

# Deterministic Model for Occupational Attrition among Teachers in Public Secondary Schools; A case of Kisumu East Sub-County, Kenya

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**Abstract:**-Teachers world over play a vital role in the academic growth and development of children. Good training and retention of teachers is therefore a necessity for any country. However, concerns about occupational attrition among teachers have been reported widely as global phenomena. In Kenya a number of teachers have transferred their services to other sectors like the Ministries of Education, Youth and Gender; the Teachers' Service Commission secretariat, Non-Governmental Organizations among many others. Occupational attrition translates amongst other things into shortages in teacher supply, high recruitment costs and poor learners' performance due to unprecedented disruptions which poses a challenge to the education system. The study sought to propose a deterministic model for occupational attrition among teachers in public secondary schools in Kenya. The study was anchored on four objectives; to propose a deterministic model for occupational attrition among secondary school teachers, to study the properties of the model, to carry out a simulation study on the proposed model and to apply the model to the case of Kisumu East Sub-County in Kenya. The study was carried out in ten public schools in Kisumu East Sub-County selected using stratified random sampling using three strata; boys', girls' and mixed schools from which a sample of 250 teachers was drawn. A multiple linear regression model was constructed using R programming language. The adequacy of the regression model was examined using adjusted  $R^2$  and the significance of the regression model was tested both globally and marginally. The study revealed that poor schemes of service highly influenced occupational attrition compared to the other factors. It was recommended that the Government should revise the schemes of service introduce competitive package for those with higher qualifications.

**Key words:** Attrition, retention, deterministic, heteroscedasticity, multicollinearity

## I. INTRODUCTION

In Britain, Lambert (2003) contends that teachers' mobility between and out of Schools is a major threat to the education sector leading to loss of human resource in the sector. A number of teachers keep on changing Schools while a number have switched jobs from teaching to other lucrative jobs due to a number of reasons, including lack of respect for the teachers and comparatively lower pay.

The Ghana Education Service (GES) estimates that about 10,000 teachers leave the classroom yearly for various reasons, at the same time, the number of teachers that go on

study leave annually has been on the rise with about 3,000 teachers leaving the classroom to pursue further education. This has worsened the staffing situation and to a greater extent compromised the quality of education (Ingesoll, 2001).

According to Adelabu (2005), teaching profession in Nigeria has been relegated to the background and that teaching is not accorded the respect it deserves with a good number of teachers quitting the teaching service annually to other jobs with satisfaction based on the reasons for quitting. The teaching profession in Nigeria is therefore characterized by continued mobility, changeovers, low morale among teachers and poor job satisfaction.

Rohland (2001) revealed in parts that a teacher retention strategy that addresses teachers' occupational attrition is essential in South Africa in order to reinforce the contribution of teacher education in the growth of education sector for the teaching profession lacks stability as most young teachers quit the classroom instruction for other related jobs and this has been observed to be common with the science and language teachers. Gauteng Department of Education (2002) reports that in Gauteng there is a negative growth rate of the permanent educators and that there are more permanent educators leaving than entering the system, implying a decreasing number of permanent educators.

Thousands of teachers are quitting the classroom for better paying jobs elsewhere worsening the staffing situations in Kenya. According to Machio (2011), 6,205 teachers leave the profession annually for various reasons with a higher proportion quitting the profession for the private, other public and informal sectors. In the recent past, a number of teachers have transferred their services to the Ministries of Youth and Gender as well as the Teachers' Service Commission (TSC) secretariat, Ministry of Education (MOE), prime ministers' office among others and this has led to a continued reliance on Board of Governors (B.O.G) teachers. In 2008, about six hundred public secondary teachers left the profession in a period of six months for better paying jobs elsewhere (Oyaro, 2008).

Kisumu East District houses the headquarters of Nyanza province which offer a wide range of job opportunities for instance insurance firms, banking firms, business, sugar industries, fishing firms, the Non-Governmental

Organizations (NGOs) among many others. These lucrative sectors attract teachers from the teaching profession leading to shortage of teachers. The exit of teachers from the teaching profession lead to shortage of teachers affecting mostly the sciences, mathematics, languages and the technical subjects crucial in the Kenyan education system. The government must give priority to stop brain drain particularly concerned with the exodus of teachers to other sectors and countries for greener pastures (Kizito, 2003).

The free primary education that has necessitated the increase in student population in public secondary schools and the struggle to attain the objectives in education as enlisted in Vision 2030 may not be realized due low teacher to student ratio as a result of occupational attrition. This is a pathetic situation and for the quality of education to improve, we need experienced teachers showing that teachers' occupational attrition must be contained for improved quality of education and knowledge provision (Keriga, 2009).

#### *Statement of the problem*

According to the Republic of Kenya (2010) in the year 2010 statistical reports, 0.1% of public secondary school teachers left the profession in 2008, 0.127% in 2009 and 0.14% in 2010. The trend though infinitesimal showed that the teaching profession was facing a major threat from occupational attrition. Kisumu East Sub-County in particular, was the worst hit in Nyanza region, because in 2008, 2009 and 2010 about 20, 23 and 25 teachers respectively left the profession with a shortfall of about 181 teachers which was the second highest in the province after Rachuonyo North Sub-County with a shortfall of about 201 teachers (Republic of Kenya, 2010). Machio (2011) also confirmed the fear when the chairman of Teachers Service Commission (TSC) alluded to the problem terming it as mass exodus.

The impact of occupational attrition among teachers lead to increased costs towards the operations in secondary education which are broadly categorized as training, recruitment, selection, and induction as well as loss of productivity, this was evidenced by the fact that though the enrolment was on the rise in public Secondary Schools, there was always teacher shortage in spite of the annual recruitment

#### *Objectives*

##### *General objective*

To model the rate of occupational attrition among public secondary school teachers in Kenya

##### *Specific objectives*

- (1) To propose a deterministic model for occupational attrition among public secondary school teachers in Kenya.
- (2) To study the properties of the proposed model.
- (3) To apply the model in the case of Kisumu East Sub-County.

## II. SUMMARY OF LITERATURE REVIEW

Teachers' occupational attrition is a global phenomenon, in his 1997, state of union address; the former U.S president Bill Clinton challenged all the Americans to ensure that there was a talented, dedicated and well-prepared teacher in every classroom across the country, with the increase in the complexity of today's technological society. He said "It is therefore imperative that our children have well prepared teachers who know their subjects and know how to teach them effectively he further said that the society should be able to recruit and hire qualified teachers and keep them in the profession" (Sincere, 1997).

A study by Lewis in 2004 on Rate of teacher attrition in New York revealed that from 30 % to 50 % of beginning teachers leave the profession within the first five years in New York. Studies on teacher occupational attrition reveal that teachers are leaving the profession at high rate at the global level. Study by Williams in 2002 on teacher shortage and performance found out that teacher OA affects the quality of education in the United States with the attrition projected province wise at both elementary and secondary levels.

#### *Occupational Attrition in the Educational Sector in Kenya*

According to Mbuthia (2003) valuable brains are drained from the education sector and staffing levels are fluctuating for reasons of staff turnover. He further noted that fluctuating in staffing levels will likely remain a feature in educational institutions for reasons of intellectual labour migration stimulated on one hand by desirable short-term staff exchange programmes and on the other hand by undesirable long-term effects of brain drain.

The exodus of trained teachers from teaching profession to lucrative areas continued and worsened in Kenya. In 1998, more than 100 teachers moved to Seychelles leaving several positions unfilled (Republic of Kenya, 2004)

A study conducted by Omondi in 2011 on factors influencing performance of student teachers on teaching practice of selected primary training colleges in Western Kenya confirmed that teachers today leave the profession for higher education in different fields of study due to the liberalization of the education sector.

#### *Schemes of service and occupational attrition*

Teachers' salaries are poor compared to other professions like law and medicine or even the public service (Agutu, 2010).

In 2005 in the United States of America, Robinson in her research on teacher turn over, wastage and movements between schools found out that low pay was the major reason behind the mobility of teachers and especially professional exit from the profession.

Low pay has pushed both teachers in both primary and secondary schools to migrate into other well-paying professions in the civil service, NGOs and private sector.

According to the daily Nation on 5<sup>th</sup> May 2008, the principals revealed that six hundred teachers left the classroom for better jobs; the tutors joined banks, media and the youth ministry.

According to Musimba (1998), a number of strikes have been organized to agitate for better pay by the teachers through their union Kenya National Union of Teachers (KNUT) and Kenya Union of Post Primary Teachers (KUPPET).

The teaching profession has organized one of the highest numbers of strikes in the country among the other professions up to the most recent strike in the year 2010. The government has always insisted that the teachers are poorly paid because of their numbers, which has been an unjustified explanation. This study therefore undertakes to assess the extent to which schemes of service determine occupational attrition and will suggest probable ways of correcting the situation.

#### *Working conditions and occupational attrition*

According to the study by Ferber in 2011 on why great teachers quit and how we might stop the exodus in United States of America found out that many teachers in the United States do not have enough time to do everything that they feel they should be doing. He claims that this is eroding their personal and professional time. According to the study by Smitters and Robinson in 2005 on teacher turn over, wastage and movement between schools in the United States shows that long hours and large classrooms with a few in disciplined students make teaching a miserable professional life, for these lead to high stress, burnout and no opportunity for advancement.

In Kenya, past studies showed that most teachers work for extra hours without any form of payment unlike other sectors where extra hours are compensated in terms of overtime payment. In most boarding schools, teachers work up to as late as midnight and report on duty as early as four a.m. early in the morning. Comparing with other sectors, work begins at 8.00 a.m. in the morning and ends at 5.00 p.m. Teachers therefore show desires to join these sectors (Rugene, 2001).

#### *Principal's management styles and occupational attrition*

Harris (2005) describes leadership style as the manner a leader leads, which is reflected in some of the things principals do which include how they communicate, exercise power and authority and the effect these have on teachers and other school workers.

According to Massie (2007), the teachers are merely informed to implement decisions that are arrived at elsewhere hence an autocratic leader is dictatorial and often assumes he or she is the best leader and falsely assume that teachers depend on them for survival and often imagine they have the best solutions to problems.

In the United Kingdom, research by Evans (2003) on the relationship between management style and teacher stress

found out that teachers in schools which are managed autocratically felt ignored, undervalued, exploited and frustrated and therefore opt for other schools perceived as peaceful to them or other professions with most of the affected teachers exiting the teaching profession into private business. In the same study, it was revealed that democratic style was the best way to ensure high teacher retention in all schools in the United Kingdom.

In the United States of America, a study by Smitters and Robinson (2005) on teacher turn over, wastage and movement between schools contend that management style is a key factor affecting teacher retention, wastage and movement in the United States. According to the study, occupational attrition is a threat to the education standards and is partly attributed to poor leadership styles, especially authoritative leadership style, whereby most teachers feel left out and move to professions where their presence and contribution can be felt.

#### *Affinity for higher education and occupational attrition*

In his study on the relevance of Education on job satisfaction in Germany in 2001, Hens found out that, those with higher education felt more confident and satisfied with their occupations. He also found out that the individuals with higher education were able to move from one job to another with a lot of flexibility.

According to Smitters and Robinson (2005) on teacher turn over, wastage and movement between schools in the United States of America, teachers with masters' degrees were on the run and aiming at higher salaries. Smitters and Robinson contend that these teachers felt sufficiently equipped to be instructors at any level of education and were therefore instructors in various institutions prioritizing the better payers.

Merylin in 2006 on teacher shortage and education in South Africa found out that the most educated had little interest on becoming instructors and mostly struggled for the high government positions as administrators and managers. This is said to have led to acute teacher shortage in South Africa to the extent that the country opted for importation of teachers from other countries including Kenya.

### III. METHODS AND MATERIALS

#### *Source of data*

The target population for this study was all public secondary school teachers employed by TSC within Kisumu East Sub-County, Kenya. There was a total of 691 teachers in 40 Public secondary schools in the district, 300 of whom were males and 391 females (Republic of Kenya, 2010).

According to Krejcie and Morgan (1970), sample size  $n$  is given by;

$$n = \frac{\chi^2 N p(1-p)}{d^2(N-1) + \chi^2 p(1-p)}$$

Where; N = the population of all teachersemployed by TSC in Kisumu East district which is about 691.

d= The degree of accuracy expressed as a proportion always taken as 0.05

p = The population proportion (assumed to be 0.5 since this would provide the maximum sample size)

$\chi^2$  = The table value of chi – square for 1 degree of freedom at the desired confidence level equal to 3.841 (Nasiuma, 1995).

$$n = \frac{3.841 \times 691 \times 0.50 \times 0.50}{0.05^2(691 - 1) + 3.841 \times 0.50 \times 0.50}$$

$$n = 247$$

A sample of 250 teachers was considered to take care of the questionnaires which may not have been returned.

Stratified sampling was used to select schools in the ratio 1: 1: 3 (boys', Girls' and mixed schools) respectively based on the available schools in each category. The study area had 5 boys' schools, 4 girls' schools and 31 mixed schools. The number of teachers selected from each school was proportionate to the number of teachers in each school. From the teachers selected from each school, purposive sampling was used to select female and male teachers in the ratio 4:3 respectively proportionate to their respective populations in order to ensure representativeness of both sexes in the sample.

#### Model Building

A multiple linear regression was proposed as

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon_i \quad (1)$$

Where

$Y_i$	- Occupational attrition
$X_1$	- Schemes of service
$X_2$	- Working conditions
$X_3$	- Principals' style of management
$X_4$	- Affinity for higher education
$\varepsilon_i$	- Error terms which are assumed to be normally identically and independently distributed with zero mean and constant finite variance $\sigma^2$

#### Testing for the adequacy of the model

The adequacy of the model was tested using adjusted  $R^2$  and the significance of the regression model was examined using the global test as well as the marginal tests on the parameter estimates to investigate the significance of the independent variables. The global test was done by the analysis of variance while the marginal test was done by testing hypotheses on individual parameter estimates;  $\beta_1, \beta_2, \beta_3$  and  $\beta_4$ . The less significant factors were dropped in the final model.

From Figure 2, the model is such that the fit is linear and there are no outliers. The model therefore as proposed is valid in determining the dependent variable.

#### IV. RESULTS AND DISCUSSIONS

A multicollinearity test conducted on the independent variables; working conditions, salary, management styles and affinity for higher educations showed very weak collinearity. This is depicted in the output in Table 1 and Figure 1. From Table 1, the eigen values vary from a maximum to a minimum value, showing the existence of multicollinearity. Consequently, the ratio of maximum to minimum eigen value is less than 100. By rule of thumb, when the ratio is less than 100, the multicollinearity between the independent variables is not significant.

The proposed deterministic model is

$$Y_i = 2.16817 - 0.37918X_1 + 0.01301X_2 + 0.09981X_3 + 0.04143X_4 \quad (2)$$

From the model in (2), the rate of occupational attrition among Secondary school teachers inversely varies as the salary and directly varies as the working conditions, principals' management styles and affinity for higher education. The salary is the most significant factor in determining occupational attrition followed by principals' management styles, then affinity for higher education and lastly working conditions.

From Table 2, the model explains 75.49% of the variability in the data. This shows that the proposed model is adequate as a deterministic model for occupational attrition among teachers in Kenya, a case of Kisumu East Sub-County. From Table 2, the global test on regression shows that  $6.086e-12 < 0.05$ . Hence the regression is significant at 95% level of confidence. From table 3, for  $X_1$  and  $X_3$ , the p-values are less than 0.05. Therefore, salary and principals' management styles are significant factors in the model. Affinity for higher education and working conditions are therefore less significant in determining occupational attrition among teachers. The adjusted model is given as

$$Y_i = 2.16817 - 0.37918X_1 + 0.09981X_3 \quad (3)$$

#### V. CONCLUSIONS AND RECOMMENDATIONS

The study revealed that a lot was still needed to make the education sector the sole giver of knowledge. It was therefore revealed that schemes of service and particularly poor remuneration determined occupational attrition to the greatest extent.

The study further revealed that there were overcrowded classes, poor pollution control leading to poor working conditions which hindered teachers' productivity and therefore determine occupational attrition.

The study found out that the principal was the key retainer of teachers and his or her management style gave a bearing on whether the teachers would like or leave for another job. It was therefore revealed that principal's management style determines occupational attrition.

The study found out that majority of the teachers in the district had either acquired Masters degrees, enrolled or planning to enroll for higher education. Most of those enrolled were displeased with the current job and had intentions of crossing to the Universities as lecturers or better opportunities upon course completion. determining occupational attrition.

#### *Recommendations for further Study*

A study on how schemes of service influence worker productivity.

Table 1. Test for multicollinearity output

```
mycorr<-cor(mydata)
>mycorr
```

	Y	X1	X2	X3	X4
Y	1.00000000	-0.4678164	0.1085028	-0.01041985	-0.01837413
X1	-0.46781639	1.0000000	-0.2499061	0.33585701	0.14441007
X2	0.10850281	-0.2499061	1.0000000	-0.18774015	-0.29786913
X3	-0.01041985	0.3358570	-0.1877401	1.00000000	0.11118036
X4	-0.01837413	0.1444101	-0.2978691	0.11118036	1.00000000

```
>eigen(cor(mydata))$values
[1] 1.8177928 1.1462180 0.9282092 0.6836533 0.4241268
```

```
>plot(mydata)
>max(eigen(cor(mydata))$values)/min(eigen(cor(mydata))$values)
[1] 4.285966
```

```
kappa(cor(mydata),exact=TRUE)
[1] 4.285966
```

Table 2. The model output

Call:

lm(formula = Y ~ X1 + X2 + X3 + X4, data = mydata)

Residuals:

Min	1Q	Median	3Q	Max
-1.04305	-0.00902	0.04375	0.04375	0.43594

Coefficients:

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	2.16817	0.12646	17.145	< 2e-16 ***
X1	-0.37918	0.04744	-7.993	9.12e-14 ***
X2	0.01301	0.03855	0.338	0.7361
X3	0.09981	0.03914	2.550	0.0115 *
X4	0.04143	0.05772	0.718	0.4737

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.7612 on 207 degrees of freedom  
Multiple R-squared: 0.7549, Adjusted R-squared: 0.2305  
F-statistic: 16.8 on 4 and 207 DF, p-value: 6.086e-12

Table 3. The ANOVA output

Response: Y

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
X1	1	3.422	3.4221	60.0088	4.152e-13 ***
X2	1	0.0012	0.0012	0.0207	0.88581
X3	1	0.3794	0.3794	6.6533	0.01059 *
X4	1	0.0294	0.0294	0.5151	0.47375
Residuals	207	11.8047	0.0570		

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Figure 1. Plots to test for multicollinearity between the variables

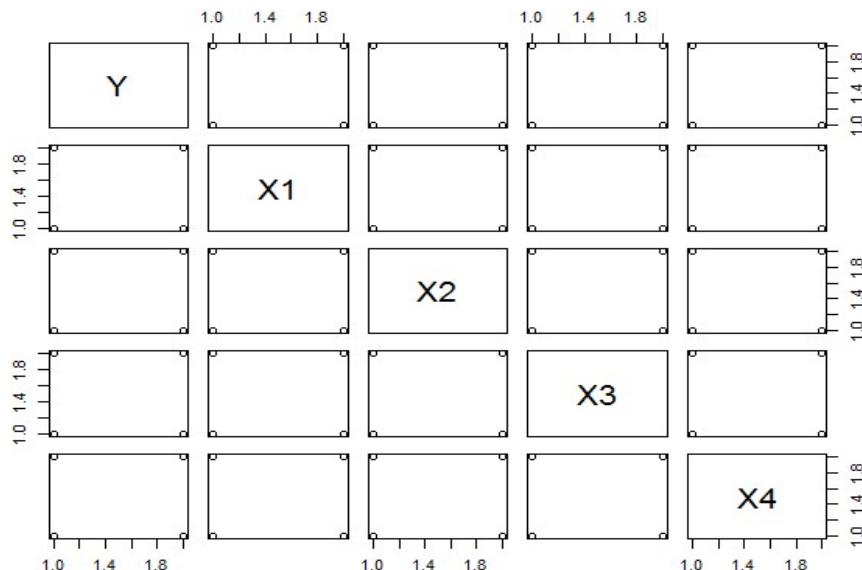
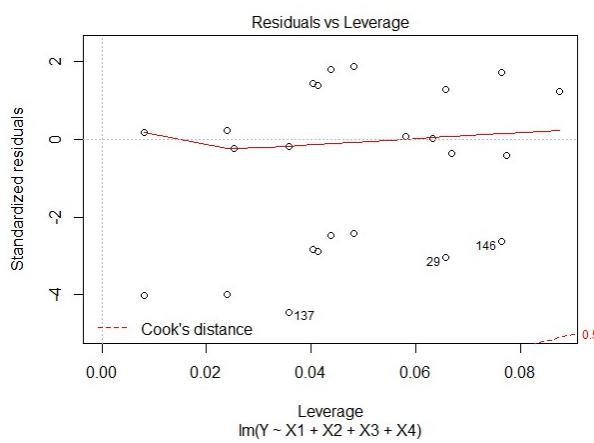
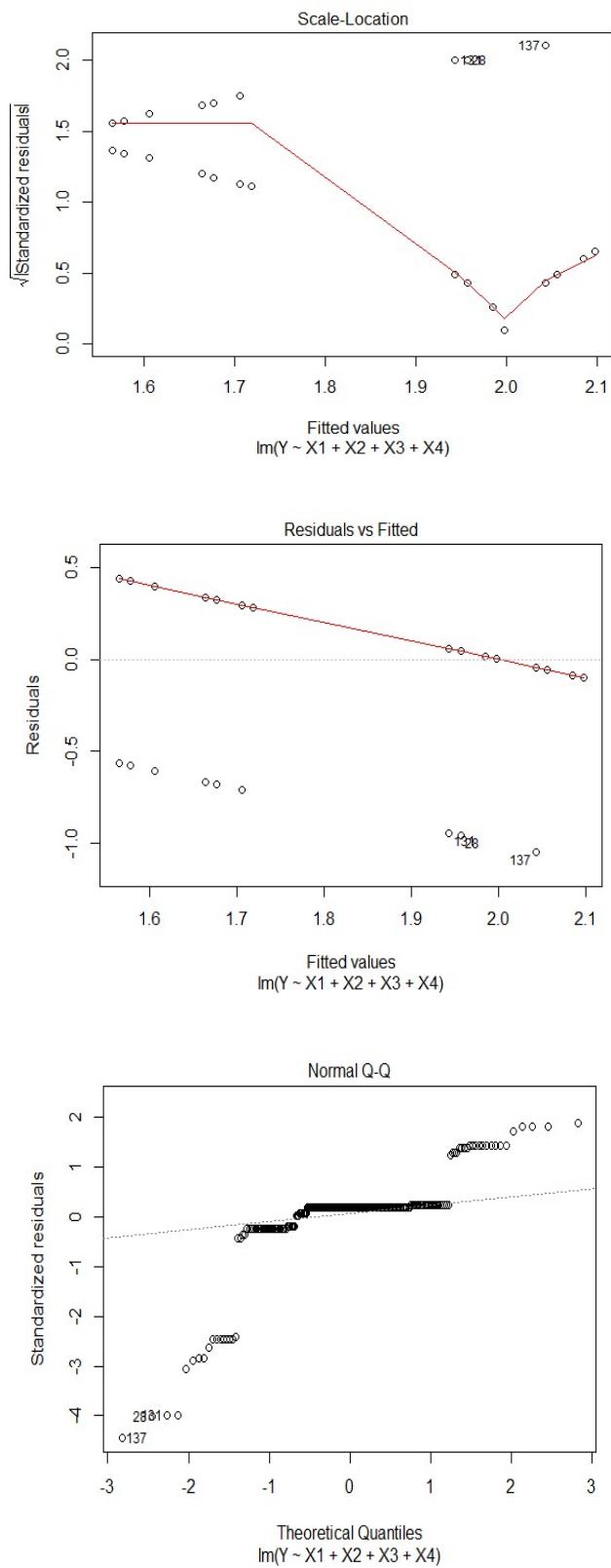


Figure 2. Model diagnostics plot





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