The Moderating Effect of Virtual System Upgrades in The Effect of Electronic Fiscal Devices on Value Added Tax Collections in Tanzania: The Case of Kinondoni Tax Region

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ABSTRACT

Tanzania Revenue authority introduced the virtual electronic fiscal devices as part of the modernization on top of existing fiscal devices (EFDs), however there a scant information on their effect. This study examined the moderating effect of virtual electronic fiscal devices in the relationship between electronic on Value Added Tax (VAT) collections in Kinondoni Tax Region, Tanzania. The study collected primary data from a randomly selected sample of 59 tax officers, 90 taxpayers and 21 tax consultants from TRA Kinondoni Tax Region, making a total of 170 respondents. The questionnaires with Likert scale questions was used to collect this data. Additionally, the study used secondary monthly time series VAT collection data from January 2005 to August 2022, a total of 212 months. The primary data was analyzed descriptively (using percentages) and secondary data inferentially (using ordinary least squared (OLS) regression analysis). From descriptive results majority of respondents (over 70 percent) agreed and strongly agreed that EFDs had positive effects on VAT collections and that Virtual EFDs have positive enhancing effect to the role of EFD in VAT collections. The univariate OLS regression analysis shows that EFDs had a positive and statistically significant effect on revenue collections (coefficient = 37.9 billion and p-value = 0.0073), the 1 percent level of significance and that the moderation of VEFD to EFD introduction has a positive and statistically significant impact on revenue collection (coefficient of 8.63 billion, p-value =0.000), at 1 percent level of significance. It is recommended that the government improves EFD and VEFD electronic systems, promote taxpayer education and awareness to use the systems. Future studies should use countrywide data, qualitative analysis and compare the VEFD-VAT collection relations across tax Regions.

 Keywords: Value Added Tax, Tax Collections, Electronic Fiscal Devices, Virtual Electronic Fiscal Devices, Kinondoni Tax Region

INTRODUCTION

Developing and emerging nations need a huge amount of tax revenues for efficient government functioning (Neog & Gaur, 2020). The government can raise this revenue either directly (direct tax) or indirectly (indirect tax) (Lingam, 2013). As per the world Bank (2015), Value Added Tax (VAT) accounted for about 27% of total gross tax revenues before adjustment for VAT refunds. It is one of the important tools of revenue collection in the world as over 160 countries have adopted its policies (Gerald & Naritomi, 2018). VAT is broad based, it avoids cascading taxes and overtaxing, and it has compliance incentives for business

to business transactions and minimizes the chance of avoidance (Kisanga et al. 2021). Despite the strength and significance of VAT, there are pitfalls associated with it. Mohamed (2015) and Kenani et al.(2019) report a problem of tax evasion through non-issuance of the tax invoices, among other challenges. In Tanzania, "The TRA's EFD was introduced to VAT registered traders under the "The Value Added Tax (Electronic Fiscal Device) Regulation, 2010" – Subsidiary Legislation, Government Notice No. 192 published on May 28, 2010, and enshrined in the Finance Act 2010 with the main aim of enhancing VAT compliance in Tanzania" (Chege et al., 2015). Despite the presence of EFDs, compliance problems existed through issues such as the cost of device and system breakdowns (Mohammed, 2015;Zakaria, 2019; Chambi, 2020). In December 2020, the Tanzania Revenue Authority (TRA) implemented an upgrade to the existed EFD technology to a Virtual EFD (TRA, 2021). This system upgrade was intended to add up to the effectiveness of the existed EFD system that was introduced in 2010. For system impact evaluation, there is a need of knowledge on **whether VEFD has enhanced the effect of EFD on revenue collections.** In the body of knowledge, this area has not been researched, particularly in Tanzania.

LITERATURE REVIEW

The account of basic, theoretical and empirical literature is inevitable to the direction of the study. The Value Added Tax (VAT) is an indirect consumption tax which is assessed on the value added to a product at each point in the production and distribution cycle (Chege et al., 2015). In Tanzania, all domestic goods are charged 18 percent of value as VAT. Electronic Fiscal Devices or EFD Machines are machines used for effective management and control of businesses, particularly sales and stock control. They are fiscal because it serves the main purpose of accurate taxation which is electronically reported to the revenue authority (Mohamed, 2015 and Zakaria 2019), which in Tanzania, the TRA. In its introduction, in 2010, the EFD system required all taxpayers to purchase the device, until in 2020 with the introduction of the Virtual system upgrade (VEFD), modernizations were made to the system where no requirement to own a device is the case. According to Zakaria (2019), VAT collections refers to revenues, or amount of money, in Tanzanian Shillings, collected in a particular fiscal year from all VAT payers/traders.

The Unified Theory of Use and Acceptance of Technology (UTAUT) by Venkatesh (2003) predicts that any technological system is adopted and used because of its performance expectancy, effort expectancy, social influence and facilitating conditions (Abaad, 2021). The introduced upgrades to EFD system is an improved edition that requires no taxpayer to have the EFD device, it is more simplified with the aim to improve VAT compliance. The scholarly attention on the effect of EFDs on VAT collections confirms the positive effect (Chambi, 2020; Zakaria, 2019; Chege *et al.*, 2015; Mohamed, 2015 and Mlima, 2014). However, in the body of literature, there is a paucity of knowledge about the moderating role of VEFDs in the effect of EFD on VAT collections in Tanzania. Based on the UTAUT model and extant empirical evidence, it is logical to hypothesize that VEFD might positively influence VAT collections. However, due to scarcity of this knowledge, the current study is done to examine the moderating role of VEFD in the effect of EFD on VAT revenue collection in Tanzania, focusing in the Kinondoni Tax Region. To achieve that, the study first examined the effect of EFDs on VAT collections and then examined the interaction effect of virtual system upgrades on EFD (VEFD) in the effect of EFD on VAT collections. Figure 1 below presents the conceptual framework guiding the study.

Figure 1: Conceptual Model of the Study
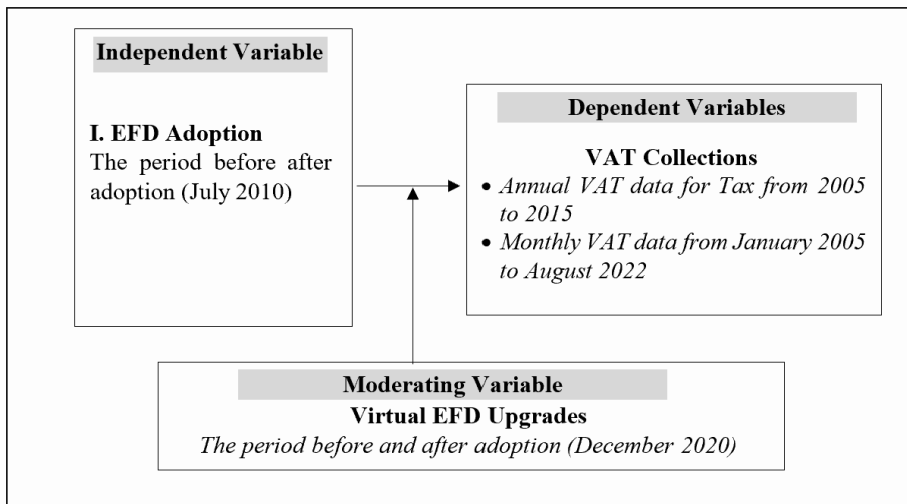
Source: Researcher's Construct based on the Literature Review

METHODOLOGY

This research follows a quantitative approach that uses numerical data as well as statistical methods of analyzing that data due to its high objectivity (Mohajan, 2020). This approach was inspired by the positivist philosophy of the study that requires using objectively observed information and tools to analyze it (Mason, 2014; Saunders et al., 2009). Further, the explanatory design to analyze the cause and effect relation between EFD, VEFD and VAT collections necessitated the use of regression techniques (Chege & Otieno, 2020).

The quantitative data used in this study is in two forms; primary and secondary. The primary data was collected from a ra domly selected sample of 59 tax officers, 90 taxpayers and 21 tax consultants in Kinondoni Tax Region. The Kinondoni Tax Region was chosen due to its active business nature and sufficient contribution to the country's tax revenues. The primary data was collected by the use of Likert scale questionnaires that insured taxpayers to express their level of agreement to different usefulness aspects of the EFDs and VEFDs and their effect on revenue collections. The numerical values of data obtained were 1 for Strongly Disagree, 2 for Disagree, 3 for Neutral, 4 for Agree and 5 for Strongly Agree. The secondary confidential data on revenue collection amounts of VAT was requested from the internal sources in TRA and it was released for this research purpose only. To analyze the direct effectof EFD on revenue collections, annual VAT revenue was used from 2005 to 2015, 11 years and for moderation effect of VEFD, the monthly VAT data was used from January 2005 to August 2022, 212 months.

The primary data was analyzed descriptively where the percentage of respondents wasreported per their levels of agreements in tables. Further, the univariate OLS regression analysis was used to analyze the effect of EFD on VAT collections. In this, the dummy independent variable was time, whose value was 1 for a period after July 2010 and zero (0) for the time before July 2010. This is because the EFD system was introduced in that time.

The dependent variable was total VAT revenue collections for Kinondoni Tax Region, from 2005 to 2015 measured in Tanzanian Shillings. The moderation regression analysis was also conducted to analyze whether Virtual EFD upgrades did improve VAT collections. Since the VEFD was introduced in December 2020, and the use of annual data would lead few observations, the researcher opted to analyze monthly VAT revenue data from January 2005 to August 2022. In this moderated regression analysis, the independent variable was a dummy variable, equal 1 after July 2010 (when EFD was first introduced) but zero before,

the moderator was also dummy equal 1 after December 2020 (when EFD was upgraded to VEFD) and the independent variable was monthly revenue collections from 2005 to August 2022.

RESULTS

Table 1 below presents the demographic profile of respondents. These results show that the study is adequately representative, because data was collected from, taxpayers, tax officials and tax consultant of different ages, gender, sectors of operation, education levels and business experience.

Table 1. Respondents Demographic Profile

Variable	Demographic Groups	Frequency	Percent
Age	18 – 30	63	37.1
	31 – 40	56	32.9
	41 – 50	32	18.8
	51 – 60	15	8.8
	=>61	4	2.4
	Total	170	100
Gender	Female	80	47.1
	Male	90	52.9
	Total	170	100
Sector of Operation	Government	59	34.7
	Services Business	34	20
	Retail Business	43	25.3
	Wholesale Business	25	14.7
	Industrial Business	9	5.3
	Total	170	100
Education Attainment	Primary Education	11	6.5
	Secondary Education	15	8.8
	Certificate & Diploma	46	27.1
	Bachelor Degree & Above	98	57.6
	Total	170	100
Business Experience	Less than 1 Year	40	23.5
	1 Year < Age < 5 Years	65	38.2
	=> 5 Years	65	38.2
	Total	170	100

Source: Field Data (2022)

To answer the objectives of this study, results presented in Tables 2 and 3 explain the direct effect of EFDs on VAT collections where the former is for descriptive results and the latter is for regression results. Table 4

presents the results of the moderation effects of VEFD using regression.

The descriptive analysis results in Table 2 show that about 73.6 percent of respondents have agreed and strongly agreed that EFD made them to pay more VAT simply because they are easy to use. Additionally, 72.9 percent have agreed and strongly agreed that the ease of learning to use EFD has made them pay more VAT. A lack of challenge with the devices made 54.1 percent of taxpayers to agree and strongly agree that they pay more VAT. About 76.5 percent of respondents agreed and strongly agreed that they pay more VAT because the EFDs are easy to print receipts. From general acceptance of the EFDs, 75.3 percent of taxpayers agreed and strongly agreed that they pay more VAT. Additionally, the EFDs have improved tax payments/collections because they improved business information (76.4%), business control (78.6%), timely transactions (75.9%), business efficiency (72.9%) and other contributions (76.5%). The descriptive statistics have shown that EFDs have increased VAT collections because majority of taxpayers have agreed and strongly agreed on the effect of EFDs in their own tax payment.

Table 2 Effect of EFD Adoption on VAT Collection

EFD has made taxpayers/me pay more VAT because	SD	D	N	A	SA	Total
I pay more VAT because EFD is easy to use	0.0	5.9	20.6	51.8	21.8	100.0
I pay more VAT because EFD is easy to learn to use	0.0	6.5	20.6	57.6	15.3	100.0
I pay more VAT because there is no challenge in usingEFD	3.5	15.3	27.1	38.8	15.3	100.0
I pay more VAT because it is easy to print receipts usingEFD	0.0	2.9	20.6	52.4	24.1	100.0
I pay more VAT because I generally accept to use EFDs	0.0	4.7	20.0	48.2	27.1	100.0
I pay more VAT because EFD improves by businessinformation/ record keeping	1.2	2.4	20.0	48.8	27.6	100.0
I pay more VAT because EFD gives me more controlover my business	0.0	6.5	15.9	49.4	28.2	100.0
I pay more VAT because EFD helps me to complete transactions quickly	0.0	7.1	17.1	44.1	31.8	100.0
I pay more VAT because EFD increases the efficiencyof my business	1.8	3.5	21.8	44.1	28.8	100.0
In general, I agree with the contribution of EFD in mybusiness	1.2	4.1	18.2	46.5	30.0	100.0

Source: SPSS Data Analysis (2022)

The regression analysis complements the descriptive analysis presented in Table 1 above. As shown in Table 3 below, the findings of regression analysis show that Kinondoni Tax Region

used to collect less tax revenues prior to the introduction of EFD but after its introduction, the Region collected more revenues.

Table 3. Regression Results for the Effect of EFD on VAT Collections

Variable	Coefficients
Dummy_Post_EFD	3.79e+10 (0.007)
Dummy_Prior_EFD	
Constant	2.16e+10 (0.026)
F	11.80
Prob>F	0.0074
R-Squared	0.5674
Adj. R-Squared	0.5193

Source: STATA Analysis (2022)

This is seen through the values of regression coefficients in two different regression models. In the first regression model (Model I), the VAT revenue collected was regressed by the dummy variable =1 after introduction of EFD (Oist_EFD). The effect of introduction EFDs seems to be positive with the magnitude of 3.79e+10 which 37.7 billion Tanzanian shillings is. This effect is statistically significant at 1 percent due to the probability value of 0.007 which is less than 0.01. This result shows that, on average, between 2005 and 2015; the introduction of EFDs in 2010 have increased VAT collections by an average amount of 37.9 billion Tanzanian shillings. This increase is both statistically and economically significant. Interms of statistical significance, the probability value (p-value) is less than 0.01. In economic significance, the annual average growth of TZS. 37.9 billion From one tax Region is significant figure but it is brought by the EFD introduction.

The moderating variable was a dummy equal to 1 after December 2020 (called Dummy for introduction of VEFD) and dummy equal 1 after July 2010 (the month EFD was introduced) was an independent variable. The interaction variable was also introduced, which is a multiplication of the two. From regression analysis, Table 4 present the results.

Table 4 Regression Analysis Results: The Effect of EFD

Variable	Model I
Dummy_Post_EFD	6.94e+09 (0.000)
Dummy_Post_EFD#Dummy_Post_VEFD (moderation)	8.64e+09 (0.000)
Constant	1.88e+09 (0.000)
R-Squared	0.6122
Adj. R-Squared	0.6085

Source: STATA Analysis (2022)

The table of results show that introduction of EFD on VAT collection (as measured in monthly data) is positive and statistically significant at 1 percent. That is, the monthly revenue effect of introduction of EFD in 2010 is TZS. 6.94 billion. This is because of the positive coefficient of regression. This effect is moth significant in statistical way since the p value is less than 0.01 and also economically significant due to a substantial monthly additional VAT collected in a single tax Region. However, this was regression as the basis or reference point to an analysis of the moderation of Virtual EFD.

Thus, a generated variable called Post_EFD_Post_VEFD measures the interaction effect of Virtual EFD on EFD in promoting VAT collections. That is, on top of the effect of EFD on VAT collections, how the Virtual upgrade of the EFD system enhances VAT collections? The result shows a coefficient value of 8.64e+09 that is TZS. 8.64 billion. Comparatively, the result implies that, when EFD is not upgraded it adds monthly VAT revenue of TZS. 6.94 billion to Kinondoni Tax Region but when the upgrade into the Virtual EFD, the addition to revenue became TZS. 8.64 billion Monthly. Therefore, the monthly VAT revenue addition that took place in December 2020 alone has yielded additional monthly revenue equal to the difference of the two regression coefficients. That is, in Kinondoni Tax Region, the average of TZS. 1.7 more billion in VAT revenues have gained every month since the introduction ofvirtual EFD system in December 2020 to August 2022 (the end of data observation period).

This study has found different conveniences and usefulness of EFD that has promoted VAT collections increment. It concurs with Chambi (2020) who found that due to the ease of use, EFD has improved compliance and collections in Tanzania. Furthermore, Zakaria (2019) used time series regression and found positive EFD effect on collections. Additionally, Chege *et al.* (2015) studied 291 VAT registered traders and found significant effect of EFD on VAT collections due to factors such as ease of use and improvement of business information. In his study Weru *et al.* (2013) found that EFD improves control over business transactions and hence promote compliance and collections in Malawi. Also, the fact that EFD are easy to learn to use, improves tax collections in Tanzania as the study of Mlima (2014) suggests. These findings contrast with Kenani *et al.*(2019) who found negative effect of EFD on VAT collections. Generally, the findings suggest that EFDs improved VAT collections in Kinondoni Tax Region.

In December 2020, the TRA upgraded the EFD system from the devices use to EFD device- free system where the taxpayer can use the smartphone or computer as a substitute for the device. Due to recent nature of the technology, this study is the first investigation to contribute about the moderating role of Virtual upgrade to the effect of EFD on revenue collection. Since the study is new, there is no extant empirical studies to justify the results with. However, since Virtual EFD is a technological aspect, the UTAUT theory applies to and supports the study findings. This theory argues that performance expectancy, social influence, effort expectancy and facilitating conditions drives a person's intention to use a particular technology. The UTAUT model hence predicts that VEFD reduced the tax compliance costs which includes not required to purchase the EFD device. This relates to effort expectancy since it requires less financial cost (effort) to comply. Secondly, is that VEFD has simplified the VAT compliance process which is also related to effort expectancy. Thirdly, is about taxpayer willingness to use VEFD to comply to EFD which is related to social influence that influences their willingness. The other factors are that the use of VEFD improves business information, business control and business efficiency. These factors are linked to performance expectancy that is a UTAUT variable.

CONCLUSION AND RECOMMENDATION

This study determined the moderating effect of Virtual Electronic Fiscal Devices (VEFDs) in the impact of Electronic Fiscal Devices (EFD) on Value Added Tax Collections in Tanzania. The study concludes that the Virtual system upgrades in the VAT system has enhanced the role of EFD in VAT collections. Furthermore,

the study concludes that effort expectancy attributes such as ease of use and ease to learn to use, as well as performance expectancy attributes such improving business information efficiency and owners' control over the business, have contributed to the effectiveness of VEFD. Therefore, for further development of the revenue collection system in Tanzania, it is important to consider focussing on improving the effort expectancy and performance expectancies of the system.

Following from the findings of the study, the government of Tanzania is advised to invest more in technological usefulness of tax collection systems including EFD's in order to boost the government's revenue potential. The Tanzania Revenue Authority (TRA) is advised to offer more education, particularly to the new taxpayers on the benefits of using EFD's such as lowering compliance costs, ease of use, improving business records, so that they can adopt, use, comply and pay more VAT. Taxpayers are advised to comply to the tax laws through the use of EFDs and VEFDs because it improves business records, their control on the business and business efficiency; but at the macro level increase the capacity of the government to offer its services to the citizens.

Due to limited access to revenue data beyond Kinondoni Tax Region, the researcher was limited to study the country context but only confine the study in Kinondoni Tax Region. The Virtual EFD system is the new recent upgrade that has not been adopted by many taxpayers. Therefore, during data collection, the researcher took more than planned time to give education to the respondent about what a virtual EFD is. The third limitation of the study is the period of time since the introduction of VEFD that limits annual analysis of the effect of VEFD which would have few observations, from December 2020 to August 2022. This forced the researcher to analyze the data in its monthly format.

For future research, the countrywide data is to be used to draw a macro conclusion about the effectiveness of VEFD. Also, since Kinondoni is one of the liveliest business urban areas, it is suggested that a comparative study is carried out to understand the effect differential across Tax Regions. Finally, there is no study to explore the extent to which virtual EFD has been received, accepted, used and its associated challenges.

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