Effect of Cashless Reform on Revenue Collection Performance in Kakamega County

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ABSTRACT

Revenue is considered a key element for any state since the resources mobilized and collected are used to finance government projects and provide services to citizens. After the creation of Kakamega County due to devolution, Kakamega initiated revenue reforms in 2019 to mobilize its own source of revenue. Despite the reforms, the county is still facing challenges and massive deficits in revenue collection, which hinder its operation. The study specifically examined the effect of cashless reform on revenue collection performance in Kakamega County. Secondary data between the two periods was used, and the study chose descriptive, correlational, and causal comparative as the study designs. The data in this research was analyzed using both descriptive and inferential statistics. Descriptive statistics measured include mean, standard deviation, minima, and maxima. The Pearson correlation coefficient was also calculated. Pre-estimation diagnostic tests carried out in the study included unit root and Philip Perron tests for stationarity. Results indicated that after reforms, cashless reform had a moderately positive relationship with revenue collection performance (0.450). From regression analysis, model estimates after reforms were ($t = 2.81$, $p<0.05$) for cashless system reform. Post-estimation diagnostic tests carried out include the Breusch-Godfrey LM test, whose findings showed that there is no autocorrelation; the Variance Inflation Factors (VIF), which indicated that there was no multicollinearity; the Breusch-Pagan test, whose results and findings showed the error terms were homoscedastic; and finally, the Jarque-Bera test, which showed that residuals are regularly conveyed. Recommendations from the study were that Kakamega County should come up with modern ways of revenue collection. Additionally, the county should come up with a simplified and cost-effective system to enhance revenue collection. The study further recommended severe sanctions on tax evaders. The discoveries from research will be utilized by policymakers to enhance revenue collection within Kakamega County by increasing the revenues collected. Also, the findings will help the Kakamega County Revenue Agency (KCRA) staff gain insights on policy reforms within the county and their causal effect on revenue collection performance.

Keywords: Cashless System Reform, County Government Reforms, Revenue Collection Performance, Structured Revenue Stream, Unstructured Revenue Stream

I. INTRODUCTION

Globally, revenue is considered and ranked as the largest source of income for any country. According to the World Bank, the ability to collect revenue by the world economies in the USA, Asia, and Europe has enhanced their ability to venture into the development of human capital, developing infrastructure, and providing services to citizens and businesses. Georgia is among the European nations that offers the best example of tax revenue reforms. In 2004, Georgia implemented strict reforms such as reforming its tax code, simplifying taxes, lowering tax rates, and eliminating small local taxes with insufficient income. According to the IMF Finance and Development article, corporate income was taxed at 15% and the VAT reduced from 20% to 18%. Tax deficits from lower rates are counterbalanced by a more extensive tax base, way better compliance, and tighter authorization. The Georgian government made it less demanding to pay charges by submitting electronic returns. With the reforms made by the Georgian government, the revenues of the state increased (Akitoby, 2018).

According to Mabugu and Simbanegavi (2015), in their article Tax and Expenditure Reforms in Africa, African governments implement tax reforms to increase tax revenue. The changes included introducing a general tax system,

simplifying the tax system, and improving tax administration. With the reforms introduced by the African governments, revenue collected has continuously grown within the continent.

Osoro (2020) argues that the Eastern African countries, namely Kenya, Uganda, and Tanzania, adopted the tax regime that was left behind by colonial powers. The main sources of revenue in the region have been PAYE, VAT, corporate tax, customs, and excise duty. With improved technology in the region, countries in the region have digitized their tax collection as their main tax revenue reform. Digitization has improved and enhanced revenue collection within the region and Kenya in particular. Kenya's revenue collection has grown tremendously in the past few years.

Kakamega County was formed after the Kenyan constitution was promulgated in 2010, which introduced devolution to the country. Various reforms and structures that have led to the enhancement of revenue collection in Kakamega were introduced by the county's leadership. Some of the revenue streams within Kakamega County include, but are not limited to, single business permits (SBPs), toll fees, motorcycle stickers, land rates, ground rent, kiosk rent, plan approvals, renovation fees, parking fees, market fees, and advertisement fees. Kakamega County has prioritized revenue reforms to increase revenue collection as one of the measures to mobilize needed resources to meet the county's development agenda. In 2014, the county created the Kakamega County Revenue Agency (KCRA) under the ministry of Finance, ICT, and Economic Planning, which was tasked with the sole purpose of administering, collecting, and enforcing revenue collection within the county.

Despite the milestones achieved in revenue collection due to the reforms put forward by Kakamega County, the achievements were quashed in the period when the country was badly hit by the spread of COVID 19. The COVID-19 outbreak led to a dismal performance in revenue collection. The county government, in consultation with various stakeholders and departments, should come up with well-defined structures and reforms to enhance revenue collection within the county. Revenue is a key project that, when maximized by the county, can lead to the raising of needed resources for economic development. With the amount collected from revenue, the money can be used to fund key projects within the county, such as infrastructural development, improving the health sector, and improving human capital.

1.1 Statement of the Problem

Taxes are a crucial source of income for the Kenyan government and the county governments. Since its inception, Kakamega County has prioritized revenue collection and considered it a fundamental project for the county government of Kakamega because revenue collection provides essential resources to finance key activities. Notably, revenue collection deserves serious attention to harness the required resources to help in the actualization of the county's projects. Several studies done in Africa and the world over (Mooij et al., 2015; MacDonald, 2016) have indicated positive relationships between revenue reforms and revenue collection performance. However, that seems not to be the case in Kakamega County. A survey carried out in 2019 by the Kakamega County Revenue Agency (KCRA) reported that Kakamega County has the potential to generate approximately Ksh 3.5 billion in a financial year.

However, reports by the Kakamega County Revenue Department revealed that in the financial years 2017/2018, 2018/2019, 2019/2020, and 2020/2021, only the following revenues were collected: 441.3 million, 896.7 million, 1.2 billion, and 1.1 billion, respectively (KCRA, 2021). To deal with these revenue collection deficits, the county government of Kakamega introduced revenue reforms in 2019 (KCRA) to correct the inefficiencies and inequalities in revenue collection. This has not been achieved as expected. The contribution of the reforms to revenue collection in Kakamega County remains an issue that warrants examination. This study aims to determine the effect of cashless reforms on revenue collection performance in Kakamega County, Kenya.

1.2 Objective of the Study

The overall objective of the study was to find out the effects of cashless reforms on revenue collection performance in Kakamega County. The study was based on the following hypothesis.

HO1: There is no statistically significant relationship between Cashless reform and Revenue collection performance in Kakamega County

1.3 Significance of the Study

This research is very important to many involved. First, the Kakamega County Revenue Agency (KCRA) administration will use the findings to make decisions about revenue collection. Also, the findings and conclusions from this study will be useful, as they will be used to improve and strengthen the revenue collection system in Kakamega County. Finally, researchers, students, and scholars will use this research for further research and can also help students who want to do more research on tax language.

1.4 Scope of the Study

The main aim of the study was to determine the effect of cashless reforms on revenue collection performance in Kakamega County. According to the 2019 census, Kakamega County has a population of 1,867,579. The county comprises twelve sub-counties, namely Lurambi, Shinyalu, Ikolomani, Butere, Khwisero, Mumias West, Matungu, Mumias East, Navakholo, Malava, Lugari, and Likuyani. This study concentrated on effective revenue reforms for revenue collection in Kakamega County. The study focused on a 36-month period before reforms (July 2016–June 2019) and a 36-mmonth period after reforms (July 2019–June 2022). These two periods are quite essential so as to give a comparative analysis to examine the effect of the cashless reforms on revenue collection performance in Kakamega County. Also, Kakamega County made its biggest milestone in revenue collection in 2019. This study used regression models to explain the relationship between revenue collection and revenue reforms. In the study, revenue diversification theory was used as the theory to explain revenue reforms under survey.

II. LITERATURE REVIEW

Kanyi and Kalui (2015) conducted a study on Kenya's tax reforms, focusing on the amount of tax collected by the state. The research aimed to address the country's tax system's inefficiencies and weaknesses, aiming to maximize tax collection for financing expenditures. They highlighted the adoption of digitization and electronic payment, which enhanced revenue collection in Kenya. The study used descriptive and regression methods to analyze the effects of tax reforms and policies on tax collection. The findings showed that Kenya's policies positively affected tax collection, and the authors recommended the adoption of more modernized and efficient policies for better revenue collection and administration. The study underscores the importance of tax reforms in addressing the challenges faced by the Kenyan government.

The global trend towards cashless economies for increased efficiency and reduced risks is evident, with Nigeria's case (Olanipekun, 2013) illustrating electronic payment benefits and challenges. This study focuses on Kakamega County's revenue reforms, drawing from Nigeria's experience, to enhance revenue collection efficiency and align with cashless economy goals. The research parallels Olanipekun's insights, emphasizing security and efficiency, but also addresses infrastructural and literacy hurdles. Analyzing Kakamega's context, the study seeks to optimize revenue collection, reflecting Nigeria's drive towards a cashless economy.

As Srouji (2020) emphasizes, Gulf Cooperation Council (GCC) nations, including the United Arab Emirates, have been gradually adopting digital payments to improve tax and revenue collection. Srouji highlighted benefits like increased revenue, enhanced security, and transparency. Despite this transition, cash still dominates transactions due to infrastructural limitations, cyber security concerns, and high transaction costs. Srouji noted that cash reliance in developing nations often stems from socio-economic inequality. Srouji suggested establishing a connection between socio-economic inequality and cash usage. This paper aligns with Srouji's findings, investigating the impact of digital payments on tax and revenue collection, similar to the analysis of cashless reforms on revenue collection in Kakamega County.

The Kisumu County government has undergone substantial reforms in revenue collection and administration, resulting in notable changes in revenue outcomes (Odhiambo & Nyariki, 2022). The researchers explored the influence of cashless management on revenue enhancement and collection within Kisumu City County. Specifically, they investigated the impact of electronic point of sale (POS) machines on revenue collection. Their study revealed that the adoption of the cashless system led to increased efficiency and higher revenue collection for Kisumu City County. This study aligns with the ongoing research, as both highlight the positive effects of cashless systems in improving and augmenting revenue collection processes.

2.2 Theoretical Literature Review

The revenue diversification theory served as the study's main guide. As discussed below, this theory explains how cashless reforms affect revenue collection performance. John Anthony Beare, an economist, developed the revenue diversification theory in 1982 to explain the variations in income between various states. In his survey,Conybeare stated that one of the many predictions for ensuring government behavior is that states will try to maximize their tax revenues by changing their tax base. Revenue diversification theory states that communities with greater income diversity have lower tax expenses when other determinant soft-axe expenses are controlled (Conybeare, 1982). Amounts of taxes collected will be maximized when a country has more than one tax base. In addition to an increase in revenue, diversifying the revenue base reduces the collection risk in that less revenue realized in one stream will be offset by more revenue collected in the other streams. Some of the limitations found in the revenue diversification theory were spotted by the Cambridge University press

Cambridge University Press states that the capacity of developing nations to broaden their tax base is constrained by their ability to withdraw tax assets from their jurisdictions. Another limitation pointed out was that the physical location of most developing countries hinders them from generating enough revenues. By contrast, he pointed out that the situation is different in developing countries: while their tax bases are more diverse than in developed countries, they cannot be better than they are because of the administration's weakness.

Revenue diversification theory was relevant to the study since its main objective of maximizing revenues by diversifying the tax base amplifies what the county is seeking through its revenue reforms: increasing revenue collection performance in Kakamega County. It is believed that the revenue reforms put in place by Kakamega County have improved and enhanced the performance of revenue collection within the county. In addition, the county has diversified its tax base by coming up with various revenue streams such as market fees, land rates, SBPs, distribution licenses, advertisement fees, rent from county properties, motor vehicle stickers, and building plan approvals. With these various revenue streams, revenue collection within the county has been revamped since a drop in the collection from one revenue stream is offset by a higher collection from the other.

III. METHODOLOGY

3.1 Research Design

According to Saunders et al. (2007), design can be named in terms of time, choice of methods, or methodologies utilized to gather data. The study settled on the use of descriptive research designs, correlation research designs, and causal comparative research designs. A descriptive research design was used in the study to illustrate and explain the patterns of the variables by using the mean, standard deviation, maxima, and minima. A correlation research design was also adopted in the study. A correlational design was deployed to analyze the relationship between the variables. The correlation design showed the direction and magnitude of the variables; it explained whether the variables had a positive or negative relationship. Furthermore, the researcher also settled on a causal comparative design to check on the impact of the reforms on revenue collection. A causal comparative design was used to check the cause-and-effect of the reforms on revenue collection performance.

3.2 Data Collection

Data collection for the cashless system reform study involved gathering information on revenues generated from parking fees. Accessing parking fee and market fee data was facilitated through county dashboards, where clients conveniently paid these taxes via mobile phones. Additionally, total county revenue data was obtained for two distinct periods: July 2016 to June 2019 (pre-reform) and July 2019 to June 2022 (post-reform). This time-based approach aligns with Dix's (2020) characterization of time series data as progressive measurements recorded over time to track change. The selected periods were strategically chosen to yield meaningful comparative insights into revenue collection performance subsequent to Kakamega County's introduction of revenue reforms in 2019. Data collection was executed using designated data collection sheets.

3.3 Data Analysis

In the data analysis section, the study deployed both descriptive and inferential methods to analyze the data. The parking fee, which was a measure of cashless system reform, was settled to find out the impact of cashless system reform on revenue collection in Kakamega County. The descriptive statistics that were measured in the study were the mean, maxima, minima, and standard deviation. Conversely, the study conducted a correlation analysis to find out the relationship between the predictor variables (revenue reforms) and the predicted variable (revenue performance). In the analysis, Pearson's R, R squared, and adjusted R were calculated. Lastly, a two-sample t test was incorporated into the analysis section to check the effect of the reforms on revenue collection performance.

3.4 Model Specification

The researcher carried out a univariate and a multivariate analysis in the study. The univariate analysis investigated the relationship between the independent variable (cashless system reform) and the dependent variable (revenue performance). In the study, cashless system reform was measured by parking fee. Besides, the multivariate analysis investigated the relationship between revenue collection and all the other reforms (independent variables).
The regression model below was arrived at;

$$Y=\alpha+b_1x_1+\mu$$

Where:
Y- is revenue collected by the County in a month; α- is a Constant - The sum of amount collected within the County when all factors are held constant; b_1- is the coefficient that clarifies the change in Y when X1 changes by a single unit; X_1- represent Cashless System Reform (parking fee) and; μ- represent the disturbance error term.

The above equation demonstrates the relationship between total collection and one of the reforms conveyed by the county (cashless revenue reform). The variance of each parameter estimate was calculated using the STATA software. The coefficient of determination (R^2) will be used to measure the variation between Y (revenue collection performance) explained by the variation in the Cashless system (X_1).

3.5 Measurement of variables

Table 1
Description and Measurement of the Variables

Variable	Description	Measurement	Expected sign
Revenue collection Performance	Revenues collected by the County.	Monthly total revenue collections	+/-
Cashless System	Revenues collected via the *606# cashless platform	Cashless dashboard. I.e. Market and Parking fee paid via the platform.	+/-

IV. RESULTS & DISCUSSIONS

4.1 Descriptive Statistics

The study utilized monthly data from sources like the Kakamega County Revenue Agency (KCRA), CBK, and KNBS. Statistical measures, including mean, standard deviation, minima, and maxima, were calculated to analyze the data. According to George and Mallery (2018), the mean represents the average of the sample data, while the standard deviation measures variability around the mean. Minima and maxima indicate the smallest and largest values, respectively, providing insights into the distribution's spread.

Table 2
Descriptive Statistics in Millions of Kshs

Reforms	tax_rev	Toll_rev	mark_fee	park_fee	psrm_rev	CPI
			Before			
Count	36	36	36	36	36	36
Min	16.71155	2.3758	0.29422	0.4379	9.775574	87.26
Max	91.00584	4.9428	2.93655	1.60029	86.71107	103.52
Mean	37.9356	3.736292	2.273183	0.780858	31.17702	95.47861
S.D	17.16141	0.625259	0.603193	0.25266	17.40314	4.573992
Skewness	0.986511	-0.68494	-2.02937	1.041738	1.119174	-0.22765
Kurtosis	3.765801	2.653814	5.234542	4.424266	4.114672	2.192274
			After			
Count	36	36	36	36	36	36
Min	31.44148	0.2754	0.0688	0.19485	23.11347	103.83
Max	90.26357	3.9407	4.18171	3.07805	85.00286	124.22
Mean	54.66133	2.168123	1.635631	1.096914	49.76066	112.315
S.D	17.23538	0.815096	0.918204	0.649978	17.00809	5.8118
Skewness	0.450195	-0.75869	0.894331	1.519791	0.426572	0.284836
Kurtosis	1.998401	3.429925	4.003204	4.873519	2.056631	2.043391
			Combined			
Count	72	72	72	72	72	72
Min	16.71155	0.2754	0.0688	0.19485	9.775574	87.26
Max	91.00584	4.9428	4.18171	3.07805	86.71107	124.22
Mean	46.29846	2.952207	1.954407	0.938886	40.46884	103.8968
S.D	19.04055	1.06943	0.835476	0.514834	19.47963	9.941233
Skewness	0.52158	-0.49248	-0.18286	1.175738	0.504161	0.181047
Kurtosis	2.505951	2.785907	3.102958	5.446207	2.489604	2.014944

Table 4.2 shows a comparative descriptive analysis between the revenue reforms (Before and after reforms) and revenue collection performance. From the table, the revenue collection performance before the reforms had a minima of Ksh 16.7 million and a maxima of Ksh 91.0 million. The revenue collection performance had a mean of Ksh 37.94 million and a standard deviation of Ksh 17.16 million.

After the revenue reforms, revenue collection performance had a minima of Ksh 31.4 million, maxima of Ksh 90.3 million, mean of Ksh 54.7 million with a standard deviation of Ksh 17.2 million. After reforms, parking fee which was a measure of the cashless reform had a minima of Ksh 0.195 million, maxima of Ksh 3.078 million, standard deviation Ksh 0.650 million with a mean of Ksh 1.10 million.

4.2 Time Series Plots.

According to Siraj-Ud-Doulah (2019), time series plots are created by plotting a variable against time and are used in many disciplines to study, predict and forecast variables.

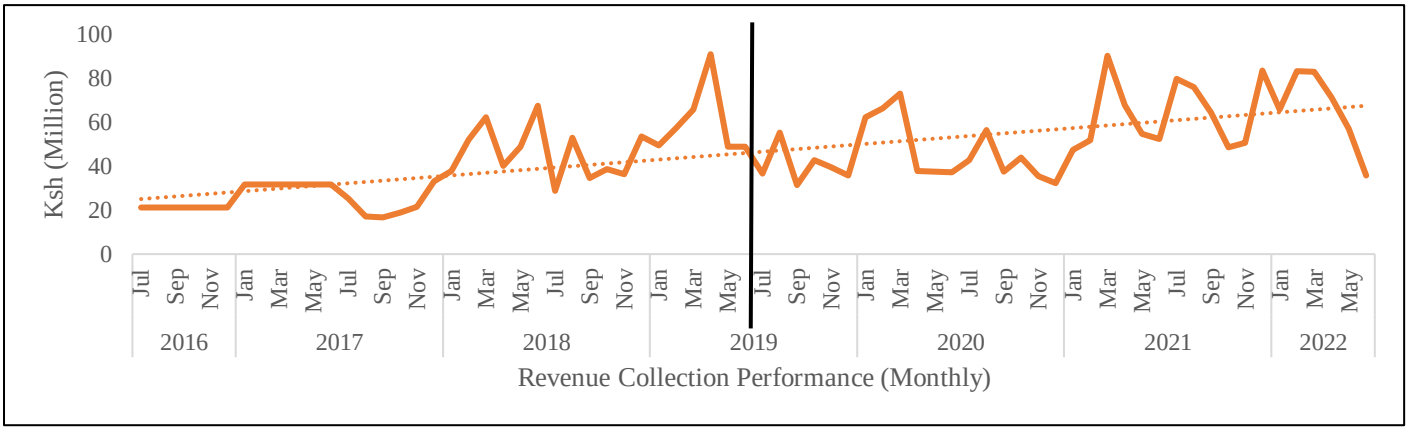

Figure 1

Time Series Plot for Revenue Collection Performance

From the above time series plots on revenue collection performance, it's evident that revenue collection performance has no specific pattern to predict from. Each month has a distinct different amount of revenue collected. The trend indicates that the first four months of the year experiences high revenue collection. This trend can be justified by the fact that a majority of licenses are paid within this period i.e. January to April. This period of the year has a fairly comparative advantage as compared to other periods in terms of the amount of revenue collected. From the above figure, it was noted that as from January 2017 revenue was increasing though in unsystematic manner. The highest being in March 2019 which was followed by a sharp decline in the subsequent months. The figure indicates that the County registered low revenue collection as from April 2019 to December 2020. The trend in the decline can best be explained by the fact that there was an outbreak of the contagious Covid 19 pandemic which paralyzed economic activities not only in Kakamega County but the whole country.

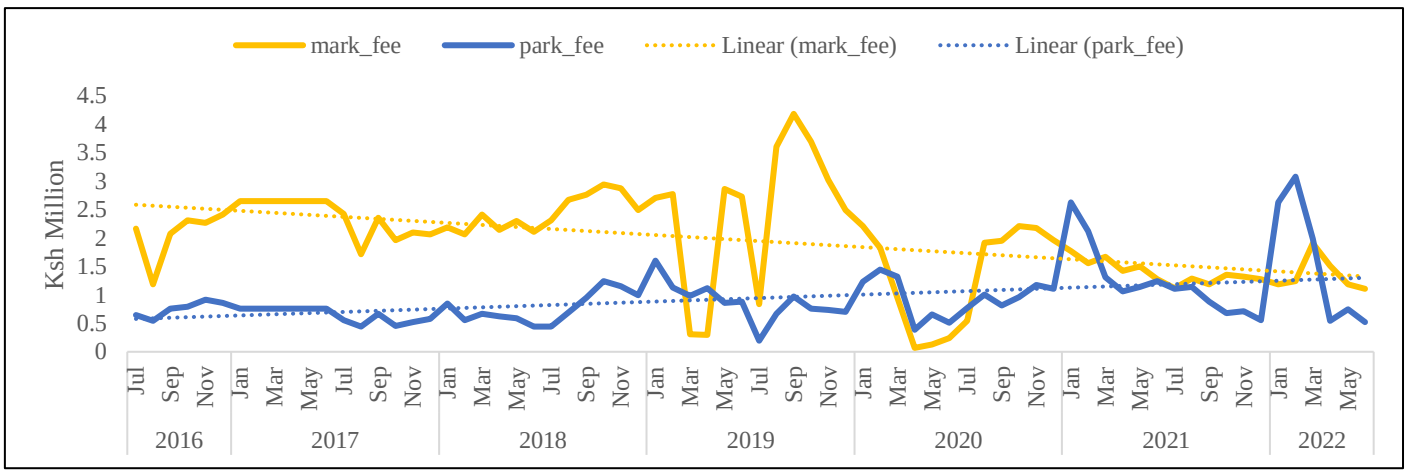

Figure 2

Time Series Plots for Cashless Revenue Reform

With the cashless system reform, both parking fee and market fee are depicting irregular trends with no particular pattern to be followed. There is a sharp decline in parking fee and market fee in the months of April to June 2020. The sharp decline can be explained by the effects of Covid-19 which led to closure of markets and restriction of movement due to the nationwide curfew.

4.3 Correlation Matrix

Correlation analysis is employed in statistics to check out the magnitude and direction between one variable with another. Correlation checks out how strong the relationship might be. When the variables increases in the relationship with each other it shows that they have a positive relationship while it is negative when an increase in one variable the other one declines. According to Emily James, 2022 a strong positive relationship ranges from + 0.5 to +1 while a strong negative relationship will range from – 0.5 to -1.

Table 4.3.1 showed the results of correlation analysis. Before reforms revenue collection with cashless reform (parking fee) had a relationship of (r =0.3762), moderate positive.

Table 3

Correlation Analysis Before reforms

	Tax Rev	**Park Fees**
Tax Rev	1	
	36	
Park Fees	0.3762	1
	0.0238	
	36	36

Table 4

Correlation Analysis After reforms

	Tax Rev	**Park Fee**
Tax Rev	1	
	36	
Park Fees	0.4496	1
	0.0059	
	36	36

Source: Author's computation based on STATA

After reforms table 4.3.2 showed that revenue collection performance and cashless reform (parking fee) had a relationship of (r =0.4496), moderate positive. After reforms, there was an increase in correlation between revenue performance and cashless reform.

4.4 Regression Analysis

Regression analysis is a simple method which is employed in statistics to investigate the relationship between two or more variables (Singhraul & Garwal, 2018). Regression analysis is used to check the relationship between the endogenous variable (revenue performance) and exogenous variable (cashless reform). The study utilized both univariate and multivariate regressions. The relationship between the dependent variable and a single independent variable will be checked in the univariate analysis. Conversely, multivariate analysis is used to check the relationship between a dependent variable and multiple independent variables

4.4.1 Univariate Analysis

4.4.1.1 Univariate for Cashless System

Univariate analysis was conducted in the study to check out the relationship between cashless system reform and total collection from revenue. The analysis was conducted in the two periods (Before reforms and after reforms) to find out the significant effect of cashless reform on revenue collection performance.

Table 5

Regression Model Summary for Cashless Reform (Before Reforms)

Source	**SS**	**Df**	**MS**	Number of obs	=	36
				F(1, 34)	=	5.6
Model	0.178711	1	0.178711	Prob > F	=	0.0238
Residual	1.084312	34	0.031892	R-squared	=	0.1415
				Adj R-squared	=	0.1162
Total	1.26302	35	0.03609	Root MSE	=	0.17858
Tax Rev	**Coef.**	**Std. Err.**	**t**	**P>t**	**[95% Conf. Interval]**	
Cashless	0.531361	0.224466	2.37	0.024	0.075191	0.987532
_cons	1.606344	0.041369	38.83	0.000	1.522272	1.690415

Author's computation based on STATA.
The model below was arrived at;
Before reforms
Rev.coll = 1.606344 + 0.531361 Cashless Reforms.

The R squared value from the model was 0.1415 which implied that the model explained 14.15% of the variation in revenue collection performance before reforms. Before the reforms, the model is statistically significant, F (1, 34) = 5.6, p=0.0238< 0.05 suggesting that cashless system had a significant impact on revenue collection performance.

Table 6

Regression Model Summary for cashless reform (After reforms)

Source	**SS**	**Df**	**MS**	Number of obs	=	36
				F(1, 34)	=	8.61
Model	0.131509	1	0.131509	Prob > F	=	0.0059
Residual	0.519167	34	0.01527	R-squared	=	0.2021
				Adj R-squared	=	0.1786
Total	0.650676	35	0.018591	Root MSE	=	0.12357
Tax Rev	**Coef.**	**Std. Err.**	**T**	**P>t**	**[95% Conf.Interval]**	
Cashless	0.254415	0.086692	2.93	0.006	0.078236	0.430595
_cons	1.723051	0.020703	83.23	0.000	1.680978	1.765123

Source: Author's computation based on STATA.

The following model was arrived at;

After reforms

Rev.coll = 1.723051 + 0.254415 Cashless Reforms

After the reforms, R squared value was 0.2021 which meant that the model explained 20.21% of the variation in revenue collection. R squared value after the reforms increased as compared to before reforms which implied that the reform had a significant effect on revenue collection performance. The model in the after reforms was statistically significant, F (1, 34) =8.61, p=0.0059<0.05 thus the cashless system reform had a significant impact on revenue collection performance.

With t=2.37, p= 0.024 for cashless reform in the period before the reforms, it implied that cashless system had a significant impact on revenue collection performance. Cashless system after reforms had, t =2.93, p =0.006 which showed that it had a significant impact on revenue collection performance. With t = 2.93 and p =0.006 which is less than 0.05 we conclusively reject the null hypothesis which stated that there is no statistically significant relationship between revenue collection performance and cashless system reform.

Table 7
Two sample t test for the cashless system reform (Park Fees)

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
0	36	0.780858	0.04211	0.25266	0.69537	0.866346
1	36	1.096914	0.10833	0.649978	0.876993	1.316835
Combined	72	0.938886	0.060674	0.514834	0.817906	1.059866
Diff		-0.31606	0.116226		-0.54786	-0.08425
t=	-2.7193	df=	70	Pr(T < t) =	0.0041	

Source: Author's computation based on STATA.

Significant differences in the two periods was checked out by use of two sample t test. Two sample t test was introduced in the study to check out if the cashless system reform had a significant effect on revenue collection performance. This was analyzed by using the differences in the means in the two periods. Cashless reform which was measured by use of Parking fee had a mean of Ksh 0.781 million before reforms and Ksh 1.097million after reforms which meant that it had a significant impact.

4.5 Multivariate Analysis

Table 8 shows the multivariate analysis of all the revenue reforms introduced by the Kakamega County.

Table 8
Multivariate Analysis

Source	SS	Df	MS	Number of obs	=	36
				F(3, 32)	=	15.76
Model	0.387997	3	0.129332	Prob > F	=	0.000
Residual	0.262679	32	0.008209	R-squared	=	0.5963
				Adj R-squared	=	0.5585
Total	0.650676	35	0.018591	Root MSE	=	0.0906
Tax Rev	**Coef.**	**Std. Err.**	**t**	**P>t**	**[95% Conf. Interval]**	
Toll Fees	0.130527	0.048968	2.67	0.012	0.030783	0.23027
Park Fees	0.183883	0.065368	2.81	0.008	0.050733	0.317034
PSRM Fee	0.262622	0.067629	3.88	0.000	0.124865	0.400378
_cons	1.244422	0.115378	10.79	0.000	1.009405	1.479438

Author's computation based on STATA.

The research sought to find out the relationship between county government reforms and revenue collection performance. Diagnostic tests were conducted in the study which showed there is a significant relationship between the reforms and County's collection. Cashless reform (Parking fee) was extracted from the multivariate model and used for publication purposes. The following model was arrived at;

$$\text{Rev Coll} = 1.244422 + 0.183883X_1t + 0.130527X_2t + 0.262622X_3t + e_t$$

Rev Coll = Revenue collection performance
X_1t= cashless reform measured by parking fee
X_2t= toll fee reform
X_3t= Public sector Revenue Management (PSRM) reform
e =the error term
t= time series data.

4.6 Effect of cashless reform on revenue collection performance.

Results and Discussions.

After reforms, descriptive statistics results showed that cashless reform had a mean of 1.1 million as compared to the mean of 0.781 million before the reforms with a standard deviation of 0.650. A correlation value of 0.4496, moderate positive, showed that the relationship between revenue performance and the cashless reform was positive. Results in the regression model showed that cashless system reform had t= 2.81, p= 0.08 < 0.05 indicating that the

reform was statistically significant on revenue collection. The positive coefficient of $\beta_1 = 0.184$ showed that when cashless reform increases by a single unit, revenue collection performance will subsequently increase by 0.184 million in the short run. The positive relationship between the cashless reform and revenue collection can be explained by the fact that cashless system method of revenue collection embraced the use of modern technology which increased the amounts of revenue collected in the county.

Public sector Revenue Management (PSRM) and toll fee were also used in the study as reforms to inform the impact they had on revenue collection in Kakamega. Multivariate analysis in the study showed that both toll fee and PSRM reform had positive coefficients of 0.131 and 0.263 respectively. This meant that both reforms positively contributed to the total collections of revenue. An R squared value of 0.5963 meant that the model explained 59.63% of the variation in revenue collection.

4.7 Post Estimation Diagnostic Tests.

4.7.1 Test for Autocorrelation

Autocorrelation in a linear model will occur when there is a degree of similarity between the residuals and their previous values. Normally in a linear model the values should be independent. Breusch – Godfrey Lm test was used to check for autocorrelation in the study. Normally the null hypothesis states that there is no autocorrelation.

Table 9

Breusch -Godfrey Test for Autocorrelation

Breusch-Godfrey LM test for autocorrelation			
lags(p)	chi2	Df	Prob > chi2
1	1.791	1	0.1808
H0: no serial correlation			

Source: Author's computation based on STATA.

The chi squared value of 0.1808 is greater than 0.05 level of significance implying lack of autocorrelation. We therefore fail to reject the null hypothesis which states that there is no autocorrelation in the data set.

4.7.2 Test for Multicollinearity.

Hayes 2020, described multicollinearity as the occurrence of intercorrelations between independent variables in a model. The study used variance inflation factor (VIF) to check for multicollinearity. A VIF of 1 and 5 shows that the variables are moderately related while a VIF of 5 to 10 indicates presence of high multicollineraity between the variables.

Table 10

Variance Inflation Factor Test for Multicollinearity

Variable	**VIF**	**1/VIF**
PSRM Fee	1.16	0.860349
Toll Fees	1.1	0.907234
Park Fees	1.06	0.945531
Mean VIF	1.11	

Author's computation based on STATA.

The VIF for cashless reform was 1.19 and that for other variables was less than 5 implying lack of multicollinearity

Table 11

Normality Test of Residuals

Variable	**Observation**	**Jarque-Bera normality test:**	**Prob>chi2**
Residual	72	1.709	.4254

From the above table, it is evident that the study employed use of Jarque- Bera to test for normality. With the probability value being more than 5%, the null hypothesis was not rejected and in this way the conclusion is that the residuals have a normal distribution.

V. CONCLUSION & RECOMMENDATION

5.1 Conclusions

Parking fee was used to measure the cashless reform in the study. The results in the analysis indicated that cashless reform had a positive correlation with revenue which had a value of 0.4496. In the study, regression model results showed that cashless system reform had a positive coefficient which meant that when cashless reform increases it will have a positive effect on the amounts of revenue collected. The results showed that the Cashless system reform had a coefficient of β_1= 0.184. With the coefficient value of 0.184 implied that an increase in cashless system reform by one-unit will lead to revenue collection performance increase by 0.184 million in the short run. There was a p value of 0.008 which is less than 0.05, meaning that cashless reform is significant. Based on the findings above, it was revealed that cashless revenue reform had a significant positive effect on revenue collection performance. Thus the null hypothesis that there was no statistically significant relationship between cashless system and revenue collection performance in Kakamega County was rejected in favor of alternative hypothesis.

5.2 Recommendations

It was evident that the reforms employed by Kakamega County had a significant positive effect on the amounts of revenue collected. The study findings revealed that cashless system reform had a significant positive effect on revenue collection performance. Cashless system enabled tax payers to pay for their obligations at the comfort of their mobile phones. Challenges experienced in collection of unstructured revenue streams such as parking fee was addressed by use of this system. To increase the amounts of revenue collected, the study recommended that Kakamega County should embrace use of the cashless system when it comes to other revenue streams. A diversified revenue base which uses the cashless system will in turn improve the collection since most revenue collected will be accounted for. The risk of direct handling of revenue by the officers in charge of collection will thus be minimized. Civic education should also be carried out to enlighten the public on the new system so as to efficiently collect revenue.

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