



COLLEGE OF TECHNOLOGY

**A MODEL FOR ASSESSING THE PERFORMANCE OF POST
GRADUATE RESEARCH SUPERVISORS IN KENYAN
UNIVERSITIES.**

By

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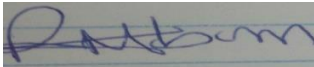
**A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE AWARD OF MASTERS DEGREE IN
DATA ANALYTICS IN THE COLLEGE OF TECHNOLOGY AT KCA
UNIVERSITY.**

SEPTEMBER, 2021

DECLARATION

I declare that this dissertation is my original work and has not been previously published for any award.

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I do hereby confirm that I have examined the masters' proposal of MBOM LUKE OTIENO and I have approved it for examination.

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ABSTRACT

Higher education has become important in Kenya due to the increase in the number of students, introduction of new courses at the universities and an increase in the number of universities. Our study undertook to create a model that investigated and identified the attributes that can be used to determine the performance of supervisors when assessing post graduate research students' in Kenyan universities. The study was driven by the desire to evaluate why many post graduate students do not complete their research in a timely manner. The findings of this study can be used as a measure to determine promotions, to improve supervision performance in Kenyan universities, to improve service delivery in the industries and to ensure average or high completion rates of students at the post graduate level in Kenyan universities. The research targeted a population of 20 and more post graduate students and coordinators from Kenyan Universities. Online questionnaires were used to get data from the respondents and Likert scale was used to convert data into numeric values. We investigated whether the supervisor performance can be determined by the supervisor characteristics, student characteristics and use of learning resources and facilities. The data collected from the students and coordinators was analyzed using a system designed using Django web frameworks and data analytics was applicable.

Keywords:

Supervisor Performance, Likert scale, supervisor characteristics, student characteristics, learning resources and facilities, Django web frameworks, descriptive analytics.

ACKNOWLEDGEMENT

I would like to thank my supervisor Dr. Simon N. Mwendia for his guidance and support. Thanks to my MSc. classmates whose encouragement has seen me reach this far. I would like to appreciate my family for the understanding and support that they have accorded me during this period of study.

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LIST OF ABBREVIATIONS AND ACRONYMS

SDG - Sustainable Development Goals

SDG4 - Sustainable Development Goal Four

LCD – Liquid Crystal Display

SQL – Structured Query Language

CPU – Central Processing Unit

SEM - Structured Equation Modelling

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background of the study

The 2030 agenda for sustainable development adopted by United Nations in September 2015 aims to transform the world through a number of target goals. Goal four (SDG4) seeks to promote lifelong learning opportunities for all and equitable quality education (Desa, 2017). This goal is yet to be achieved by Kenyan universities.

Evaluating academic staff performance in any university is aimed at realizing the goals of the institution. The human resource departments of tertiary institutions have always used manual methods to evaluate or assess the performance of supervisors in relation to research students that they are supervising. This manual evaluation process is characterized by inconsistent reports. The goals and missions of universities are expected to guide in the development of an automated or online assessment model to ensure consistency and accuracy of the process (Ojokoh, Akinsulire, & Isinkaye, 2019).

Performance appraisal is an important tool used by organizations to evaluate the effectiveness of their employees. It is required for performance feedback, career development decisions and employee rewarding decisions. A number of techniques can be used by universities to appraise employees or supervisors including assessment centers, multisource (360 degree) and the 720 degree (Ashima & Gour, 2013).

Data analytics is the use of techniques and methods to explore data so as to find insights that will support the decision making process. Data analytics enable information system experts to evaluate, understand and model processes. A number of techniques can be used to analyze data such as descriptive, prescriptive, diagnostic and continuous analytics (Nguyen, Gardner, & Sheridan, 2020)

1.2 Problem statement

Post graduate students in Kenya usually take a long time to complete their programs at the various universities. Between 2001 and 2008, the average completion time in Kenyan universities was between 50% and 70% with higher completion rates for female candidates. This has however reduced from 2009 onwards to below 50% (Rong'uno, 2016) as shown in Table 1.1. With reference to Table 1.1, the completion rates are not 100% the worst cases being the period between 2013 and 2015 when no student completed the program. According to

(Mukhwana, Oure, Too, & Some, 2016), it takes a long period to process students from the time they enroll to the time of completion. As a result, the number of postgraduate students produced by universities is not enough to meet the national needs such as replacing the ageing faculty, the professional cadres in government, staffing the universities, international agencies and the private sector. Studies show that this delay can be attributed to two reasons namely (i) Supervisors are not available to evaluate students work due to many allocated administrative duties or they are supervising many students (Bacwayo, Nampala, & Oteyo, 2017) and (ii) Lack of students' commitment to research attributed to other roles at work or within their families.

In most cases, it is not known whether to blame the supervisors or the students for the delay in completion of studies (Amutabi, 2018). Lengthy post graduate studies and drop-outs may be attributed to student related factors, resource challenges and supervision process. The supervisor's role is however key to the process of thesis writing (Rong'uno, 2016).

TABLE 1.1
Phd Completion Rates in Three Kenyan Universities

Year	Male			Female			Total		
	Enrol	Com	%	Enrol	Com	%	Enrol	Com	%
2001	8	6	75.00	2	1	50.00	10	7	70.00
2002	5	4	80.00	3	3	100.00	8	7	87.50
2003	6	4	66.67	5	4	80.00	11	8	72.73
2004	11	6	54.54	13	10	76.92	24	16	66.67
2005	26	8	30.77	15	7	46.67	41	15	36.59
2006	44	29	65.91	21	18	85.71	65	47	72.31
2007	45	16	35.56	24	19	79.17	69	35	50.72
2008	42	21	50.00	50	13	26.00	92	34	36.96
2009	54	9	38.89	56	24	42.86	111	45	40.54
2010	53	9	16.98	49	8	16.33	102	17	16.67
2011	62	5	8.06	70	8	11.43	132	13	9.85
2012	64	4	6.25	98	1	1.02	162	5	3.09
2013	72	0	0.0	78	0	0.0	150	0	0.00
2014	61	0	0.0	42	0	0.0	103	0	0.0
2015	33	0	0.10	28	0	0.0	61	0	0.0
Total/ mean	506	135	35.43	478	117	41.16	984	252	25.61

Little or no studies have been conducted to develop a model that can assess supervisor performance using a combination of 360 Degree appraisal technique involving both the

administration and students and data analytics. The 360 Degrees appraisal technique was used to conduct the appraisal by collecting data about supervisors from different respondents. The 360 Degree method will provide for greater insight into the important values.

(Bungai & Indra , 2018) in their study used administrative sources to appraise supervisors but did not incorporate the students in their process. (CUE, 2014) in its report emphasizes od the appraisal of supervisors using data gathered from administrators in Universities but does not consider the input of students.

The data analytics was important for the evaluation of the data to justify why a number of factors will determine the performance of supervisors. This is illustrated in table 1.2.

Model	Appraisal technique	Data analytic(s) technique (s)
Bungai & Indra, 2018	360 Degrees	Descriptive
Hadi & Muhammad, 2019	Assessment centers	Diagnostic
Yeoh, Jessica, & Benjamin, 2012)	360 Degrees	Descriptive Predictive

TABLE 1.2: Models Used, Their Appraisal Techniques and the Data Analytic Techniques

Source: Author (2021)

1.3 Main Objective

The main research objective was to develop a model that combines a performance appraisal method with data analytics to assess the performance of post graduate research supervisors in Kenyan Universities.

1.4 Specific Objectives

Specifically, the research aims

1. To find attributes that can be used to determine the performance of supervisors in guiding their research students.
2. To investigate and identify a suitable combination of a performance appraisal method and data analytics technique that can use the identified attributes to assess supervisor performance.

3. To develop a model that will use the combination of performance appraisal method and data analytics technique to assess the performance of supervisors in Kenyan universities.
4. To evaluate the effectiveness of the model.

1.5 Research questions

1. Which attributes can be used to determine the performance of supervisors in guiding their research students?
2. Which are the performance appraisal techniques and data analytics techniques that will use the identified attributes to assess supervisor performance?
3. Which model will use the combination of techniques to assess the performance of supervisors?
4. How effective is the model?

1.6 Significance of the study

The significance of this research is to provide a basis of assessing the performance of supervisors in Kenyan Universities.

The findings of this study can be used for the following

1. As a measure to determine promotions
2. To improve supervision performance in Kenyan universities.
3. To ensure average or high completion rates of students at the post graduate level in Kenyan universities
4. To improve service delivery in Kenyan industries

1.7 Motivation of the study

This study was driven by the desire to evaluate whether the performance of supervisors in Kenyan universities has an impact on the low completion rates of post graduate students.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

This chapter describes the contribution of various scholars in our area of study. It gives the definitions of the terms used and the metrics used to measure the performance of supervisors. It describes the theoretical review which highlights the theories advanced in the field of performance assessment and empirical review that provides the research findings in related areas.

This chapter also provides the conceptual framework which explains the main aspects to be studied and the operationalization of the variables in the conceptual framework.

2.2 Theoretical Review

2.2.1 Overview of SDG4

The world that we want to live in is defined by the Sustainable Development Goals (SDGs) which apply to all nations. The SDGs were adopted by United Nations member states in 2015 in order to try and end poverty, ensure that all people enjoy peace and prosperity by 2030 and to protect the planet. SDG4 is aimed at promoting lifelong learning opportunities for everyone and ensuring inclusive and equitable quality education. This goal is yet to be achieved by Kenyan universities (Desa, 2017).

Several researchers have discussed reasons for the shortfalls in the academic performance of students in universities especially in project completion. According to (Amutabi, 2018) the timely completion of graduate studies is critical in measuring research output of universities thus the low ranking of universities without PhD and masters students. In Kenya, number of supervisors for PhD and masters projects are inexperienced thus they lack the knowledge and skills necessary to give useful feedback to students.

Crisis in the quality of higher education is as a result of the increase in the number of universities and student enrolments. This has led to poor mentorship and supervision of graduate students for example in Kenya the lecturer (or supervisor) to student ratio is 1:70 compared to the international standard of 1:30 (Bacwayo, Nampala, & Oteyo, 2017) . This ratio cannot justify the achievement of SDG4 objectives.

According to (Matheka, Jansen , & Hofman, 2020) 1992 PhD students were enrolled in 10 Kenyan universities between the years 2010 and 2016. Table 2.1 gives valid data for only 1924 PhD students of which 14.7% were on course with their programs or had graduated, 15.7% had a delay for one year and 69.6% had delayed for over 2years. For the 1172 PhD students that were enrolled between 2010 and 2013 only 13.3% had graduated. This confirms that the SDG4 goal is yet to be achieved.

Student pace	PhD students enrolled between 2010- 2013		PhD students enrolled between 2010-2016	
	Frequency	Percent	Frequency	Percent
Graduated	156	13.3	157	8.2
On track	0	0.0	126	6.5
Delayed 1 yr.	8	0.7	302	15.7
Delayed 2yrs	89	7.6	294	15.3
Delayed 3yrs	212	18.1	338	17.6
Delayed 4yrs	284	24.2	284	14.8
Delayed 6yrs	240	20.5	240	12.5
Delayed 6 yrs.	142	12.1	142	7.4
Delayed 7 yrs.	41	3.5	41	2.1
Total	1172	100	1924	100.0

TABLE 2.1: Status of Phd Students Enrolled Between 2010 and 2013 and Between 2010 And 2016

Source: (Matheka, Jansen , & Hofman, 2020)

Research skills, supervision, research work and institution motivation are associated with timely completion of masters and PhD programs. However according to a study in the United Kingdom many students have mentioned supervision of their research projects as the main cause of delay for their completion. Their progress is affected by erratic contact with supervisors who may not be at the university or busy with administrative work. The supervisor – student relationship will determine whether the research work was completed on time (Ndayambaje, 2018).

The strategies that can be applied when supervising postgraduate students include traditional strategy, group supervision and mixed model. In the traditional strategy the student

is assumed to be the learner and the supervisor to be the expert. They regularly meet to discuss progress. This model is applicable to independent students who require minimal input from their supervisors. In the group supervision strategy, there is interaction between the students themselves and with their supervisors which creates a research community to ensure exchange of ideas and thus complement supervisory input. The mixed model blends the features of the traditional and group supervision with new technologies including use of online programs. While most universities are implementing the traditional methods, the mixed model is the most appropriate because it supports multiple supervisor student relationships and the use of updated technologies (McCallin & Nayar, 2012).

2.2.2 Attributes that determine the performance of supervisors

2.2.2.1 Supervisor Characteristics

The supervisor's characteristics including intellectual competency, pragmatism and personal potency can influence his or her performance with reference to post graduate research evaluation. Supervisors or lecturers are considered by students as effective if they are knowledgeable, engages students, dynamic, have a good rapport with the students and are competent in their subject area (Yeoh , Jessica , & Benjamin , 2012). According to (Delany, 2013) good supervisors should be friendly, supportive, approachable, open minded, capable of acknowledging errors and organized.

Supervisor's research experience will determine the quality of supervision by the supervisor (Hadi & Muhammad, 2019)

2.2.2.2 Course characteristics

Different courses are done at different universities in the world. Students perceive courses as difficult depending on their subject learning outcomes and knowledge required to understand the research related to the course.

2.2.2.3 Learning resources and facilities

The availability of learning resources and facilities both online and offline are important in the assessment of supervisors. (Yeoh , Jessica , & Benjamin , 2012), emphasizes that library resources, availability of computers and other accessories e.g LCD projectors for research and communication as well as an appropriate study environment are key to the assessment.

2.2.2.4 Capital availability

For lecturers to effectively supervise their students, they must be well remunerated and motivated. (Yeoh , Jessica , & Benjamin , 2012), points out that capital is needed to continuously train a university's new and current work force to ensure competitive advantage.

2.2.3 Methods/Models for performance appraisal

Performance appraisal is an important tool used by organizations to evaluate the effectiveness of their employees. It is required for performance feedback, career development decisions and employee rewarding decisions. A number of techniques can be used by universities to appraise employees or supervisors including assessment centers, multisource (360 degree) and the 720 degree (Ashima & Gour , 2013).

2.2.3.1 360 Degree appraisal technique

Many organizations including universities have implemented the 360 degree feedback appraisal technique due to its effectiveness in performance rating. Commonly referred to as multisource feedback, it involves gathering information about a person's behavior and the impact of the behavior from the person's superiors, suppliers, customers and colleagues before extracting performance information (Ece & Cemal , 2016). 360 Degree emphasizes that behavioral change can be understood through enhanced self awareness. It requires the appraisee to evaluate inputs from multiple organizational levels and external sources and due to its multi-rate nature, it is more effective, credible, reliable and accurate system. It however has experienced some drawbacks including damage to the self-esteem of employees, expensive and time consuming to implement as well as difficulty in ensuring confidentiality (Ashima & Gour , 2013). The 360 degrees approach provides formative feedback on the performance of supervisors as seen by others who are familiar with their work (Hemati, 2011). This method enables subordinates to evaluate their bosses.

2.2.3.2 720 Degree appraisal technique

It focuses on the customer and investor perceptions of work and involves the carrying out of the 360 degrees in two steps whereby in the first step the employee performance will be evaluated to get feedback. The second step will involve using the feedback to discuss how the defined targets can be achieved. This technique is preferred because of its improved feedback from many resources, improved customer service, better assessment of training needs and reduced discriminatory risk. It may however experience problems such as downfalls in design

processes, lack of commitment by top level executives, inadequate information, insufficient process understanding and training and rating ineffectiveness. (Ashima & Gour , 2013)

2.2.3.3 Assessment centers

It involves evaluating employees over a defined timeframe by observing their work behaviors over a series of exercises such as fact finding exercises and group discussions. It is a flexible method that supports measurement of multiple attributes and diagnosis of multiple employee attributes. However this method may not be very common with evaluators due to the need for a large workforce, large workloads for assessors and high investments for management. (Ashima & Gour , 2013).

2.2.4 Types of data analytics

Data analytics refers to the use of techniques and methods to explore data so as to find insights that will support the decision making process (Nguyen, Gardner, & Sheridan, 2020)

2.2.4.1 Descriptive analytics

It focuses on what has been carried out by data analysts and does not support the drawing of findings. It involves the use of data mining and data aggregation techniques to review and examine data sets in order to determine what has happened over a particular period. It shows the success or failures in organizations that have occurred over the past. It however has limitations such as not being able to determine what might happen in the future or what should be done next. It can be applicable in the reporting of general trends and summarizing of past events (Byron, 2016)

2.2.4.2 Predictive analytics

It focuses on understanding the past activities on data and using the information to predict what may occur in the future. It is based on probabilities and uses techniques such as data mining, machine learning algorithms and statistical modelling. Predictive analytics can be used by organizations to forecast employee behavior and to identify the behavior patterns of students in a university (Byron, 2016)

2.2.4.3 Prescriptive analytics

It is used by data analytic experts to determine the activities that should be done in order to achieve better decisions. It enables business executives to make very concrete decisions using the data that is at their disposal. It therefore uses the results of descriptive and prescriptive analytics to enable the business organization to make strategic and advanced decisions. It

requires very large amounts of data which may not always be available thus results may not be adequate.

2.2.4.4 Diagnostic analytics

It is the type of data analytics that evaluates the data in an attempt to understand the causes of events and behavior in order to generate an analytic dashboard. It facilitates the explanation of why a certain observation was made through descriptive analytics and helps to drill down into the problem areas. It enables data analysts to find and correct data quality issues and to gain more meaningful insight about the data (Chintan & Amit , 2014). Diagnostic analytics techniques include roll up, drill down and factor analysis. Factor analysis involves computing the correlation matrix for all variables, factor extraction, factor rotation and making of final decisions about the number of underlying factors.

2.2.4.5 Continuous analytics

It is an integrated query processing approach that allows structured query language (SQL) to be run continuously over data before the data can be stored in the database. It addresses the reporting and analytic demands of modern network enterprises. It uses a unified stream relational language which extends SQL and provides benefits to application developers and database administrators to solve their reporting and analytics problems. In this type of analytics, data is processed as it arrives thus the CPU cycles are properly utilized. Continuous analytic systems can easily be integrated into current information technology environments thus it is considered to be an evolving approach (Chintan & Amit , 2014).

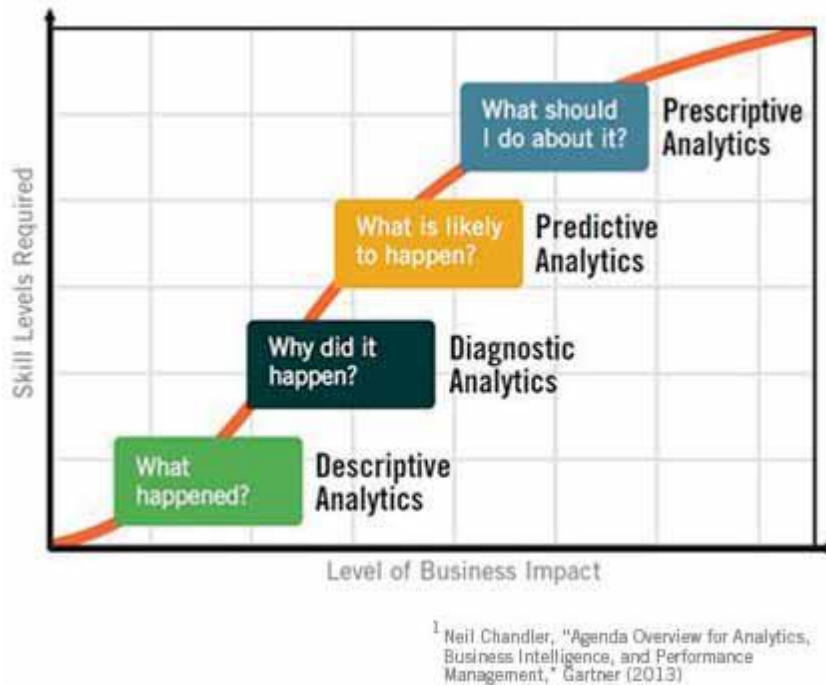


FIGURE 2.1: Types of data analytics

Source: (Chintan & Amit , 2014)

2.3 Empirical review

Many universities continue to attract students for postgraduate programs however, many of these students do not complete their programs in a timely manner. It has been reported that in the United Kingdom about 40% - 50% of the students do not complete their PhDs on time while in the United States of America the value is at 50% (Ndayambaje, 2018). The author carried out a study to investigate the link between timely completion of PhD programs and the supervision procedures with reference to international postgraduate students at Kenyatta University in Kenya. Qualitative pathway and narrative research design were adopted together with a non-probability sampling technique. Six graduates who were part of the international students' community at Kenyatta University in 2015 and 2016 were the informants. The author further states that data from the informants was collected using interviews, email and what's up and the data was analyzed using thematic analysis. The study confirmed that good relationship and qualitative interaction between supervisor and the students will highly determine the completion rates of postgraduate research and poor feedback from supervisors can make the students to lose hope in their research. The gap in this study is that it only focused on international students and not the local or Kenyan students thus the motivation for our study.

(Bungai & Indra , 2018) used the 360 degrees performance appraisal model to evaluate whether the performance of research lecturers at Tridharma College in Indonesia was in accordance with the predefined performance criteria. They used three variables to assess the lecturer performance namely education and teaching, conducting research and performance in carrying out community service. The assessment involved the establishment of work standards, assessment of the work with reference to the standards and provision of feedback. The model used the lecturer, chief of the study program, the dean and peers at the college as the source of data as shown in figure 2.2

CHIEF OF STUDY PROGRAM

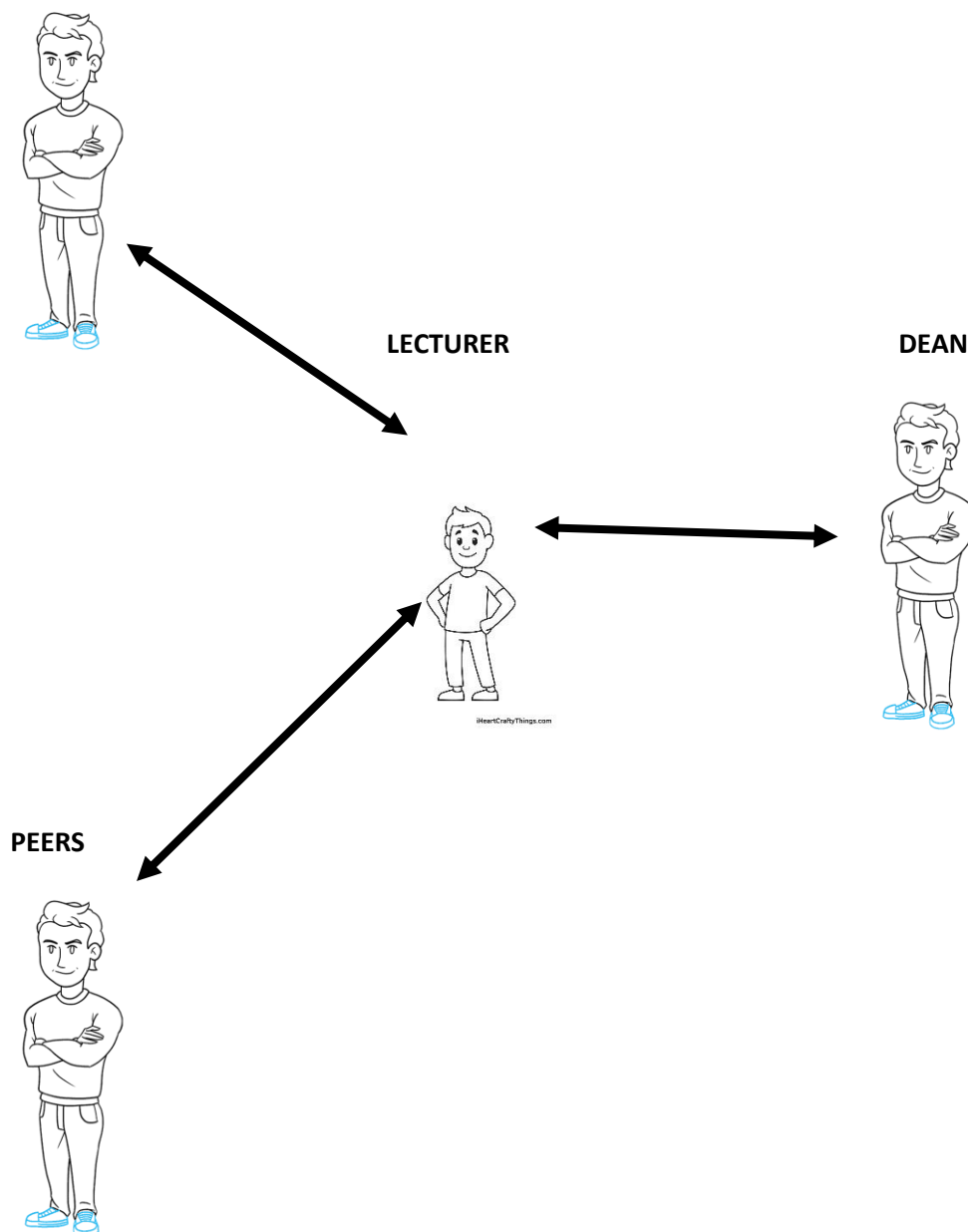


FIGURE 2.2: Evaluation of Lecturer Performance Model Using 360 Degrees

Source: (Bungai & Indra , 2018)

Our study relates to the capability of the lecturer to carry out research which according to (Bungai & Indra , 2018) five indicators were used for measurement as shown in table 2.2.

No	Indicator	Not Good	Less Good	Fairly Good	Good	Very Good
A	Results of research published as books, through newspaper, seminar or poster	0%	27%	44%	26%	3%
B	Translation of scientific books	0%	29%	34%	35%	2%
C	Editing scientific papers	0%	33%	41%	24%	2%
D	Planning and working on patented technologies	2%	26%	41%	28%	3%
E	Creation of design and patented technology masterpiece	2%	44%	28%	24%	1%

TABLE 2.2: Results on Evaluation of Lecturers Based on How They Carry Out Research

Source: (Bungai & Indra , 2018)

Based on the results in table 2.2 (Bungai & Indra , 2018) concluded that the capability of the lecturer to facilitate research was 1% not good, 32% less good, 37% fairly good, 27% good and 3% very good.

The results confirm that the researchers used the formula below to find the averages based on the ratings.

$$\text{Average rating } (AR_X) = (R_A + R_B + R_C + R_D + R_E) / R_N$$

Where

R_A, R_B, R_C, R_D and R_E are the Likert scale response averages for not good, less good, fairly good, good and very good respectively.

It does not consider the appraisal by students and does not specify how the average percentages for the lecturer performances were obtained thus the motivation for our study.

A report by (CUE, 2014) describes the model which evaluates how the suitability of appointment or promotion of academic staff can be determined. The report specifies that the

academic staff can be evaluated on the basis of research and publication, teaching and instruction, community engagement and other contributions, administration and responsibility and professional consulting in the industry.

Table 2.3 summarizes the relative weighted points for different categories of academic staff.

Area of contribution	Relative weighted points (%)			
	Lecturer	Senior Lecturer	Associate Professor	Professor
Teaching and instruction	30	25	20	15
Research and publication	40	50	60	65
Professional consulting	-	10	10	10
Administration and responsibility	20	10	5	5
Community engagement	10	5	5	5
Total Score (%)	100	100	100	100

TABLE 2.3: Summary of Relative Weighted Points for Different Categories of Academic Staff

Source: (CUE, 2014)

The report does not specify how the percentage relative weighted points were computed. It also does not incorporate measures on how students should evaluate their supervisors during post graduate research. This has formed the basis for our study.

Many universities evaluate lecturer performance at the end of the semester in order to identify the areas that need improvement. A model by (Yeoh , Jessica , & Benjamin , 2012) to identify the factors that determine the performance of lecturers in a Malaysian University concluded that subject characteristics, learning resources and facilities, characteristics of lecturers and tutorials as well as course characteristics were the predictors. In the evaluation of lecturer characteristics, it was confirmed that the lecturers were willing to guide their students

in their areas of study. The results indicated that there were no differences in gender and year of study on lecturer characteristics. The model shown in Figure 2.3 was used in the study and the results shown in table 2.4 and table 2.5 were derived.

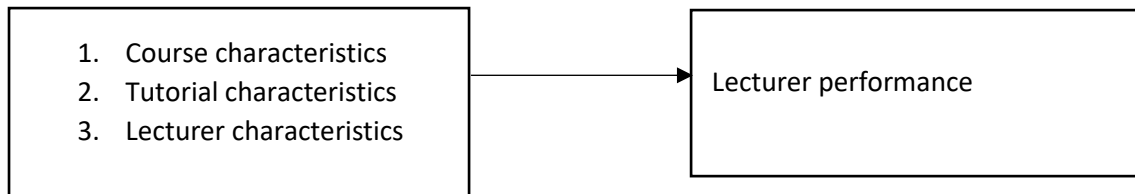


FIGURE 2.3: Model of Lecturer Performance Among Public Higher Education Institutions

Source: (Yeoh , Jessica , & Benjamin , 2012)

	M	SD	1	2	3	4	5	α
Lecturer characteristics	50.19	8.51		0.788**	0.557**	0.520**	0.714**	0.942
Subject characteristics	22.10	3.82			0.603**	0.598**	0.674**	0.894
Learning resources and facilities	17.65	3.94					0.585**	0.853
Overall performance	7.70	1.62						0.851

Note: **Significant correlation 2 tailed at 0.01 level

TABLE 2.4: Descriptive Statistics and Correlations Between Selected Variables And Overall Lecturer Performance

Source: (Yeoh , Jessica , & Benjamin , 2012)

Model	Variable (N=223)	B	SE B	Standardized β	t
1	(Constant)	0.888	0.341		2.602
	Lecturer	0.136	0.007	0.711	20.248**
2	(Constant)	0.227	0.330		0.689
	Lecturer	0.106	0.007	0.556	14.442**
	Learning resources	0.121	0.016	0.296	7.696**
3	(Constant)	-0.059	0.339		-0.175
	Lecturer	0.084	0.010	0.440	8.300**
	Learning resources	0.103	0.017	0.251	6.170**
	Subject	0.075	0.024	0.177	3.146**

Note:

* $p < 0.05$, ** $p < 0.01$

Model 1: $F(1, 400) = 409.963$, $p < 0.01$, $R^2 = 0.506$, $\Delta R^2 = 0.505$

Model 2: $F(2, 399) = 264.441$, $p < 0.01$, $R^2 = 0.570$, $\Delta R^2 = 0.568$

Model 3: $F(3, 398) = 183.525$, $p < 0.01$, $R^2 = 0.570$, $\Delta R^2 = 0.577$

TABLE 2.5: Multiple Regression Analysis Summary for Overall Performance of Lecturers

Source: (Yeoh , Jessica , & Benjamin , 2012)

Correlation analysis was used to test the relationship between overall lecturer performance and variables and a significant relationship was confirmed. In order to identify the determinants of the overall lecturer performance, multiple linear regression using stepwise method was utilized.

Model 3 given in table 2.5 was used to justify the determinants of overall lecturer performance. The results indicate that 57.7% of the lecturer performance was indicated by three predictors namely lecturer, learning resources and subject.

The model equation was given by $-0.059 + 0.084l + 0.103lr + 0.075s + \text{Error}$. Where l denotes lecturer, lr denotes learning resources and s represents subject. As shown by the standardized beta, a unit standard deviation increase in lecturer score results into 0.440 standard deviation increase in lecturer performance. Learning resources had a $\beta=0.251$ and subject $\beta=0.177$. The study by (Yeoh , Jessica , & Benjamin , 2012) was based on 360 degrees appraisal

technique supported by descriptive analytics. This study did not focus on the students' element thus the motivation of our study.

2.4 Conceptual framework

Conceptual framework is described as the link of concepts that give a comprehensive understanding of a phenomena. Its concepts play an integral role by supporting each other, defining their phenomena and establishing a framework policy (Jabareen, 2009).

The conceptual framework for our study will comprise of dependent variable and independent variables. Independent variable is the variable whose value affects another variable but it is not affected by another variable while a dependent variable changes in value determined by the independent variables (Shukla, 2018).

The dependent variable in our study is the supervisor performance while the independent variables are student characteristics, supervisor characteristics and learning resources and facilities. Figure 2.4 shows the diagrammatic representation of the conceptual framework.

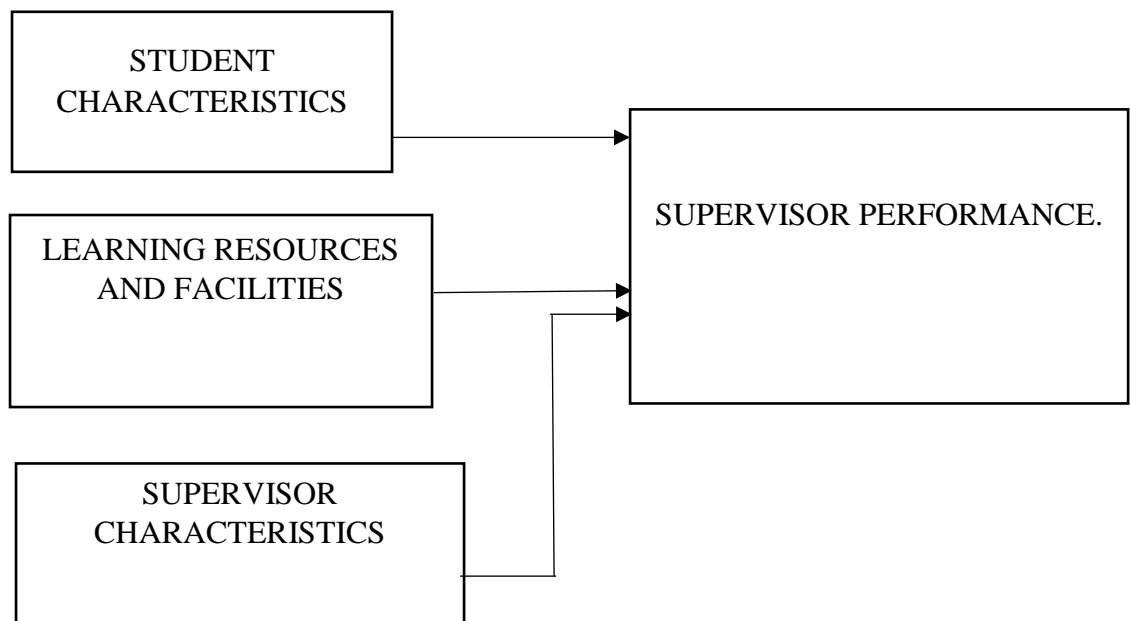


FIGURE 2.4: Diagrammatic Representation of the Conceptual Framework.

Source: Author (2021)

2.5 Operationalization of variables

The activity that involves the translation of abstract things into measurable variables is referred to as operationalization of variables. It involves the allocation of a range of values for a given variable (Sargent , 2008).

2.5.1 Supervisor characteristics

This variable was operationalized by evaluating the willingness of the supervisor to guide students, the preparedness of the supervisor during meetings with students to discuss their progress, timely feedback to students and clear assessment requirements. The statements were constructed using a five point scale. The responses will range from strongly disagree for one point and strongly agree for five points.

2.5.2 Student characteristics

This variable was operationalized by evaluating the capability of the supervisor to guide the student's to develop ideas and present them in written format, to identify methods that will help them achieve their goals and to solve difficult research related problems. A likert scale was used for measuring the variable.

2.5.3 Learning resources and facilities

The indicators for this variable include whether the supervisor used of e-learning resources and videoconferencing facilities to conduct meetings with students. A five point likert scale was used for measuring the variable.

2.5.4 Supervisor performance

This is the dependent variable whose indicators will include the independent variables namely supervisor characteristics, student characteristics and learning resources and facilities. The variable was measured using a formula derived from the independent variables and data analytic methods. The supervisor performance value was computed by finding the average of the data collected using the 360degree appraisal method. The appraisal of supervisors was done by the students and Coordinators.

VARIABLE	INDICATORS	METRICS
Supervisor characteristics	<ul style="list-style-type: none"> ▪ Willingness of the supervisor to guide students ▪ Preparedness of the supervisor during meetings ▪ Timely feedback to students ▪ Clear assessment requirements ▪ Supervisor guided students to complete research on time. 	Likert scale
Student characteristics	<ul style="list-style-type: none"> ▪ Ability to develop ideas and present them in written format ▪ Ability to identify methods for achieving goals ▪ Ability to solve difficult research related problems ▪ The research sharpened the student's analytical skills 	Likert scale
Learning resources and facilities	<ul style="list-style-type: none"> ▪ Use of e-learning resources ▪ Use of videoconferencing facilities for meetings. 	Likert scale
Supervisor performance	<ul style="list-style-type: none"> ▪ Supervisor characteristics ▪ Student characteristics ▪ Learning resources and facilities 	Supervisor performance model

TABLE 2.7: Operationalization of Variables

Source: Author (2021)

2.6 Chapter summary

This chapter introduced the concept of literature review. It describes the contribution of various scholars in our area of study. The Sustainable Development Goal Four (SDG4) is explain and reference is made on whether it has been achieved or not. The various attributes or factors that determine the performance of supervisors are highlighted together with the methods that can be used to appraise supervisors. The chapter discusses the types of data analytics and how they can be applied in research. It discusses the works of various scholars in relation to the appraisal methods. Conceptual framework is discussed in order to describe the dependent and independent variables and a table is used to show the operationalization of the variables.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Introduction

This chapter begins with a discussion of research design and describes how our research was carried out in our study. It describes the target population and the sampling techniques that were used. It explains the instruments that were used to collect the data and the data analysis techniques. The methodological approach to our research was quantitative and survey based.

3.2 Research design

Research design refers to the conceptual structure that is used to identify the tools that will support the solution of research problems (Kothari, 2004). The goal of our research was to address the problem of assessing the performance of supervisors in Kenyan universities. Our research aimed to create a model that will support in the assessment of supervisors in Kenyan universities.

In our study, we used a three stage progression referred to as **Use-Modify-Create** which describe the three phases of students' activities in computational thinking. According to (Irene , et al., 2011) at the *Use* stage, students can be considered to be the consumers of another person's creation for example they can carry out experiments using ideas from other authors models. The *Modify* stage is where students can carry out numerous modifications and refinements on the models thus acquiring new skills which will enable them to come up with ideas and models of their own. At the *Create* stage there is the testing, analyzing and refining of the model based on the specifications so that the students can make a claim that the model is theirs. Figure 3.1 illustrates the progression pattern.

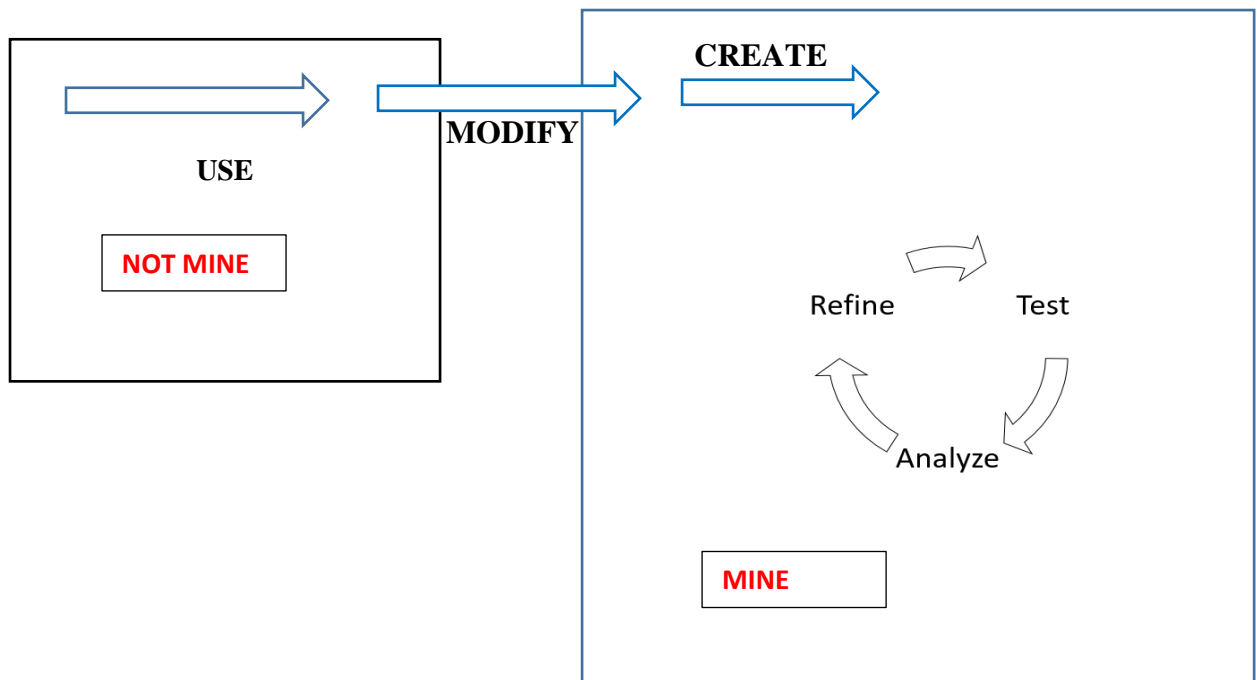


FIGURE 3.1: Use-Modify-Create Learning Progression

Source: (Irene , et al., 2011)

The *Use* activity can be carried out using the reusing strategy where pieces of code or models created by others are used to satisfy a need instead of working from scratch. The Use stage supported our study by facilitating the understanding of the work of other scholars. This supported the identification of attributes that were used to determine the performance of supervisors in guiding their research students (objective 1).

The *Modify* activity uses the tinkering strategy which involves changing the model units of modules. It develops risk taking and creative thinking. This activity supported the identification of a suitable combination of a performance appraisal method and data analytics technique that uses the identified attributes to assess supervisor performance (objective 2).

The *Create* activity uses the remixing strategy which involves putting together the modules and units created by others to develop an original model. This activity enabled us to develop a model that uses the combination of performance appraisal method and data analytics technique to assess the performance of supervisors (objective 3). It also supported the testing and evaluation of the model (objective 4).

3.3 Sampling design and sample size

Sampling is the activity of evaluating a population under a study and selecting a representative group (McLeod, 2019). A sample refers to a section of the population that was studied by a researcher (Kothari, 2004).

For our study, a random sample for a target population was used in which a sample size n was drawn such that N members (20 and above for our study) of the population will have a common chance of being incorporated in the sample. Questionnaires were administered (using online platforms like what's up and email) to respondents mainly post graduate research students and Coordinators in various Universities in Kenya to seek their assessment on the performance of supervisors.

3.4 Target population

According to (McLeod, 2019) target population refers to the group of individuals from where a sample can be derived. In our study, data was collected from post graduate research students and Coordinators in Kenyan universities.

3.5 Data analysis techniques

The valid responses from the respondents was analysed by a system designed using Django Web framework. Descriptive data analytics was applicable.

CHAPTER FOUR

4.0 DATA ANALYSIS, FINDINGS AND DISCUSSIONS

4.1 Introduction

This chapter presents the results and analysis of the study. The data was acquired from 24 post graduate research students and 3 Coordinators. This sample was guided by (Nielsen, 2012) which states that quantitative studies require testing of at least 20 users. (Casteel & Bridier, 2021) emphasize that the recommended sample sizes are 10-20 for descriptive research design, 20-20 for ethnography and 12-15 for a case study.

14 respondents were PhD students while 10 students were pursuing their Masters program. The students were drawn from three universities in Kenya two of which were public universities and one private namely KCA University. Seven students were from KCA University (4males and 3 females), three male students from the University of Nairobi and 14 students from Maseno University (6male and 8female). There were three coordinators drawn from Maseno University (Information science PhD), KCA University (Data Communication, Masters) and University of Nairobi (Computing Sciences, Masters). (Ndayambaje, 2018) collected data from 6 PhD graduate students from Kenyatta University in Kenya in her study to evaluate how supervision affects the timely completion of PhD programs. Questionnaires designed using Django web framework were administered to the respondents via what's up and email. The supervisor performance was computed by finding the average of student appraisal and coordinator appraisal. In the design of the questionnaire we preferred to use Likert scale values of 1-5 than the percentages used by (Bungai & Indra , 2018) because the values can support assessment of opinions, behaviors and attitudes (Bhandari, 2020) in a more specific manner.

4.2 Results for research question one and objective one

The specific objective one of this study was to find attributes that can be used to determine the performance of supervisors in guiding their research students. From the literature review three attributes were identified including

4.2.1 Supervisor characteristics

This attribute considers how the students rate the work of their supervisors with reference to indicators such as Willingness of the supervisor to guide them, preparedness of the supervisor during meetings, timely feedback by the supervisor to student's work, clear assessment requirements and whether the supervisor guided the students to complete their research on time.

4.2.2 Student characteristics

This attribute considered how the supervisor is rated by the students with reference to his/her capability to help the students improve their abilities in the research activity. The indicators include whether the supervisor helped the student to develop ideas and present them in written form, to identify methods for achieving goals, to solve difficult research related problems and to sharpen his or her analytical skills.

4.2.3 Learning resources and facilities

This attribute considered how the supervisor is rated by the course coordinator based on whether the supervisor used e-learning resources and video conferencing facilities for meetings.

	A	B	C	D	E	F
1		<i>Supervisor characteristics</i>	<i>Student characteristics</i>	<i>Learning resources and facilities</i>	<i>Supervisor rating</i>	
2	<i>Supervisor characteristics</i>	1				
3	<i>Student characteristics</i>	-0.957399904	1			
4	<i>Learning resources and facilities</i>	-0.637888187	0.52713956	1		
5	<i>Supervisor rating</i>	0.524177203	-0.490989392	0.26193217	1	
6						
7						
-						

TABLE 4.1: Correlation Matrix for Objective One Results

Source: Author (2021)

The correlation matrix of table 4.1 indicates that there is a moderate uphill (positive) relationship (of 0.56) between supervisor characteristics and supervisor rating or performance. The relationship between student characteristics and supervisor rating is -0.49 which indicates a moderate downhill (negative) linear relationship. Learning resources and facilities has a correlation of 0.26 with supervisor rating which indicates a weak uphill (positive) linear relationship. The results mean that the supervisor and student characteristics have a major influence on the supervisor rating.

4.3 Results for research question two and objective two

The specific objective two of this study was to investigate and identify a suitable combination of the performance appraisal method and data analytic technique that can use the identified attributes to assess supervisor performance.

The 360 degree appraisal technique was used due to its effectiveness in performance rating and its capability to allow the appraisee to evaluate inputs from many external sources. The 360

degrees appraisal technique was also adopted since majority of the studies have adopted it. In our study the supervisor evaluation was done using data gathered from students and coordinators.

Descriptive analytic techniques were used to find the total and average ratings for both coordinator and student ratings.

The data derived from the coordinators and supervisors together with the analytic technique enabled the researcher to develop the model for the study as illustrated in the third objective.

Table 4.2 provides a summary of the models used, their appraisal techniques and the data analytic techniques used.

Model	Appraisal technique	Data analytic(s) technique (s)
Bungai & Indra, 2018	360 Degrees	Descriptive
Yeoh, Jessica, & Benjamin, 2012)	360 Degrees	Descriptive Predictive
Lyde, Griesher, & Byrns, 2016	360 Degrees	Descriptive

TABLE 4.2: Models Used, Their Appraisal Techniques and the Data Analytic Techniques

Source: Author (2021)

With reference to Table 4.2, the above models used the 360 degree appraisal technique but did not consider research students as a source of data.

4.4 Results for research question three and objective three

The specific objective three of this study was to develop a model that will use the combination of performance appraisal method and data analytics technique to assess the performance of supervisors in Kenyan universities.

COORDINATOR GRADUATE PROGRAMS

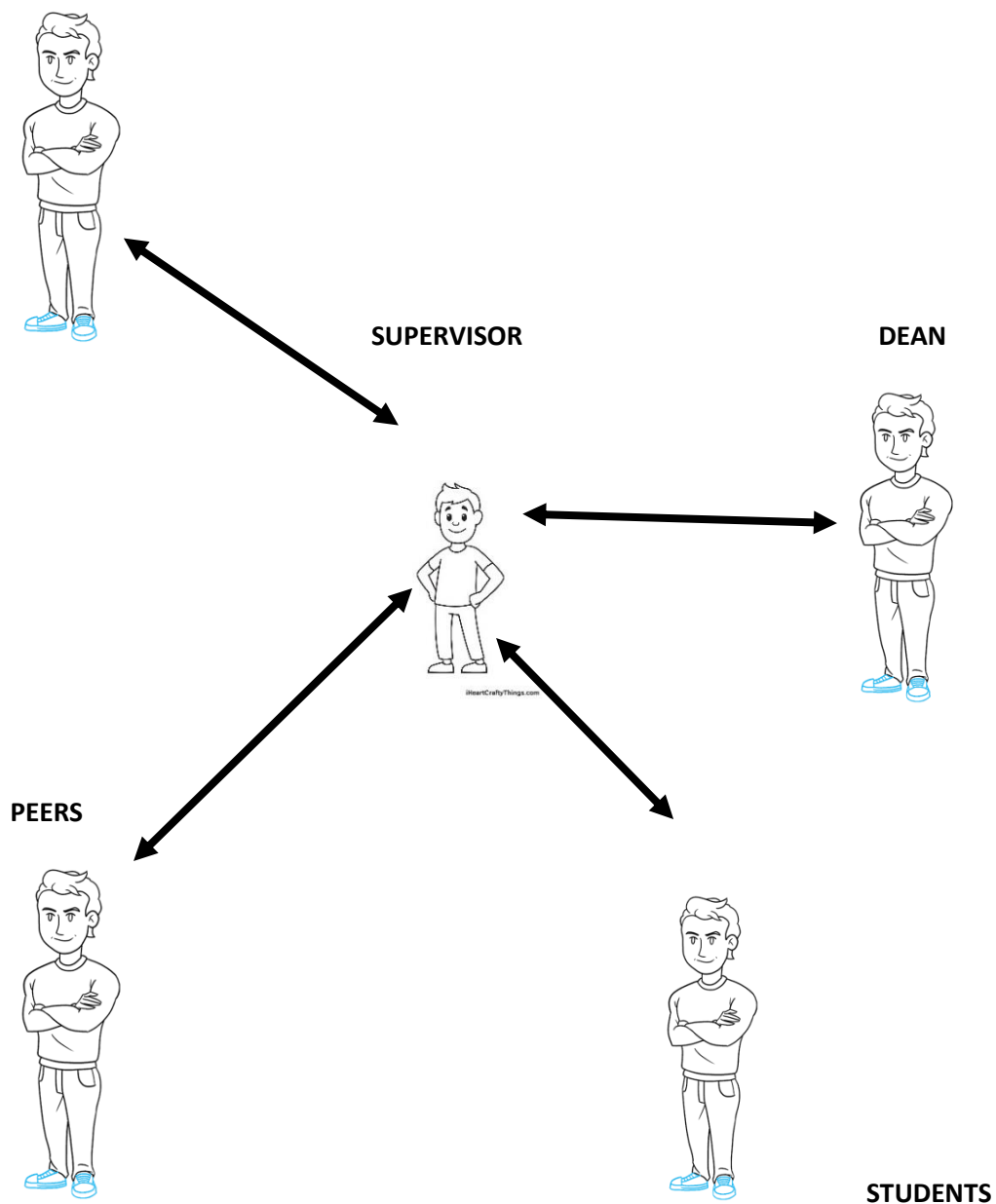


FIGURE 4.1: 360 Degrees Model for Assessing Supervisor Performance

Source: Author (2021)

The model represented in figure 4.1 is the classical representation of the model which is derived from (Bungai & Indra , 2018) study. The components of the model include:

Coordinator graduate programs is the head of a graduate program e.g Information systems in a particular faculty.

Peers are the colleagues of the supervisor or other supervisors of post graduate students

Students are the post graduate students pursuing their Masters degrees or PhDs

Dean is the head of the faculty or school at the public or private university.

Supervisor is the person evaluating and guiding the students in their research

Our model is derived from the study that was done by (Bungai & Indra , 2018). In their study, they only focused on the evaluation of supervisors by their administrators but did not address the input of students. In our model we have added the student as an entity to evaluate the supervisors.

4.4.1 The mathematical representation of the model

(Bungai & Indra , 2018) in their study used the average formula given by

Average rating (AR_X) = (R_A+R_B+R_C+R_D+R_E)/R_N, as described in the empirical literature review section 2.3. In their study they considered the evaluation of lecturers by members of administration only. In our study we have used the 360 degrees technique and added the students evaluation.

The mathematical model for Supervisor performance S_P is given by

$$S_P = \left[\frac{(\underline{AV_Y + AV_X}) + (\underline{C_X + C_Y})}{2} \right] \quad (1)$$

$$S_P = \frac{S_A + C_A}{2} \quad (2)$$

Explanation of the parts of the model

The average supervisor characteristics rating AV_Y

This is the average rating of respective supervisors by post graduate students based on supervisor characteristics. It is computed using the formula $AV_Y = \sum S_y / S_{TY}$. Where S_{TY} is the total number of students who evaluated the supervisor characteristics for a particular supervisor as shown in (1).

The average student characteristics rating AV_x

Different post graduate students evaluated their supervisors based on the student characteristics. This component is computed using the formula $AV_x = \sum S_x / S_{TX}$. Where S_{TX} is the total number of students who evaluated the student characteristics for a particular supervisor as shown in (1)

The average coordinator rating on timely completion, C_Y

This is the average coordinator rating of whether the supervisor guided students to complete research on time given by $C_Y = C_T / S_{TD}$ where C_T is the total rating and S_{TD} is the total number of coordinators who evaluated the supervisor characteristics as shown in (1).

The average coordinator rating on learning resources, C_X

C_X is the average coordinator rating of whether the supervisor used learning resources and facilities to guide students is given by $C_X = C_T / S_{TD}$ where S_{TD} is the total number of coordinators who evaluated the supervisor and C_T is the total rating.

Student appraisal S_A

This is the total value of appraisal by the students which is computed by finding the average of supervisor characteristics rating and student characteristics rating as shown in (1).

$$S_A = \frac{(AV_Y + AV_X)}{2}$$

Coordinator appraisal C_A

This is the overall coordinator appraisal of supervisors and is computed by finding the average of whether the supervisor used learning resources and facilities when guiding students in their research and whether the supervisor guided students to complete research on time as shown in (1).

$$C_A = \frac{(C_X + C_Y)}{2}$$

4.5 Results for research question four and objective four

The specific objective four of this study was to evaluate the effectiveness of the model. To evaluate the model, an online questionnaire (designed using Django web framework) for an online performance scorecard was distributed to the post graduate students and supervisor coordinators so that they could evaluate the research supervisors. The students and coordinators would login or register using the interface shown in figure 4.2

Supervisor Evaluation

Login Page

Username

Password

Login

Don't have an account? [Register](#)

FIGURE 4.2: Login Screen

Source: Author (2021)

After creating the account and logging in the system allowed the students to rate their supervisor as shown in figure 4.3

Contact Information

Victoria Kyalo
victoria@gmail.com

Supervisors programme

Masters

Department

Computing Sciences

Kindly Rate Your Supervisor
Supervisor Characteristics

Rating scale: 1=Poor, 2=Fair 3=Good 4=Very Good 5 = Excellent

supervisor

Indicators	Points Available	Ratings
Willingness of the supervisor to guide students	5	<input type="text" value="4"/>
Preparedness of the supervisor during student meetings	5	<input type="text" value="5"/>
Timely feedback to students	5	<input type="text" value="4"/>
The supervisor provided clear assessment requirements	5	<input type="text" value="2"/>

RATE

Kindly Rate Your Supervisor
student Characteristics

Rating scale: 1=Poor, 2=Fair 3=Good 4=Very Good 5 = Excellent

supervisor

Indicators	Points Available	Ratings
Ability of the student to develop ideas and present them in written format	5	<input type="text" value="4"/>
Ability of the student to identify methods for achieving goals	5	<input type="text" value="3"/>
Ability of the student to solve difficult research related problems	5	<input type="text" value="3"/>
The research sharpened the student's analytical skills	5	<input type="text" value="4"/>

RATE

FIGURE 4.3: Supervisor Rating By Students

Source: Author (2021)

Supervisor Characteristics

Supervisor Serial Number	Total Rating
S002	15
S002	16
S002	16
S002	16
S002	14
S002	14
S002	17

TABLE 4.3: The Average Supervisor Characteristics Rating AV_Y For Supervisor S002

Source: Author (2021)

$$AV_Y = 108/7 = 15.43$$

Student Characteristics

Supervisor Serial Number	Total Rating
S002	16
S002	16
S002	16
S002	15
S002	16
S002	12

TABLE 4.4: The Average Student Characteristics Rating AV_X for Supervisor S002

Source: Author (2021)

$$AV_X = 91/6 = 15.17$$

Category	Total Marks	No of Rates	Average
Student Characteristics (S_x)	91	6	15.17
Supervisor Characteristics (S_y)	108	7	15.43

Student Average, $S_A ((S_x + S_y)/2) : 15.3$

TABLE 4.5: The Average Student Appraisal Rating S_A for Supervisor S002

Source: Author (2021)

The system could not filter S_A for all the supervisors thus we computed the values as shown in table 4.6

Supervisor Number	AV_Y	AV_X	S_A
S002	15.43	15.17	15.3
S003	15.33	14.75	15.04
S0010	18.25	13.5	15.88
S009	16	14.5	15.25

TABLE 4.6: Overall Student Appraisal S_A for Selected Supervisors

Source: Author (2021)

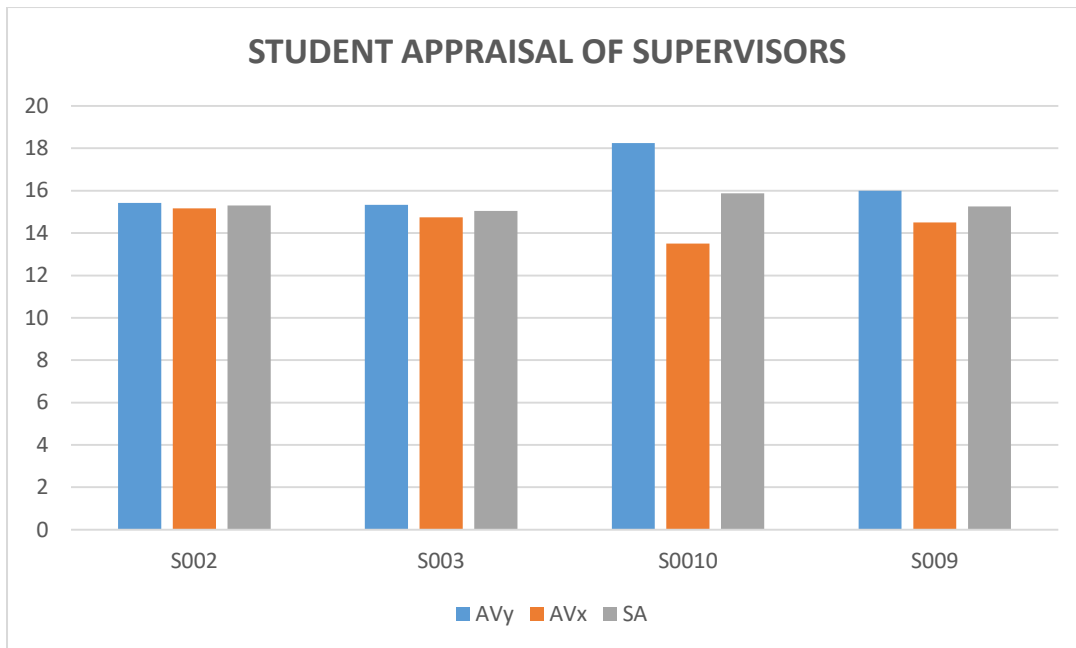


FIGURE 4.4: Graphical Representation of Overall Student Appraisal

Source: Author (2021)

From figure 4.4 it can be concluded that none of the averages directly determine the student appraisal. The student appraisal is given by their combined average.

Supervisor Characteristics

Supervisor Serial Number	Total Rating
S002	4
S002	4

TABLE 4.7: Results of Average Coordinator Rating On Timely Completion for S002

Source: Author (2021)

$$C_Y = C_T / S_{TD} = 8 / 2 = 4$$

E-learning Resources Characteristics

Supervisor Serial Number	Total Rating
S002	7
S002	8

TABLE 4.8: Results on Average Coordinator Rating On Learning Resources for S002

Source: Author (2021)

$$C_X = C_T/S_{TD} = 15/2 = 7.5$$

Category	Total Marks	No of Rates	Average
E-learning Resources Characteristics (Cx)	15	2	7.5
Supervisor Characteristics (Cy)	8	2	4.0
Coordinator Average, CA $((C_x + C_y)/2) : 5.75$			

TABLE 4.9: Overall Coordinator Appraisal C_A for Supervisor S002

The system could not filter C_A for all the supervisors thus we computed the values as shown in table 4.10

Supervisor Number	C_X	C_Y	C_A
S002	7.5	4	5.75
S003	8.33	4	6.17
S0010	7	4	5.5
S009	7	4	5.5

TABLE 4.10: Overall Coordinator Appraisal C_A for Selected Supervisors

Source: Author (2021)

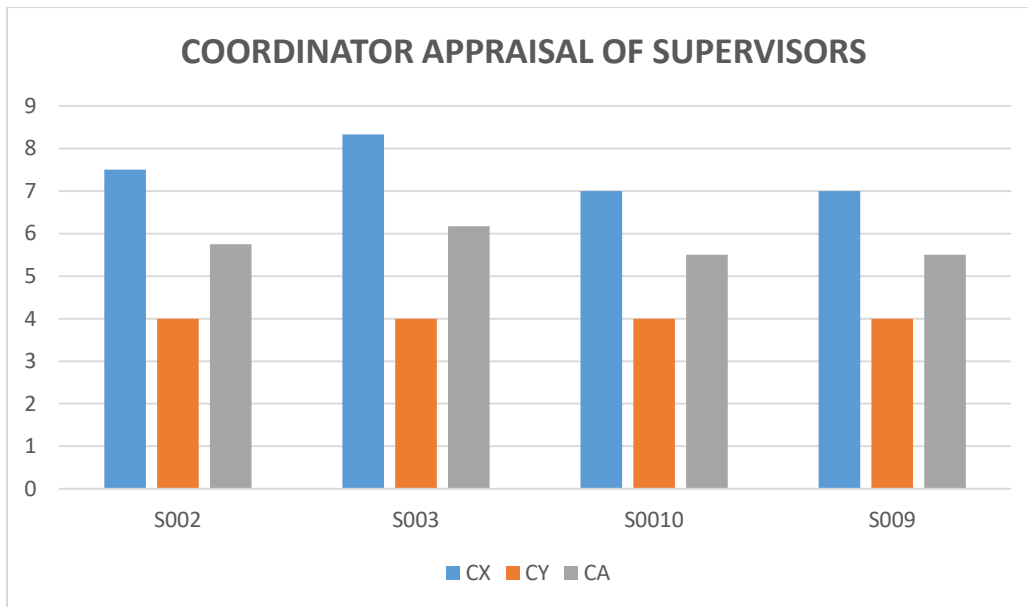


FIGURE 4.5: Graphical Representation of Overall Coordinator Appraisal

Source: Author (2021)

Supervisor performance results

After both coordinators and students have given their inputs, the appraisal system would find the supervisor performance from the overall student ratings and coordinator ratings. This is shown in table 4.11 for supervisor number S002.

Category	Average
Student Average, $SA((Sx + Sy)/2)$	15.3
Coordinators Average, $CA ((Cx + Cy)/2)$	5.75
Supervisor performance $((CA+SA)/2) : 10.53$	

TABLE 4.11: Supervisor Performance for Supervisor S002

Source: Author (2021)

The overall supervisor performance and thus the overall mathematical model for various supervisors is as shown in table 4.12

Supervisor Number	S _A	C _A	S _P
S002	15.3	5.75	10.53
S003	15.04	6.17	10.61
S0010	15.88	5.5	10.69
S009	15.25	5.5	10.38

TABLE 4.12: Overall Supervisor Performance for Selected Supervisors

Source: Author (2021)

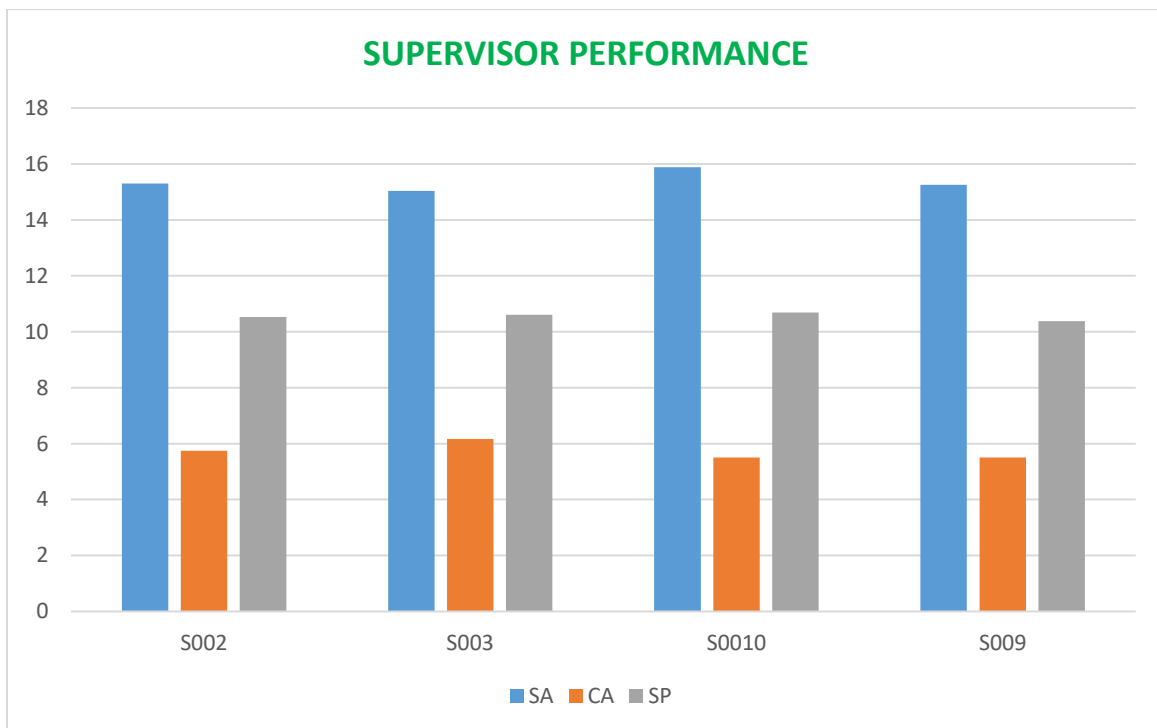


FIGURE 4.6: Graphical Representation of Supervisor Performance for Selected Supervisors

Source: Author (2021)

The above results indicate that S_A and C_A do not determine supervisor performance in isolation but it is their average that determines supervisor performance.

4.6 Discussion of Results

In the study done by (Bungai & Indra , 2018) and the report by (CUE, 2014) no correlation between the variables that determine supervisor performance has been specified.

(Bungai & Indra , 2018) emphasized the use of 360 degree and descriptive analytics but their source of data was restricted to only members of the administration unlike in our study where both members of the administration and post graduate students provide inputs for evaluating research supervisors.

The results of objective three indicate that the three variables supported the development of the model that supported the determination of supervisor performance. The students evaluation and the coordinator evaluation were averaged to give the supervisor performance rating. This eliminates the possibility of biased supervisor evaluation rating by either the students or coordinators. The results from objective four confirm the functionality of the system

4.7 Summary of Results

This result can be used as a better appraisal of supervisors compared to the appraisal procedure that was evaluated by (Bungai & Indra , 2018) which only involved administrators but not students. The (CUE, 2014) report outlines the procedure for promotion of lecturers in universities but does not mention the input of student evaluation of lecturers. From figure 4.7 it can be concluded that all the three variables namely student characteristics, supervisor characteristics and use of learning resources and facilities will influence supervisor performance.

CHAPTER FIVE

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter uses the results of the study in chapter 4 to draw conclusions. It recommends the direction for future research and how the results of this study will benefit different Universities and the society at large.

5.2 Conclusions

From the literature, supervisor performance has been found to be an important factor in post graduate research.

From objective one results, it can be concluded that learning resources and facilities, supervisor characteristics and student characteristics will influence the performance of research supervisors when guiding post graduate University students.

From objective two results, it can be concluded that the combination of 360 degree appraisal technique and descriptive analytics can be used to identify attributes to assess supervisor performance.

From objective three results, it can be concluded that our study led to the development of a model that combined the 360 degrees technique and descriptive analytics to assess the performance of supervisors using inputs from post graduate research students and coordinators.

From objective four results, it can be concluded that the system was operational as it allowed both students and coordinators to login and evaluate supervisors. The system also supported the computation of the overall coordinator and student appraisal values hence the finding of supervisor performance.

The results of this study reveal that better post graduate research supervisor performance results can be achieved by considering the appraisal by students and members of the administration in this case coordinators. This results agree with the study that was done by (Bungai & Indra , 2018) and the report by (CUE, 2014) that supervisor performance can be determined through evaluation by various administrators. However it adds the element of student appraisal which was missing in both studies.

The goals of this study were achieved because we managed to create up a system that uses the 360 degree technique of appraisal and data analytics to evaluate the performance of supervisors.

5.3 Contribution of the study

This research has enabled us to develop a model that will support the evaluation of post graduate research students' supervisor performance. Kenyan Universities can adopt this model to facilitate reliable evaluation of research supervisors. The study adds to the knowledge of (Bungai & Indra , 2018). Reliable supervisor evaluation results will provide facts that Kenyan Universities can use to promote their supervisors and ensure average or high completion rates of students at the post graduate level. The study will ensure that industries have the relevant professionals which in turn will improve the economy.

The study has contributed to the computing discipline by supporting the design and building of a system to support appraisal of supervisors and to store the appraisal information in databases. It brings about the automation of the appraisal procedure which was not evident in the research done by (Bungai & Indra , 2018), report by (CUE, 2014) and the study by (Yeoh , Jessica , & Benjamin , 2012).

5.4 Recommendations for future research

In future we recommend that a larger population of students and coordinators to be used to test the appraisal system.

The study only considered two elements of the performance model namely the students and coordinators thus we recommend that in future more research should be done to incorporate the data from the dean and the peers.

The system should be improved to automatically filter the overall student and coordinator appraisal and to provide a graphical representation of the student appraisal results, coordinator appraisal results and the average supervisor performance value.

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APPENDIX I: RESEARCH SCHEDULE

A Gantt chart is used to illustrate the schedule for our study. It is a chart of scheduled information where activities are listed in the vertical axis and the horizontal axis shows duration which maybe in weeks or months. The activity durations are shown as horizontal bars.

Research Chapter	MAR 2021	APRIL 2021	MAY 2021	JUNE 2021	JULY 2021	AUGUST 2021	SEPTEMBER 2021
Proposal research							
Chapter one: Introduction							
Chapter two: Literature Review							
Chapter three: Methodology							
Chapter four: Data analysis							
Chapter five: Summary							
Final review and submission							

Source: Author (2021)

APPENDIX II: RESEARCH BUDGET

Resource	Estimated cost (Ksh)
Internet cost @4000 per month	28000
Stationery	2000
Equipment cost	20000
Miscellaneous expenses	5000
Total cost	55000

Source: Author (2021)