delivering project on time, within budget, with in specification; success of the product produced or success in achieving the business objectives of the project (Bannerman, P. L., 2008)

1.8 Significance of the study

ECWC is currently under a Construction Project Management Reform. This reform has sixteen knowledge areas. It is believed to have a promising future regarding modern PM practice applicable for the enterprise.

The enterprise is a new merger established in 2015. This gives a chance for early shaping and enhancement to reach its vision of a worldwide proficient construction corporation in 2026. And this paper covers five of the reform knowledge areas. Those are human, material, time, equipment, and financial resource managements. Thus this study can highlight the practice in the project.

This research will provide an insight to impact of those resource managements for the project success. It seeks to find out possible engaging and trailing areas to work harder and manage endeavors.

This project work can also be taken as a reference for further investigations in the project, ECWC, and even in the industry. Additionally, scholars can be motivated to work on the rest eleven knowledge areas in relation to success of the project or any other project.

1.9 Scope of the study

The study aimed at identifying impact of resource management for success of Addis Ababa Police Commission maintenance project. It circles around Human, Material, Equipment, Time, and Financial resources exerted in the project and how well the management practice strive to achieve project success.

1.10 Organization of the study

This project work is organized in to five chapters. The first chapter covers Background of the Project, Background of ECWC, Statement of the Problem, Basic Research Questions, Specific Research Questions, General Objectives of the Study, Specific objectives of the study, Operational Definition of key terms, Significance of the study, Scope of the study, Organization of the study, and Delimitations of the study.

The second chapter is organized to cover literature review of relevant papers to support the study. It includes an introduction, a theoretical review, and the review of empirical literature.

The third chapter called research methodology provides Research Design, Research Approach, Population of the Study, Sample size, Sampling Technique and Participants, Source of data, Procedures of data collection, Methods of Data Analysis, Validity and Reliability, and Ethical Considerations.

The fourth chapter encompasses data presentation, analysis, and interpretation of results and discussions. And lastly the paper summarizes findings, conclude on the results, and provide recommendations and suggestions for future researches. All these are included in the last chapter.

1.11 Delimitations of the study

This project paper investigates Impact of Resource Management on the Success of Construction Projects of ECWC but it is limited to the case of AAPC Maintenance Project. It would be very vast and unattainable if it is done in the corporate level. Some of the reasons are dispersed project locations, involvement of numerous stakeholders and vast corporation size. Thus a specific project is selected as a case study to deeply investigate the relationship of dependent and independent variables.

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction

This chapter review related theoretical literatures. In the review studies about project, Project Resource Management, Resource Based PM Knowledge areas, Project Success, Impact of Resource Management on the Success of Construction Projects, and others related issues are discussed.

This chapter also review preceding empirical findings related to this study title and provide a base to investigate the relations between variables.

2.2. Theoretical Review

2.2.1. Project

A project is a temporary endeavor undertaken to create a unique product, service, or result. Projects are incorporated to fulfill goals by producing deliverables. The purpose is characterized by coordinated work, a strategic implementation, a reason to be accomplished, a result to be attain, an item to be delivered, or an advantage to be performed (PMI, 2017). Correspondingly this book justifies existence of repetitive elements in some project deliverables. But it does not change the fundamental and unique project characters.

According to PMI (2017) the temporary nature of projects show project's definite beginning and end, a fixed timeline. Mesh Bahadur KC (2020) defines project as a value making process in a tangible, intangible, or both kinds by involving series of activities and resources and aim to achieve a certain output, considering constraints like time, quality, cost and often presents a change.

In PMI (2017) project can be initiated for four reasons. These are:

- To create, improve, or fix products, processes, or services;
- To satisfy stakeholders' requests or needs;
- To implement or change business or technological strategies; and
- To meet regulatory, legal, or social requirements

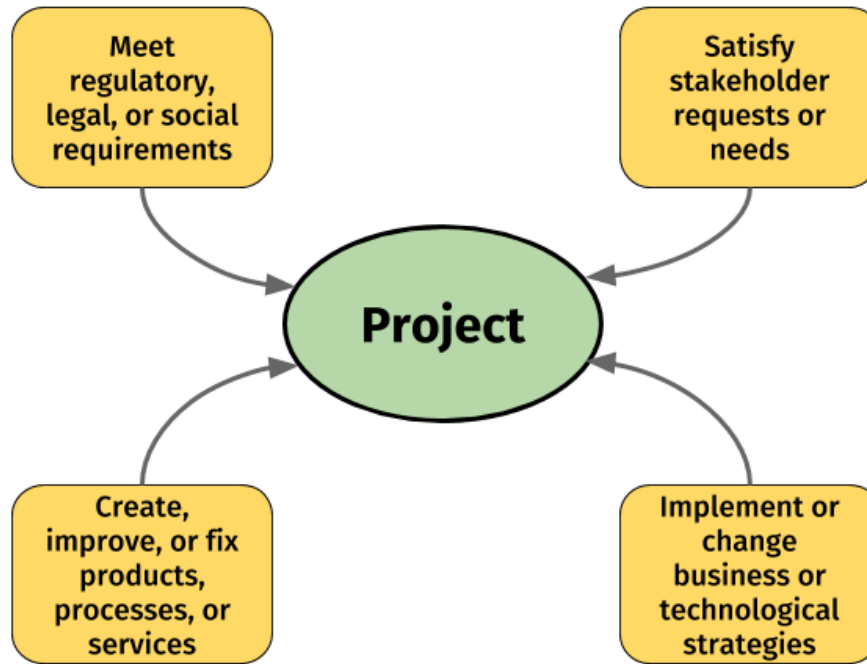


Figure 2. 1 project Initiation Context (Source: PMI, 2017)

2.2.2. Project Resource Management

Project Resource Management includes the processes to identify, acquire, and manage the resources needed for the successful completion of the project. If the procedure is correctly executed, the right resource will be allocated at the right time and place. Resources should be planned, estimated, acquired, developed, monitored, and controlled. (PMI, 2017).

Project road maps, milestones, and schedules can help project team track progress. Reports on a regular basis, stock balance sheets, Bin cards and records, attendances, appraisals, quality and progress control, trainings, meetings, and related procedures are all part of resource management.

2.2.3. Resource Based PM Knowledge areas

In different literatures, project management knowledge areas are classified differently. Some see Resource Management as HRM and others study them separately. The PMBOK guide has ten project management knowledge areas called scope management, time management, cost management, human resource management, quality management, risk management, communication management, procurement management, stakeholder management, and project integration management as a whole.

For this paper, though five of resource-related Project management knowledge areas are reviewed in the subsections below.

i. Human Resource Management

Human Resource management deals with staffing project with employees having the right skill by assigning them at the right place and time. (PMI, 2017).

Individuals in project can be crewed in to project team to accomplished assigned roles and collectively strive to acquire success. The project manager should invest suitable effort in acquiring, managing, motivating, and empowering the project team (PMI, 2017).

In the guideline of ECWC PCAD (2021) Project team can also be classified into support team, office engineering team, and Execution team. The first is composed of non-engineering staffs like finance officer, store keeper, purchaser, HR officer, and other supporters. Office engineering team crewed by engineers and construction professionals assigned to do office works. The last team is called Execution team; works at the project site and do the physical tasks.

ii. Material Management

Ivanna Nösel (2020) classified material resources into raw materials and machines, tools, software, premises, etc. These resources can either be owned by the company or leased for the project.

According to ECWC PCAD (2021) there exist processes involved in effective material management. Bid procurement deals with tendering and awarding of onsite specialty contractors and lowering bid prices to cover costly materials useable for the work. Raw materials are consumable for the project work but office furniture are for instance non consumable, can be used for other projects after completion of the project. In this case they are seen as fixed assets.

In ECWC PCAD (2021) inventory and on site construction management is a key to project success. When the project size increases so does utilization of materials. Thus applying project material management can satisfy demand, gain economy from purchasing, proving the right material at the right time, manage stock and shipping, and provide satisfactory materials.

The other is material purchasing of project specific and miscellaneous materials. The purchase order should first be issued, checked, and approved. Then purchaser will collect three or more pro-forma and the purchasing committee will award winner and proceed on purchasing. Storage and inventory management will provide maximum supply service consistent to maximum investment, balance forecast and actual demand, keep track of material, organize storage, and secure stocks. ECWC PCAD (2021).

iii. Time (Schedule) Management

Project Schedule Management includes the processes required to manage the timely completion of the Project PM ((2017). There are six steps in the PMI listed down.

- Plan Schedule Management: forming policies, procedures, and documentation for scheduling, creating, executing, monitoring and controlling the project schedule.
- Define Activities: identifying and recording project activities and deliverables.
- Sequence Activities: ordering and relating project activities.
- Estimate Activity Durations: estimating the number of work periods needed to complete individual activities with the estimated resources.
- Develop Schedule: studying activity sequences, durations, resource requirements, and schedule restraints and create project schedule.
- Control Schedule: monitoring and controlling project status to update schedule and manage changes.

According to ECWC PCAD (2021) the project schedule begins with a milestone schedule followed by a Work break down structure (WBS) and a project diagram to show critical path. If there exists a float; difference between time of critical path and project time; the project schedule will be crashed to correct the float.

iv. Equipment Management

In ECWC PCAD (2021) it is stated that Equipment management frameworks permit the enterprise to track and oversee the instruments and small equipment that offer assistance for project success. Overseeing gear support and costs in a centralized program maximizes productivity and progresses Return on Venture (ROI).

Equipment assignments create an audit trail for each piece of equipment and hold team members accountable. Another means of management is through Routine Digital Inspections. It Monitors equipment health in the best way to maximize efficiency and avoid downtime. Leveraging an equipment management system allows team to seamlessly collaborate on maintenance, keep track of utilization, and monitor expenses to ensure profitability.

v. Financial Resource Management

This type of management provides sound financial plan at project inception, daily management of finance, funding, prevent disputes between stakeholders, register payment of tax. The processes included in financial management are preparing voucher, opening bank accounts to

deposit and pay by bank cheques, with draw of money from a Cheque Account, receiving Bank Statement, Recording Monthly Receipts and Payments, Budget Line Summaries, Income and Expenditure Statements, and other related tasks ECWC PCAD (2021).

2.2.4. Project Success

One of the most common challenges in project management is determining whether or not a project is successful (PMI, 2017). Different scholars relate success to project time, scope, cost, and quality and recently they add project objectives. PMI (2017) listed three questions key stakeholders and the project manager should answer. These are:

- What does success look like for this project?
- How will success be measured?
- What factors may impact success?

Answers to the aforementioned question should be given and agreed responses should be documented for reference. Project team need to monitor project status now and then to check results of demand versus actual performance.

When the business alignment for a project is constant, the chance for project success greatly increases because the project remains aligned with the strategic direction of the organization (PMI, 2017)

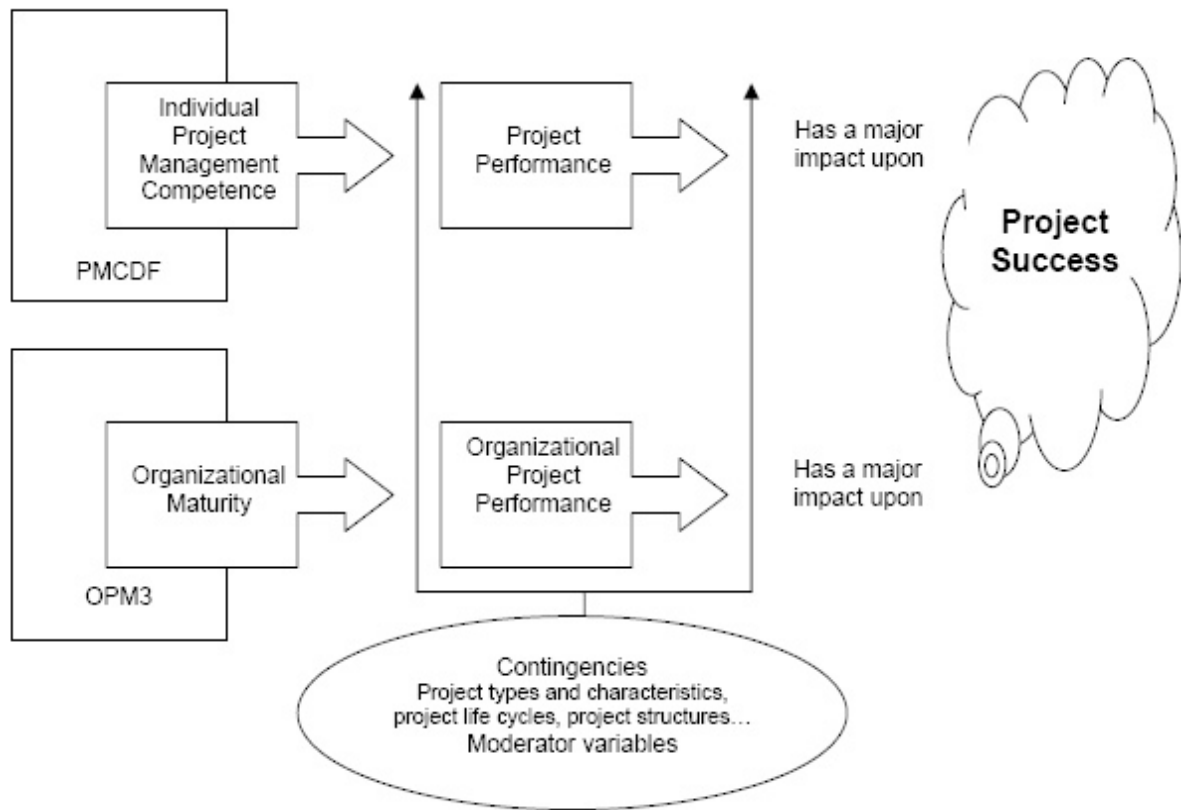


Figure 2. 2 Project Management Competence and Project Success (Source: Cartwright, C. & Yinger, M, 2007)

Stress should be given on when to determine project success. It is an obvious advantage on entitling success to a project after contractor hands back project to client. But indications can be predicted regarding success. For instance, if the project is pacing as planned, avoid/minimize risks, and overcome uncertainties, there indicates possible success at the end. This is where resource management comes in. If resources are well managed threats will be minimized and lead to achievable goals.

Freeman and Beale (1992) surveyed the extend administration writing, distinguished seven fundamental criteria for measuring the success of projects; five of which regularly utilized are:

- Technical performance
- Efficiency of execution
- Managerial and organizational implications (mainly customer satisfaction)
- Personal growth, and
- Manufacturability and business performance

On the other hand, Chan et al., (2004) characterize a conceptual framework to portray factors influencing success of a construction project: Project Management Activities, Project Strategies, Outside Environment, Project-related Variables, and Human-related Variables.

2.3. Conceptual Framework

The purpose of the study is to investigate impact of Resource management for Project Success. The conceptual framework of the study classified and relate these two variables. Resource management is categorized under Independent variable and Project Success under Dependent variable category. The independent variable further classified into Human, Material, Equipment, Time, and Financial Resources Management. The figure below demonstrates this relationship.

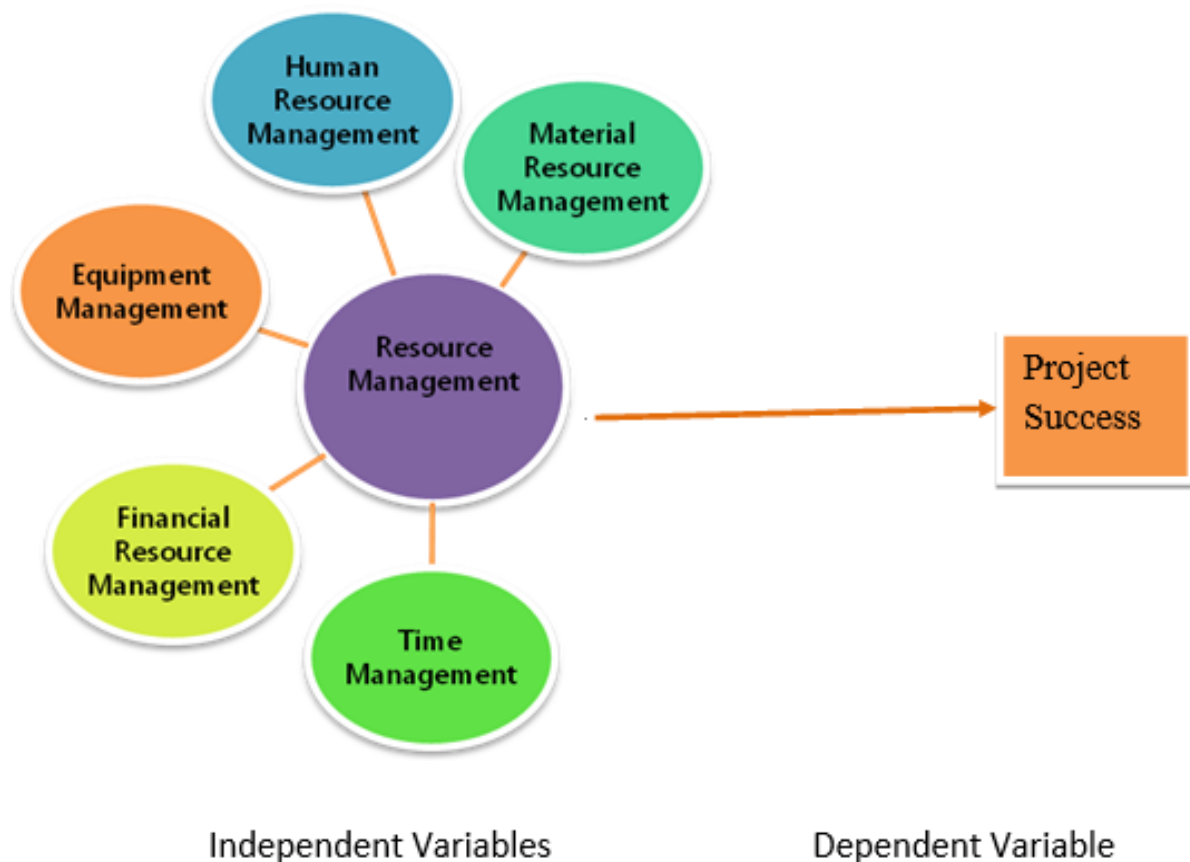


Figure 2. 3 *Conceptual Framework (Developed by researcher based on literature review, 2021)*

2.4. Empirical Literature Review

Empirical literature review was conducted to review literatures that are highly related to the project title and grasp a base for succeeding procedures. It is knowledge of actual experience rather than theory.

Pinto and Slevin (1988) in their study characterized project with a defined starting and completion date, predefined goal and specifications, complex or interconnected tasks and defined budget.

A resource is an entity that contributes to the accomplishment of project activities (SK. Nagaraju et al., 2012). Construction projects demand certain types of resources to attain the prime purpose and succeed at the end. Some of these are Human, Material, Equipment, Time, and Financial resources.

Every project requires resources to contribute to its implementation and ultimately its success. For a successful management of a project different project resources need to be determined early, even before project commencement (Ivanna Nösel, 2020).

In a case study done by SK. Nagaraju (2012), he mentioned about huge consumption of resources and a need to plan and procure them so as to perform activities in time. The crucial factor in successful implementation of a construction project not only depends on the quality and quantity of work, but also largely depends on availability of resources (SK. Nagaraju et al., 2012).

Akimnado O. (2019) distinguished Resource management to be challenging but a significant process in construction projects. There are a number of factors that prevent suitable resource distribution for projects.

Human resources also known as "work resources", are the most important because they are the ones who do the work. They contribute to carrying out the tasks necessary for the smooth running and completion of the project. (Ivanna Nösel, 2020). They are the one with skills to do the tasks. Skill in a sense technical, knowledge, and business expertise. Resources can be recruited for a project on entire duration, for short periods, or assigned from other functional or project divisions.

Ivanna Nösel (2020) considered time resources as periods of time assigned to complete project activities and project as a whole. Examples of these resources are project plan, project schedule, and time investment. Project success is related to completing the project on time. The development Project needs to be scheduled in a realistic manner by analyzing project scope, contract, and project working days. The other four resources should also be considered when arranging tasks.

Kebede T. (2016) mentioned that material management on project site is crucial for construction firm and if it is not wisely applied and monitored the entity might end up costing more than initially planned. The study found out improper material request and utilization, inadequate material stocking and wastage handling scored less than the average mean value and as a result effective material management needed to be enhanced.

Ivanna Nösel (2020) listed financial resources as finance funds, project budgets, and project grants. These resources are applicable to cover costs of human, material, equipment, time, and etc. Proper financial management is essential for businesses or projects to function effectively, efficiently and sustainably.

According to Gunduz M. et al., (2018) their study identified Company's technical capacity as the most important influencing factor for construction project success. They listed Economic fluctuations, Natural disasters, wars, unexpected laws and regulations amendments as the least affecting factors.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter deals with research design of the study, population of the study, sampling technique, sources of data, tools and procedures of data collection and method of data analysis.

3.2 Research Design

It is a descriptive case study design with in a confined space, and case. It provides in depth look on the case. The other reason the design is selected to be used as lesson learned material for similar projects. Participants are selected from the contractor's project team. Primary data were collected by distributing Questionnaires to the partakers and also personal observation was added since it is an internal study. The design is used to describe the case study findings.

The specific case study was selected to intensively study on specific group (project team), specific institute (ECWC), and specific relationship between dependent variable (Project Success) and independent variable (Resource management). It is based on researcher's direct observation and documents. This key case was selected to assess the impact of RM on project success and taken as a relevant educational tool applicable for future conducts. It provide a deep insight on the project application.

The study has applied quantitative research approach to create an understanding of the research problem. Self-administered Questionnaires were distributed in person to participants.

3.3 Population of the Study

The research target population is AAPC maintenance project team working under ECWC. The population is selected considering their engagement regarding the conceptual frame work. Since the population is formed as a project teams some of the members deployed to other projects during the study and new once are added to the project. Thus the population is cumulated to One hundred employees.

3.4 Sample size, Sampling Technique and Participants

Sampling in case study is very complex and there exists many variations in sampling strategy. For this specific study Purposive sampling design is applied to choice participants from the population. It is a non-probability sampling applied to select sample based on their involvement in the project and the study question. This technique is a Non- probability sampling and it is

based on available information and no specific range and/or formula is assigned for non-random selection. In the selection a careful personal judgment is taken to choose sample since researcher is an internal researcher working on the project.

The sample size was Fifty-seven AAPC maintenance project staff of ECWC. It is a representative of different professions, experience and other demographics. Their involvement in project is planning, executing, monitoring and controlling, supporting, and assisting the project.

3.5 Source of data

The sources of data are primary with ability to answer research questions. The primary data is gathered from Questionnaires and researcher's observation.

3.6 Procedures of data collection

Questionnaire is structured based on the research Questions and objective in relation to the research topic. Researcher performed observation and took critical information.

These two instruments were selected to find well supporting data for the project work. The researcher developed Sixty-two questions. The questionnaire has three sections. The first was intended to cover respondents' demography, the second section gives chooses for respondents to select the best possible answer. And finally the third one aims to evaluate the responses in a 1-5 Likert scale. Those are 1-indicating strongly disagree, 2-disagree, 3-neutral, 4-agree and 5-strongly agree with the statement.

3.7 Methods of Data Analysis

A case study is one of the many qualitative and quantitative methods that can be adopted to collect data for research. Such methods represent part of what is referred to as the research strategy that details the design and data collection approaches to be used in the research (Fowler and Mangione, 1990). Questionnaire data was analyzed by creating data repository, provide codes, expand codes, rationalize and analyze the data, re do if required, and then finalize the analysis. Statistical processes were applied by SPSS software version 26. Finally, conclusions were made based on results observed from the analysis and recommendations were forwarded on the basis of the data analyzed.

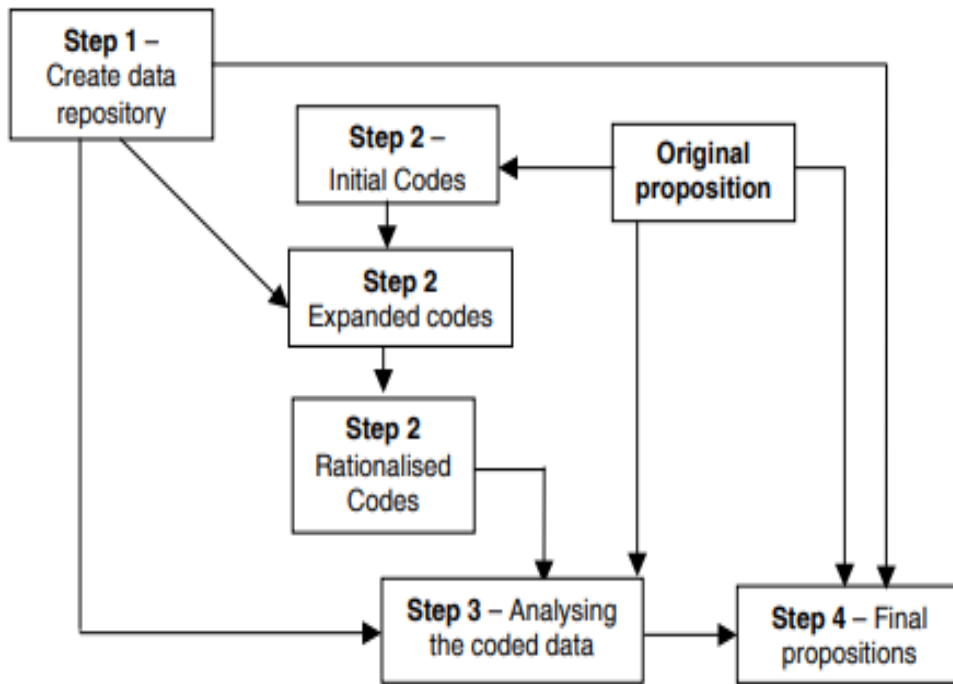


Figure 3.1 Case study structure (Source: John Atkinson, 2002)

3.8 Validity and Reliability

The research validity was insured by applying recognized research methodology. Questionnaires were genuinely employed in the data collection and observation, documents and records, and oral history were considered to seek valid outcomes. Respondents were only selected by purposive sampling technique.

The data and research instrument were reliable since they are consistent and replicable over time and ensured to be free from measurement error. The data were statically tested by SPSS software version 26.

The research's validity was established using a variety of relevant and well-proven scientific research procedures. The topics of study were closely associated with the questionnaire in order to improve the validity and dependability of data.

Thus, data collection techniques such as questionnaire and observation were used collectively to fill the gaps of one technique with the others. These elements should work together to ensure the study's validity and reliability.

The questionnaire reliability was tested by Cronbach's alpha coefficient. Cronbach's alpha coefficient was checked to be valid within the range.

Cronbach's alpha	Internal consistency
$\alpha \geq 0.9$	Excellent
$0.8 \leq \alpha < 0.9$	Good
$0.7 \leq \alpha < 0.8$	Acceptable
$0.6 \leq \alpha < 0.7$	Questionable
$0.5 \leq \alpha < 0.6$	Poor
$\alpha < 0.5$	Unacceptable

Table 3.1 Lee Cronbach's' Reliability Estimation Table (Field Survey, 2021)

The Cronbach's alpha for 30 Likert scaled components of the independent and dependent variables is 0.762. This ranges in acceptable zone.

Reliability Statistics				
Variables	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items	Measure
Human Resource Management	.705	.698	6	Scale of 5
Material Management	.701	.703	6	
Time Management	.732	.731	4	
Equipment Management	.796	.796	4	
Financial Resource Management	.762	.760	5	
Project Success	.879	.886	5	
Average	.762			

Table 3. 2 Scale Reliability Result (Field Survey, 2021)

3.9 Ethical Considerations

The researcher completed the study free from bias or self-deception. It is conducted based on acceptable ethical research procedures. Respondents of the questionnaire were volunteers and were introduced to the purpose of the study in the cover letter of the questionnaire. They were asked to answer questions as honestly as possible and return the completed questionnaires. They were also notified about no compensation for responding nor is there any risk. In addition, all of the responses in the survey were recorded anonymously. Personal information revealing identity was not asked in any way. They were also freed to ask questions, or concerns with regards to the survey, the questions, or the purpose of the study.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter presents the analysis, interpretation of the result, and discussion of result analyzed from collected and encoded data. Variables were set in the appropriate form and data were fed to SPSS version 26 software. After wards Statistical analysis were done to interpret respondents' answers for the coded questionnaires.

4.2 Findings of the study

This section discusses about findings of the study based on the data analysis. Descriptive statistics were taken to analyze frequencies, mean values, and percentiles. The Likert scale were used in the questionnaire and a mean value of the results are applied in this chapter to describe the results. Correlation and regression were also conducted to identify the most impacting independent variable.

4.2.1 Questionnaire screening

From 57 distributed questionnaires 52 were adequately responded and were collected. This means 91.2% of the distributed questionnaires were analyzed as data sources and were proper for further analysis.

Survey questionnaires were distributed to ECWC employees worked at AAPC maintenance project. The research sample is presented as follows.

Response rate % = Number of survey distributed/ Number of survey returned

$$= 52/57 = 91.2\%$$

Research rate and response adequacy			
Total	Total Number of Distributed Forms	Adequately Returned Questionnaire	Excluded Questionnaire
In Number (N)	57	52	5
Percentage of response	100.0%	91.2%	8.8%

Table 4. 1 Research rate and response adequacy (Field Survey, 2021)

Linemann (2021) mentioned internal survey receive 20% higher response rate than external survey. Also he stated if survey length and duration increases response rate drops. Thus the questionnaires were collected in a short amount but in adequate time. Also they were designed from respondents' exposure to the study.

From this result and the reference below it is more than average rate taken for in person survey and is very satisfactory response rate.

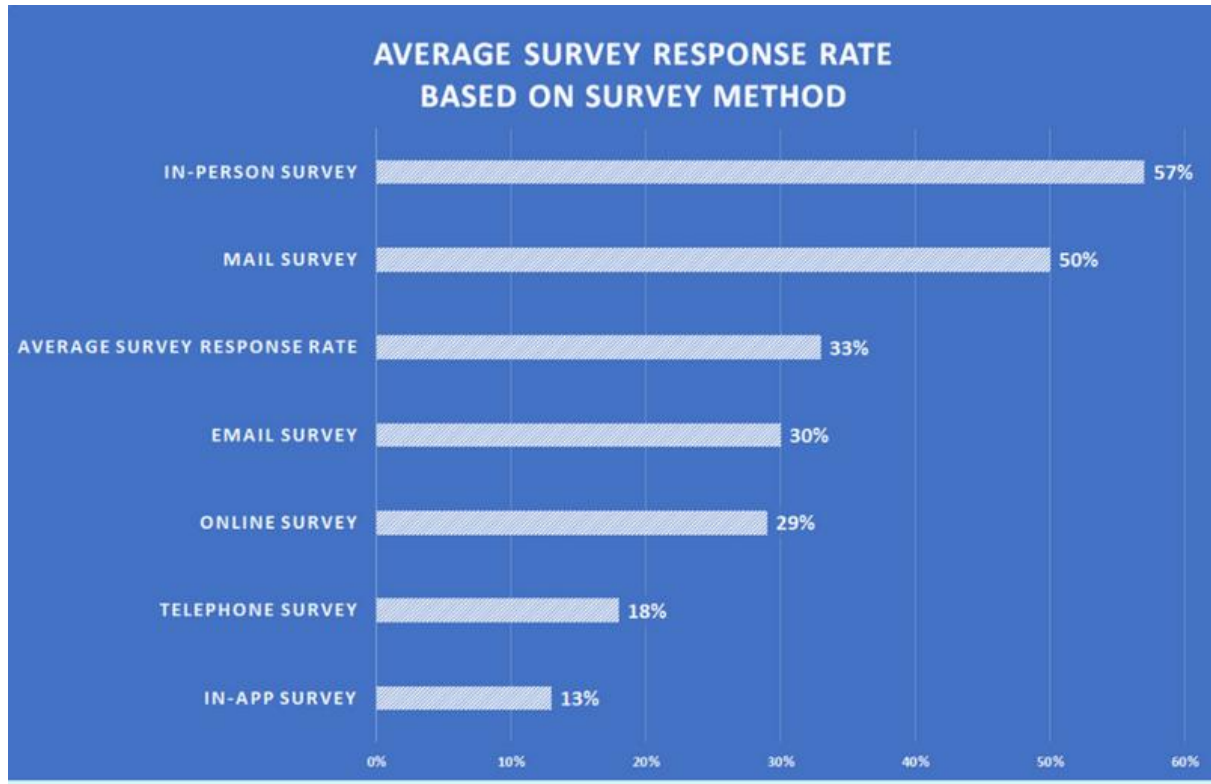


Figure 4. 1 Survey Response (Source: Clint Fontanella, 2021)

4.2.2 Respondents' profile

The respondents were from different demographic group. In order to know their frequencies six demographic questions were asked. These were Gender, Age, Name of team, Profession, Educational Qualification, and Experience. These primary data were processed by SPSS version 26 and are summarized in different forms.

First gender categories of respondents were taken by frequency statistics. The results are 29 male respondents and 23 female respondents accordingly. The results are constructed in the chart below.

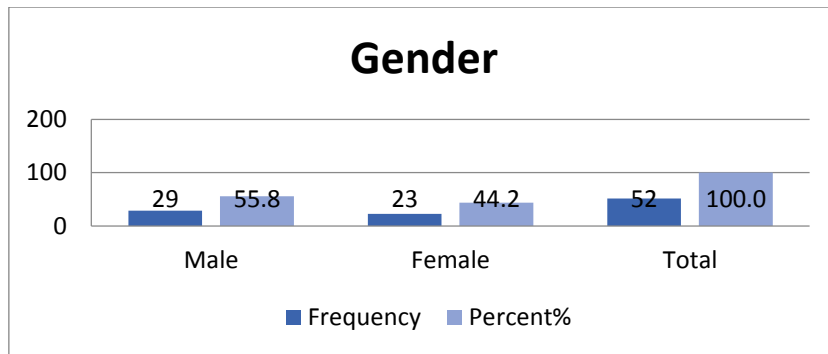


Figure 4. 2 Gender of Respondent (Field Survey, 2021)

The second respondent profile was age. When looking at Age distribution five ranges were given. From the data most of the respondents are below 30. The table below fully illustrated the results.

		Age			
		Frequency	Percent %	Valid Percent %	Cumulative Percent %
Valid	Below 30	31	59.6	59.6	59.6
	30-35	10	19.2	19.2	78.8
	36-40	7	13.5	13.5	92.3
	41-45	4	7.7	7.7	100.0
	Above 45	0	0.0	0.0	100.0
	Total	52	100.0	100.0	

Table 4. 2 Age of respondents (Field survey, 2021)

Afterwards the other three statistical frequencies were analyzed. These demographic data represent participants' proficiency. In order to classify their level of qualification the data were organized after analyzing them.

		Team			
		Frequency	Percent %	Valid %	Cumulative %
Valid	Office Engineering Team	8	15.4	15.4	15.4
	Engineering Execution Team	14	26.9	26.9	42.3
	Support Team	17	32.7	32.7	75.0
	Other	13	25.0	25.0	100.0
	Total	52	100.0	100.0	

Table 4. 3 Team of respondents (Field survey, 2021)

The above table shows to which team the respondents belongs and most of the participants are members of engineering execution and Support team.

When looking at Professional background of participants ten option were provided. After the data were analyzed 36.5% of the total respondents were from engineering background scoring the highest mark and none were from daily laborer. The complete figure shows results as a whole.

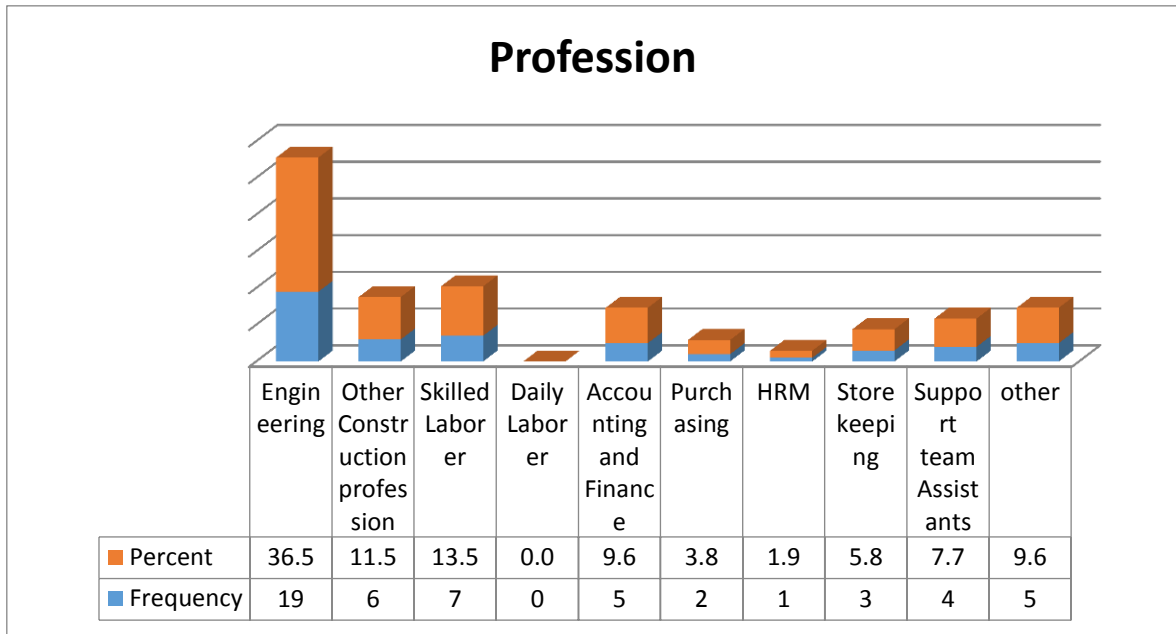


Figure 4. 3 Profession of respondents (Field Survey, 2021)

More than half of the respondents have first degree and none of them were under 8th grade.

Educational Qualification					
		Frequency	Percent %	Valid Percent %	Cumulative Percent %
Valid	Under 8th Grade	0.0	0.0	0.0	0.0
	9th - 12th Grade	11	21.2	21.2	21.2
	College Diploma	9	17.3	17.3	38.5
	Advanced Diploma	3	5.8	5.8	44.2
	First Degree	27	51.9	51.9	96.2
	Masters' Degree	2	3.8	3.8	100.0
	Total	52	100.0	100.0	

Table 4. 4 Educational qualification of respondents (Field survey, 2021)

Since more than half of respondents were below 30 years old it shows in the Experience that 55.8% have 0 to 5 years' experience. None of the respondents have experience above 25 since the age result shows all are under and 45. To illustrate percentage and frequency in the table:

Experience					
		Frequency	Percent %	Valid percent %	Cumulative Percent %
Valid	0 to 5 years	29	55.8	55.8	55.8
	6 to 10 years	14	26.9	26.9	82.7
	11 to 15 years	8	15.4	15.4	98.1
	16 to 25	1	1.9	1.9	100.0
	Other	0	0.0	0.0	100.00
	Total	52	100.0	100.0	

Table 4. 5 Experience of respondents (Field survey, 2021)

After analyzing the demographic data and get clear profile about respondents the next step was to dig deep and find information that potentially answers the research questions.

4.2.3 Resource management and Project success

The participants were asked about the type of resources used in AAPC maintenance project and the result shows 92.3% of them argue on the whole 5 resource types as one. These are Human, Time, Material, Equipment, and Finance.

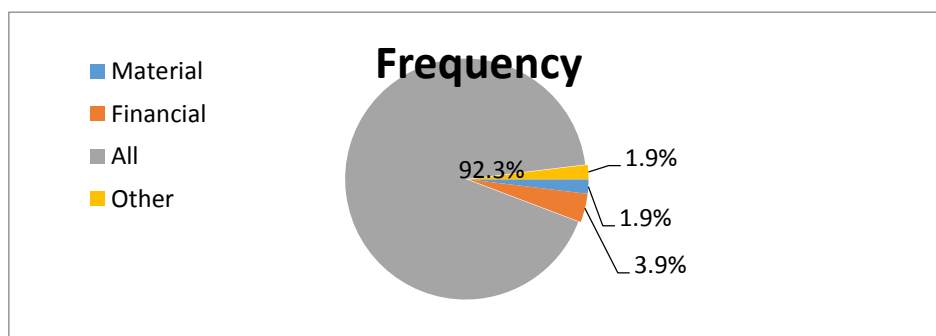


Figure 4. 4 Category of Resource in AAPC project (Field Survey, 2021)

The participants were asked to choose personnel responsible for managing the five resource types in a separate questions and their response was organized in the chart below.

Resource management types and responsible personnel

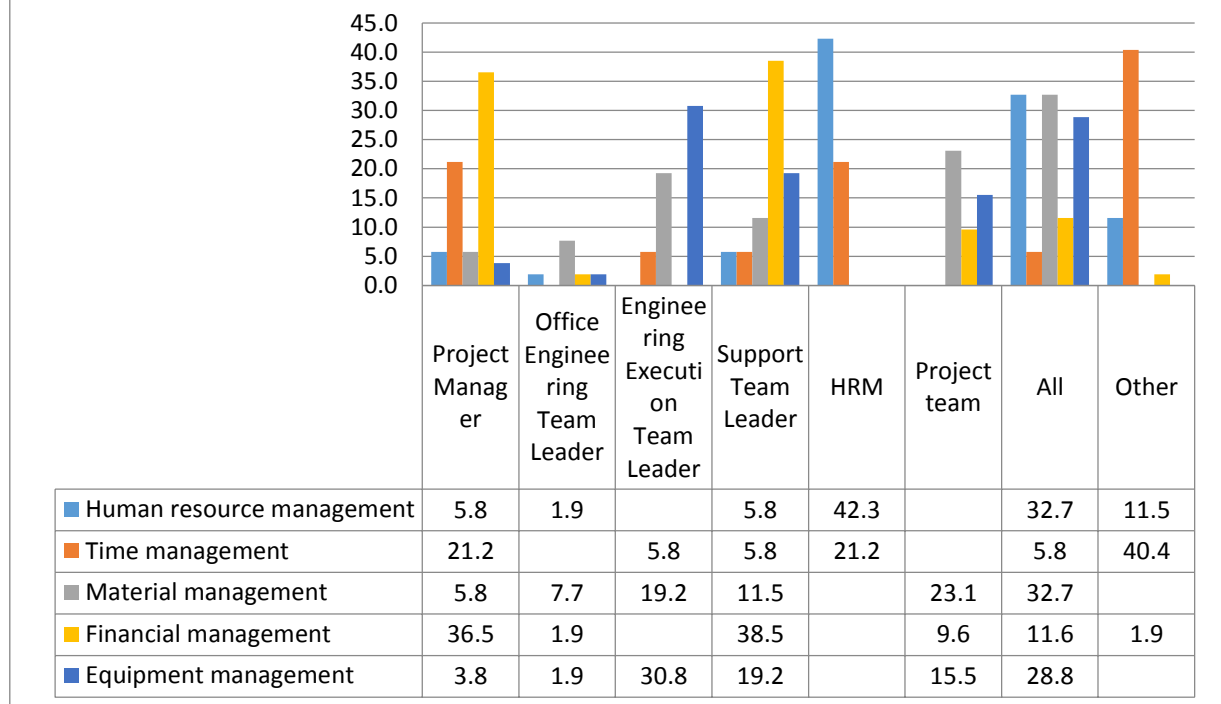


Figure 4. 5 Resource management types and responsible personnel (Field Survey, 2021)

Then the results of those five management categories were compiled in to one new variable called Resource management. Cumulated frequency results of those resources analyzed in percentile. Table below shows these results and from that integration of the listed professionals is a must to accompany the resource management process.

In the chart the percent are scattered within the professions and the greater value 22.3% stays within ‘All’ meaning the unified hands. Thus all of the professionals play a role to contribute in the resource management.

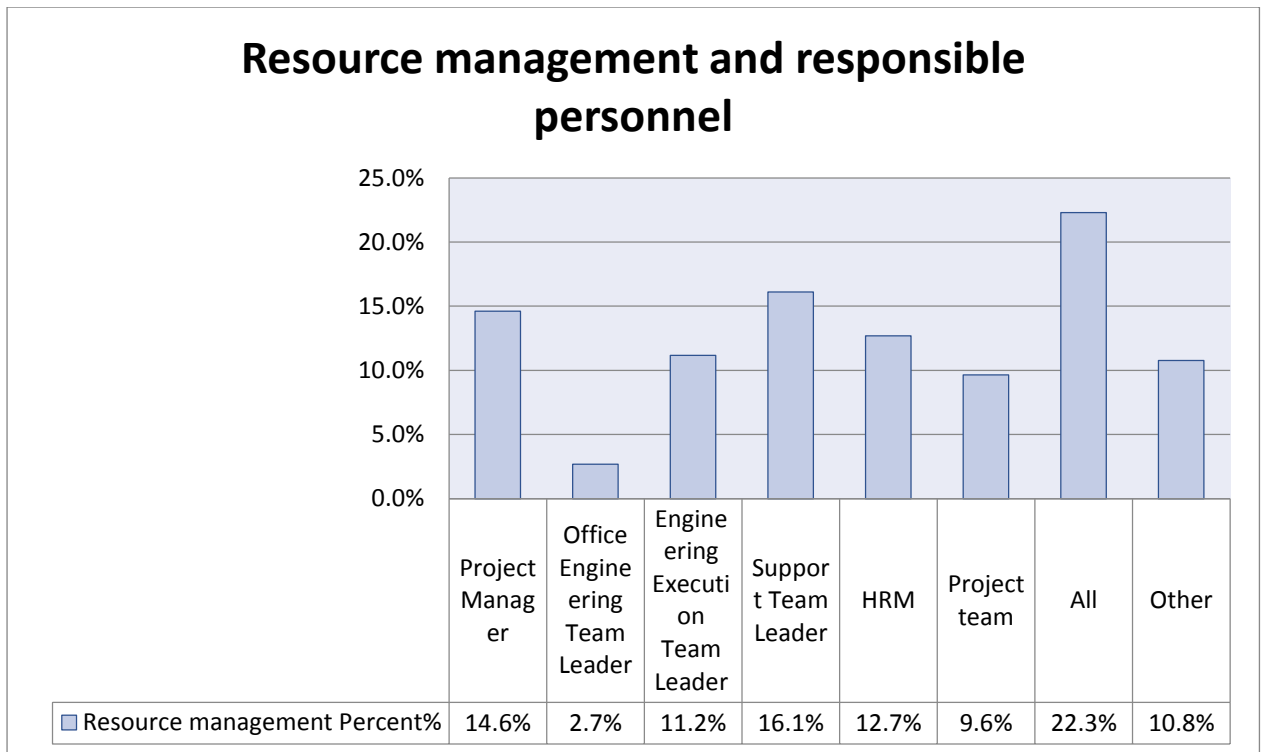


Figure 4. 6 Resource management and responsible personnel (Field Survey, 2021)

To assess major challenges in relation to resource participant where asked to identify those challenge. From the analysis the major challenges are scope change, late budget release, organization culture, and all in general.

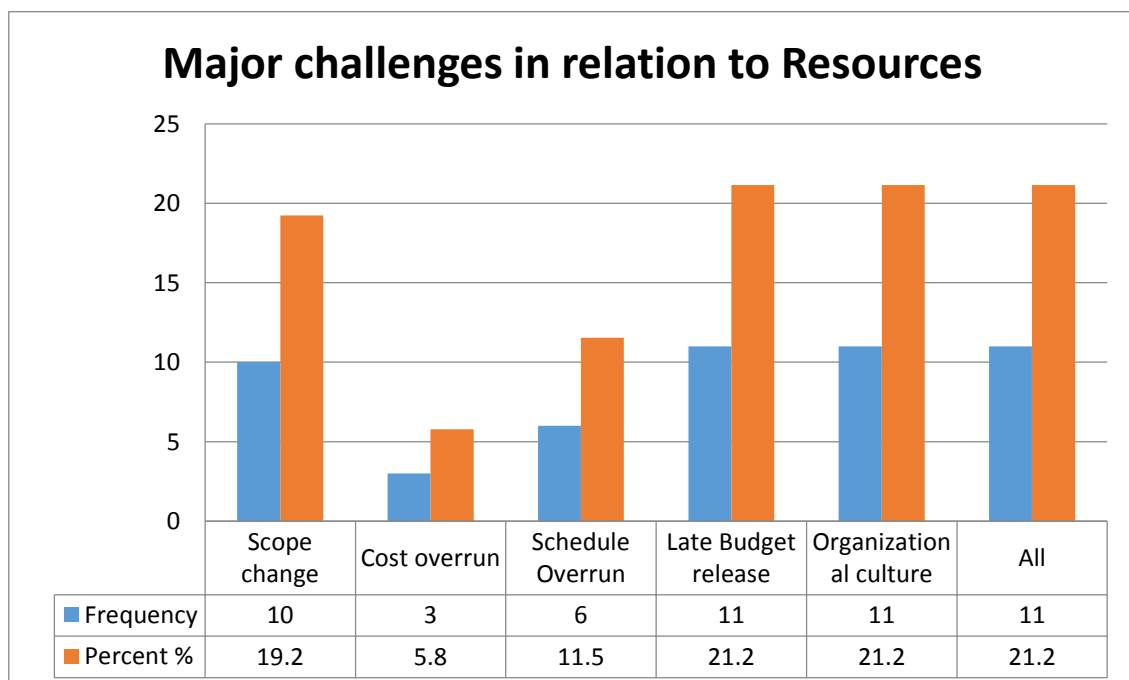


Figure 4. 7 Major challenges in relation to Resources (Field Survey, 2021)

To further investigate relation of the dependent and independent variables yes/no nominal measure was questioned and 90.4% agree the challenges threaten project success.

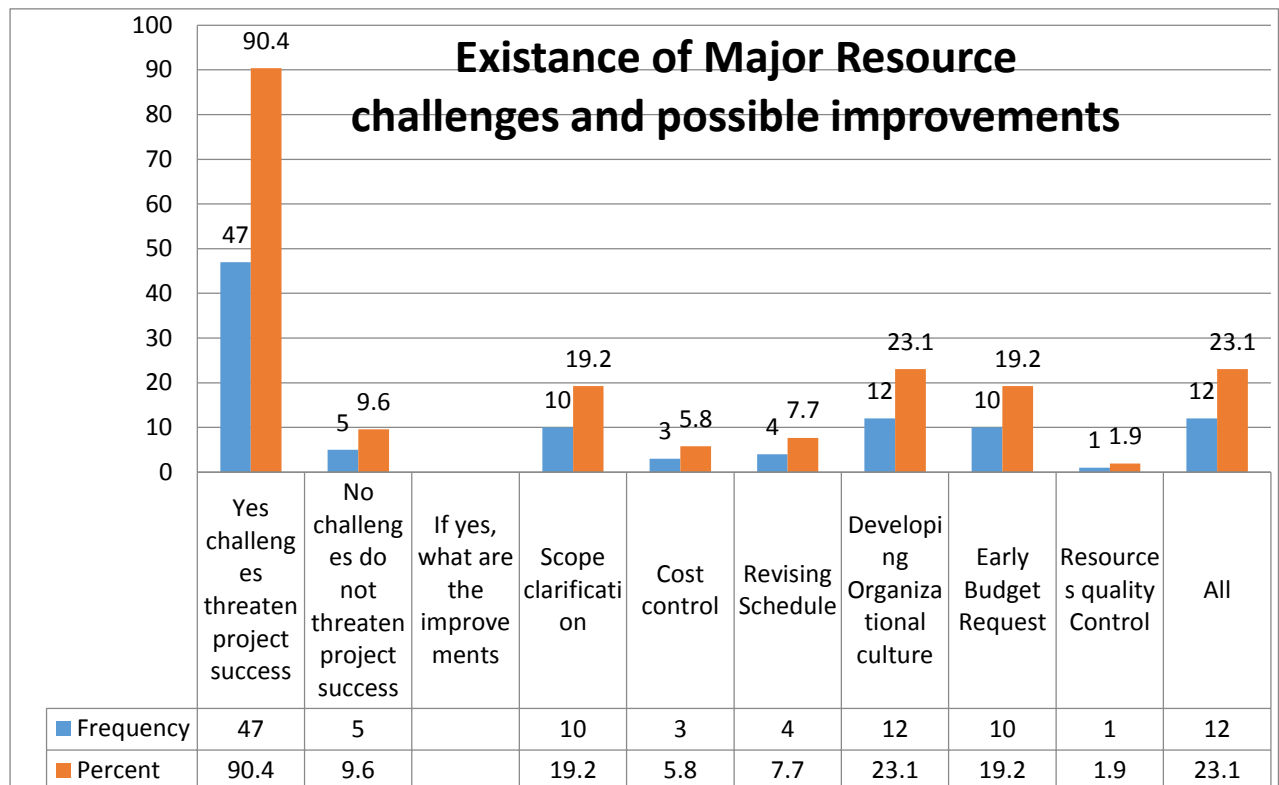


Figure 4. 8 Existence of Major Resources challenges and possible improvements (Field Survey, 2021)

23.1% of Respondents believe the solution is developing organizational culture while 19.2% of respondents' selected scope and budget each. The remaining percent divide among all and other improvements.

Five questions were asked about ECWC construction project management reform. As a start their awareness was questioned and 67.3% (35 respondents) of the total 52 individuals heard about it and 32.7% have not.

Note: n= Number of Respondents who are familiar with ECWC PM reform, 35

: N= Total number of Respondents, 52

: refer analyzed results of % to N from Appendix B (Q2.23-2.26)

Experience of respondents with the reform			
	No. of respondents (n)	% to n	% to N
Respondents who practiced the reform in the project	23	65.7	44.2
Respondents who believe the reform is practiced by other staffs in the project	24	68.6	46.2
Respondents who believe the reform has made improvement on RM	21	60.0	40.4
Respondents who believe the reform has contribution to Project success	19	54.3	36.5

Table 4. 6 Experience of respondents with the reform (Field survey, 2021)

The table above relates five questions which cover about ECWC's Reform, its practice, and relation with project success.

The third section of the questionnaire has 30 questions with a Likert scale measure. To clarify on the scale;

LIKERT Scale

1= Strongly Disagree;

2= Disagree;

3= Neutral;

4= Agree;

5= Strongly Agree

Those 30 LIKERT Scale questions were transformed into 6 new variables of HRM, Material Management, Time Management, Equipment Management Financial Resource Management, and Success of Project. They were denoted as Ordinal scale and their transformed variable names are HRM, MM, TM, EM, FRM, and SP correspondingly.

The mean values of the 6 new variables were explored for skewness and kurtosis distribution of the results to identify type of distribution and regression. It measures symmetric probability distribution of random variables of mean.

Moidunny (2009) interpreted mean values into:

- 1.00-1.50 score Very low
- 1.51-2.50 score Low

- 2.51-3.20 score Medium
- 3.21-4.20 score High
- 4.21-5.00 = Very High

Statistics							
		HRM	MM	TM	EM	FRM	SP
N	Valid	52	52	52	52	52	52
	Missing	0	0	0	0	0	0
Mean		3.1474	3.5577	3.5337	3.6635	3.2769	3.4423

Table 4. 7 Mean values of the 6 new variables (Field survey, 2021)

Normally Distributed LIKERT scale (parametric method)

- Linear regression
 - Pearson Correlation

Not Normally Distributed LIKERT scale (Non parametric method)

- Ordinal regression
 - Spearman rank Correlation

Normality test was done and to examine continuous variable Shapiro Wilk value was considered since the respondents are below 100.

Tests of Normality							
	Kolmogorov-Smirnova			Shapiro-Wilk			Interpretation
	Statistic	df	Sig.	Statistic	df	Sig.	
HRM	.077	52	.200*	.981	52	.548	Normally distributed
MM	.129	52	.031	.960	52	.078	Normally distributed
TM	.123	52	.048	.968	52	.176	Normally distributed
EM	.158	52	.002	.931	52	.005	Further investigation(= <0.05)
FRM	.096	52	.200*	.976	52	.378	Normally distributed
SP	.134	52	.020	.964	52	.120	Normally distributed
*. This is a lower bound of the true significance.							
a. Lilliefors Significance Correction							

Table 4. 8 Tests of Normality (Field survey, 2021)

All the new variables except EM has a significance value greater than 0.05. They are not statistically significant and normally distributed. Hence linear regression analysis was applied for the 5 variables.

On the other hand, EM has significant value equal to 0.05 meaning it is statistically significant, further investigation is required to check symmetry of the distribution. A log variable for EM was conducted and the result of normality test is given below.

Tests of Normality							
	Kolmogorov-Smirnova			Shapiro-Wilk			Interpretation
	Statistic	df	Sig.	Statistic	df	Sig.	
logEM	.140	52	.012	.943	52	.015	Not Normally Distributed(<0.05)
*. This is a lower bound of the true significance.							
a. Lilliefors Significance Correction							

Table 4. 9 Tests of Normality for logEM (Field survey, 2021)

Here the result shows the log variable has significance less than 0.05 and it is not normally distributed. Thus Ordinal regression was computed for EM variable.

Model Fitting Information					
Model	-2 Log Likelihood	Chi-Square	df	Sig.	
Intercept Only	155.230				
Final	154.329	.902	1	.342	Model fits data
Link function: Logit.					

Table 4. 10 Model Fitting Information for ordinal regression of SP and EM (Field survey, 2021)

Goodness-of-Fit				
	Chi-Square	df	Sig.	
Pearson	120.537	104	.128	Model fits data
Deviance	99.270	104	.613	Model fits data
Link function: Logit.				

Table 4. 11 Goodness-of-Fit for ordinal regression of SP and EM (Field survey, 2021)

Pseudo R-Square	
Cox and Snell	.017
Nagelkerke	.017
McFadden	.003
Link function: Logit.	

Table 4. 12 Pseudo R-Square for ordinal regression of SP and EM (Field survey, 2021)

Nagelkerke value of EM and SP is 0.17 to interpret this 1.7% of the dependent variable called success of project depends on change of the independent variable called Equipment management.

Next correlation of EM and SP is analyzed by bivariate and the result in the table shows 0.271 correlation between them. This leaves a very low correlation between them and significant value of 0.359 shows it is not statistically significant.

Correlations				
			EM	SP
Spearman's rho	EM	Correlation Coefficient	1.000	.130
		Sig. (2-tailed)	.	.359
		N	52	52
	SP	Correlation Coefficient	.130	1.000
		Sig. (2-tailed)	.359	.
		N	52	52

Table 4. 13 correlation of SP and EM (Field survey, 2021)

From previous normality test HRM, MM, TM, FRM, and SP are normally distributed and to analyze the variables Linear regression was computed.

First HRM and SP were linearly analyzed and the table under shows correlation coefficient R is 0.675 meaning it is within the range of -1.000 and +1.000. the interpretation is as HRM increases so as SP and they are moderately correlated in the range between 0.500 and 0.700.

R square value 0.455 interprets to HRM can affect SP or project success in 45.5%.

Model Summary ^b									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df 1	df2	Sig. F Change
1	.675 ^a	.455	.444	.60738	.455	41.802	1	50	.000
a. Predictors: (Constant), HRM									
b. Dependent Variable: SP									

Table 4. 14 linear analysis SP and HRM (Field survey, 2021)

The ANOVA value of 0.000 significance also shows HRM has a strong effect on SP.

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	15.421	1	15.421	41.802	.000 ^b
	Residual	18.446	50	.369		
	Total	33.867	51			
a. Dependent Variable: SP						
b. Predictors: (Constant), HRM						

Table 4. 15 ANOVA of linear regression of SP and HRM (Field survey, 2021)

To check if there was another independent variable that has better impact on project success (dependent variable) step wise linear regression was conducted and the outputs are put forth.

Model Summary ^c												
Model	R	R Square	Adjusted R Square	Std. Error of the	Change Statistics							
					R Squar	F Chan	df1	df2	Sig. F Chan			
1	.675 ^a	.455	.444	.60738	.455	41.802	1	50	.000			
2	.708 ^b	.502	.481	.58691	.046	4.549	1	49	.038			
a. Predictors: (Constant), HRM												
b. Predictors: (Constant), HRM, TM												
c. Dependent Variable: SP												

Table 4. 16 Model summary of linear regression of HRM, TM, and SP (Field survey, 2021)

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	15.421	1	15.421	41.802	.000 ^b
	Residual	18.446	50	.369		
	Total	33.867	51			
2	Regression	16.988	2	8.494	24.659	.000 ^c
	Residual	16.879	49	.344		
	Total	33.867	51			
a. Dependent Variable: SP						
b. Predictors: (Constant), HRM						
c. Predictors: (Constant), HRM, TM						

Table 4. 17 ANOVA of linear regression of SP, HRM, and TM (Field survey, 2021)

Coefficients ^a								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	1.179	.360		3.273	.002	.455	1.902
	HRM	.719	.111	.675	6.465	.000	.496	.943
2	(Constant)	.391	.507		.772	.444	-.628	1.411
	HRM	.587	.124	.551	4.730	.000	.338	.836
	TM	.341	.160	.248	2.133	.038	.020	.661
a. Dependent Variable: SP								

Table 4. 18 coefficient of linear regression of SP, HRM, and TM (Field survey, 2021)

From the above table HRM and TM are significant for SP but HRM is perfectly significant compared to TM.

To support this output and select the best influencing independent variable excluded variable with less significant influence exceeding 0.05 are put forward in the table below.

Excluded Variables ^a						
Model		Beta In	t	Sig.	Partial Correlation	Collinearity Statistics
						Tolerance
1	MM	.223 ^b	1.889	.065	.261	.746
	TM	.248 ^b	2.133	.038	.291	.750
	FRM	.236 ^b	1.812	.076	.251	.616
2	MM	.210 ^c	1.844	.071	.257	.744
	FRM	.143 ^c	.998	.323	.143	.497
a. Dependent Variable: SP						
b. Predictors in the Model: (Constant), HRM						
c. Predictors in the Model: (Constant), HRM, TM						

Table 4. 19 excluded variables of linear regression (Field survey, 2021)

To identify correlation of HRM and SP Pearson correlation was applied. It was analyzed by bivariate and the result in the table shows 0.675 correlation between them. This leaves correlation range above 0.50 and creates large association (correlation) between HRM and SP.

4.3 Discussion of Findings

In the beginning of questionnaire formulation, the plan was to distribute and collect 57 responses from ECWC employees worked at AAPC maintenance project. But unfortunately 52 of them were only adequately responded. It was 91.2% of the planned quantity thus it was enough to go forward.

After the data were collected it was analyzed using SPSS version 26. The first category of questionnaire was demography and it was found that 55.8% of the respondents were male and 44.2% were female. 59.6% of respondents were below 30 years old and the rest were between 30 and 45. Team wise Office Engineering Team took 15.4%, Engineering Execution Team covered 26.9%, Support Team with 32.7%, and the rest for Other team. 36.5% of the total respondents were from engineering background and the remaining scattered between 8 other professions.

51.9% of the respondents have first degree and none of them were under 8th grade. 55.8% of the total have 0 to 5 years' experience and all of them are within the 25 years' experience range.

92.3% of the total respondents agree on consumption of all the resource types namely Human, Material, Time, Equipment, and Finance. They believe all members of the staff are responsible to manage resources but the percentage differs for each resource and personnel type. Further, these five resources compiled into 1 independent variable called resource. Its management then stays in the hand of all staff with percent of 14.6 for PM, 11.2% engineering execution team leader, 16.1% support team leader, 12.7% to HRM, 22.3% as a whole, and the rest to other teams.

From the analysis the major challenges are 19.2% scope change, 21.2% late budget release, again 21.2% organization culture, and the rest is for all as a major. 90.4% agree the challenges threaten project success. And again 23.1% of Respondents believe the solution is developing organizational culture while 19.2% of respondents' selected scope and budget each.

Regarding ECWC's construction project management reform Five questions were raised and 67.3% of the total have information about it. 65.7% practiced it, 68.6% believe others applied it. When they were asked if they believe the reform has made improvement on RM 60% of them agree and 54.3% of the respondents also believe it has contribution to Project success.

In the third section of questionnaire Likert scale measure was developed with score of 1= Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree, and 5= Strongly Agree. 30 questions were transformed into 6 new variables called HRM, MM, TM, EM, FRM, and SP.

According to Moidunny (2009) mean values of Medium score; HRM is 3.147; High score; MM with 3.557, TM 3.533, EM of 3.663, and FRM of 3.442 value. The result shows the RM types are applied in a promising way.

All of the RM except EM were normally distributed. EM turned to be not normally distributed.

After analyzing the data for EM it was found that project success depends on Equipment management at a percent of 1.7 and its correlation turns to be 0.271 with 0.359 significant value. The correlation is very low since it is under 0.3 and significant value exceeds acceptable tolerance of 0.05 and to conclude Equipment management has less effect over project success and it is excluded.

Normality distributed HRM, MM, TM, FRM, and SP variables were analyzed by linear analysis and when HRM and SP first correlated 0.675 score was registered. This was interpreted to moderate positive correlation. Whenever HRM increases so does SP in 45.5% of regression.

ANOVA value of 0.000 significance showed HRM's strong effect over SP. From the linear regression model table HRM and TM both are significant for SP but HRM is perfectly significant at 0.000 compared to TM of 0.038. MM, TM, and FRM were excluded since the significant variable of 0.261, 0.291, and 0.251 exceed HRM value and the standard 0.05 value.

Ivanna Nösel (2020) mentioned that Human resources also known as "work resources" are the most important because they are the ones who do the work. They use skills to contribute to carrying out the tasks necessary for the smooth running and completion of the project.

Abhishek A. et al., (2017) stated that construction industry is significant to national economy and creation of employment opportunities to number of people. The Human Resource management can be undertaken based on the Organizational structure of a company or on the project level. HRM handles workforces from Recruiting to termination or luckily retention. Human resources play a bigger role if they are well managed and retained.

Project Success is delivering project on time, within budget, with in specification; success of the product produced or success in achieving the business objectives of the project (Bannerman, P. L., 2008). In addition Freeman and Beale (1992) surveyed the extend administration writing, distinguished seven fundamental criteria for measuring the success of projects; five of which regularly utilized are Technical performance, Efficiency of execution, Managerial and organizational implications (mainly customer satisfaction), Personal growth, Manufacturability and business performance. Looking at all aforementioned, the ideas are highly related to HRM.

On the other hand, Chan et al., (2004) characterize a conceptual framework to portray factors influencing success of a construction project; Project Management Activities, Project Strategies, Outside Environment, Project-related Variables, and Human-related Variables. Clearly the factors are all related to HRM. This study results also found there exists moderate relation between HRM and Project success.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

The aim of this chapter is to summarize, conclude, and recommend on major findings based on the analyzed outputs. Primarily the study was conducted to identify impact of resource management on project success under the case of AAPC maintenance project. The study population is ECWC staff working at the aforementioned project.

From the findings Human resource management is the most impacting and associated independent variable. But still the mean score in medium and requires enhancement. The two subtopics below provide conclusion and recommendations.

5.2 Conclusion

All sort of resource is required for project. It can be human, material, time, equipment, finance, and the cumulative. But the level of requirement can differ from person to person. In this study these five resource types are integrated into resource and all the staff have to wisely manage them.

All the five Resource management knowledge areas in ECWC Construction Project Management Reform are practiced. To illustrate, from the total respondents 67.3% of them have information about the reform and from these participants 65.7% (44.2% from total) practically apply the reform in their work. 68.6% of them (46.2% of the total) believe the reform is practiced by other staffs in the project. In addition, 60.0% of them (40.4% of the total respondents) believe the reform has made an improvement on resource management. Adding to this 54.3% (36.5% of the total sample) believe the reform has contribution to project success.

If the resources are not well managed they can threaten project success. Majorly three of the resources were marked as impacting variable. A Figure of 19.2% was given to scope change, 21.2% for late budget release and organization culture each, and the rest is for all challenges. Here these challenges have impacted the project and 90.4% of participants agree the challenges threaten project success.

In order to avoid or minimize the impact again 23.1% of Respondents believe the solution is developing organizational culture, 19.2% of respondents' selected scope and budget each. 60% of respondents agree ECWC's Construction project management reform has made improvement

on resource management and 54.3% of them agree on its contribution to Project success. Hence the current impacts of resource management for success of AAPC are over time, finance, and human resource. But critically the outputs pin point on human resource.

The analysis output shows HRM is the most significant and moderately correlated to SP in positive range. 45.5% of regression was scored by HRM since it is perfectly significant and strongly affect SP. Thus it is very crucial to apply knowledge of HRM in the project and since its mean value of the Likert scale is 3.1474 it needs to be enhanced to fit in with the project and rise the value more than the average mean value.

The mean values of the five Resource management knowledge areas are all scored above 3.147. But HRM is the least scoring and the most impacting management type. Hence this knowledge area is relatively less applied in the project and requires careful review, improvement, and control.

As a conclusion all the results in the finding justify Resource management has an positive impact on success of AAPC. And HRM is the most impacting management reform in the cased project.

5.3 Recommendations

From the finding HRM is the most impacting resource management type and the least scoring from Likert scale mean value. The following recommendations are forwarded to improve practice of HRM in AAPC maintenance project.

1. The project and ECWC as a whole should practice a developed and thought through Manpower planning and recruiting system on project basis.
2. The construction project reform is newly applied to ECWC and the project. Accordingly, site reform trainings should be facilitated.
3. Provide new joiners with an induction to the enterprise practice and create experience sharing platform.
4. Arrange for onsite trainings to Project staff and create suitable relationship and team spirit
Since human resources are implementers of all other resources. If the base is well managed the rest will be less effort taking.
5. Human capital requires appreciation, motivation and support. Outstanding members need to be acknowledged for their effort towards project success.
6. Manage and fairly appraise employees' performance and discuss the evaluation purposefully to encourage them and fix the gaps.

5.4 Suggestions for Future Research

The study discovered the most impacting variable of the five resource management types is HRM. Further investigations can be done to enhance the practice and succeed on the project and other similar projects.

Ethiopia is a developing country with a promising future in construction sector. Well organized frame work of resource management practice is essential in order to create profitable industry. Therefore, scholars are recommended to further investigate gaps and develop supporting guidelines.

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Appendix A: Questionnaire



Seek Wisdom, Elevate your Intellect and Serve Humanity

Addis Ababa University
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Addis Ababa University

College of Business and Economics

School of Commerce

Master of Art in Project Management

Dear Participant,

My name is Samrawit W/Tsadik and I am conducting my final project work on Impact of Resource Management on the Success of Construction Projects of ECWC: The Case of AAPC Maintenance Project. Since you are engaged in the project, I am inviting you to participate in this Project study and complete the attached surveys.

If you choose to participate, please answer all questions as honestly as possible and return the completed questionnaires promptly. There is no compensation for responding nor is there any risk. All of the response in the survey will be recorded anonymously. Thus, do not provide personal information.

If you have any comments, questions, or concerns with regards to the survey, the questions, or the purpose of the study, please contact. Thank you for your participation.

Kind Regards,

Samrawit W/Tsadik

Email: samriwbw16@gmail.com

Instructions

- Answer honestly and clearly
- Do not provide personal information
- Keep the paper clean and avoid strikes
- Mark [✓] in the space provided to label your response
- Use the blank space if you believe your answer is not listed.

SECTION 1: Demographic Information

1.1 Gender

Male [] Female []

1.2 Age

Below 30 [] 30-35 [] 36-40 [] 41-45 [] Above 45 []

1.3 Name of your team

Office Engineering Team [] Engineering Execution Team [] Support Team []

Other []

1.4 Profession

Engineering [] Other Construction profession [] Skilled Laborer []

Daily Laborer [] Accounting and Finance [] Purchasing [] HRM [] Store keeping [] Support team Assistants [] Other [_____]

1.5 Educational Qualification

Under 8th Grade [] 9th - 12th Grade [] Collage Diploma [] Advanced Diploma []

First Degree [] Masters Degree [] PHD [] Other [_____]

1.6 Experience

0 to 5 years [] 6 to 10 years [] 11 to 15 years [] 16 to 25 years []

Other [_____]

SECTION 2: Questions related to Resource management and Project success

2.1 What category of resources used in the project?

Human [] Time [] Material [] Equipment [] Financial [] All []

Other [_____]

2.2 Who is responsible to manage Human Resources?

Project manager [] Office Engineering team leader [] Engineering Execution team leader [] Support team leader [] HRM [] All [] Other [_____]

2.3 Who is responsible to manage Time?

Project manager [] Office Engineering team leader [] Engineering Execution team leader [] Support team leader [] HRM [] Project team [] All [] Other [_____]

2.4 Who is responsible to manage Material Resources?

Project manager [] Office Engineering team leader [] Engineering Execution team leader [] Support team leader [] Project team [] All [] Other [_____]

2.5 Who is responsible to manage Equipment?

Project manager [] Office Engineering team leader [] Engineering Execution team leader [] Support team leader [] Project team [] All [] Other [_____]

2.6 Who is responsible to manage Financial Resources?

Project manager [] Office Engineering team leader [] Engineering Execution team leader [] Support team leader [] Project team [] All [] Other [_____]

2.7 Is there a resource management planning practice in the project?

Yes [] No []

2.8 If Yes, when does it starts?

After Project Award [] After Commencement [] During construction []
Other [_____]

2.9 Does the Project have a committee to manage Resources?

Yes [] No []

2.10 If Yes, have you seen any improvements made by them?

Yes [] No []

2.11 Is there a resource management reporting format available at the project?

Yes [] No []

2.12 If Yes, to whom is it submitted?

- Project manager Office Engineering team leader Engineering Execution team leader Support team leader Head office All Other [_____]
- 2.13 If Yes, how often is it submitted?
Daily Weekly Monthly Yearly All Other [_____]
- 2.14 What are the major challenges in relation to Resources?
Scope change Cost overrun Schedule Overrun Late Budget release Organizational culture Under qualified resources All Other [_____]
- 2.15 Does the above challenge/s threaten project success?
Yes No
- 2.16 If Yes, what actions are taken as improvement?
Scope clarification Cost control Revising Schedule Developing Organizational culture Early Budget Request Resources quality Control All Other [_____]
- 2.17 Have you ever taken trainings related to Resource Management? (In the time you are assigned to the Project)
Yes No
- 2.18 If yes who organized it?
Project manager Office Engineering team leader Engineering Execution team leader Support team leader Head office Other [_____]
- 2.19 Was it helpful in any way?
Yes No
- 2.20 How does it contribute to Resource management?
Improve resource quality upgrade standards minimize risks Other [_____]
- 2.21 How does it contribute to Project Success?
Improve Integrated practices upgrade performance minimize risks Other [_____]
- 2.22 Have you heard about ECWC Construction Project Management Reform?
Yes No
- 2.23 If Yes, have you tried to practice it in the project?
Yes No

2.24 Do you believe the reform is practiced by other staffs?

Yes [] No []

2.25 Have you seen any improvement made by the reform regarding Resource Management?

Yes [] No []

2.26 If yes, does it contribute to Project Success?

Yes [] No []

SECTION 3: Questions to rate respondents view in relation to impact of resource management on project success under the selected case study.

Mark [✓] on one of the number cells aligned to the statement which represents your level of agreement. All the questions are going to be answered by relating it to ECWC’s AAPC maintenance project.

Rating Scale

1= Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree, 5= Strongly Agree

NB: AAPC represents Addis Ababa Police Commission and ECWC; Ethiopian Construction Works Corporation.

No.	Statements	1	2	3	4	5
A. Human Resource Management						
1	Project Human resources are seen as capitals of ECWC					
2	The project staffs are recruited based on their skills and experience					
3	The project leaders motive staffs and create workable environment					
4	The project leaders fairly appraise staffs and acknowledge their effort towards project success					
5	Recreational activities have been facilitated to create good communication between staff members.					
6	Project team have been given orientation and on-site training					
B. Material Management						
1	There exist processes involved in effective plan for material management					
2	Qualified materials are purchased from awarded suppliers					
3	Materials quality is always checked and approved by consultants					
4	Tendering and purchasing committee have the right skill to do the tasks					
5	Required materials are requested to be purchased or shipped in before the tasks begin and avoid idle workmanship					
6	Materials are managed by consistent supply service, reliable recording, and secured stocks					
C. Time Management						

1	The project has well developed plan with predefined and ordered tasks					
2	Schedules are applied and appraised to keep project track against project success					
3	Duration of activities were evaluated in a regular basis					
4	Schedule change was done consciously thinking project success					
	D. Equipment Management					
1	A good track of equipment is created to employ it at the right time and support the project success path					
2	Routine equipment Inspections are done					
3	Speedy measure is taken when equipment malfunctions					
4	Required equipment are requested to be purchased or shipped in before the tasks begin and avoid idle workmanship					
	E. Financial Resource Management					
1	The project has sound financial plan					
2	The project cost effectiveness examined along with other appraisals					
3	The required budget requested early to avoid idle workmanship					
4	System is created to shorten prolonged payment collection					
5	Cost overruns are consciously looked to avoid or reduce the cause and succeed on the project					
	F. Project Success					
1	The project resource management practice is competent in creating a successful project					
2	The project team is matured enough to wisely utilize resources and create a successful project					
3	The project team wisely appraise resources utilization to create a successful project					
4	The project is strongly organized and strive for success					
5	The project team takes quick measures on faulty acts of resources utilization to create a successful project					

Thank you for your kind cooperation!

Appendix B: SPSS Outputs

Q2.7 Is there a resource management planning practice in the project

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	40	76.9	76.9	76.9
	No	12	23.1	23.1	100.0
	Total	52	100.0	100.0	

Q2.8 If Yes, when does it starts

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	After Project Awareness	10	19.2	25.0	25.0
	After Commencement	14	26.9	35.0	60.0
	During construction	15	28.8	37.5	97.5
	Other	1	1.9	2.5	100.0
	Total	40	76.9	100.0	
Missing	System	12	23.1		
Total		52	100.0		

Q2.9 Does the Project have a committee to manage Resources

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	41	78.8	80.4	80.4
	No	10	19.2	19.6	100.0
	Total	51	98.1	100.0	
Missing	System	1	1.9		
Total		52	100.0		

Q2.10 If Yes, have you seen any improvements made by them

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	36	69.2	81.8	81.8
	No	8	15.4	18.2	100.0
	Total	44	84.6	100.0	
Missing	System	8	15.4		
Total		52	100.0		

Q2.11 Is there a resource management reporting format available at the project

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	47	90.4	95.9	95.9
	No	2	3.8	4.1	100.0
	Total	49	94.2	100.0	
Missing	System	3	5.8		
Total		52	100.0		

Q2.12 If Yes, to whom is it submitted

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Project manager	19	36.5	38.0	38.0
	Office Engineering team leader	6	11.5	12.0	50.0
	Engineering Execution team leader	2	3.8	4.0	54.0

	Support team leader	4	7.7	8.0	62.0
	Head office	4	7.7	8.0	70.0
	All	15	28.8	30.0	100.0
	Total	50	96.2	100.0	
Missing	System	2	3.8		
	Total	52	100.0		

Q2.13 If Yes, how often is it submitted

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Daily	13	25.0	26.0	26.0
	Weekly	5	9.6	10.0	36.0
	Monthly	4	7.7	8.0	44.0
	All	25	48.1	50.0	94.0
	Other	2	3.8	4.0	98.0
	7	1	1.9	2.0	100.0
	Total	50	96.2	100.0	
Missing	System	2	3.8		
	Total	52	100.0		

Q2.17 Have you ever taken trainings related to Resource Management? (In the time you are assigned to the Project)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	15	28.8	30.0	30.0
	No	35	67.3	70.0	100.0
	Total	50	96.2	100.0	
Missing	System	2	3.8		
	Total	52	100.0		

Q2.18 If yes who organized it

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Project manager	6	11.5	35.3	35.3
	Office Engineering team leader	1	1.9	5.9	41.2
	Engineering Execution team leader	1	1.9	5.9	47.1
	Support team leader	1	1.9	5.9	52.9
	Head office	7	13.5	41.2	94.1
	Other	1	1.9	5.9	100.0
	Total	17	32.7	100.0	
Missing	System	35	67.3		
	Total	52	100.0		

Q2.19 Was it helpful in any way

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	26	50.0	81.3	81.3
	No	5	9.6	15.6	96.9
	3	1	1.9	3.1	100.0
	Total	32	61.5	100.0	
Missing	System	20	38.5		
	Total	52	100.0		

Q2.20 How does it contribute to Resource management

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Improve resource quality	6	11.5	18.8	18.8
	upgrade standards	10	19.2	31.3	50.0
	minimize risks	13	25.0	40.6	90.6
	Other	3	5.8	9.4	100.0
	Total	32	61.5	100.0	
Missing	System	20	38.5		
	Total	52	100.0		

Q2.21 How does it contribute to Project Success

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Improve Integrated practices	8	15.4	24.2	24.2
	upgrade performance	14	26.9	42.4	66.7
	Minimize risks	11	21.2	33.3	100.0
	Total	33	63.5	100.0	
Missing	System	19	36.5		
Total		52	100.0		

Q2.22 Have you heard about ECWC Construction Project Management Reform

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	35	67.3	67.3	67.3
	No	17	32.7	32.7	100.0
	Total	52	100.0	100.0	

Q2.23 If Yes, have you tried to practice it in the project

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	23	44.2	44.2	44.2
	No	29	55.8	55.8	100.0
	Total	52	100.0	100.0	

Q2.24 Do you believe the reform is practiced by other staffs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	24	46.2	46.2	46.2
	No	28	53.8	53.8	100.0
	Total	52	100.0	100.0	

Q2.25 Have you seen any improvement made by the reform regarding Resource Management

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	21	40.4	40.4	40.4
	No	31	59.6	59.6	100.0
	Total	52	100.0	100.0	

Q2.26 If yes, does it contribute to Project Success

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	19	36.5	36.5	36.5
	No	33	63.5	63.5	100.0
	Total	52	100.0	100.0	

❖ **Skewness and kurtosis test**

Descriptive

		Statistic	Std. Error	
HRM	Mean	3.1474	.10603	
	95% Confidence Interval for Mean	Lower Bound	2.9346	
		Upper Bound	3.3603	
	5% Trimmed Mean	3.1382		
	Median	3.0833		
	Variance	.585		
	Std. Deviation	.76459		
	Minimum	1.67		
	Maximum	4.83		
	Range	3.17		
	Interquartile Range	1.13		
	Skewness	.155	.330	
	Kurtosis	-.402	.650	
	MM	Mean	3.5577	.05433

	95% Confidence Interval for Mean	Lower Bound	3.4486	
		Upper Bound	3.6668	
	5% Trimmed Mean		3.5534	
	Median		3.6667	
	Variance		.153	
	Std. Deviation		.39175	
	Minimum		2.83	
	Maximum		4.50	
	Range		1.67	
	Interquartile Range		.63	
	Skewness		-.105	.330
	Kurtosis		-.325	.650
TM	Mean		3.5337	.08239
	95% Confidence Interval for Mean	Lower Bound	3.3682	
		Upper Bound	3.6991	
	5% Trimmed Mean		3.5427	
	Median		3.5000	
	Variance		.353	
	Std. Deviation		.59415	
	Minimum		2.00	
	Maximum		4.75	
	Range		2.75	
	Interquartile Range		.75	
	Skewness		-.367	.330
	Kurtosis		.186	.650
EM	Mean		3.6635	.06399
	95% Confidence Interval for Mean	Lower Bound	3.5350	
		Upper Bound	3.7919	
	5% Trimmed Mean		3.6485	

	Median		3.5000	
	Variance		.213	
	Std. Deviation		.46147	
	Minimum		3.00	
	Maximum		4.75	
	Range		1.75	
	Interquartile Range		.75	
	Skewness		.534	.330
	Kurtosis		-.414	.650
FRM	Mean		3.2769	.11177
	95% Confidence Interval for Mean	Lower Bound	3.0525	
		Upper Bound	3.5013	
	5% Trimmed Mean		3.2684	
	Median		3.2000	
	Variance		.650	
	Std. Deviation		.80601	
	Minimum		1.80	
	Maximum		5.00	
	Range		3.20	
	Interquartile Range		1.15	
	Skewness		-.005	.330
	Kurtosis		-.435	.650
SP	Mean		3.4423	.11301
	95% Confidence Interval for Mean	Lower Bound	3.2154	
		Upper Bound	3.6692	
	5% Trimmed Mean		3.4402	
	Median		3.6000	
	Variance		.664	
	Std. Deviation		.81490	

Minimum	1.80	
Maximum	5.00	
Range	3.20	
Interquartile Range	1.20	
Skewness	-.164	.330
Kurtosis	-.508	.650