SOFTWARE PROJECT RISK MANAGEMENT PRACTICE IN ETHIOPIA

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ABSTRACT
In a country like Ethiopia, where information and communication systems are in the early stage of development, software projects may face several challenges. Risk is one of the factors that challenges project performance, and even causes failure. Risk management helps project managers to control the effect of risks. However, risk management appears to be the least practiced component of project management. To help understand the software risk management practice in the developing countries (DC) context, this study explores the risk management practice of Ethiopian software projects. It also investigates the level of adoption of formal risk management models and which steps are included in the ad-hoc risk management exercise. Finally, it looks into the relationship between risk management practice and project success. We conducted a survey of 45 banks, insurance companies and United Nations agency offices in Addis Ababa, Ethiopia. In this study, a very low rate of application of formal risk management models was observed. We observed a different perception of risk management whereby only watching projects to see if any risks occur during implementation without performing risk identification and mitigation or response plan was considered as a risk management practice by project managers. It was also found that some project managers were not able to confidently tell whether risk management processes have taken place in the projects they manage.

KEYWORDS: Addis Ababa, Ethiopia, formal risk management, project success, risk, risk dimension, risk management, risk management practice, software project

1. INTRODUCTION

Information and Communication Technology is believed to play an important role in development. However, the success of Information Technology projects may be affected by multiple factors, inhibiting them from achieving their objectives and bringing the aspired change. One of the factors that affect project success is risk (Alhawari et al., 2012; Bakker et al., 2010; Bhatia & Kapoor, 2011; Boehm, 1991).

Many authors describe risk as a threat that can affect success of projects if not addressed well. Risk refers to an unprecedented event or condition that can arise at any phase of a project and affect the outcome. It can be one of the major factors causing projects to fail (Bannerman, 2008; Royer, 2000). Bhatia and Kapoor (2011:1) describe risk as "a problem that can threaten the success of the software project but has not happened yet".

Risks should be managed well in order to control their adverse effects and also to make the best of the probable positive outcomes they can produce. Failure to manage risks may result in severe consequence on projects and may even cause total failure. Also, the positive impact that can arise from risks can be missed if proper risk management is not in place (Sanchez et al., 2009; Ward & Chapman, 2003). Due to their complex nature, software projects may face many challenges and can easily be exposed to risks that can affect their success. Controlling the likelihood of happening and magnitude of impact of risks cannot be attained without a sound risk management process. Risk management helps project managers to control and prevent unprecedented project outcome (Fakhar et al., 2013; Roy, 2004;

Sarigiannidis & Chatzoglou, 2014; Tesch et al., 2007). Because risk management allows controlling the effect of risks in projects, the literature suggests that it contributes to the success of projects (Bannerman, 2008; Bhatia & Kapor, 2011; Kwak & Stoddard, 2004).

Risk management is considered to be an important component of software project management. Numerous studies have been conducted on the topic. However, in spite of its importance, literature shows that it is the least practiced (Mnkandla, 2012; Royer, 2000; Sanchez et al., 2009). However, despite the wide research coverage of risk management, much has not been said on risk management practice in DC.

This research contributes to the literature by exploring the risk management practice in the software project management and investigating its impact to the software project success in a DC context. Data was collected by conducting a survey in 45 banks, insurance companies and UN agencies in Addis Ababa, Ethiopia. These organisations invest hugely in the information systems and are highly concerned with the success of projects. The finding from these organisations is believed to give an important insight on the research topic in the Ethiopian and the DC context as well. To examine the risk management practice, the study looks into the research questions: *Is risk management practiced in Ethiopian projects; are formal risk management models adopted in the projects; what steps of the risk management processes are included* and *what is the relation between risk management and software project success?* To answer these questions, we conducted a survey on 45 projects in UN agencies, banks and insurance companies in Addis Ababa, Ethiopia.

The finding of this study exhibits a different perspective of project managers on risk management. We found that even though they do not include any risk assessment and mitigation or response plans in the projects they manage, project managers deem that they are practicing risk management by only watching the projects for any probable occurrence of risks. Another observation shows project managers who are not fully clear of the risk management processes that are included in the projects they manage. Some project managers were not able to tell whether risk assessment or any other risk management steps are conducted in the projects.

The paper is structured as follows: a review of literature and development of hypotheses are presented in the next section. Section three discusses the research methodology, data collection and analysis methods and demographic profile of participants. Findings from this study are presented in section four and discussed in the following section. Lastly, section six presents conclusions, limitation of this study and future work.

2. LITERATURE REVIEW

Risk is expressed as an event or condition that can arise at any phase of a project and can affect the project's expected outcome such as delivery time, budget or quality if not handled well. Risks can threaten the success of projects, and as a result, can prohibit organisations from realizing their goals, ambitions and plans (Alhawari et al., 2012; Bakker et al., 2010; Bhatia & Kapoor, 2011; Boehm, 1991). Mnkandla (2012:281) describes risk as "the potential for loss, damage or destruction of a system as a result of a threat exploiting vulnerability."

Risk management defines the strategies, tools and methods to identify and control or manage risks. Its objective is to minimize the probability and impact of adverse effects while maximizing the probability and impact of potential opportunities, and thus keeping the outcome of the project under the control of Management (Roy, 2004; Tesch et al., 2007). Risk management helps project managers to control and prevent unprecedented project outcome (Fakhar et al., 2013; Roy, 2004; Sarigiannidis & Chatzoglou, 2014; Tesch et al., 2007) and contribute to the success of projects. Failure to manage risks may result in severe consequence on projects and may even cause total failure (Sanchez et al., 2009; Ward & Chapman, 2003). However, despite its importance and the continued attention by the

academia, studies show that formal of ad-hoc risk management practice is still inadequate (Baloch et al., 2014; Bannerman, 2008; Khan et al., 2014; Mnkandla, 2012; Pu, 2011).

Information technology being a relatively new concept in Ethiopia, it is expected that the situation will not be much different. Therefore, we can establish the following hypotheses:

H01: Risk management is not practiced in the Ethiopian software projects.

H11: Risk management is practiced in the Ethiopian software projects.

H02: Formal risk management procedures are not applied in the Ethiopian software projects.

H12: Formal risk management procedures are applied in the Ethiopian software projects.

With varying details, many frameworks contain risk identification, analysis, mitigation or response, and monitoring and control steps (IEEE, 2001:5-13; PMI, 2013:312-354; SEI, 2010:349). In an ad-hoc risk management, project managers carry out one of more of the steps. Some project managers perform risk identification but do not proceed with analysis, mitigation action. Some others add one or more steps after risk identification and others follow all the steps (Bannerman, 2008; Kajko-Mattsson & Nyfjord, 2008). A recent finding shows an evidence of risk assessment on large-scale offshore agile software development projects (Bass, 2016). The study shows that mitigation action is identified for each risk identified. The third hypothesis is thus suggested as:

H03: Projects do not include all the identification, analysis, mitigation, response, monitoring and control steps.

H13: Projects include all the identification, analysis, mitigation, response, monitoring and control steps.

Authors agree that proper risk management enhances project success. Zwikael and Ahn (2011) that even moderate levels of risk management planning can minimize the impact of risks on projects and bring about a significant improvement in project success. Identifying and addressing risks that can arise in a project can considerably improve the chance of project success (Baloch et al., 2014; Chawan et al., 2013). A 1997 Microsoft study indicates that a majority of software projects do not incorporate risk management and suffer the consequent high levels of risk. The study suggests that a small amount of overhead investment to risk management can significantly improve the success rate of projects. The analysis shows that a 5% budget devoted to risk management can result in a 50%–75% increase in the opportunity of completing projects on time and within budget (McConnell, 1997). Therefore, the last hypothesis of this paper is defined as:

H04: Risk management practice does not influence success of Ethiopian software projects.

H14: Risk management practice influences success of Ethiopian software projects.

Information system projects in DC face multiple risks and exhibit a high rate of failure (Heeks, 2002; Qureshi, 1998). According to Heeks, the degree of ICT success or failure in DC can be characterized in three levels: First, there can be a total failure, where “an initiation never implemented or in which a new system was implemented but immediately abandoned.” Secondly, projects fail partially in which requirements are partially fulfilled or the system has included undesirable outcomes. Thirdly, projects can face sustainability failure, in which “an initiative at first succeeds but is then abandoned after a year or so.”

Several risks contribute to failure of projects in DC. Lack of ICT strategy, inadequate telecom and network infrastructure are common characteristics of many DC that contribute to failure of projects. Lack of senior management commitment, unclear scope or objectives and

failure to gain user involvement are among top risk items projects in DC face. User acceptance of new IS applications are hindered by factors such as change in cultural, social and business norms and values. In addition, IS projects in DC are affected by factors also common in developed countries such as inadequate fund and misunderstanding of user needs (Addison & Vallabh, 2002; Gichoya, 2005; Mansell, 1999; Mursu et al., 2003). Galliers et al. (1998) emphasize that poor planning is one of the major reasons for project failure in DC.

Few studies have been, however, conducted on risk management practice in DC. Wet & Visser (2013) studied the level of application of risk management standards in South African software projects and suggested that it cannot be considered adequate. A majority of the projects did not include any risk management practice in their project management. Another study on risk management practices in IS outsourcing in commercial banks in Nigeria shows lack of both strategic and operational risk management practices (Adeleye et al., 2004). To the best knowledge of the authors, there is no publication on risk management practice in the Ethiopian software project management context. All attempts to look up research work on risk management practice in Ethiopia in databases that offer a wide range of journal articles, such as ACM, Emeraldinsight, JSTOR and ScienceDirect, ended with no results. The gap in the literature in the DC context has initiated this study. The paper aims to contribute to filling the gap by studying the risk management practice in Ethiopia.

3. METHODOLOGY

3.1 Data Collection

This research uses survey methodology with non-probabilistic purposive sampling to gather data. Survey was fundamentally chosen for its convenience in allowing anonymity of respondents. Survey allows respondents to openly provide honest responses more so than other types or research methodologies (Oates, 2006). It was clearly stated in the research instrument that responses will remain confidential and anonymous. The use of purposive sampling was prepared because it allows gathering and analysing quality data from willing, capable and knowledgeable informants. Purposive sampling is thus said to be more efficient in producing the required information than random sampling (Bhattacharyya 2006). Study of research management practice requires gathering data from organisations that are known to have software systems. It is also believed that the result will be as useful and indicative of the situation in Ethiopia if organisations that invest the most resource on information systems are targeted. Thus, purposive sampling, which falls under non-probability sampling, was employed in this study to conduct the research on a selected domain of organisations: UN agencies, banks and insurance companies in Addis Ababa, Ethiopia. These organisations invest heavily on Information Systems and mobilize huge resources to software projects. Working for one of the UN agencies in Ethiopia, Author Mihret had the chance to interact with multiple other UN agencies and was able to observe that they have well-established Information Communication Technology (ICT) infrastructure and software systems. Secondly, the Ethiopian banking and insurance system requires companies to have a sound information management system to acquire a banking or insurance license (Ethiopia, House of Peoples' Representatives 2008:4207; Ethiopia, House of Peoples' Representatives 2012:6472).

Data was collected using an online questionnaire with Google Forms. Google Forms was selected because the study participants comprised of organisations which have very secured IT environments. Such organisations have a huge concern about the security of applications they access and they do not allow access to all kinds of software and online applications. For this reason, the well-known Google application was used to collect data through the course of this study. Use of Google forms was comfortably accepted by participants as many of the organisations do not block Google applications in their network.

The data collection instrument included open ended, dichotomous or yes/no, multiple choice and Likert scale question types. All questions were closed-ended with provision of the 'Other' space to provide respondents with the opportunity to respond with any additional information that may not be included in the list of choices. A wide range of literature was studied in this research to acquire detailed knowledge of the subject matter. Questionnaires used in other studies were as well examined in developing the structure and content of the instrument (Han & Huang, 2007:49; Kajko-Mattsson & Nyfjord, 2008; Wallace et al., 2004). The research instrument is included in the Appendix.

With the purposive sampling method, invitation to participate in the survey was sent to all UN agencies, banks and insurance companies operating in Addis Ababa, Ethiopia and continuous follow up was diligently made to maximize the response rate. Participants were assured that collected data will strictly be kept confidential and that no identity will ever be made public and linked to a particular response. Among the total of 57 organisations, project managers from 45 offices have responded to the survey.

3.2 Data Analysis

Data collected through Google Forms was exported to Microsoft Excel and then transferred to SPSS version 20.0 for analysis. Microsoft Excel was very helpful in analysing collected data and providing summaries using pivot tables and charts. SPSS has also helped in statistical computations with a graphical user-friendly interface. Data analysis was carried out by applying Data summarizing functions and statistical tests. Cross tabulation of budget utilization and extent of meeting specification of projects completed on time or ahead of schedule was carried out to identify the proportion of succeeded projects. Risk dimensions and items most affecting projects were analysed by calculating mean scores of responses. One-sample T-Test test was applied to test the statistical significance of the mean scores of risk management practice and risk occurrences. Fisher's exact test was employed to view relation between formal or ad-hoc risk management practice and project success.

3.3 Demographic Profile

Organisation Type

Forty per cent (18) of the respondents in this study were from banks, another 40% from UN agencies and the remaining 20% from insurances. 53.3% of the organisations under study have above 500 employees. Another 40% have between 100 and 500 employees. The remaining 6.7% of the organisations have 10 – 50 employees.

Project type

More than half of the total projects under study (55.6%) were off-the-shelf software customizations. New software development accounted to 35.6% and the remaining 8.9% were upgrade of an existing software system. The development of 62.2% of the projects was outsourced to an international vendor, and 8.9% projects were outsourced to joint local and international vendors. The remaining 28.9% were developed in-house.

Project Budget Allocation

Budget wise, 27 projects (60%) were allocated with a budget of more than Ethiopian Birr (ETB) 1,000,000 (USD 50,000). Two projects (4.4%) were planned with a budget of between ETB 500,001 and 1,000,000 (USD 25,001 – 50,000), one project (2.2%) between ETB 100,000 and 500,000 (USD 5, 001 – 25,000). Three projects (7%) were allocated with less than ETB 100,000 (USD 5,000). Three respondents (7%) were uncertain on the amount of budget allocated for the projects and the remaining 9 projects (20%) were not allocated with a specific budget.

4. FINDINGS

4.1 Risk Management Practice

Risk management is identified as the least practiced component of project management. Many organisations leave out risk management from their software development projects (Mnkandla 2012:279; Royer 2000:6; Sanchez et al., 2009:19). Our finding shows a different trend in Ethiopian software projects. 67% of the organisations reported that they include risk management in their software project management. A one-sample T-Test was applied to test the statistical significance of the mean value being greater than 50%. The test produced a statistically significant value with $p<0.001$, which resulted in refutation of the null hypothesis H01 leading to the conclusion that risk management is practiced in Ethiopian software projects.

Of the 67% organisations that reported to practice risk management, only 16% applied pre-defined formal models. The most commonly used risk model, among these firms, is IEEE framework. This model is used by 11.1% of the participants. 6.7% applied the Boehm's risk management framework. One organization applied the Riskit model. A hypothetical target mean of 50% was considered for passing the test. The sampled mean (16%) was much lesser than the target mean. There was no need, therefore, to run a test for the statistical significance. The null hypothesis, H02, could not therefore be refuted and it was not possible to conclude that formal risk management is applied in Ethiopian software projects.

The other 51% of participants reported that they practice ad-hoc risk management by conducting one or more of the risk management steps. However, a small proportion of these organisations (27%) carried out the steps from identification to analysis and prioritization, preparing mitigation or response plans, and continuous monitoring. Research also shows that while completely leaving risk management out of the project management process is typical, failing to implement all phases of the process is also common (Bannerman, 2008; Adeleye et al., 2004). Among the 51% that reported to practice ad-hoc risk management, only 42% conduct risk identification. The rest 9% reported that they do not undertake risk assessment, but they are practicing risk management by keeping an eye to monitor occurrence of risks during the implementation of the projects. 33% organisations analysed and prioritized the identified risks. The rest 7% identify risk, but do not proceed with analysis and prioritization. 38% of the participants indicated that they put mitigation and response plans in place to keep control of the risks and their impact. Overall, 27% of the organisations which exercised risk management undertook all the identification, analysis, mitigation or response, and control and monitoring steps. The result is much lower than 50%, thus H03 could not be rejected and it was not possible to conclude that all the steps or risk management process are carried out.

There were also responses of uncertainty of whether risk management processes are performed or not. 16% of the respondents were uncertain whether risk identification was undertaken at the beginning of the projects or not. One project manager was not sure if identified risks were prioritized or not.

4.2 Project Success

Time, cost and meeting specification are the first three criteria looked at in evaluating project success. They are also referred to as the iron triangle and are considered the basic criteria in measuring project success (Al-Tmeemy et al., 2011; Atkinson, 1999; Wateridge, 1998). Studies suggest that they are easy, timely and the most common combination of criteria that have long been used to measure project success (Anda & Sjøberg, 2009; Savolainen et al., 2012; Kaur & Sengupta, 2011). Although completion of project within agreed time, budget and meeting the required functionality does not guarantee success of a project (Nixon et al., 2012; PMI, 2013; Westerveld, 2003; Toor & Ogunlana, 2010; Wateridge, 1998), failure in

meeting one of the three are the basic criteria accounts to failure of the project (Anda et al., 2009; Atkinson, 1999; Wateridge, 1998). In this study, due to time constraint, only the three were dealt to categorize projects as 'a success' or 'a failure' based on the findings. Projects which were completed on time, within budget and meeting specification fully were considered as succeeded and those which did not meet these criteria were regarded as failed.

A large proportion of projects under study have shown delay in their schedule. 13 projects were completed within the planned schedule and the rest 32 projects were delayed. Budget wise, only 18 projects (40%) were within budget. Another 40% have exceeded the budgeted amount. Nine project managers (20%) have indicated that they don't have adequate information on the status of budget implementation of the projects. Of the total 45 projects, 9 were completed within budget and on time. Among these, 53 projects were completed meeting their initial specification in full. This yields a 11% success rate of projects.

4.3 Relationship between Risk Management Practice and Project Success

One of the factors that affect project success is risk (Alhawari et al., 2012; Bhatia & Kapoor, 2011; Ropponene & Lyytinen, 2000; Royer, 2000) and risk management is pointed as an important crucial basis that contributes to project success (Boehm, 1991; Samad & Ikram, 2006; Silva et al., 2012; Pu, 2011; Teller & Kock, 2013). In this study, cross tabulation of risk management practice versus project success (illustrated in Table 1 below) shows that none of the projects to which no risk management was applied succeeded, and 5 of the 30 projects to which risk management was included succeeded.

The relationship between presence of risk management and project success was investigated by applying Fisher's exact test to the finding. The test produced a p value of 0.153, which is not statistically significant. It cannot, therefore, be concluded that presence of risk management has influenced success of the projects. H04 was not, therefore, rejected.

Table 1: Cross Tabulation of Risk Management Practice versus Project Success (N=45)

			PROJECT SUCCEEDED		TOTAL
			NO	YES	
RM Practiced	No	Count	15	0	15
		% within RM Practiced	100.0%	0.0%	100.0%
		% within Project succeeded	37.5%	0.0%	33.3%
	Yes	Count	25	5	30
		% within RM Practiced	83.3%	16.7%	100.0%
		% within Project succeeded	62.5%	100.0%	66.7%
Total		**Count**	**40**	**5**	**45**
		% within RM Practiced	**88.9%**	**11.1%**	**100.0%**
		% within Project succeeded	**100.0%**	**100.0%**	**100.0%**

5. DISCUSSION

Though the risk management practice seems to be reasonably fair, a very low proportion of application of formal models was observed. A similar observation was made in another African study. Wet and Visser (2013) found a very low rate of formal risk management practice in South African software projects. A number of reasons can be attributed to this. One possible reason could be inadequate familiarity with formal risk models among project managers in DC. Secondly, the complexity of formal frameworks may hinder their applicability. Thirdly, this can be due to the risk management perception of project managers. Our finding on practice of ad-hoc risk management signifies this. 9% of project managers that reported to exercise ad-hoc risk management do not carry out risk identification and work on mitigation or response plans. However, they only keep an eye on their project to

monitor happening of risks and they consider that as including risk management in their project management process. This may be an indication to the presence of lack of adequate knowledge among project managers. Research shows that project management knowledge limitation is one of the risks hampering project success (Keil et al., 2008; Mursu et al., 2003; Shaikh & Ahsan, 2014).

It was also found common to perform risk identification, but not continue with risk analysis and development of mitigation or response plan. This is in compliance with Adeleye et al. (2004) whereby 48.5% of the participants identified risks in their projects, but only prepared response and monitoring plans. A similar situation is observed in the South African study. Only 40% of 35 software projects followed one or more of the steps identified by the IEEE Standard for Software Risk Management (Wet & Visser, 2013).

Further, a number of uncertainties were observed in the responses as to whether the organisations conduct risk identification or not. This may again be an indication to gaps in the project management knowledge. On the other hand, uncertainty may be a result of lack of proper follow up of projects. All in all, it shows inadequacy in the software project management.

The finding shows a high rate of project failure. High level of project failure in DC is not a new finding (Heeks, 2002; Kundi & Shah, 2009; Mpazanje et al., 2013; Nauman et al., 2005). Literature suggests that risk management enables project stakeholders become aware of risks in good time and take proper and timely action, thus, contributes to reducing project failure, in other words, enhances project success rate (Bakker et al., 2010; Marcelino-Sádaba et al., 2014; McConnell, 1997; Raz et al., 2002; Zwikael & Ahn, 2011). Emphasizing the contribution of poor practice of risk management to project failures, Boehm (1991:32) suggests that "their problems could have been avoided or strongly reduced if there had been an explicit early concern with identifying and resolving their high-risk elements." In contrary, our finding did not show significant relationship between risk management practice and project success rate. This indicates that other factors play role to failure of projects. However, this is not in the scope of this study. Identifying other factors contributing to failure of Ethiopian software projects can be an opportunity for future study.

In DC, as information systems is yet in its initial state of development, the same can be expected about risk management practice. This study also demonstrates the same in the Ethiopian context. Further, this research contributes to knowledge with its finding of project mangers' perception of risk management and their involvement in the process. It was found that project managers consider they carry out risk management just by watching their projects for occurrence of risks, but without undertaking risk assessment. We also found that project managers showed uncertainty in identifying which steps of the risk management processes are practiced in the projects they manage.

5.1 Limitations

The study adopted purposive non-probabilistic sampling and the study population was composed of banks, insurance companies and UN agencies in Addis Ababa, Ethiopia. Though these are organisations that invest heavily on information systems, and the research is believed to give an insight on the subject in the Ethiopian context, the findings cannot be generalized to reflect the reality in other business areas like smaller private sector and government offices. Further research can be conducted to investigate the risk management practice in other business domains in the country like government and small-scale business sectors.

6 CONCLUSION

Risk management is an important component of software project management. However, much has not been said on risk management practice in the DC; to the best of the authors' knowledge, none in the Ethiopian context. This paper tries to contribute to filling this gap. A very low adoption of formal risk management models was observed in this study. This may not be unexpected, as the development of information systems is in its infancy stage in Ethiopia and so can be software risk management. However, an important finding was obtained in this study in relation to project managers' perception of risk management practice. It was observed that project managers considered that they exercise risk management without performing risk identification and mitigation or response, but only because they watch the projects to monitor any occurrence of risks.

Another key finding of this study was uncertainties by project managers on whether risk management processes were carried out in the project implementation or not. This reveals a gap in the ability of project managers to adequately manage projects. Factors affecting effectiveness of project management in the Ethiopian context can be an opportunity for future studies.

Investigation of risk management knowledge and perception of project managers can be an opportunity for future work. Also, studies on factors that are affecting the level of adoption of formal models and practice of risk management in general can contribute towards a full picture in the topic. The insignificant relationship between risk management practice and project success suggests the presence of other factors that play significant roles to success or failure of projects. This can also be a potential area of future study.

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APPENDIX I: RESEARCH INSTRUMENT

I. GENERAL

1. Full name (optional) _____
2. Name of your organisation (optional) _____
3. Your organisation type: *
   - o A bank
   - o An insurance company
   - o A UN Organisation

4. What is the size of your organisation?
   - o Under 10 employees
   - o 10 – 50 employees
   - o 50 – 100 employees
   - o 100 – 500 employees
   - o Above 500 employees

II. PROJECT PROFILE

Please choose one of the Information Systems projects that have been undertaken in your organisation and complete the following questions with the information.

5. Project title _____
6. Please select the project type: *

- New software development
- Off-the-shelf software customization
- Upgrade of an existing software system

7. Project implementation type *
   - In-house developed
   - Outsourced to a local vendor
   - Outsourced to an international vendor
   - Outsourced to a joint local and international vendors
8. What was the total budget planned for the project?
   - <100,000 ETB
   - 100,000 – 500,0000 ETB
   - 500,001 – 1,000,000 ETB
   - >1,000,000 ETB
   - No specific budget was planned
   - I don't know

III. PROJECT COMPILATION

9. Which of the following is true about the project schedule? *
   - It has been going on ahead of schedule
   - It has been going on as per the planned schedule
   - There has been a delay in the project schedule
   - I don't know
10. Which of the following is true about the project budget?*
    - It has taken lesser budget than estimated
    - It has taken the same budget as estimated
    - It has taken more budget than estimated
    - I don't know
11. At completion, to what extent has the project met the specification? *
    - Fully
    - In majority
    - Average
    - Not really
    - Not at all
    - I don't know

IV. RISK MANAGEMENT

i. Formal models

12. Different formal models are available for risk management. Organisations can apply one or more of existing formal risk management methodologies or they can design their own framework. Below are listed few of widely used formal risk management models. Please indicate which formal risk management models were applied in your organisation.
    - Boehm's Risk Management Model
    - IEEE Risk Management Model
    - Riskit Risk Management Model
    - CMMI Risk Management Model
    - Other: _____
    - No formal Risk Management model was applied

ii. Which of the following actions were performed in carrying our risk management?

13. Risk identification carried out at the commencement of the project? *	○ Yes ○ No *(Skip to question no. 17)* ○ I don't know
14. Identified risks were prioritized	○ Yes ○ No *(Skip to question no. 16)* ○ I don't know
15. How was the risk prioritization done?	☐ Based on likelihood of occurrence ☐ Based on magnitude of impact ☐ Other:_____
16. Risk response or mitigation plan determined for the identified risks	○ Yes ○ No ○ I don't know
17. Project was continuously monitored to watch risks occurring during implementation	○ Yes ○ No ○ I don't know