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on

**Assessment of Data-Driven Project Management
Practices with a particular focus on
Project Maturity Models:
The case of Ethiopian Red Cross Society**

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List of Abbreviations

DDDM – Data-driven Decision Making

DDPM – Data-driven Project Management

DMP – Decision Making Process

ProMMM – Project Management Maturity Model

CMM – Capability Maturity Model

DCMM – Data Capability Maturity Model

BD – Big Data

DBA – Database Administrator

PNS – Partner National Societies

ERCS – Ethiopian Red Cross Society

ICRC – International Committee of the Red Cross

IFRC – International Federation of Red Cross and Red Crescent Societies

SEI – Software Engineering Institute

PMBOK – Project Management Body of Knowledge

PMI – Project Management Institute

Abstract

The objective of this study is assessing data-driven project management practice with particular focus on project maturity models, the case of Ethiopian Red Cross Society. To accomplish its objectives, the researcher has employed a descriptive research design and used both primary and secondary data. For the primary data the researcher has conducted an online survey questionnaire and for the secondary data the researcher has used document reviews associated with ERCS and other partner national societies that have delegation offices in Ethiopia, within the ERCS premises or compound. According to this study, the project management practice in the organization mainly depends on gut or instinct and partially on data that is inconsistent and unstructured. The study has discovered that there are some limitations in data-driven project management practice in the organization which the researcher believes is a contributing factor for the project delay, cost overrun and quality issues. In relation to this limitations, it's been found out that there is limitation to the project data culture, project data management, and data-driven decision making in the organization. Based on the findings the researcher has noted a gap in data-driven project management between the data use culture in the existing project management practice and what ought to be. The results of the findings are presented using tables, charts, percentages, and also discussed using project maturity models. Based on the findings the researcher makes recommendation in order to improve the data-driven project management practice in the organization. According to the researcher, ERCS needs to make all the efforts required to improve or bridge the gap in its data-driven project management practices and basis all of its projects decisions mainly on data so as to gain the competitive advantage data would bring about.

Keywords: Data, Project, Project data, Data-driven culture, Project management, Data-driven project management, Data-driven decision making

1. INTRODUCTION

1.1 Background of the Study

With project failure rates remaining troublesome, many project managers are turning to data for help. Proper use of data can take the guesswork out of decision-making and provide tangible support project managers can use to guide their teams. Data can also prove valuable in helping project managers schedule work, allocate resources, increase efficiency, reduce costs, and more effectively manage risks.

The ability to analyze the performance of a project objectively, and make rational and informed decisions, plays a huge part in the project's success. It's well known that, in project management, planning, tracking, and analyzing the progress of a project is a significant undertaking. The question is, is it really worth it? Does an experienced project manager really need data to drive their decisions, or can they rely on their gut?

Nowadays, project managers have a wide range of project metrics to manage, measure, observe and analyze the performance of their projects. The ability to analyze the performance of a project objectively, and make rational and informed decisions based on data, can play a huge part in the success of the projects. If we take a data-driven approach to project management, we'll find that our projects are not only more likely to be delivered on time, but it will also increase their chances of coming in under budget.

A data-driven project management methodology allows project managers to plan, monitor, and control projects while delivering them on time and within budget. It is well known that data can help professionals to make better decisions. For example, data analysis is necessary for risk analysis, and for understanding how actions can be taken when uncertainty endangers the project.

It's about the clever use of data to support better decisions. Data-driven project management aims at combining best of both worlds: Mix facts (data) with experience (opinions) and make better decisions along the life of our projects (Vanhoucke, Mario 2018).

It is no secret that many of the decisions we take in our daily and professional lives are not always backed up by facts or data. We can think of the time we had to choose the team we will have to work with for a group project. The odds are that we almost always preferred a friend rather a more skilled person to be in our team. In fact, that was just one small example of a decision influenced by one's own intuition, feelings, surroundings, other more dominant people, experience, subjective perception, etcetera. Of course, it is not wrong to have decisions influenced by those factors; however, they are not the driving basis for data-driven project management.

In fact, data-driven project management promotes decisions that are based on solid and objective data which at a later stage ought to be influenced by one's own knowledge. And as Edward Deming says, "Without data, you're just another person with an opinion".

1.2 Problem Statement

The Ethiopian Red Cross Society implements multiple humanitarian and development projects. The projects in such humanitarian organizations are mainly dependent on the external donors with all the stakeholders' high interest in executing the projects within the schedule and budget, and readily accessible data for decision-making and continuous partnering and funding.

On top of that, it's highly desirable that such projects must be completed according to the plan as most of them are designed in response to emergency needs for different natural and manmade disasters and conflicts so as to reach out to those who are in need in a meaningful and valuable

way. It's also expected that running such humanitarian projects needs to keep track of the execution of the projects in a well-organized, data-driven and informed manner.

Unfortunately, from the observation and preliminary informal interview with a few selected project staffs, there is a gap in project data use culture at the ERCS that affects the execution of projects with informed decisions in the organization and limitation in data visibility about the projects. Some of the projects even go behind the schedule as per the agreement between the organization and the project sponsors affecting the overall project output quality and impact.

Continuing with such project management practice will only affect the overall project quality and the impact it is intended to make about. Implementing data-driven project management approach will help the organization to manage its projects in a better way and maintains and even strengthens its relationship with its partners by improving the project output quality and impact, and enhancing the project data visibility to all the stakeholders.

Although there are several researches undertaken in the area of data-driven culture and decision making based on data, not much has been done specifically in the context of project management and project data culture. Hence, this research is conducted in the interest of adding or contributing some knowledge in the area of the research topic.

The research aims at assessing data-driven project management practices in the organization with a particular focus in project maturity models and propose to use it in its effort to build data-driven project management in the organization.

1.3 Research Questions

The researcher has selected three research questions that the research work is set to answer. Hence, the research work will be focusing on these research questions as listed below:

- i. Is there an established way of collecting, storing, and analyzing project data in the organization?
- ii. Is there an effective data-driven decision making process in the organization regarding project management?
- iii. What are the gaps in project data use culture in the organization and recommendations to bridge the gap?

1.4 Objective of the Project

General objectives of the project:

- To assess the data-driven project management practices with a focus on project maturity models taking the Ethiopian Red Cross Society as the case of the study.
- To assess the project data management practices in the organization.

Specific objectives of the project:

- To analyze the data use culture in the organization in relation to project management.
- To examine decision making process in the organization in relation to project management.

1.5 Significance of the Study

Nowadays, in this digital era, the project management field greatly benefits from data-driven decision-making frameworks, which in turn ask the project manager to be flexible and proactive, to react and take advantage of what data brings to project management practices.

In this regard, organizations need to give a serious attention to their project data use culture and project data analytics practices in order to gain a competitive advantage. Thus, it is very significant and highly demanding to study and analyze the data gap in their project management practice overall.

Hence, the study is intended to direct and shape the project management practices of the Ethiopian Red Cross Society to be based on data, and will also aim at improving the project data use culture in the organization in its project management practices. In addition, it is to make an in-depth analysis of the data-driven project management practices at the Ethiopian Red Cross Society with a focus on project maturity models.

1.6 Scope of the Project

The scope of this project is to assess the data-driven project management practices with particular focus on project maturity models at Ethiopian Red Cross Society including projects that are being funded and partially managed by the partner national societies (PNS). The researcher will thoroughly analyze the data culture of the project management in the organization and the gap in using data and data analysis techniques in project decisions.

1.7 Limitations of the Study

This study has a number of limitations that have to be addressed with future researches in the area. As businesses deal with huge increases in the amount of data collected - sometimes referred to as big data - there's a corresponding increase in the trend toward data-driven decision making (DDDM). Problems arise when insufficient resources are applied to data processes and too much confidence placed in their validity. To prevent data-driven disasters, it's crucial to continually examine data quality and analytic processes, and to pay attention to common sense and even intuition. When data seems to be indicating something that doesn't make logical sense or just seems wrong, it's time to reexamine the source data and the methods of analysis.

1.8 Organization of the Project Work

This project work focuses on analyzing the gap in data-driven project management practice in Ethiopian Red Cross Society, and begins with - **Chapter 1: Introduction** - that emphasizes on the

background of the study, statement of the problem that need to be addressed in my research, research questions that need to be answered throughout the study, both the overall and specific objectives of the study, significance of the study, scope of the study, limitations of the study, and organization of the thesis. It then briefly discusses in - **Chapter 2: Literature Review** - the literature written in the area of data-driven project management practice with all the components that need to be addressed in relation to it. Next, **Chapter 3: Methodology** – discusses the research methodology being used with all its sub parts such as: the research approach, the research design, the data source and types, the population and sample, the data collection procedures, the ethical consideration, and the data analysis techniques, which is then followed by a list of references of literatures reviewed and used. Then, **Chapter 4: Data Presentation, Discussion, Analysis and Results Findings**, briefly discusses about the results of the study followed by **Chapter 5: Summary, Conclusions and Recommendations** – that briefly puts conclusions and recommendations that will bridge the gap analyzed and identified in data-driven project management practice in the organization throughout the study.

2. LITERATURE REVIEW

2.1 Project and Project Management

Project management has been invented and practiced for as long as people have lived on our planet. It has played a significant role in practically every company, including product or service development, technological improvement, and megastructure construction (Seymour and Hussein, 2014).

According to the *PMBOK® Guide*—Fourth edition (PMI, 2008, p. 434) a project is “a temporary endeavor undertaken to create a unique project service or result.” Projects are temporary and close down on the completion of the work they were chartered to deliver.

Project is a temporary, unique and progressive attempt or endeavor made to produce some kind of a tangible or intangible result (a unique product, service, benefit, competitive advantage, etc.). It usually includes a series of interrelated tasks that are planned for execution over a fixed period of time and within certain requirements and limitations such as cost, quality, performance, others.

PMI issued the first PMBOK in 1987, in an effort to catalog all of the project management knowledge standards, methods, tools, and methodologies (Seymour and Hussein, 2014). The Project Management Body of Knowledge (PMBOK) is a set of guidelines for effectively applying project management ideas and managing specific projects using a defined project life cycle model (Project Management Institute, 2013).

According to PMBOK “Project management is the application of knowledge, skills, tools and techniques to project activities to meet the project requirements” (Project Management Institute 2013, p. 5).

A key factor that distinguishes project management from just 'management' is that it has this final deliverable and a finite timespan, unlike management which is an ongoing process. Because of this a project professional needs a wide range of skills; often technical skills, and certainly people management skills and good business awareness. Project management is a distinct area of management that helps in handling projects. It has three key features to distinguish it from other forms of management and they include: a project manager, the project team and the project management system.

The project management system comprises organization structure, information processing and decision making and the procedures that facilitate integration of horizontal and vertical elements of the project organization. The project management system focuses on integrated planning and control.

2.2 Project Life Cycle

From the start of conception to the completion and delivery of the final project outcome to the customer, a project goes through numerous phases. The lifecycle of a project is defined by all of these different phases taken together. According to Maylor (2010), the general project life cycle consists of several interaction phases during which the work produced evolves over time. The project's general behavior is to perform relatively less work in the early stages, more during the doing phase, and less throughout the development period (Maylor, 2010). The diagram below depicts the general project life cycle of a typical project as described by Maylor (2010).

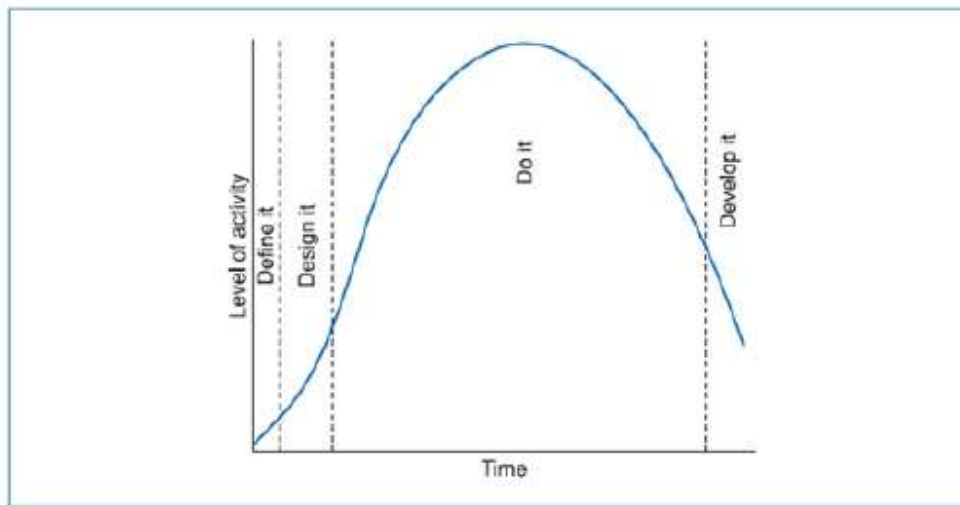


Figure 2.1 Generic Project Lifecycle and how level of activity varies with time (Maylor, 2010, p.33)

The project life cycle is also described by PMBOK as "the succession of phases that a project passes through from its commencement to its closure." (2013), p. 38, Project Management Institute. These stages are typically followed by one another, but the factors that determine them depend on the type of project and the entity in charge of it. According to PMBOK's earlier explanation, a project is a temporary endeavor that typically has a clear beginning and finish. The same time-bounding concept also applies to the phases of projects, which have clear starting, ending, and controlling points (Project Management Institute, 2013).

The project life cycle, as defined by Prince2 standards, is the amount of time taken from the commencement of the project until the final product is accepted or the project is closed. As a result, actions taken such as project support and follow-up maintenance after the project's closure has been accepted are typically not taken into account during the project's lifecycle (Turley, 2010).

2.3 Data-Driven Project Management

A data-driven project management methodology allows project managers to plan, monitor, and control projects while delivering them on time and within budget. It is well known that data can help professionals to make better decisions (Vanhoucke, Mario 2018).

Data-driven project management is sometimes known in literature as dynamic scheduling (Uyttewaal, 2005; Vanhoucke, 2012) or integrated project management and control (Vanhoucke, 2014) and refers to the integration of different planning, risk and control methodologies in a single decision-support system to manage projects. It requires data of past projects, it is based on accurate time and cost estimates, it offers insights into the impact of risk, and it provides a set of key performance indicators to improve decision-making. Rather than solely relying on the project manager's intuition and experience, the ultimate goal of such a data-driven project management approach is to make better decisions for projects in progress based on facts and numbers.

In combination with the project manager's experience, data-driven project management aims at maximizing the project's success and delivering it on time and within budget to the project's client.

It's generally believed that the intelligent analysis of data leading to objective and informed decisions will play a critical role in the success of projects. Therefore, the need for data-driven project management (DDPM) is becoming a necessity.

2.3.1 Data and Big Data

The development in both quantity and speed of data during the past few decades has been remarkable, from which no field has been spared from (Shaw 2013:3). These developments might have taken their first steps providing answers to the governmental and military needs, but quickly the innovations turned to be results from the desires of businesses to perform their activities in a

more fast-paced and efficient manner (Shaw 2013:3-4). The need to process the ever-increasing amount of data faster and with more efficient manner is now shared among all industries and the pace of new innovations in the field does not show any signs of slowing down. According to Gupta (2018:214-215) 90 percent of the data that exists today has been created during the past two years. The challenge companies and other entities are now facing, is making sense from all of this information flowing in in the form of raw data (Gupta 2018:214-215).

In the new digital era of operations, companies are required to be 'data driven', which ultimately means that the operations are based on data assets and those are heavily utilized in the organization (Morrow 2021:158). These changes in utilizing data were described already in early 2000's where a publication of Meta Group described the increased amount of data, the time reduced for processing data and increased lack of structure in that data with three terms: volume, velocity, and variety (Shaw 2013:91). The quality and structure requirements for the data are defined by the data needs the organization faces, naturally, affecting the decisions made in the entity and their quality as well (Bartlett 2013).

The diversion of business communications from landline telephone systems to online services during the past decades (Shaw 2013:109-110) is a good example on how businesses are changing due to the needs and wants of the environment – in today's world it is an exception that a certain service would not be available in an online platform. The enhances in transmission capacity and speed has enabled many features that have not been an opportunity before, for example streaming sound and video has enabled various developments in handling business from another side of the world (Shaw 2013:109-110).

When creating a functional data processing and information flows, the importance of well-organized database that serves the organizations customers raises to the fore (Bartlett 2013). The

data pipeline has to be considered when structuring these operations with the end-user in mind, this enables the data management to reach all the way from the acquisition to application of the data (Bartlett 2013). The aim of the organization should be focused on proliferating the databases and data warehouses across its functions in a tiered manner, where any and all layers are extensible and interoperable (Biere 2011:52). This enables that the data and information needed in a certain function can be easily accessed at the closest possible point for the user but does not disable the broad managerial overview on the data and its utilization.

All of this data used and stored, will need to be protected to an extent. The level of protection required will differ depending on the nature of the data, the field the organization is operating in as well as other, more individual affecting factors. As there are various solutions to protect the information an organization views to be the most critical, Shaw (2013:118) recommends a storage solution outside of the Internet. Shaw (2013:119) quotes his judo sensei on this matter: “The best defence is to not be there in the first place!”.

Data protection is crucial also when considering the reliability of the data. When data as itself is often lacking (e.g., missing, incorrect, inaccurate, misunderstood, obsolete) it must be secured during acquisition as well as storage, to protect it from further corruption from outside factors (Bartlett 2013). Regular inspections on the data quality are also necessary to ensure its security and reliability (Bartlett 2013).

The term Big Data has emerged during the recent years, and it represents the vast amount of complex data available for organizations today (Gupta 2018:215-216). In its most simplicity, Big Data is used to describe the large scale of data available in various different forms and from various different sources, but it can also allow the organizations to achieve a variety of objectives, such as

cost reductions, improvements required in completion of tasks and support to internal business decisions (Davenport 2014:178-179).

Big data is a general term used to describe techniques for analyzing large data sets from traditional and digital sources that are too large and complex to process and analyze with standard data processing and database management applications. As a result, advanced computing and statistical techniques have been developed to capture, process, understand and analyze these data.

According to Akter et al. (2016), big data is defined in terms of five 'Vs:' volume, velocity, variety, veracity, and value. 'Volume' refers to the quantities of big data, which are increasing exponentially. 'Velocity' is the speed of data collection, processing and analyzing in the real time. 'Variety' refers to the different types of data collected in big data environments. 'Veracity' represents the reliability of data sources. Finally, 'value' represents the transactional, strategic, and informational benefits of big data.

Big data consists of expansive collections of data (large volumes) that are updated quickly and frequently (high velocity) and that exhibit a huge range of different formats and content (wide variety). Davis (2014). It refers to datasets with sizes beyond the ability of common software tools to capture, curate, manage, and process the data within a specified elapsed time. Bharadwaj et al. (2013). It is a combination of volume, variety, velocity and veracity that creates an opportunity for organizations to gain competitive advantage in today's digitized marketplace. Schroeck et al. (2012). Big data focuses on three main characteristics: the data itself, the analytics of the data, and presentation of the results of the analytics that allow the creation of business value in terms of new products or services. Gantz & Reinsel (2012)

The lack of structure is one main feature of Big Data (Davenport 2014:177). The constant flow of data coming in, combined with the unstructured formats and very large volume of the data makes

it impossible to analyze Big Data without utilizing machine learning and Artificial Intelligence (AI) in the analysis (Davenport 2014:177). These aspects present new challenges, but also new opportunities for the organizations utilizing them (Davenport 2014:3). For example, a lot of data collected through customer interactions is rather unstructured in nature and high in volume – in order to make analysis from this type of data, Big Data solutions alongside with machine learning and AI is needed for informational outcomes to be reached (Davenport 2014:180).

2.3.2 Data-Driven Culture

The concept of data driven culture can be described as the shared pattern of norms, beliefs, behaviors, values, and practices in the organization, which are aligned with the best usage principles of business analytic tools and viewed as a crucial part in creating positive outcomes for the organizational performance (Chaudhuri et al. 2021). This concept has been used for a longer time, but the technological developments during the past years have re-emerged this topic to the fore (Chaudhuri et al. 2021). It has been stated that data driven culture can result in positive impact in processes, product innovations, and overall business performance, drive the organization towards growth, as well as facilitate appropriate responses to the dynamic business environment (Chaudhuri et al. 2021).

Aiming towards more data driven culture requires organizational transformation, which does not come without challenges. Esteller-Cucala, Fernandez and Villuendas (2020:230-233) listed the most likely challenges to occur as follows: (1) not following an organization change procedure, (2) Not filling the knowledge gap, (3) Failure to cope with people's resistance to change, (4) Lack of sense of urgency, (5) Insufficient organizational readiness for change, (6) Insufficient management support and involvement, and (7) Lack or ineffectivity of communication.

It has been argued that the comfort of the old habits and deep-rooted ways can dim the change effort, but when the organization becomes aware of these challenges, the likelihood of them affecting the transformation decreases significantly (Esteller-Cucala et al. 2020:228). This organizational transformation is crucial for achieving the data driven culture desired and therefore, it would be recommended for the organization to concentrate resources into this process to be able to extract the maximum value from its performance (Esteller-Cucala et al. 2020:230).

Chaudhuri et al. (2021) describes the value extracted from data driven culture arising from the basis of digitalization and technology and the business analytics based on them. In other words, the technology and digitalization are forming the base for the analytics and culture, to which the outcomes of all prior efforts are based on and where the value is gained from.

2.3.3 Data-Driven Decision-Making

Data-driven decision making (DDDM) is the practice of collecting data, analyzing it, and basing decisions on insights derived from the information. This process contrasts sharply with making decisions based on gut feeling, instinct, tradition, or theory. Data-driven decisions are more objective and can be easily evaluated according to their impact on metrics.

The global economy and the environment where the organizations are competing in is increasingly demanding more open communication and more fast paced decision making (Biere 2011:81). According to Davenport and Manville (2012:12-13) the increased level of competition, economic uncertainty, and volatility have speeded up the movement of markets and customers, which creates a need for the organizations to make right decisions quickly. The development in technologies and analytical capabilities during the past decades, have made tapping into the information resources easier, but on the other hand, increased the number of choices to be made (Davenport & Manville 2012:240).

The challenges that these organizations are facing are increased with the amount of misinformation hiding in raw data, and even more, misinterpretations derived from the raw data (Bartlett 2013). This combined with the decreased time frame for decision making, remodeling the decision management process in the entity has become crucial (Bartlett 2013). Then again, as these operations differ between each organization it must be stated that there is not one universal solution or approach to solve these challenges (Davenport & Manville 2012:242).

Morrow (2021:159) introduces in his work an infinite structure for data informed decision-making with six steps: ask, acquire, analyze, integrate, decide, and iterate. The continuity in this design emphasizes the need for the organization to iterate on the decisions made in the past and therefore, accelerating the learning curve of the organization (Morrow 2021:159). To achieve this structure of data informed decision making, and to improve its employees' insights on it, it would be recommended for the organization to cultivate a data driven culture across its operations (Chaudhuri, Chatterjee, Vrontis & Thrassou 2021). To reach the full potential of the company, it is crucial to focus on the improvements in the organizations data scanning abilities, as well as revitalizing its data driven culture (Chaudhuri et al. 2021).

2.4 Project Management Maturity Models (ProMMM)

Many businesses are recognizing the power of a project-based approach, and are implementing project management as a core competence. The value of a formal and structured approach to project management is becoming increasingly recognized as the discipline develops and more organizations begin to reap the benefits of proactive project-based management. The successful business will be the one that manages its projects most effectively, maximizing competitive benefits while minimizing the inevitable uncertainty. Guidelines and standards define best practice project management (for example, PMBOK 2000, APM-BoK 2000, BS6079-1: 2000), and there

are a number of sources of help available to organizations wishing to develop or improve in house project management processes.

In order for an organization to be able to determine whether its project management processes are adequate, agreed measures are required to enable it to compare its management of projects with best practice or against its competitors. As with any change program, benchmarks and maturity models can play an important part in the process by defining a structured route to improvement.

The Project Management Maturity Model (ProMMM) has been developed to meet these needs, drawing on established concepts from existing models such as the Capability Maturity Model (CMM) from Carnegie-Mellon Software Engineering Institute (Paulk et al. 1993, 1995) and the EFQM Excellence Model from the European Foundation for Quality Management (EFQM, 1999). It also draws on a previously published model developed to assess organizational risk management capability (the Risk Maturity Model—see Hillson 1997). The basis for ProMMM is practical and pragmatic, based on the empirical experience of its developers in providing project management consultancy across a wide range of industries over many years. The lack of an academic research base is not felt to be a disadvantage, as ProMMM represents the accumulated wisdom and expertise of project management professionals who are leading practitioners in the field.

Numerous models of project management maturity evaluation are available, most of which are based on and inspired by the Capability Management Model created for the software project management field (Backlund et al., 2014). In order to develop a comprehensive and practical model, Khoshgoftar and Osman (2009) performed research comparing various maturity models (OPM3, CMMI, P3M3, PRINCE, BPMM, and Kerzner's Project management maturity model) based on many benefits and characteristics related to these maturity models. According to the

study's findings, OPM3 is the most practical maturity model out of all those examined, covering projects, programs, and portfolios in a multidimensional framework that narrows the gap between actualized initiatives and organizational strategy (Khoshgoftar & Osman, 2009). The study also demonstrated that OPM3 offers the most thorough and continuous method of analyzing organizational maturity gaps and is applicable to all industries (Khoshgoftar & Osman, 2009). Similar to how Yazici (2009) demonstrated that OPM3 is the most often utilized maturity model, project management practices are identified, managed, and improved inside an organization. The arguments convincingly demonstrate that OPM3 is highly effective in carrying out this study, which is undertaken to identify gaps and enhance project management best practices inside a business.

2.4.1 Organizational Project Management Maturity Model (OPM3)

There are many chances and difficulties for organizations to survive and develop in a changing environment due to the rapid change in technology, business, and economic conditions. One of the primary difficulties for businesses is to maintain focus and accomplish strategic goals while taking external circumstances into account (Project Management, 2008). Organizations are able to maintain goal-focus and adapt to changing environments by carrying out projects and practicing project management (Project Management, 2008). Project Management Institute (PMI) introduced the Organizational Project Management Maturity Model (OPM3) to establish a framework for implementing and controlling project management best practices in order to meet organizational strategic objectives. This was done to successfully implement project management practices and support organizational strategies (Project Management, 2008).

The OPM3 is a framework that offers an organizational-wide view of portfolio management, program management, and project management to enable achieving Best Practices within each of these areas, according to its definition. This comprehensive viewpoint is an effective instrument for successful organizational strategy execution (Project Management, 2008, p. 1)

Increasing organizational maturity is a progressive process that may be accomplished by adopting a project management culture and making a number of notable improvements at various stages of development. Improvements in project timeframes, cost and schedule tracking, and improved strategic decision-making are just a few of the near-term advantages that can be linked to an organization's project management maturity. As a result of project management maturity, there are long-term advantages such as sustained growth and enhanced profitability over time (Crawford, 2007).

Organizational Project Management Maturity Model (OPM3) Description

Project Management Body of Knowledge, the foundation for organizational project management maturity assessment, is a great starting point given the widespread adoption of this standard and the breadth of knowledge accessible for ten knowledge domains (Crawford, 2007). The Capability Maturity Model's five stages of maturity and the ten knowledge domains described in the PMBOK are the foundation for the model created to evaluate project maturity. In addition to knowledge areas, OPM3 has placed specific emphasis on the management oversight and project managers' professional development (Crawford, 2007).

2.4.2 Project Management Knowledge Areas

The ten knowledge categories listed below make up the maturity assessment, which is separated into important components to measure and evaluate an organization's maturity. These essential elements are studied separately without impacting the others.

According to the American standard, they are the essential Project Management Knowledge Areas (PMKAs) needed to fully comprehend project management processes (Project Management Institute, 2017). Each PMKA has unique procedures, methods, inputs, outputs, tools, and techniques that work in concert to satisfy the project's overall needs and demands. Despite particular PMKAs frequently being singled out as "more significant" than others, the synergistic effect of these PMKAs is well documented in project practice and science. One common claim is that project management is concerned with producing a product in accordance with specified scope, time, cost, and quality (Project Management Institute, 2017; Wysocki, 2019; Zidane & Olsson, 2017).

The Iron Triangle, which refers to the three main components of or restrictions to project management - time/schedule, cost, and quality - is another phrase that appears frequently in the project management literature (Duggal, 2011; Pollack et al., 2018; Shenhar & Dvir, 2007). The initial intent of the Iron Triangle was to provide project managers with a framework for assessing and balancing the opposing demands of money, time, and quality within their projects (Atkinson, 1999). It eventually became the preferred way for defining and evaluating project performance, with project directors generally believing that only those three requirements are required for a project to be successful (Pinto, 2010).

The Iron Triangle concept describes the interdependence of three constraints: raising quality may necessitate increased time, which could raise cost, while a fixed time schedule may cause a decrease in quality and a rise in cost as a result (Morris & Sember, 2008). The Iron Triangle is still the most important idea in project management, despite the fact that its strength has frequently been compared to other knowledge domains like Scope or Performance (Badewi, 2016; Pinto, 2010; Pollack et al., 2018).

Project Integration Management

Project Integration Management is a particular PMKA that is directly under the project manager's supervision and is typically not assigned to other project members (Project Management Institute, 2017). It is a type of systems engineering known as integration engineering that establishes a governance structure to improve the systematic management of the requirements of important stakeholders (Eisner et al., 1993). (Asif et al., 2010). According to Berteaux & Javernick-Will (2015), organizational integration of knowledge, process, and strategy helps to improve project performance through capabilities developed in previous projects and innovations throughout the organization, all of which support keeping the organization competitive. Kim (2006) investigates the relationship between supply chain integration and a company's performance. The effectiveness of project processes is significantly impacted by integration management. They specify resource allocation, balancing (competing) project requirements and demands, examining alternative possibilities, modifying project processes to achieve objectives, and managing the dependency across PMKAs. There is a close relationship between these two concepts (Demirkesen & Ozorhon, 2017). (Project Management Institute, 2017).

Project Scope Management

The goal of project scope management is to define and implement all procedures necessary to ensure that the project includes all necessary activities for its effective completion (Project Management Institute, 2017). This indicates that not a single task required to complete a project can be skipped, but tasks that are not necessary should also not be included. Every project contains deliverables (for instance, a product or service), hence scope is often established at the level of both the specific needs for each deliverable/product as well as the requirements for the entire project.

Project scope frequently includes several components related to determining work schedules, work length, resource requirements, and work costs, both in theory and in practice (Mazur et al., 2009; Moroz & Nemchenko, 2017; Pollack et al., 2018). Project scope should only be seen as defining and directing activities that lead to achieving project objectives because there are specific PMKAs for such parts (Bingham & Gibson, 2017). By examining the project's ultimate state, the project's objectives, output, requirements, and restrictions are identified. The project's total work is then broken down into smaller, more manageable group activities, or what is known as work packages.

Project Schedule Management

One of the key aspects of any project and a component of the so-called Iron Triangle is the amount of time required to complete specific project tasks and/or the full project (Baloyi & Bekker, 2011; Duggal, 2011; Pollack et al., 2018). As the Project Management Institute (2017) noted, the timetable of project activities is defined and managed rather than time itself. As a result, this knowledge area's former name of "Time Management" has been modified to "Schedule Management." A project schedule is a component of project management that analyzes and creates

a precise timeline, offering a thorough plan of operations, delivery, and project milestones. It also serves as a communication tool for communicating with other project stakeholders.

The interrelationship between the activities is established once they are required for the deliverables, and the time needed to complete each activity is estimated. The schedule management plan gathers all of this information and makes it readable. The intended start and end dates, the length of each activity, and the resources allotted to it are typically included in the schedule. A certain amount of flexibility is required in other activities to ensure the project manager can successfully complete the project, even though the critical path defines the priority activities that must be completed exactly within the given time in order for the project to avoid being delayed (Liu & Hu, 2021). (Zidane & Olsson, 2017)

Project Cost Management

Another component of the so-called Iron Triangle is cost. Cost typically refers to both direct costs, such as the price of labor and supplies, which are directly related to completing a project, as well as indirect costs, such as general and administrative expenses. Cost management is a crucial component of project management in any project and has a direct impact on a company's strategic goals, business strategy, and mission (Pinto, 2010). In the end, effective cost management will support maximizing a business's profit. As a result, such a system needs the backing of senior management while simultaneously attempting to incorporate staff from all levels of the organization (Huang & Zhang, 2013). The objective of a manager is to express all costs in monetary terms.

Therefore, planning, calculating the financial resources required to complete a project, adding up individual costs into a budget, and managing planned and realized costs are all included in project cost management (Project Management Institute, 2017).

Project Quality Management

The final component of the Iron Triangle is quality (Pollack et al., 2018). Quality in a project context refers to both achieving the technical requirements of a project and to meeting the wants and expectations of consumers. Along with project management, quality also refers to the standard of project deliverables. In order to guarantee the highest quality goods and services as a result of the project process, quality management entails the knowledge and procedures necessary. Establishing quality standards, ensuring that quality policies have been properly implemented in the project, and monitoring and evaluating the performance of certain project deliverables and management procedures are all important to reach (and maintain) the intended level of perfection. (Lu et al., 2019; Ab Malik et al., 2019; Nastase, 2013; Project Management Institute, 2017).

Project Resource Management

Project resource management is a crucial component of the project process that can make a project successful or unsuccessful. The most crucial resources and factors affecting a project's success or failure are frequently highlighted as being the human resources (knowledge, skills, and competences) (Denicol et al., 2020; Do Vale et al., 2018). This is related to leadership coaching, where a project manager who has mastered both leadership and coaching techniques leads team members through the project process to a successful conclusion by inspiring them and equipping them with the necessary knowledge and abilities while developing future project managers through ongoing education (Woods & Abdon, 2011; Shokory & Surady, 2018; Spence et al., 2019). Resource management also refers to different kinds of resources, according to the Project Management Institute (2017). To make sure that all necessary material resources are allotted and used in accordance with plan, the primary procedures in resource management are resource

estimation, procurement of required resources, formation of teams and team competences, team management, and resource control.

Project Communication Management

Working on a project requires effective communication as a prerequisite. Planning, administering, and monitoring communications are all a part of project communication management (Project Management Institute, 2017). This is not just an information sharing process; it also includes procedures for timely and accurate planning, searching for, gathering, creating, storing, managing, controlling, overseeing, and, finally, using project information.

Effective communication can help cut costs significantly and shorten project duration (Yap & Skitmore, 2020). Project management's job is to keep risk at a level that is acceptable to the project and its stakeholders because some hazards cannot be prevented from occurring.

Project Procurement Management

The procedures required for acquiring goods, services, or supplies from parties outside than the project team are referred to as project procurement management (Project Management Institute, 2017). By meticulously organizing, planning, carrying out, and managing the procurement process, the best suppliers are chosen (whose prices are not always the lowest) (Lent, 2013; Owusu et al., 2020; Rane et al., 2019). This stage of project management is used to make sure the project is run effectively, sustainably, and lawfully.

Project Stakeholder Management

One of the most recent PMKAs is project stakeholder management (Project Management Institute, 2017). A project doesn't exist for itself; it exists for certain stakeholders, such a sponsor or owner who wants to profit from the project or a client who will use (and pay for) the project's deliverables (Derakhshan et al., 2019). A project frequently needs to satisfy certain legal requirements or win

public acceptance. Therefore, it is essential for any initiative to identify important stakeholders and win their support.

Managers require more than just technical expertise to successfully complete a project; they also need to be able to recognize stakeholders and establish and maintain good rapport with them. Stakeholder involvement in a project can be increased using a variety of tactics. Stakeholders can participate in the creation of the project management plan, the project charter and scope statement, the supervisory board for change, revisions to the project, and setting boundaries (Jayasuriya et al., 2020; Project Management Institute, 2017).

2.4.3 Project Management Maturity Levels

Benchmarking an already-existing Capability Maturity Model (CMM) by the Software Engineering Institute served as the foundation for the Organizational Project Management Maturity Model (OPM3). CMM offers a paradigm for evaluating organizational maturity in a number of areas, and its structure is widely regarded (Crawford, 2007). The figure below displays the important elements from ten knowledge areas in relation to the maturity assessment's five levels.

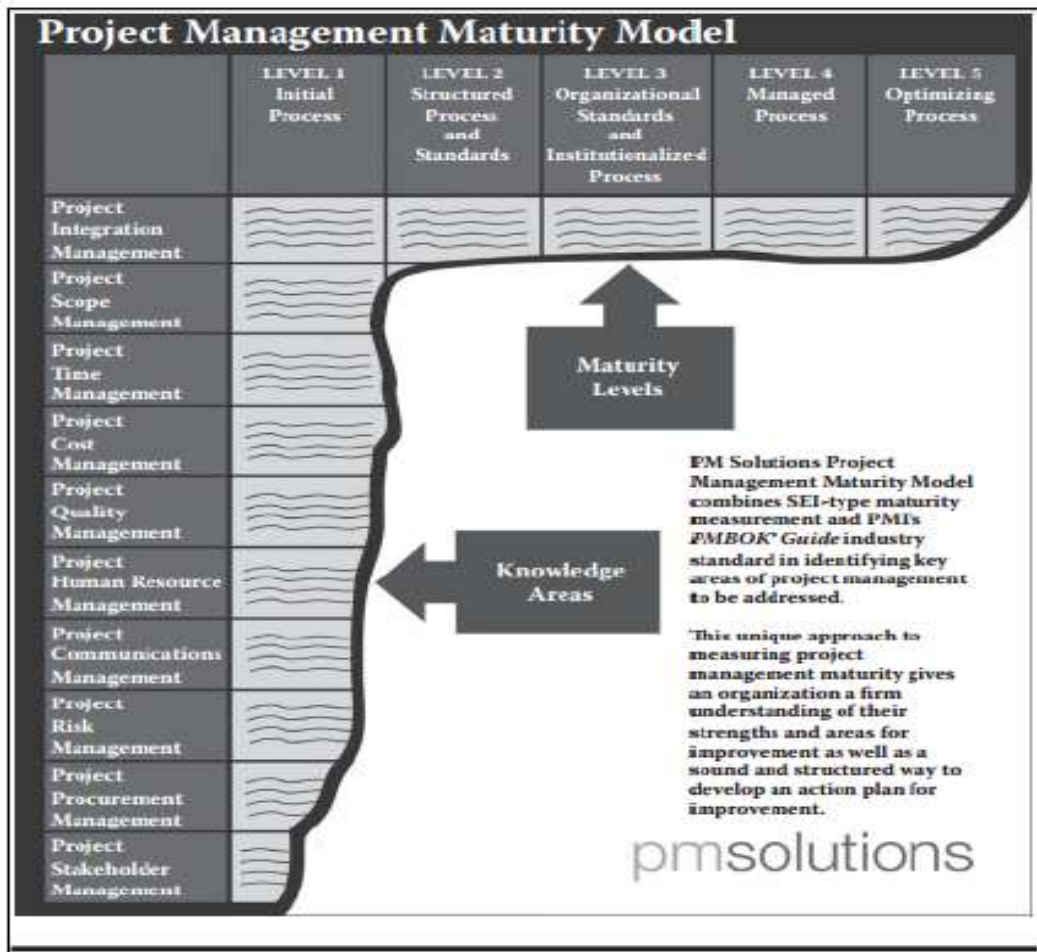


Figure 2.2. OPM3 – Basic Framework (Crawford, 2007, p. 5)

The ability to identify a path for progress is made possible by organizational maturity levels, which primarily concentrate on ongoing strategic commitment improvement although short-term enhancements might also be tailored to meet certain objectives. However, ongoing process improvements can result in actual benefits [Office of Government Commerce, 2010].

The foundation of maturity level begins with the presumption that project management procedures inside the company are not organized and not used jointly. The final stage of maturity involves institutionalization of project management practices and practices that actively explore continuous improvement and attempt to go beyond these in novel ways.

Below is a description of each maturity level that corresponds to an SEI maturity level.

Level 1: Initial Process

The project management processes are somewhat acknowledged. The requirement for project management is not well understood by management. Project management practices and standards are not well-established. Within the organization, documentation and other helpful project management methods are ad hoc and poorly structured. Organizations struggle to regularly duplicate prior successes in large part because of inadequate process documentation and process description. The organization can effectively complete projects at level 1 maturity, but these success factors are connected to important individual contributions rather than enterprise-wide knowledge and competence. Pennypaker (2001).

The main characteristics of projects at this level of maturity include they are managed differently, using an informal style; they heavily depend on the project manager; project management receives little management support; there is no official method to compile lessons acquired and apply them to subsequent projects; and project results are uncertain.

Level 2: Structure, Process and Standard

At this level, fundamental project management standards and procedures are defined and mostly applied to significant and noticeable initiatives. The standard is applied to the fundamental project management process and is repeatable. The standard is not taken into account at the organizational level and focuses only on projects. The fundamental procedures are properly documented. Although there is a lack of consistency and involvement to comply for all projects, management supports and encourages the deployment of project management techniques. Key projects are handled by functional management, who participate in them and carry them out methodically. A few fundamental tools and methods are used, such as tracking project costs, making estimates, and creating schedules using general tools and the knowledge of experts. Pennypaker (2001).

Level 3: Organizational Standard and Institutionalized Processes

At the organizational level, project management methods are well-established and present. Stakeholders are actively involved and viewed as essential members of the project team at this level. All procedures and standards have formal documentation and are institutionalized. Management participates in important project choices and issues. Each project is analyzed and handled in the context of the others. Pennypaker (2001).

Key characteristics of project management practice at this maturity level include management backing for project management procedures; successfully organize, coordinate, manage, integrate, and oversee each project; project team members have received adequate project management training; reliable application of tools and methods for the project management process; and previous project experiences and lessons learned are well-organized and applied to new initiatives.

Level 4: Managed Processes

Processes and standards for project management are well-established, developed, and quantitatively managed. Additionally, it is integrated with other company systems and procedures. Based on various efficiency and effectiveness indicators, including cost projections, baseline estimates, and earned value, all projects and adjustments are assessed. Projects are managed based on past performance and anticipated future outcomes. Information on the project is accessible and integrated with other corporate systems to help business choices be as effective as possible. At this level, projects are taken into account as organizational units and are viewed holistically. Pennypaker (2001).

Main characteristics at this maturity level include project portfolio management is integrated into the business plan of the organization; active management backing for coupling project execution

with company strategy; effectively manage, integrate, and oversee a number of initiatives; and the database for past project information is used and well-maintained.

Level 5: Process Optimization

Processes are thoroughly institutionalized as a way to continually enhance project management procedures and project results. Lessons learned are regularly evaluated and used to improve project management standards, procedures, and documentation. At this level, management and the organization are focused on continual improvement in addition to good project management. Pennypaker (2001).

Key characteristics at this maturity level include actively promoting project management improvement; adopting a flexible, project-centered organizational structure; adopting a career path for project managers; and emphasizing the importance of project management training for staff growth.

Stage of Maturity	Description
1) Performed	Unpredictable process that is poorly controlled and reactive
2) Managed	Project process is characterized but is often reactive
3) Defined	Characterized process for the organization that is proactive
4) Quantitatively Managed	Process measured and controlled
5) Optimizing	Process improvement focus

Table 2.1 Stages of Maturity (Paulk et al, 1993)

Other maturity models created by various private project management consultancies or professional project organizations also use these five levels of maturity. These models include those created by Harold Kerzner, ESI International Project Framework, and the Center for Business Practices. Each maturity model has an own pattern and is adapted from the general

concept of progression toward project management maturity, despite minor nomenclature variances.

SEI's Capability Maturity Model Integration	ESI International Project Framework	Kerzner's Project Management Maturity Model	Center of Business Practices
Level 1: Initial: Ad hoc and chaotic processes	Level 1: Ad hoc: Processes are poorly defined because they are used independently and little organization support.	Level 1: Common language: Small pockets of interest inside the company; sporadic usage of project management; and no investment in PM training.	Level 1: Initial Process: Ad hoc process and managerial awareness
Level 2: Managed: Project planning and control for requirements management occurs; process quality control is carried out; and usage of configuration management.	Level 2: Consistent: The methods used by the organization are well-intentioned, and there are no project control procedures or learned lessons.	Level 2: Common Processes: Benefits that may be seen are concrete, creation of a PM curriculum; and firm-wide PM support.	Level 2: Structure, Process and Standards: Basic procedures that are not always followed on projects; management support; and estimates and schedules based on expert knowledge.
Level 3: Defined: Verification and validation of processes take place; requirements are developed and products are integrated; and risk management is also prioritized.	Level 3: Integrated: Processes are designed to improve every aspect of PM; and techniques are used and understood consistently throughout the company.	Level 3: Singular Methodology: Support from management and culture; integrated processes; and financial gain from PM training	Level 3: Institutionalized Project Management: Every process of the project is repeatable; and schedules and estimates are based on industry standards.
Level 4: quantitative management: Process performance is measured, and there is a focus on quantitative PM.	Level 4: Comprehensive: Information is used to evaluate processes and eliminate variance; advanced PM tools and procedures are developed; and PM is fully adopted throughout the company.	Level 4: Benchmarking: Practices are analyzed and evaluated; and a project office is established.	Level 4: Managed: Effective project performance analysis; estimates and schedules based on corporate characteristics; and project management approaches connected with corporate processes.
Level 5: Optimizing: Enhancement of innovation and deployment, and occurrence of causal analysis and resolution.	Level 5: Optimizing: Project capability is continuously improved, and common failures are removed.	Level 5: Continuous Improvement: Continuous endeavor to enhance and develop project capacity, and elimination of common failures.	Level 5: Optimizing: The company places a strong emphasis on continual improvement and has processes in place to monitor project success and efficiency.

Table 2.2. A comparison of project maturity models and maturity stages

2.4.4 Capability Maturity Model (CMM)

Until recently, the term 'maturity' was rarely used to assess an organization's performance in performing various duties. However, some firms have recently undergone this maturity concept and assessment in order to identify new ways to improve and standardize their services. The first maturity model, the "Capability Maturity Model," was created by the Software Engineering Institute to assess and improve the performance of organizations in building software with repeatable results (Crawford, 2007).

The capability maturity model was created to focus on people, process, and product at every stage of software project management (Kumta & Shah, 2002). It necessitates a radical shift in the project manager's perspective on software management. The variables are poorly regulated and the first level 1 is unpredictable. To achieve success at level 2, project managers demonstrate their own models and existing processes. Project managers must approve and follow organizational standard practices at Level 3. Controlling existing organizational standards and focusing on process improvements are the levels 4 and 5 accordingly (Kumta & Shah, 2002).

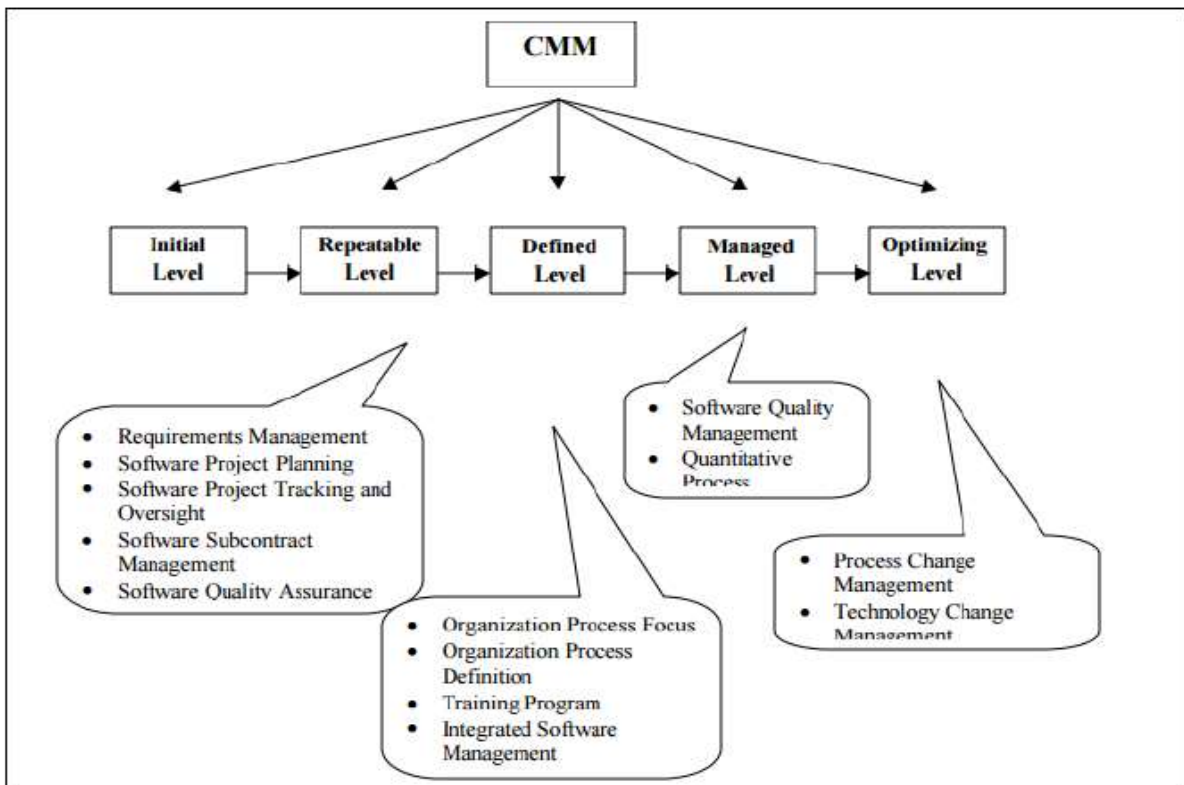


Figure 2.3 Capability Maturity Model Framework

2.3.4.1 Capability Maturity Model from a Data Perspective

The Capability Maturity Model (CMM), published by the Software Engineering Institute (SEI), is a well-established, defined model that characterizes the software development maturity of organizations based on their practices and procedures. However, it does not address the maturity of organizations with regard to the manner in which data is managed. It has been found that the five levels of the SEI CMM can be mapped to a data perspective based on the manner in which data is stored, managed, and maintained.

The following outline maps the five levels of maturity to the manner in which organizations manage data – effectively outlining the structure of a Capability Maturity Model for the management of data.

Level 1 – The Initial Level

The level 1 organization has no strict rules or procedures regarding data management. Data may exist in multiple files and databases; using multiple formats (known and unknown); and stored redundantly across multiple systems (by different names and using different data types). There is no apparent method to the madness and few, if any, attempts have been made to catalog what exists. Changes are made “on the fly” as they are requested by program development. If a centralized data management group exists, it functions merely to apply the change requests as they are needed. Frequently there is no central data management group – instead new data structures are created, and changes are made, by the development groups requiring them (or perhaps by systems programmers who know nothing about the definition of the data).

The quality of data in level 1 organizations depends on the skills of the technical programmer analysts and coders. Level 1 organizations will take on monumental tasks with little knowledge of their impact causing project cancellations, or even worse, completed systems with severely corrupted data and/or invalid reports. As a rough estimate, approximately 30% to 50% of organization operate at Level 1.

Level 2 – The Repeatable Level

To move from level 1 to level 2 an organization must begin to adhere to a data management policy. The policy should dictate how and when data structures are created, changed, and managed. Although level 2 organizations follow some sort of management policy, they have usually yet to institutionalize the policy. Instead, they rely on a central person or group to understand the issues and implement the data structures of the organization reliably and consistently. This manifests itself by the creation of a database administration function.

The success of level 2 organizations depends on the skills of the DBAs charged with managing the “technical” aspects of data. Although the differences between the business and technical aspects of data are usually (not always) understood at some level, there is less effort made to document and capture the business meaning of data. Little (or no) differentiation between the logical and physical models of data is made. Level 2 organizations will begin to institute database administration practices such as managed schema change (maintaining records of the change) and reactive performance monitoring and tuning (whoever screams the loudest gets the attention). Approximately 15% to 20% of organization operate at Level 2.

Level 3 – The Defined Level

Organizations that have successfully move from level 2 to level 3 on the data capability maturity scale have documented and established a data management policy as a core component of their application development lifecycle. The policy is enforced and testing is done to ensure that data quality requirements are being met. Level 3 organizations typically understand the business meaning of data and have created a data administration function to augment the database administration function. Level 3 organizations have a stated policy that “data is treated as a corporate asset,” even if they do not entirely understand what that means.

The success of the level 3 organization typically depends on the interaction between the DA and DBA functions and the proper utilization of tools. Although level 1 and level 2 organizations may have tools at their disposal, they usually do not apply them consistently or correctly (sometimes they linger as “shelf-ware”). Tools are used by level 3 organizations to create data models, to automate DBA steps initiated by level 2 organizations (e.g. schema migrations) and to begin proactively monitoring and tuning database performance. Approximately 10% to 15% of organization operate at Level 3.

Level 4 – The Managed Level

An organization can move to level 4 only when it institutes a managed meta data (data about data) environment. This enables the data management group (DA and DBA) to catalog and maintain meta data for corporate data structures. It also provides the application development and end-user staffs access to what data exists where within the organization (along with definitions, synonyms, homonyms, etc.). The data management group is involved (at some level) in all development efforts to assist them in the cataloging of meta data and reduction of redundant data elements (in logical models always; in physical models as appropriate for performance and project requirements). Level 4 organizations have begun to do data audits to gauge production data quality. The success of the level 4 organization depends on the buy-in of upper management to support the “data is a corporate asset” maxim. This involves treating data as they treat other assets (personnel, finances, buildings, finished goods, etc.). Advanced tools are utilized to manage meta data (repository), data quality (transformation engines) and databases (agent-based monitors, centralized consoles for heterogeneous database administration, etc.). Approximately 5% to 10% of organization operate at Level 4.

Level 5 – The Optimizing Level

The level 5 organization uses the practices evolved in levels 1 through 4 to continually improve the data access, data quality, and database performance. No change is ever introduced into a production data store without it first being scrutinized by the data management organization and documented within the meta data repository. Level 5 organizations are continually trying to improve the process of data management (example: using data modeling tools and the repository to generate physical schemas instead of as a documentation and meta data capture tool). Less than 5% of organizations operate at Level 5.

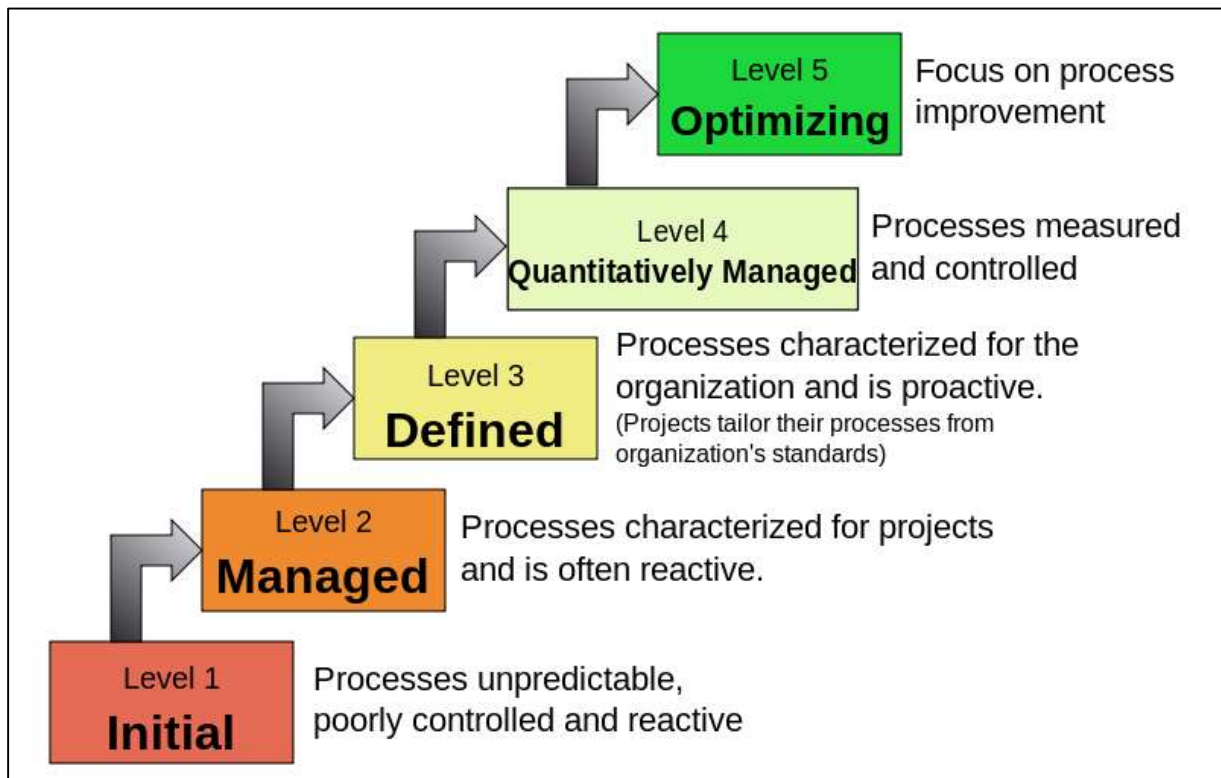


Figure 2.4 Characteristics of capability maturity model

In other words, Capability Maturity Model (CMM) applied to data management determines the maturation steps on a pathway to support data-driven project management at an optimal level of granularity.

The maturation steps or stages of Data Capability Maturity Model are as follows:

1. **Initial:** Data reuse is not possible outside of the project or department who produced the data sets. No long-term solutions for data sustainability and access.
2. **Repeatable:** Data usage is limited, only possible with help of experts who are involved in the project and requires manual effort. Domain experts help are required to interpret the data. Data access is governed mostly by the project owners.

3. **Defined:** Data sets can be utilized by other parties with a minimal effort. Organizational and community standards are utilized, variations are documented. Linking data sets can be achieved with some mapping effort. Access and sustainability processes are well defined.
4. **Managed (Capable):** Data is linked. Metadata follows (canonical) community standards, when not the variations are explicitly documented and mapped. Organization wide services are available for searching and accessing the data sets. Machine accessibility and data linking is fully achieved.
5. **Sustainable (or Optimizing for efficiency):** The data can be reused cross organizations or communities with a minimum of effort. Data can be maintained throughout time and its usage is monitored.

3. METHODOLOGY

3.1 Research Approach

Regarding the research approach, both quantitative and qualitative methods had been used. The reason for using quantitative method is that it allows us to collect quantifiable information from the participants using sampling methods and sending out online surveys, and questionnaires, the results of which can be depicted in numerical form.

Nevertheless, using qualitative approach, in addition to the quantitative method, allows us to make a holistic approach that involves discovery and enables us to develop a level of detail from highly being involved in the actual experiences with on-site presence. This approach builds its premises on inductive reasoning from the observational elements.

Here, the researcher has used a mixed approach as it's described above because the study constitutes observational elements with informal interview which are of qualitative type and descriptive surveys which are of quantitative type. The researcher had used sequential exploratory design as there was a need to observe the actual project management practices and conduct informal interview to the selected few project staffs first as a basis for assessing data-driven project management practices in the organization that was later followed by the online survey questionnaire which is of quantitative type.

3.2 Research Design

A research process' blueprint is called the research design. It is also known as a compass since it directs the course of the research process to its goal. The framework for data collection and analysis is provided by the research design; it also conveys the study's goal.

There are several study designs that may be categorized as exploratory, descriptive, correlational, or causal. This project work was chosen for a descriptive kind of study. With the use of a

descriptive survey design, a specific phenomenon may be thoroughly examined and understood in its current state (Cooper and Schindler,2008). With a descriptive survey design, specified objectives make data collecting relevant and adequate to the research topic (Abalang.J.A.2016).

3.3 Data Sources and Types

The researcher had used both internal and external data sources. The internal data source for the research work was records and reports of the organization itself. Whereas, the external data sources were the partner national societies (PNSs), the International Committee for Red Cross and Red Crescent (ICRC), and the International Federation of Red Cross and Red Crescent (IFRC)

Regarding the data types, both primary and secondary data types had been used with the research and the primary data of the research work were acquired through online survey questionnaire, informal interview and observation. Whereas, the secondary data were acquired from the internal data sources as described above.

3.4 Population and Sample

When doing research, all objects included in any subject of study are referred to as a population or universe collectively. A census inquiry is an extensive count of every component of the population. There is a great level of precision in such study where every aspect of the population is addressed. Therefore, it is not required to do a sample survey when the population size is small.

The target population is the entire population or group that a researcher is interested in generalizing the conclusion of the study. For this research, the target population are employees of Ethiopian Red Cross Society at its Head Office who are project staff, project support staff and those who are closely working on projects and related activities.

The total number of these groups of employees engaged in projects and related activities are 109 and they are entitled the target population in this research. These group of people range from juniors to managers in projects and related activities and have direct or indirect involvement with project execution in the organization.

Since the target population is small, 109, the researcher decided to conduct census study. As a result, the researcher had conducted an online survey on 109 respondents from the employees of the organization that comprise staffs from program, planning, logistics, human resources, and employees from other partner national societies delegation offices. The researcher had also conducted an informal interview with five more project and planning staffs from the same population through purposive sampling technique in addition to the on-site observation.

3.5 Data Collection Procedures

Concerning the data collection procedures, the researcher had used online Microsoft Forms to design online survey and collect answers form respondents. The researcher also had a one-to-one informal interview with the selected five people in addition to observing the existing project management practice and data use culture in the organization.

3.6 Ethical Consideration

While doing any thesis research work, basic principles of ethical research consideration is very important and should be stressed as the basic principles of ethical research is to preserve and protect confidential information about the participants and get their consent to use and share any information about them for only the purpose of the study.

In this regard, the researcher strictly followed the ethical procedures in doing the thesis and adhere to the rule with focusing on the research questions designed and approved earlier in the interaction with the research participants.

3.7 Data Analysis

The researcher used descriptive analysis method to analyze data collected from the surveys, and narrative analysis method to analyze the data collected from interviews and observations as means of data collection procedures as described above and write down my findings, review, and analyze them.

Regarding the data analysis tools and techniques, the researcher used SPSS statistical software for the descriptive data analysis as it provides broad range of analytical capabilities and data management features to analyze the data collected. The researcher also used Microsoft Excel for the narrative data analysis as it allows to automatically find unique phrase patterns within text, identify phrase and word frequency, custom latent variable frequency and definition, and find unique and common words within text phrases.

4. DATA PRESENTATION, DISCUSSION, ANALYSIS AND RESULTS

FINDINGS

4.1 Response rates and respondents general background

The online survey questionnaire was submitted to 109 respondents that comprises employees from different department of the organization. Out of which I have received responses from 78 respondents that accounts to 71.6% from the overall participants.

4.1.1 Gender Distribution of the Respondents

As it is shown in the figure below, from the total respondents, 23 female participants from the total 78 had responded to the online survey questionnaire accounting to 29.5%. The remaining 55, the larger amount of respondents were male that accounts to 70.5% from the total responses.



Figure 4.1 Gender distribution

4.1.2 Age Distribution of the Respondents

From the data analysis performed on age distribution using SPSS statistical software, the researcher received responses from 28 participants aged between 25 and 35 years of age inclusive that accounts 35.9%, 26 responses from the age group 36 to 45 accounting 33.3%, 17 respondents

aged between 46 and 55 years that accounts to 21.8%, and 6 respondents are above 55 years of age as it's shown below. From the data analysis and the responses distribution of the online survey, there is only 1 respondent below 25 years of age.

Age group				
	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	25 - 35	28	35.9	35.9
	36 - 45	26	33.3	69.2
	46 - 55	17	21.8	91.0
	Above 55	6	7.7	98.7
	Below 25	1	1.3	100.0
	Total	78	100.0	100.0

Table 4.1 Age group frequency

4.1.3 Education Level Distribution of the Respondents

From the statistical data analysis result, the largest share of the total respondents goes to Master's Degree as 44 respondents answered Master's Degree as their highest level of education that accounts 56.4%. The second largest share goes to Bachelor's Degree as 30 participants responded Bachelor's Degree as their highest level of education that accounts 38.5%. The remaining four respondents answered PhD and Diploma that accounts 2.6% each.

Highest level of education				
	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Bachelor degree	30	38.5	38.5

Diploma	2	2.6	2.6	41.0
Masters degree	44	56.4	56.4	97.4
PhD	2	2.6	2.6	100.0
Total	78	100.0	100.0	

Table 4.2 Highest level of education frequency

4.1.4 Department or Work Division Distribution of the Respondents

As it is shown in the below department or work division response distribution figure of the respondents, the majority of the respondents are from department of the Disaster Preparedness and Response, Disaster Risk Management and Disaster Risk Reduction that accounts 41% from the total respondents creating an opportunity for relatively better or fair judgement as those respondents very closely deal with projects and programs according to the structure of the organization.

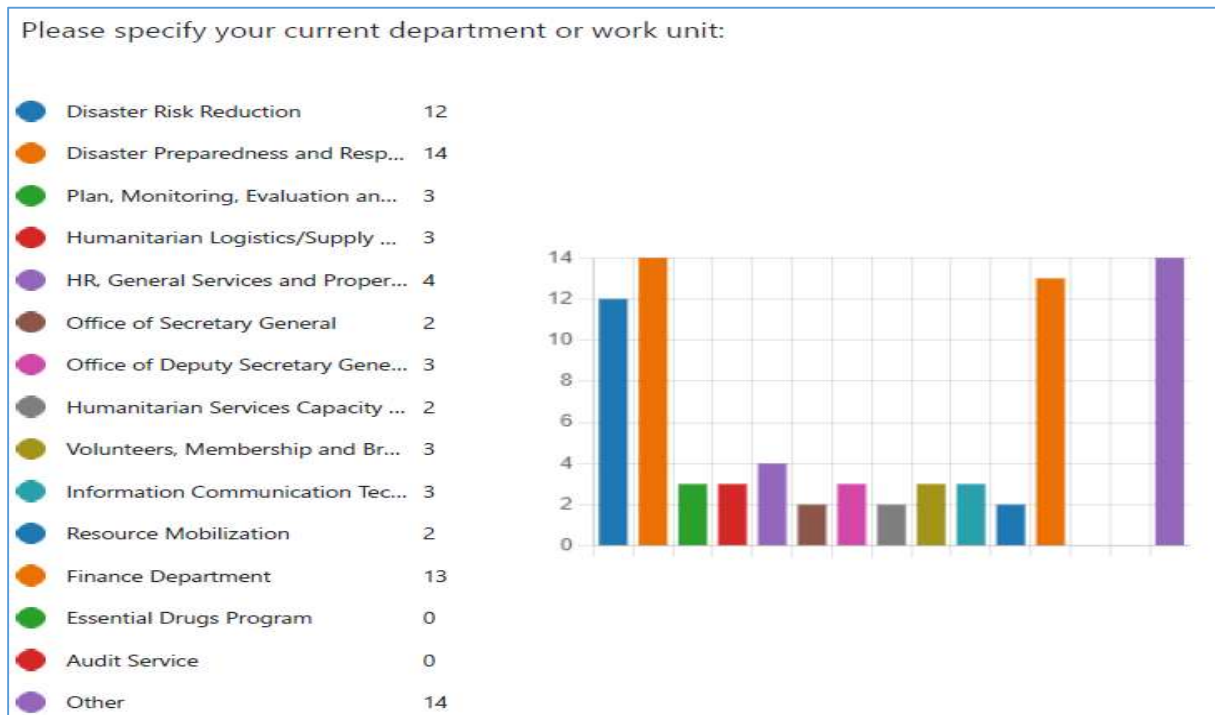


Figure 4.2 Department or work division distribution of the respondents

4.1.5 Job Position Distribution of the Respondents

From the data analysis of the responses, as it's shown in the figure below, the majority of the respondents are from the project or program staffs and account 75% of the total respondents that will really increase the recognition of the responses. This is really of great help in validation of the research objectives.

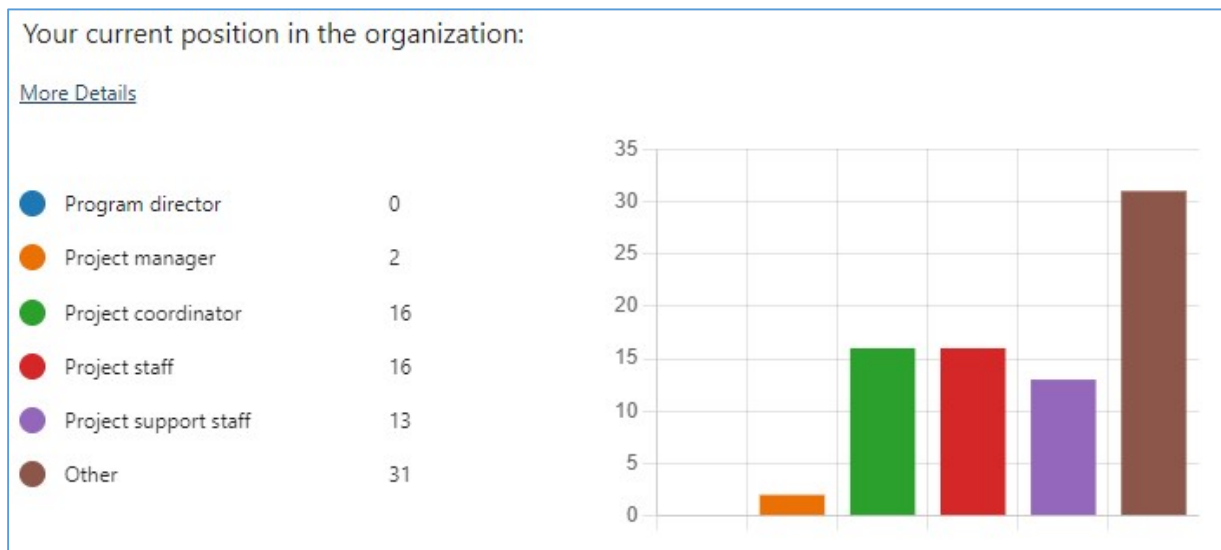


Figure 4.3 Job position distribution

4.1.6 Respondents work experience with the organization distribution

From the analysis results shown in the table below, 39 respondents have work experience less than 5 years with the organization that accounts 50% from the total and dominate from the overall responses.

Work experience with Ethiopian Red Cross Society

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 11 - 15	14	17.9	17.9	17.9
16 - 20	6	7.7	7.7	25.6
5 - 10	14	17.9	17.9	43.6

Above 20	5	6.4	6.4	50.0
Less than 5	39	50.0	50.0	100.0
Total	78	100.0	100.0	

Table 4.3 Work experience frequency

4.2 Central tendency of the responses about project data and information management

In this section the researcher has tried to put the results tendency to the center, which would ultimately contribute some share in the effort to assess the data-driven project management practice in the organization.

The questions in this section are of two types: Multiple choice and Likert scale type of survey questions. Hence, the researcher first needed to convert the Likert scale to the corresponding numeric value as given in the table below.

Likert scale string value	Numeric value assigned
Strongly disagree	1
Disagree	2
Neutral	3
Agree	4
Strongly agree	5

Table 4.4 Likert scale string value to numeric value conversion

Accordingly, questions in this section have been assigned a numeric value and further analyzed using SPSS as shown below in table.

4.2.1 Project productivity metrics data availability and accessibility

Regarding the data availability and accessibility related to project productivity metrics such as milestones, tasks, projections and duration, the descriptive statistics analysis performed using SPSS as it's shown in a table below tells us that although the mean for each metric is above average, there is still some work to do in order to have better data availability and accessibility related to all project productivity metrics in the organization.

Project productivity metrics data availability and accessibility descriptive statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Milestones	78	2.0	5.0	3.359	.9255	.023	.272	-.867	.538
Tasks	78	2.0	5.0	3.526	.9219	-.230	.272	-.769	.538
Projections	78	1.0	5.0	3.256	.9319	-.045	.272	-.215	.538
Duration	78	2.0	5.0	3.462	.9073	-.097	.272	-.769	.538
Valid N (listwise)	78								

Table 4.5 Descriptive statistics on project productivity metrics

4.2.2 Project quality metrics data availability and accessibility

The same applies to the data availability and accessibility related to project quality metrics as the project productivity metrics above, i.e. although the mean for each metric is above average, there is still some work to do in order to have better data availability and accessibility related to all project quality metrics in the organization.

Project quality metrics data availability and accessibility statistical description

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
No. of changes	78	1.0	5.0	3.269	.8926	-.001	.272	-.378	.538
Issues	78	2.0	5.0	3.346	.8948	.032	.272	-.774	.538
Cost variance	78	1.0	5.0	3.269	.9352	-.080	.272	-.246	.538
Valid N (listwise)	78								

Table 4.6 Project quality metrics descriptive statistics

4.2.3 Project documentation management in the organization

From the figure below, about project documentation management practice in the organization, 20 respondents said there is “No” established way of recording project documentation that accounts to 26%, 35 respondents said “Maybe” that accounts to 45% as it is shown in the table below, and only 23 respondents said “Yes” accounting to 29% of the total respondents that signals there is a need for improving project documentation management in the organization.

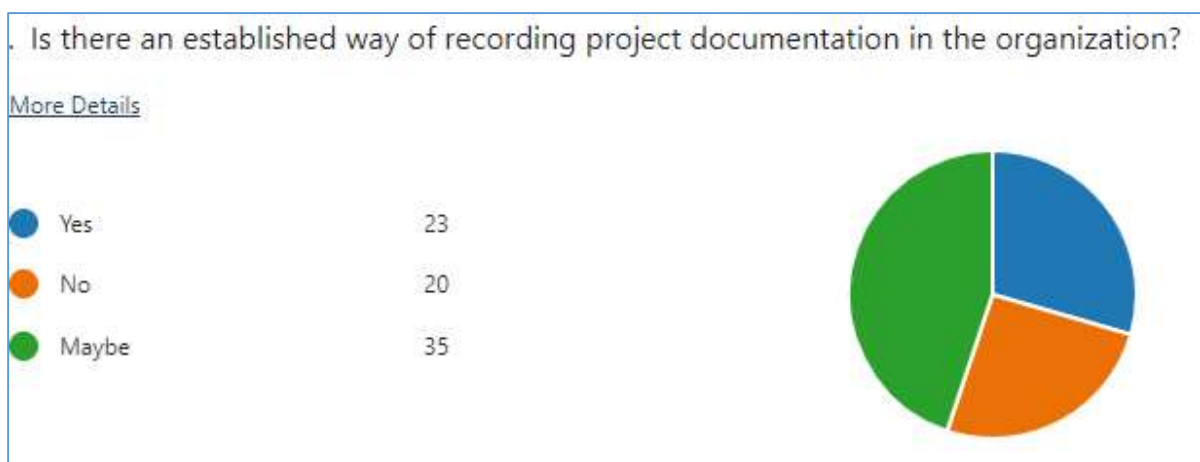


Figure 4.4 Established way for recording project documentation responses distribution

4.2.4 Project logistics, finance and human resource data availability and accessibility trend

From the table about project logistics, finance and human resource data availability and accessibility descriptive statistics, we have both a min value of 1 and max value of 5 for each variable with a mean value close to average indicating that there is a need to make improvement.

Project logistics, finance and human resource data availability and accessibility

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Logistics data	78	1.0	5.0	3.218	.9349	-.062	.272	-.346	.538

Finance data	78	1.0	5.0	3.615	.9701	-.642	.272	.088	.538
HR data	78	1.0	5.0	3.487	.9635	-.499	.272	.220	.538
Valid N (listwise)	78								

Table 4.7 Project logistics, finance and HR data availability and accessibility statistics

4.2.5 Project data management practice in the organization

From the analysis of responses, we can see that the project data management practice in the organization is very close to the average 2.73 in a 5-point scale and this directly has impact on data-driven project management practice in the organization indicating that there is a gap in data-driven project management practice in the organization that needs improvement.

Project data management practice

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Project data management practice	78	1	5	2.73	.817	.245	.272	1.332	.538
Valid N (listwise)	78								

Table 4.8 Project data management practice descriptive statistics

In the same section, other than the Likert scale questions, respondents were also asked multiple choice question that reflect the project data and information management practice in the organization.

They were questioned if there is an established way of collecting, storing and communicating project data in the organization, and from the total responses 25 respondents said “No” that accounts to 28% and 31 respondents said “Maybe” that accounts to 40%. Only the remaining 25

respondents said “Yes” that accounts to 32%, which indicates that there a need to improve project data collection, storing and communication in the organization.

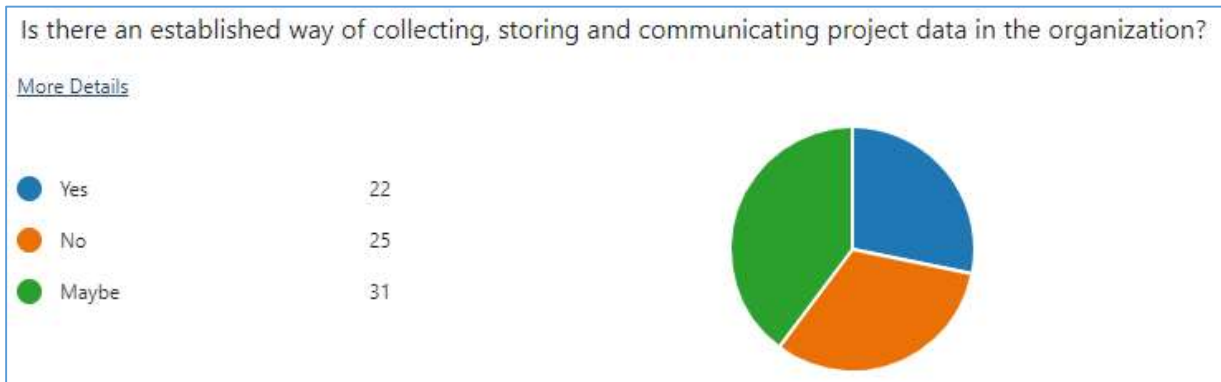


Figure 4.5 Presence of a way for project data collection, storing, and communicating responses distribution

In the same section, the respondents were also asked if there is an established way for stakeholder data management in the organization and 27 respondents answered “Yes” accounting to 35%, 21 respondents said “No” that accounts to 27%, and the remaining 30 respondents said “Maybe” that accounts to 38% indicating that there still a work to do in stakeholder data management in the organization.

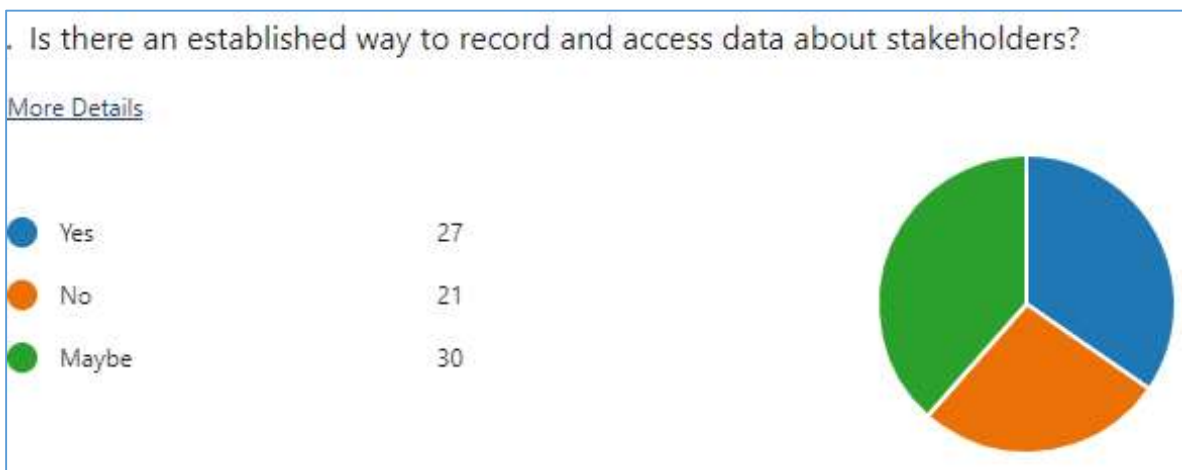


Figure 4.6 Presence of a means for stakeholder data management responses distribution

Those respondents who said there is established way for stakeholder data management in the organization were also questioned how stakeholders' data is managed, and the majority said "Both manual and electronic" with 20 responses that accounts to 50% from the total of 40 responses, and 12 respondents said "Manual" that accounts 30%. From this we can learn that there is no formal and defined way for stakeholder data management in the organization and needs improvement in this regard.



Figure 4.7 Stakeholder data management method responses distribution

4.2.6 Project Data Use Culture

In this section, respondents were asked about project data use culture in the organization so as to assess the data culture or data use practice in the organization, which will somehow affect the data-driven project management practice in the organization.

One of the questions the respondents asked in this section was to rate data use culture in the organization in relation to project management and the mean is 2.54 in a 5-point rating scale from the responses as it's shown in table below. This shows that there is a gap in data use culture in the

organization according to the respondents and needs improvement in this regard as it definitely determines the data-driven project management practice in the organization.

Data use culture

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Data use culture	78	1	5	2.54	.949	.214	.272	.323	.538
Valid N (listwise)	78								

Table 4.9 Data use culture descriptive statistics

The other question the respondents were asked is about the project data quality. This is also very important aspect of data as it determines the degree of data-driven project management practice in the organization. The respondents were asked to rate each data quality characteristic in a 5-point rating scale from very poor as the lowest score and very high as the highest score. The researcher then converted this Likert rating scale to equivalent numeric value as shown in Table 4.10 below and analyzed the data using SPSS statistical software as shown below in Table 4.11.

Likert scale string value	Numeric value assigned
Very poor	1
Poor	2
Average	3
High	4
Very high	5

Table 4.10 Likert scale rating string to numeric value conversion

The data analysis on project data quality responses shows the mean value for each data quality characteristic is close to the average and this indicates that there is a limitation in project data quality and needs improvement.

Project data quality

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Accuracy	78	1.0	4.0	2.833	.7282	-.767	.272	.939	.538
Completeness	78	1.0	4.0	2.833	.7282	-.560	.272	.540	.538
Reliability	78	1.0	5.0	3.064	.8113	-.269	.272	-.252	.538
Relevance	78	1.0	5.0	3.115	.7726	-.203	.272	-.340	.538
Timeliness	78	1.0	4.0	2.808	.7569	-.399	.272	.092	.538
Valid N (listwise)	78								

Table 4.11 Project data quality descriptive statistics

The researcher had also asked the respondents to rate the integration between sections in terms of project data or information exchange. Accordingly, we have a mean value of 2.63, which indicates that there is a gap in this regard and needs improvement in the integration between sections in order to enhance project management practice to be based on data.

Integration between sections in terms of project data or information exchange

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Integration between sections	78	1	5	2.63	.884	.119	.272	.294	.538
Valid N (listwise)	78								

Table 4.12 Integration between sections in terms of data exchange responses statistics

The respondents were also asked whether or not they use common data sets or big data in relation to project management and from the result of the response analysis given in table below shows that the majority of the respondents answered “Sometimes” that accounts 43.6% and those who said “Never” and “Rarely” account 20.5% and 15.4% respectively. This somehow indicates that still there is a need for improving data use culture in the organization as it ultimately affects data-driven project management practice.

Common datasets or big data use in relation to projects

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Always	7	9.0	9.0	9.0
Never	16	20.5	20.5	29.5
Often	9	11.5	11.5	41.0
Rarely	12	15.4	15.4	56.4
Sometimes	34	43.6	43.6	100.0
Total	78	100.0	100.0	

Table 4.13 Common datasets or big data use in relation to projects

The respondents were also asked whether or not they have had training on project data or information management and project documentation and the majority responded “No” with 59 responses that accounts to 76% as it is shown below in the figure below. This clearly indicates that there is a need for planning capacity building programs to skill up staffs to capacitate in project data management and project documentation in the organization as it has direct influence on data-driven project management.

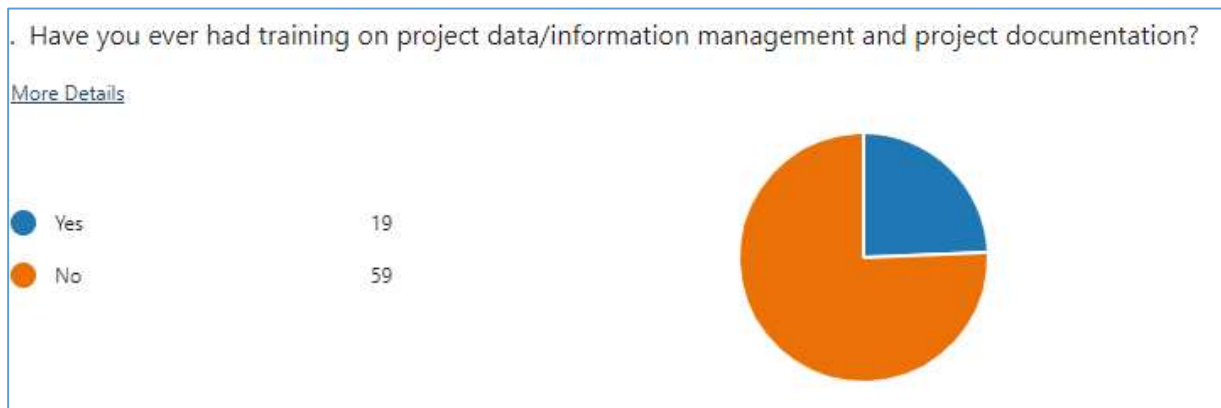


Figure 4.8 Training on project data management and project documentation responses distribution

The respondents were also asked how confident or ready they are to use project analytics tools and techniques and 28 respondents said “Somewhat confident” that accounts to 36% and 15 respondents said “Extremely confident” that accounts to 19%. However, there were 26 respondents who are neutral that accounts to 33% and 8 respondents that answered “Somewhat not confident” that accounts to 10%. This shows there is still a gap in skill with data analytics tools and techniques and needs to work on capacity building to bring about staff confidence and readiness to use project data analytics tools and techniques in the organization.

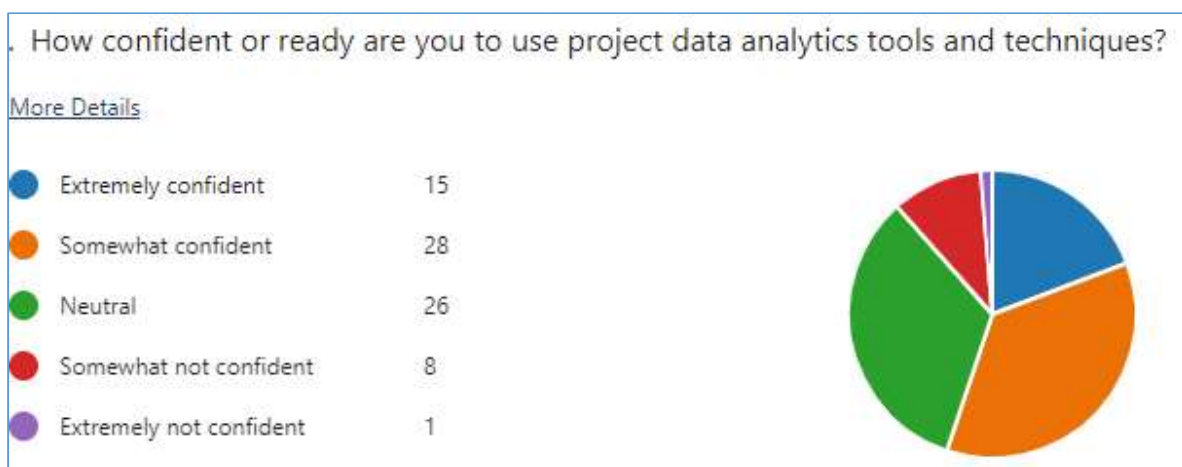


Figure 4.9 Confidence to use project data analytics tools and techniques responses distribution

In this section, the respondents were also asked how would they rate project data visibility in the organization overall, and from the analysis shown below in table, the mean value of the responses is 2.63 that's average result. This indicates that there is a gap in data visibility to manage projects based on data in the organization.

Project data visibility

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Project data visibility	78	1	5	2.63	.968	.287	.272	.370	.538
Valid N (listwise)	78								

Table 4.14 Project data visibility in the organization statistics

4.2.7 Project management and decision-making process

In this section, respondents were asked about project management and decision-making process in the organization, which will somehow reveal the data-driven project management practice in the organization.

One of the questions the respondents were asked was if there is an established way to communicate project progress report and from the table statistical analysis on the responses we can see that the 45 respondents answered “Yes” that accounts to 55% from the total respondents, and 27 respondents said “Maybe” accounting to 35% indicating that there is a possibility of an established way of communicating project progress report.

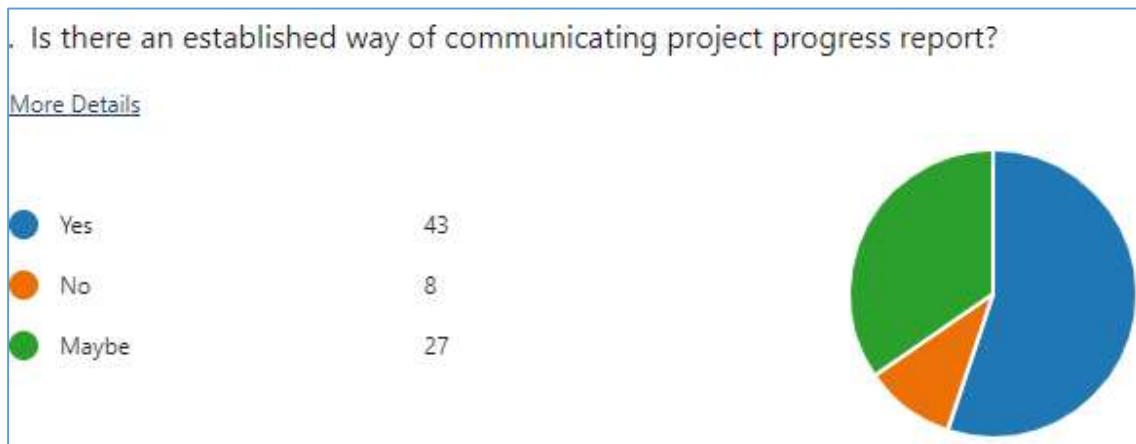


Figure 4.10 Presence of a way for communicating project progress report responses distribution

The respondents were also asked how the project progress report is being communicated and 42 respondents said “Both manual and electronic” that accounts to 54% and 25 respondents answered “Electronic – Email” which accounts to 32%. This indicates that there is no formal or standard way of communicating reports and this can make the data-driven project management practice difficult as there might not be consistent data about project progress.

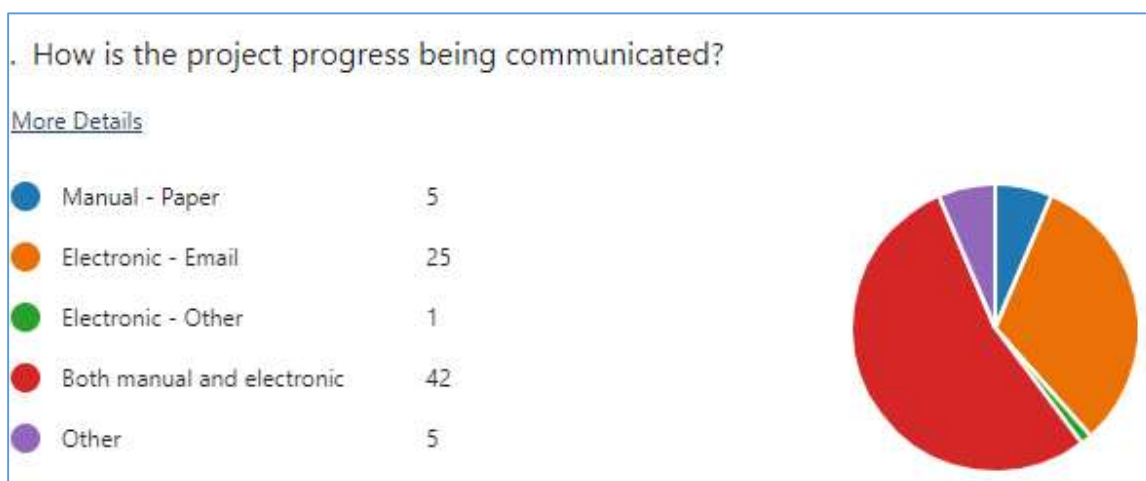


Figure 4.11 Project communication method responses distribution

The respondents were also questioned in this section how they would rate data-driven decision making in relation to project management in the organization and the mean value in the table below shows that it is 2.55 in a 5-point rating scale. This indicates the mean is an average value and hints that there is a limitation in data-driven project management practice.

Data-driven decision-making in relation to project management

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Data-driven decision making	78	1	5	2.55	.949	.177	.272	.320	.538
Valid N (listwise)	78								

Table 4.15 Data-driven decision-making in relation to project management response statistics

The respondents were also asked how likely projects are delivered on time and within budget in the organization and as we can see from the statistical analysis in table below, the mean value 4.91 in a 10-point rating scale. This indicates that on time and within budget projects delivery in the organization is below average and there is a great need for improvement in this regard.

Projects delivery on time and within budget in the organization

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Projects delivery on time and within budget	78	0	10	4.91	2.046	.106	.272	-.010	.538
Valid N (listwise)	78								

Table 4.16 Projects delivery on time and within budget in the organization statistics

The other question the respondents were asked in this section was which ways they would think best describe(s) decision making process in relation to project management in the organization. The responses distribution in the figure below shows that 38 respondents said “Based on both data and gut or instinct” that accounts to 49% and 31 respondents answered “Based on data” accounting to 40%. The other 6 respondents said “Based on gut or instinct” that accounts to 8%. From the responses analysis, we can say that there needs to be formal way to follow the decision making process so as to improve the project management practice based on data in the organization.



Figure 4.13 Way of decision making process in the organization responses distribution

The other question the respondents asked was how they would measure the quality of project execution in terms of the three key dimensions of project management in the organization. The question was asked in Likert rating scale and it first needs to be converted to its equivalent numerical value from string value as it’s shown in the table below.

Likert scale string value	Numeric value assigned
Very poor	1
Below average	2
Average	3
Above average	4
Excellent	5

Table 4.17 Likert scale rating string to numeric value conversion

From the statistical analysis on the responses, the mean values for all the three project management dimensions, namely, scope, cost and time, are 3.24, 3.28, and 2.92 respectively. From the analysis, we can learn that the time aspect of projects execution in the organization needs to be improved as it is relatively lower in mean as compared to the other dimensions and the rating scale it is shown in the table below. This could be potentially achieved by practicing data-driven project management.

Quality of project execution

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Scope	78	1.0	5.0	3.244	.7926	.496	.272	.916	.538
Cost	78	2.0	5.0	3.282	.7367	.696	.272	.501	.538
Time	78	1.0	5.0	2.923	.8793	-.083	.272	.462	.538
Valid N (listwise)	78								

Table 4.18 Quality of project execution statistics

Discussion of results by project management maturity with project data perspective focusing on OPM3 model and using project management knowledge areas

Below, results are discussed based on organizational project management maturity model using project management knowledge areas namely: Project Scope Management, Project Cost Management, Project Schedule Management, Project Communication Management, Project Stakeholder Management, Project Integration Management, Project Quality Management, Project Human Resource Management, Project Procurement Management, and Project Risk Management.

Project Scope Management

The quality of project execution in the organization in terms of scope including work schedule, work duration, work costs, and resource requirements is found to be average and this shows that there needs to be improvement in project scope management. There is a practice of breaking down project's work is into smaller, more manageable group of activities, or what is known as work packages; however, there is a need to improve these practices in to a detailed and more formal practices of work breakdown (WBS) structures. In addition to that, there is limitation to data availability and accessibility in relation to project scope including work schedule, work duration, work costs and resources requirements, and this also needs improvement. From the assessment, the data-driven project management maturity in terms of project communication management score is 3.2, which is close to level 3, the managed level, as indicated below in the spider web diagram.

Project Cost Management

From the study, the quality of project execution in the organization is found to be average in terms of cost and this needs improvement as both direct and indirect project costs have major impact on overall project output. Of course, there is a good practice of using project cost management in the organization in this regard as it's being managed in electronic way using professional enterprise resource planning (ERP) software, SAP. Yet, there is still a need to improve the usage and practices of project cost management in the organization as there is an inefficient usage of the system. Hence, there is a good practice of project cost data management as it's being supported by technology although there is a need to improve its usage in efficient manner. From the assessment, the data-driven project management maturity in terms of project cost management score is 2.9, which is between level 2 and 3 as indicated below in the spider web diagram.

Project Schedule Management

The time management of the projects in the organization is not as good as it needs to be and even some of the projects fall behind schedule. Although there is a practice of defining the time table for project execution in the organization, it's been found out that there is a gap in completing the projects according to the schedule. It has been also learnt that there is a gap in availability and accessibility of project schedule details and project timetable status as it stands and regularly either in electronic or manual way to the project staffs and the stakeholders. It is also very critical that most of the projects in the organization are sponsored by external donors and there is a great need for projects to be completed according to the schedule by all parties. As a result, from the above discussion and being one of the most important and key aspects of project management, it needs a major attention and should be improved greatly. From the assessment, the data-driven project management maturity in terms of project schedule management score is 2.7, which is between level 2 and 3 as indicated below in the spider web diagram.

Project Communication Management

Information exchange between sections concerned such as finance, logistics and human resource departments is found to be average and there is still a need to improve in this regard. Regarding the project progress report, there is a periodic project reporting mechanism which is found to be good; however, the project progress report is made through both electronic and manual way and this requires to define and have one formal and well established way to maintain project data or information consistency and ease of project data or information accessibility. From the assessment, the data-driven project management maturity in terms of project communication management score is 3.3, which is close to level 3, the managed level, as indicated below in the spider web diagram.

Project Stakeholder Management

The stakeholder management in the organization, according to the findings of the study, requires improvement as there is no recorded and well established way to record and keep data about stakeholders. And also, there is no formal way to define their participation in the creation of the project management plan, the project charter and scope statement, the supervisory board for change, revisions to the project, and setting boundaries. It has also been found out that there is no formal way to record and keep data about stakeholders as the stakeholder data is found both in electronic and manual way making it difficult to access and use it. There is also no formally defined type and level of access to data to the stakeholders and this violates one of the major characteristics of quality data, relevance. From the assessment, the data-driven project management maturity in terms of project stakeholder management score is 2.8, which is between level 2 and 3 as indicated below in the spider web diagram.

Project Quality Management

The organization has quality standards that are applied to project activities such as planning, execution, and control by the department of planning, monitoring, evaluation, and reporting (PMER), quality assurance section. Throughout the various project phases, projects are routinely evaluated and reviewed, and any necessary corrective steps are implemented. The quality of project execution in the company is determined to be ordinary, hence there is a need to improve data accessibility and availability of project quality standards and their application utilizing quality management system (QMS). From the assessment, the data-driven project management maturity in terms of project quality management score is 2.9, which is between level 2 and 3, the managed level, as indicated below in the spider web diagram.

Project Human Resource Management

The project team has a defined roles and responsibilities for project execution. Project start-up meeting takes place with project team members to discuss the roles and project scope during the planning phase of

the project. Project human resources data is available and is being managed using a software that's automated with finance payroll system. The performance management capability of the system makes it convenient to measure the performance of the project staffs. However, the electronic data accessibility of the project human resources is limited to the human resource staffs only indicating that there is limitation in HR data accessibility to the program department and needs improvement in this regard. From the assessment, the data-driven project management maturity in terms of project human resources management is in level 4, the integrated level, as indicated below in the spider web diagram.

Project Integration Management

In order to authorize the establishment of projects, certain procedures are used. To carry out and keep track of projects, the project plan, which also includes subproject plans and delivery plans, is formally authorized and documented. This includes project logical framework, also known as logframe, that is used for project planning, implementation, monitoring and evaluation in the organization. What work to be done, the output, and to whom is specified in the working plan that serves as the project charter. Stakeholders are notified of changes so they may voice their opinions and obtain consent.

After preliminary acceptance, there is a formal process for project conclusion where reports are created and both the stakeholders and the organization provide ideas and input. However, there is a gap in recording data in the archive as lessons learnt for better performance in next initiatives. There is no such established way to archive lessons learnt that could be used as an input for future projects. From the assessment, the data-driven project management maturity in terms of project integration management score is 3.2, which is close to level 3, the managed level, as indicated below in the spider web diagram.

Project Procurement Management

For carrying out procurement processes in the organization, a formal working method and forms are offered. Logistics, finance, and the project department collaborate often. There is enterprise resource planning (ERP) module for the logistics and procurement; however, it has been found out that there is limitation in using the system efficiently. Although some of the procurement data and information is shared among the concerned departments such as finance, most of the procurement and logistics activities are performed and approvals are made manually at every level making the procurement process long and time taking. There is also a gap in electronically keeping records about project procurements making project procurement data availability and accessibility limited and needs improvement in this regard. From the assessment, the data-driven project management maturity in terms of project procurement management score is 3.2, which is close to level 3, the managed level, as indicated below in the spider web diagram.

Project Risk Management

Risk management is acknowledged and occasionally used in the organization's projects. Since most of the projects carried out in the organization are similar, project staff members, including the project coordinators, are aware of common dangers from prior project experiences. The project plan has a risk management strategy to address risks that are likely to materialize. The degree and likelihood of risks are typically deemed high, and a suitable contingency plan is included in the project plan. Risk analysis is performed based on the project staff's experiences and expert judgments. However, there is limitation in electronically documenting and sharing data about the previous experience in related projects and sometimes this makes it difficult to take appropriate measure beforehand and this needs improvement. From the assessment, the data-driven project management maturity in terms of project risk management score is 3.4, which is close to level 3, the managed level, as indicated below in the spider web diagram.

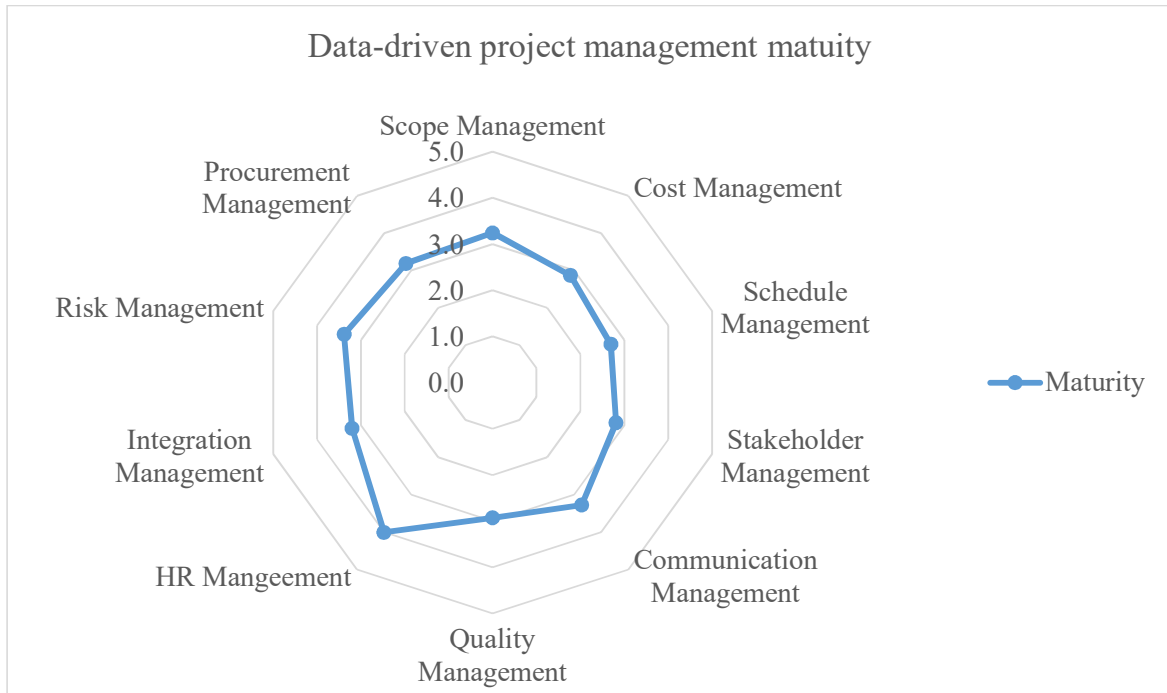


Figure 4.13 Data-driven project management maturity with project management knowledge areas

The overall data-driven project management maturity of key project management knowledge areas was found between maturity level 2 and 3 as shown in the spider web diagram above. From the assessment, all of the knowledge areas had reached maturity level 2. Crawford (2006) mentioned key characteristics of Maturity Level 2 has consistent and basic approach to project execution, repeatable processes are applied to basic project management steps and generic tools and techniques are used for key PM processes. This indicates that, the organization has at least a basic foundation of data-driven project management practices.

5. SUMMARY, CONCLUSION AND RECOMMENDATIONS

The main purpose of this study is to assess data-driven project management practices with a particular focus on project maturity models at Ethiopian Red Cross Society. This chapter presents the summary of the findings presented in the previous chapter of this study, and based on these findings final conclusion and recommendations shall be made.

Summary

Regarding project data and information management, the study results show that there is limitation in project data management practice in the organization overall as there is no strict rules or procedures being used regarding data management.

From the study, we can say that there is an established way of collecting project data using tools like Kobo Toolboxes to some extent but there is a gap in storing, processing and accessing or communicating it among different project teams within the organization and different stakeholders. The study also shows that there is limitation with project logistics, finance and human resource data and gap in integration between sections in relation to project data and information exchange.

Regarding project documentation, the study shows that there is limitation in project documentation management in the organization hinting that there is a high need for improvement in this regard. There is also a limitation in stakeholder data management in the organization as it is being shown in the study with no formal way to keep track of their data as the majority of the respondents indicated that data about the stakeholders is recorded in both manual and electronic ways in inconsistent manner.

The study also shows that there is gap in data culture in the organization and needs improvement in this regard as it definitely determines the data-driven project management practices in the

organization. The researcher also tried to assess project data quality based on its key characteristics and the data analysis on project data quality and the responses shows that although the mean value for each data quality characteristic is close to the average and it needs improvement.

It's has been also learnt that the majority of the staff haven't had training on project data management and project documentation, and as a result there is a need for planning capacity building programs to skill up staffs to capacitate in project data management and project documentation in the organization. From the assessment, we can also see that there is limitation in project data visibility in the organization and this indicates that there is a need to work towards building a strong data-driven culture as it is the base for data-driven project management. It has also been found out that there is a data policy being drafted and is in the process of approval; however, there is no data strategy in place yet that defines how to manage, analyze and act on project data in order to support and put the project data in a more consistent and manageable way. It has also been found out that although there is a way of communicating project progress report in the organization, there should be one formal way of doing it so as the project progress report is being communicated in both electronic and manual way. Regarding the data-driven decision making process in relation to project management in the organization, it is below average and this needs a serious attention as it's where the competitive advantage of the data-driven culture lies.

The other key finding of the study is that, the likelihood of project execution on time and within budget in the organization tends to be average and this really needs improvement. According to the study, the tendency of project decision making process in the organization is best described as based on both gut or instinct and data.

Finally, from the assessment, the quality of project execution in terms of the three key dimensions of the project management namely, scope, time and cost shows that it is in average level and this

also needs attention and take all the necessary steps towards data-driven project management which the researcher believes will help the organization's project management practices in this regard.

Conclusion

Since its inception, the Ethiopian Red Cross Society has been the first of its kind working in a wide range of humanitarian activities in the country. The organization performs several programs linked with its humanitarian tasks as well as other temporary relief aid activities in order to fulfill its objective based on its founding principles and values. As a result, the organization has a rather high public profile and is well-known throughout the country. At various periods throughout its history in the country, its commendable humanitarian actions have caught the attention of several local and international NGOs, as well as local and international media. The Red Cross symbol is widely recognized and revered by all people, regardless of religion, color, political views, or other differences, due to its neutrality, honesty, and impartiality.

The Ethiopian Red Cross Society, as the country's leading humanitarian organization, it has more branches than any other local NGOs, reaching down to the lowest administrative level, kebele, with the mission of preventing and alleviating human suffering and contributing to humanity's well-being and peace, in accordance with the Geneva Conventions and the Red Cross Red Crescent movement's fundamental principles and purposes i.e. to help those who suffer, without discrimination, whether during conflict, in response to natural or man-made disasters, or due to conditions of chronic poverty.

Therefore, the organization needs all its activities to be based on data and more specifically with its wide range implementations of different projects of humanitarian kinds. This nature of the organization demands it to be data-driven and base all of its decisions to be based on data.

As a result, the researcher decided to assess data-driven project management in the organization with a particular focus on project maturity models, and according to the results of the study, the overall data-driven project management maturity of key project management knowledge areas was found between maturity level 2 and 3 with all the knowledge areas reaching maturity level 2.

Crawford (2006) mentioned key characteristics of Maturity Level 2 has consistent and basic approach to project execution, repeatable processes are applied to basic project management steps and generic tools and techniques are used for key PM processes. This indicates that, the organization has at least a basic foundation of data-driven project management practices. However, there is still a need for improving the data-driven project management practices in the organization.

Recommendations

Ethiopian Red Cross Society implements multiple humanitarian projects at a time and needs to manage those projects effectively based on data, which in turn is foundation for other similar projects in addition to helping the timely and within budget completion of projects.

In addition to that, it is of great importance that humanitarian organizations like Ethiopian Red Cross Society require data more than others as most of the projects are funded by external donors, which in turn demand proper, timely and within budget execution of projects and it could otherwise potentially affect the partnership between the two parties. As it's been said, it is eminent that such organizations need to have proper and well-established project data management in place.

Hence, the Ethiopian Red Cross Society should implement proper data management system and make effort to build data-driven culture in the organization. It also needs to provide the staffs with data management and project documentation training and capacitate them with the right skills in using and managing data about projects.

It's also expected that the Ethiopian Red Cross Society management would take the lion share with every effort it takes to move towards the realization of data-driven culture by transforming the organization from where it is now to where it should be with regards to data culture and ensuring data-driven organization that bases all of its decisions on data and only data.

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7. Appendix

Appendix A - Online Survey Questionnaire

Assessment of Data-Driven Project Management Practice at Ethiopian Red Cross Society

The purpose of this online survey questionnaire is to assess data-driven project management practice at **Ethiopian Red Cross Society**. The study is used mainly for academic purposes and it is carried out as a partial requirement for the award of Master's Degree in Project Management from Addis Ababa University, School of Commerce.

Kindly, take into consideration that the validation of the research objectives depends on your genuine and timely response. Please also be assured that the information you provide will be used only for academic purposes and will be kept confidential.

It will take about 15 minutes of your time to complete the survey. Your time spent on this survey is really appreciated.

If you have questions or need clarification on the survey, please feel free to contact me on:
Mobile: 0911831782 or Email: habtish11@gmail.com

Thank you in advance for your cooperation!

* Required

Part I: General information and demographic data

1. Gender *

- Male
- Female

2. Age group *

- Below 25
- 25 - 35
- 36 - 45
- 46 - 55
- Above 55

3. Your highest level of education: *

- PhD
- Masters degree
- Bachelor degree
- Diploma
- Certificate
- High school
- Primary school
- Non-formal education

4. Please specify your current department or work unit: *

- Disaster Risk Reduction
- Disaster Preparedness and Response
- Plan, Monitoring, Evaluation and Reporting
- Humanitarian Logistics/Supply Chain
- HR, General Services and Property Administration
- Office of Secretary General
- Office of Deputy Secretary General
- Humanitarian Services Capacity Building Center
- Volunteers, Membership and Branches Affairs
- Information Communication Technology
- Resource Mobilization
- Finance Department
- Essential Drugs Program
- Audit Service
- Other

5. Your current position in the organization: *

- Program director
- Project manager
- Project coordinator
- Project staff
- Project support staff
- Other

6. Work experience with Ethiopian Red Cross Society:
(in years) *

- Less than 5
- 5 - 10
- 11 - 15
- 16 - 20
- Above 20

Part II: Project data and information management

7. Is there an established way of collecting, storing and communicating project data in the organization? *

- Yes
- No
- Maybe

8. To what extent do you agree or disagree with data availability and accessibility related to project productivity metrics below? *

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Milestones	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tasks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Projections	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Duration	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

9. To what extent do you agree or disagree with data availability and accessibility related to project quality metrics below? *

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Number of changes (Change log)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Issues	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cost variance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10. Is there an established way of recording project documentation in the organization? *

- Yes
- No
- Maybe

11. To what extent do you agree or disagree with the availability and accessibility of project documentation in terms of its key elements below? *

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Project proposal	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Project charter	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Planning	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Project management plan	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Project schedule	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Financial plan	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Risk and issues log	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Project status report	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lessons learnt	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

12. Is there an established way to record and access data about stakeholders? *

- Yes
- No
- Maybe

13. If you answered yes above, how is stakeholders data managed?

- Manual - paper
- Electronic - Excel
- Electronic - other
- Both manual and electronic
- Other

14. To what extent do you agree or disagree with project data availability and accessibility in terms of project logistics, finance and human resource? *

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Project logistics data	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Project finance data	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Project HR data	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

15. How do you rate project data management practice in the organization? *

1 2 3 4 5

Part III: Project data use culture

16. How do you rate the data use culture in the organization in relation to project management? *



17. How do you rate the quality of project data in terms of its characteristics in the organization? *

	Very poor	Poor	Average	High	Very high
Accuracy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Completeness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reliability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Relevance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Timeliness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

18. How do you measure the integration between sections in terms of data/information exchange with project implementation? *

1 2 3 4 5

19. How do you rate project data visibility in the organization overall? *



20. Do you use common data sets or big data in relation to humanitarian or development projects? *

- Always
- Often
- Sometimes
- Rarely
- Never

21. Is there data policy that provides a framework for data management in the organization? *

- Yes
- No
- Maybe

22. Does the organization have a data strategy? *

- Yes
- No
- Maybe

23. Have you ever had training on project data/information management and project documentation? *

Yes

No

24. How confident or ready are you to use project data analytics tools and techniques? *

Extremely confident

Somewhat confident

Neutral

Somewhat not confident

Extremely not confident

Part IV: Project management and decision making process

25. Is there an established way of communicating project progress report? *

- Yes
- No
- Maybe

26. How often is project progress report being communicated? *

- Daily
- Weekly
- Monthly
- Seasonal
- Yearly
- Never

27. How is the project progress being communicated? *

- Manual - Paper
- Electronic - Email
- Electronic - Other
- Both manual and electronic
- Other

28. How do you rate data-driven decision making in relation to project management in the organization? *



29. What tools and techniques are currently being used to plan and track project progress?

(Enter N/A if there are no any such tools and techniques) *

30. Do you use online tools that allow collaboration and sharing project information within and between team(s)? *

- Yes
- No
- Maybe

31. How likely are projects delivered on time and within budget in the organization? *

0	1	2	3	4	5	6	7	8	9	10
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Not at all likely

Extremely likely

32. Which of the following ways do you think best describe(s) the decision making process in relation to project management in the organization? *

- Based on gut or instinct
- Based on data
- Based on both data and gut or instinct
- Other

33. How do you measure the quality of project execution in the organization in terms of the three key dimensions of project management? *

	Excellent	Above average	Average	Below average	Very poor
Scope	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cost	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

34. What do you think the project staff including the project managers should do to bring change and improve project management practice in the organization? *

35. What do you think the Ethiopian Red Cross Society management should do to bring change and improve project management practice in the organization?

*

This content is neither created nor endorsed by Microsoft. The data you submit will be sent to the form owner.



Appendix B – Summary of Responses

Assessment of Data-Driven Project Management Practice at Ethiopian Red Cross Society

78
Responses

55:32
Average time to complete

Closed
Status

1. Gender

● Male	55
● Female	23



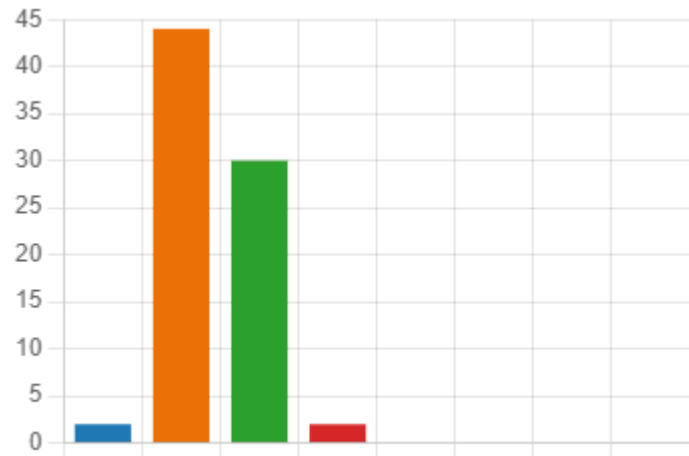
2. Age group

● Below 25	1
● 25 - 35	28
● 36 - 45	26
● 46 - 55	17
● Above 55	6



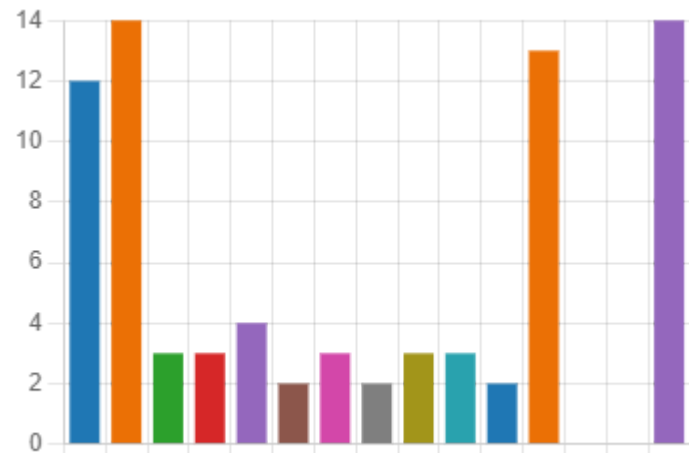
3. Your highest level of education:

● PhD	2
● Masters degree	44
● Bachelor degree	30
● Diploma	2
● Certificate	0
● High school	0
● Primary school	0
● Non-formal education	0



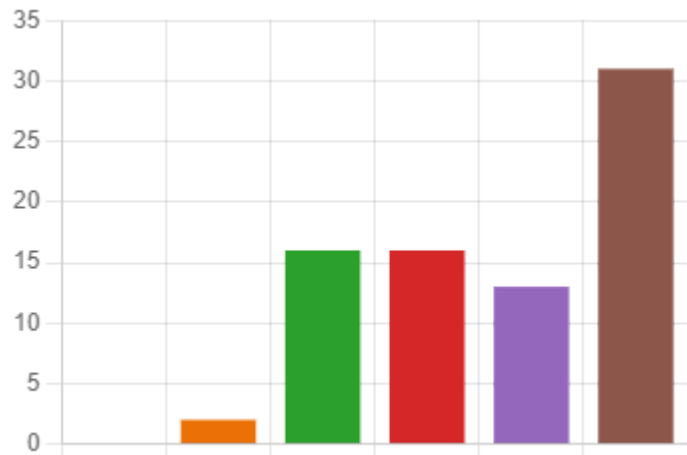
4. Please specify your current department or work unit:

● Disaster Risk Reduction	12
● Disaster Preparedness and Resp...	14
● Plan, Monitoring, Evaluation an...	3
● Humanitarian Logistics/Supply ...	3
● HR, General Services and Proper...	4
● Office of Secretary General	2
● Office of Deputy Secretary Gene...	3
● Humanitarian Services Capacity ...	2
● Volunteers, Membership and Br...	3
● Information Communication Tec...	3
● Resource Mobilization	2
● Finance Department	13
● Essential Drugs Program	0
● Audit Service	0
● Other	14



5. Your current position in the organization:

● Program director	0
● Project manager	2
● Project coordinator	16
● Project staff	16
● Project support staff	13
● Other	31



6. Work experience with Ethiopian Red Cross Society: (in years)

● Less than 5	39
● 5 - 10	14
● 11 - 15	14
● 16 - 20	6
● Above 20	5

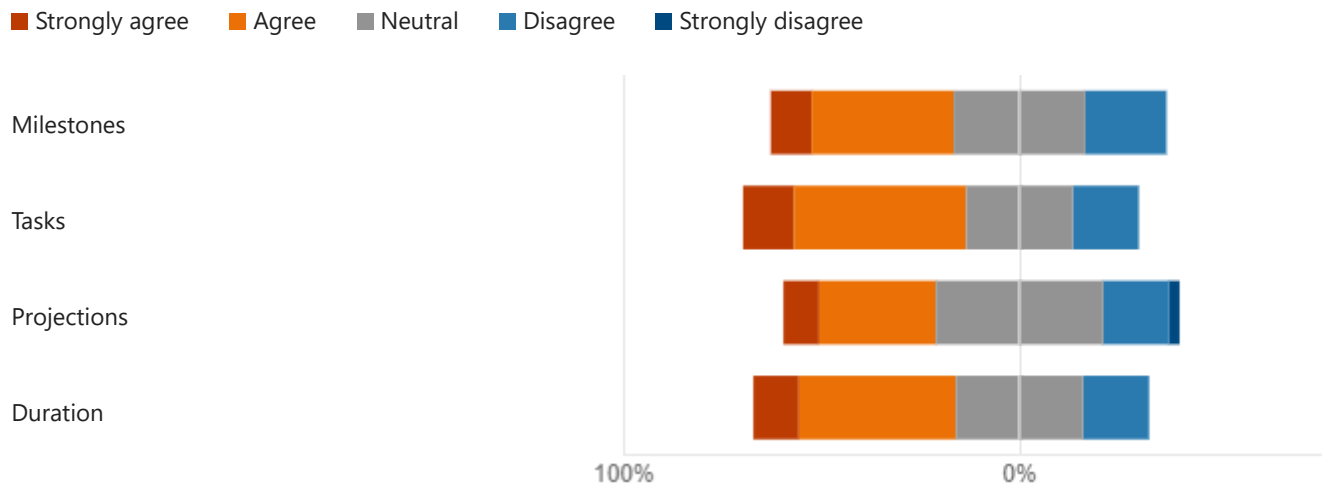


7. Is there an established way of collecting, storing and communicating project data in the organization?

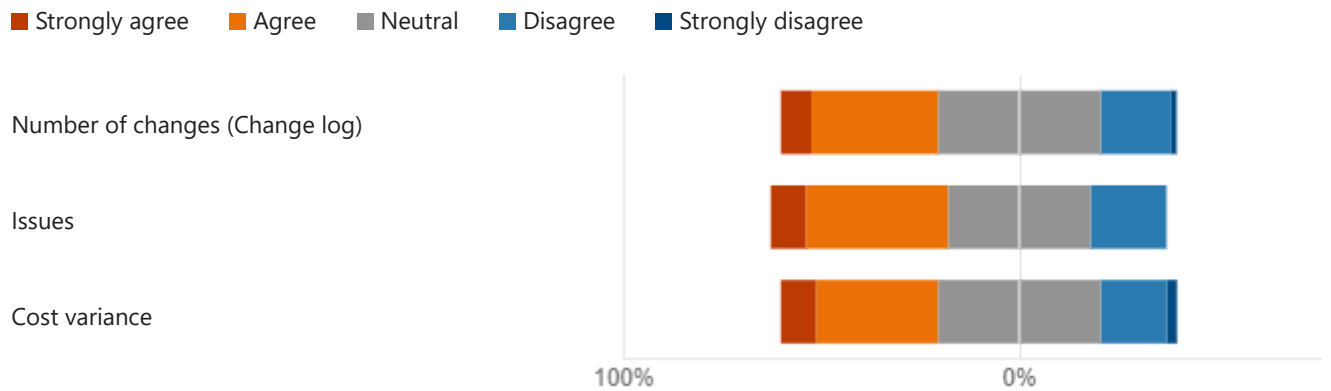
● Yes	22
● No	25
● Maybe	31



8. To what extent do you agree or disagree with data availability and accessibility related to project productivity metrics below?



9. To what extent do you agree or disagree with data availability and accessibility related to project quality metrics below?

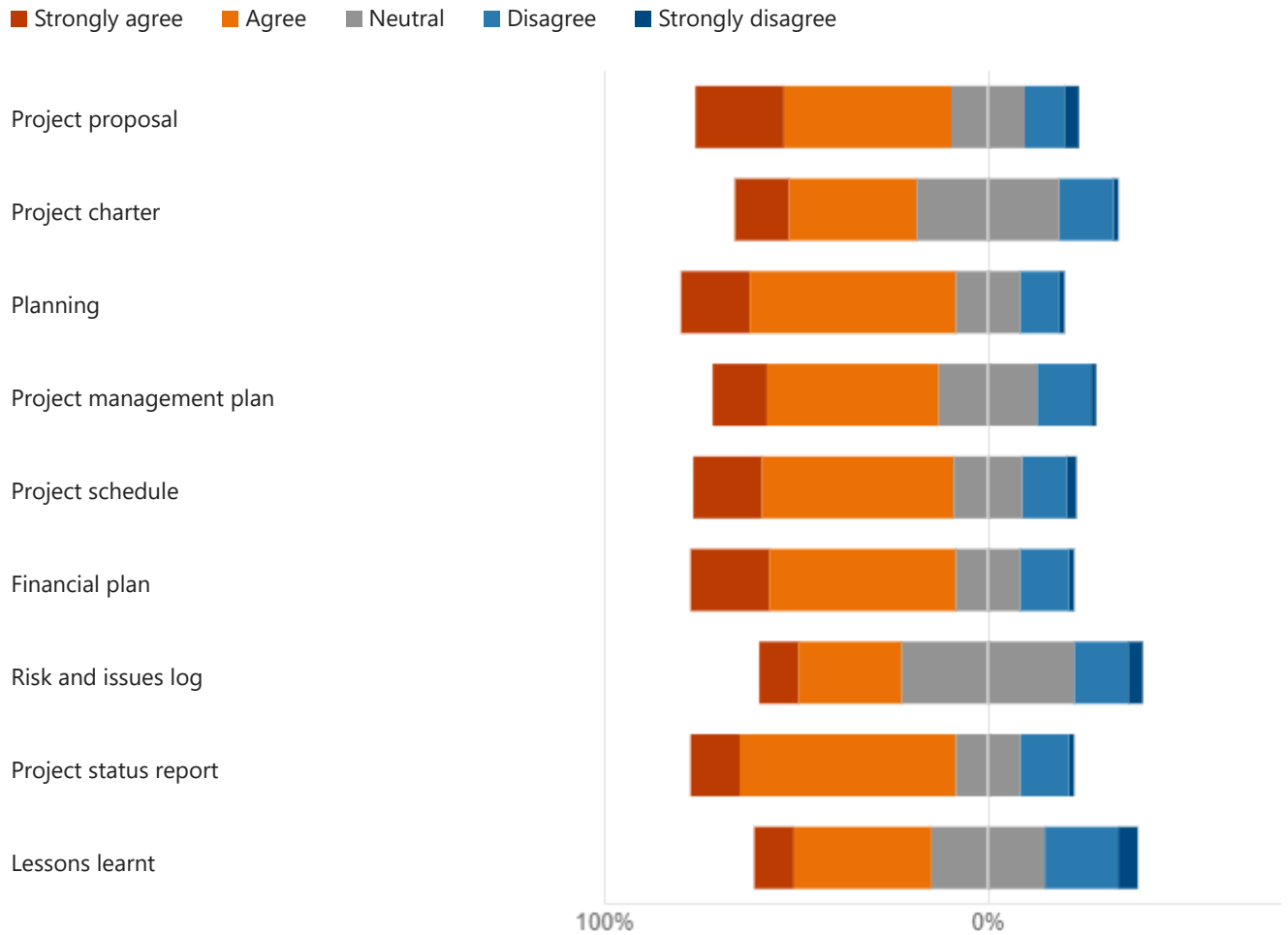


10. Is there an established way of recording project documentation in the organization?

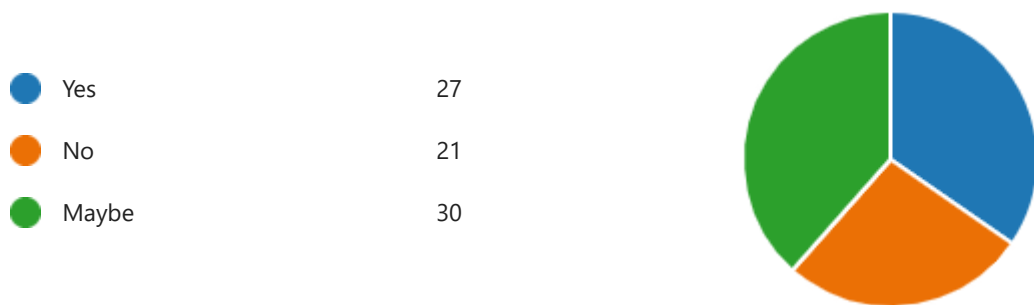
Yes	23
No	20
Maybe	35



11. To what extent do you agree or disagree with the availability and accessibility of project documentation in terms of its key elements below?



12. Is there an established way to record and access data about stakeholders?



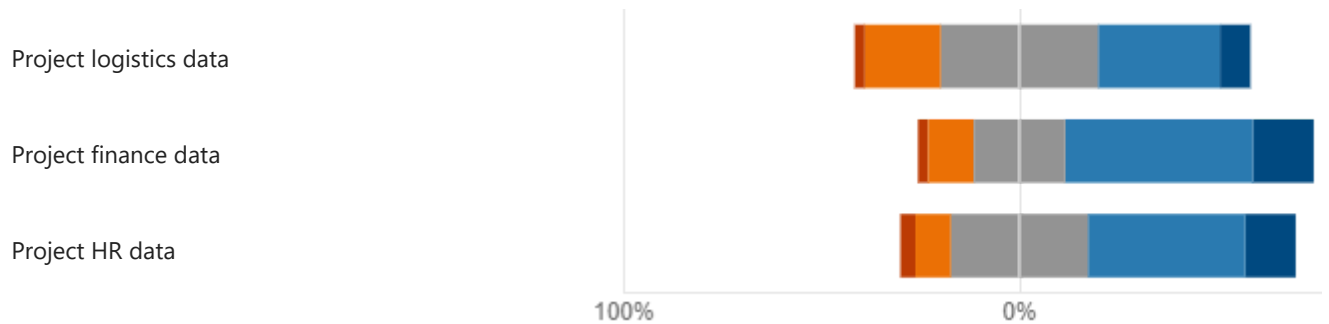
13. If you answered yes above, how is stakeholders data managed?

● Manual - paper	12
● Electronic - Excel	3
● Electronic - other	2
● Both manual and electronic	20
● Other	3



14. To what extent do you agree or disagree with project data availability and accessibility in terms of project logistics, finance and human resource?

■ Strongly disagree
 ■ Disagree
 ■ Neutral
 ■ Agree
 ■ Strongly agree



15. How do you rate project data management practice in the organization?

78
 Responses

2.73
 Average Number

16. How do you rate the data use culture in the organization in relation to project management?

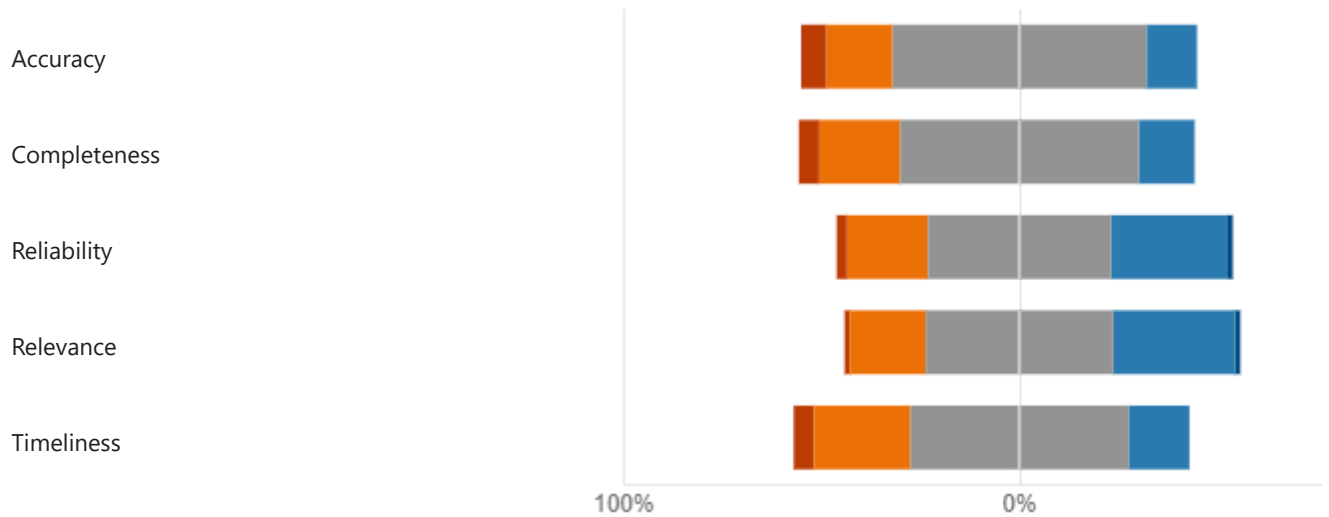
78
Responses



2.54 Average Rating

17. How do you rate the quality of project data in terms of its characteristics in the organization?

Very poor Poor Average High Very high



18. How do you measure the integration between sections in terms of data/information exchange with project implementation?

78
Responses

2.63
Average Number

19. How do you rate project data visibility in the organization overall?

78
Responses



2.63 Average Rating

20. Do you use common data sets or big data in relation to humanitarian or development projects?

● Always	7
● Often	9
● Sometimes	34
● Rarely	12
● Never	16



21. Is there data policy that provides a framework for data management in the organization?

● Yes	18
● No	18
● Maybe	42

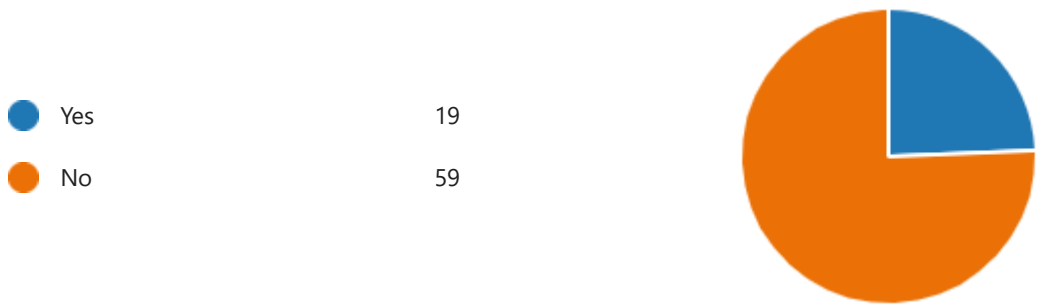


22. Does the organization have a data strategy?

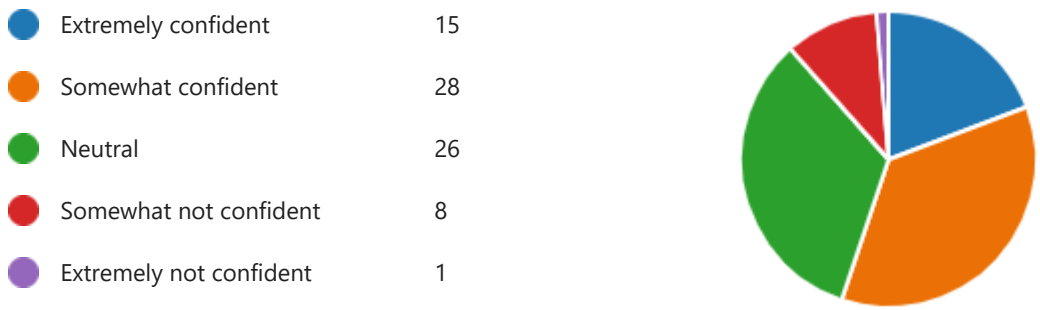
● Yes	16
● No	19
● Maybe	43



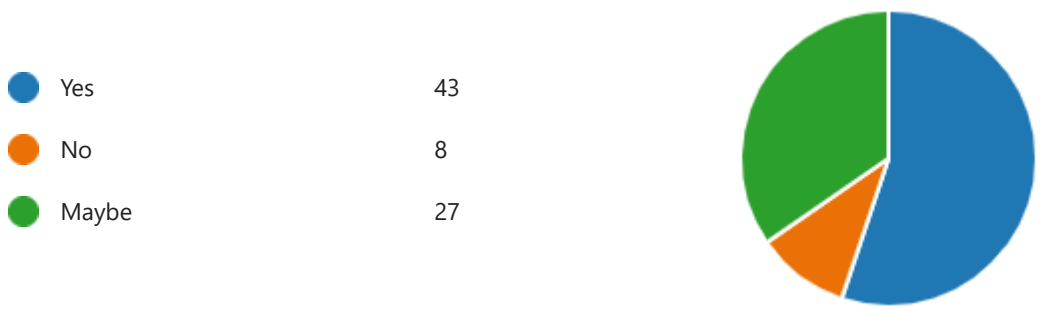
23. Have you ever had training on project data/information management and project documentation?



24. How confident or ready are you to use project data analytics tools and techniques?

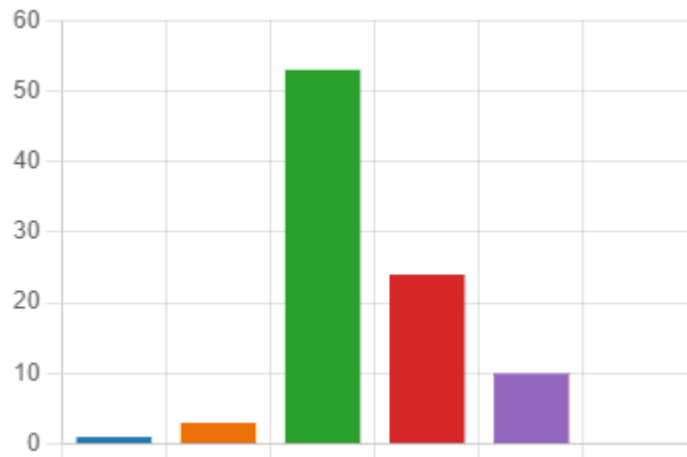


25. Is there an established way of communicating project progress report?



26. How often is project progress report being communicated?

● Daily	1
● Weekly	3
● Monthly	53
● Seasonal	24
● Yearly	10
● Never	0



27. How is the project progress being communicated?

● Manual - Paper	5
● Electronic - Email	25
● Electronic - Other	1
● Both manual and electronic	42
● Other	5



28. How do you rate data-driven decision making in relation to project management in the organization?

78
Responses



2.55 Average Rating

29. What tools and techniques are currently being used to plan and track project progress?
 (Enter N/A if there are no any such tools and techniques)

78
 Responses

Latest Responses

"Seasonal reporting and meetings"

"Manual, using computer."

"N/A"

7 respondents (10%) answered **excel** for this question.



30. Do you use online tools that allow collaboration and sharing project information within and between team(s)?

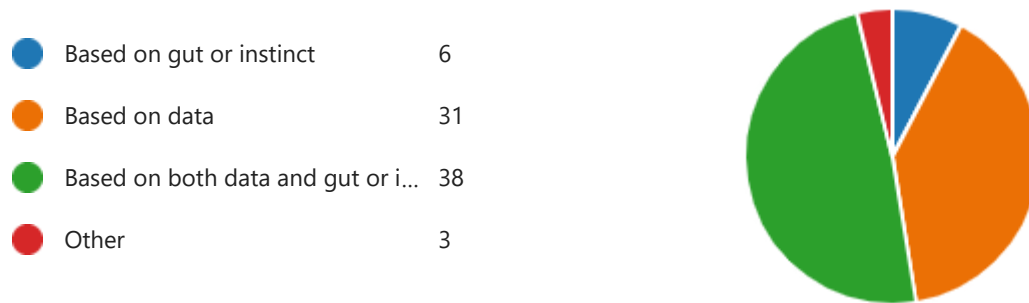
● Yes	33
● No	22
● Maybe	23



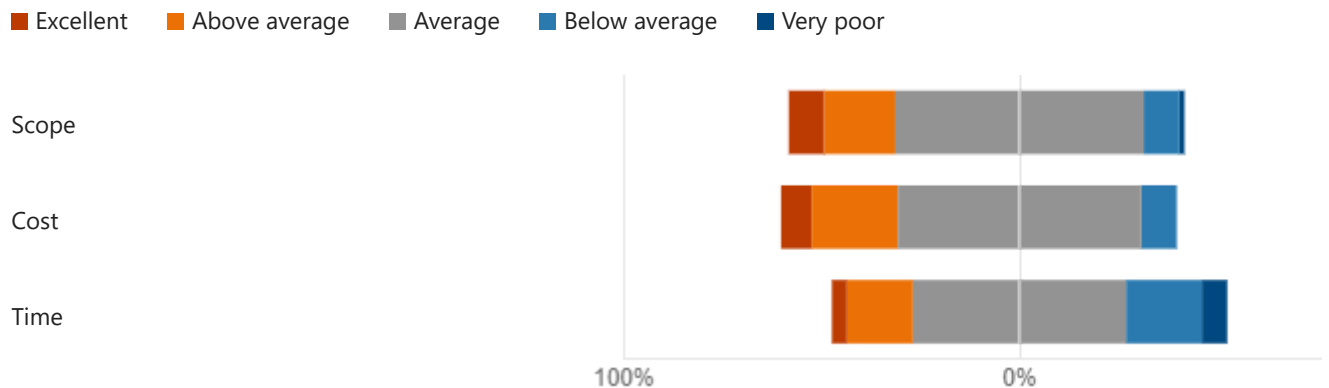
31. How likely are projects delivered on time and within budget in the organization?



32. Which of the following ways do you think best describe(s) the decision making process in relation to project management in the organization?



33. How do you measure the quality of project execution in the organization in terms of the three key dimensions of project management?



34. What do you think the project staff including the project managers should do to bring change and improve project management practice in the organization?

78
Responses

Latest Responses

"Hire more skilled staff"

"Enhance their ability in areas of project Management & increa...

"yes, they trying to improve project Management practice in th...

11 respondents (15%) answered **Project management** for this question.



35. What do you think the Ethiopian Red Cross Society management should do to bring change and improve project management practice in the organization?

78
Responses

Latest Responses

"Hire more skilled staff"

"what is said for question 34 is the answer."

"Yes"

14 respondents (19%) answered **project management** for this question.



