

The Influence of Regulatory Actions and Individual Factors on Effective Utilization of EFDs: A User-Centred Study in Tanzanian Oil and Gas Refuelling Centres

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Abstract

Electronic Fiscal Devices (EFDs) play a pivotal role in facilitating tax compliance in developing countries such as Tanzania. This study explored the influence of regulatory actions namely Regulatory Supportive Services (RSS) and Regulatory Coercive Measures (RCM) on the Effective Utilization of EFDs in Tanzanian oil and gas refuelling centres taking into account the mediating role of Individual Related Factors (IRF). Data from 101 participants were analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM). Findings reveal that both RSS and RCM positively influence EFDU, with RCM's influence being statistically significant. IRF significantly affects EFDU and mediates the relationship between RSS and EFDU strongly, and between RCM and EFDU partially. Study suggests that the effects of RSS and RCM on EFDU are amplified when IRF e.g., attitude, perceptions and behaviour towards EFD usage are considered. It highlights the importance of focusing on IRF alongside regulatory measures to enhance EFDs utilization. Moreover, study underscores the relevance of integrating institutional theory with information system theories (e.g., Theory of Planned Behaviour and Technology Acceptance Model) to understand the interplay between regulatory actions and individual factors to enhance EFD usage. Findings provide valuable insights to enhance EFD implementation particularly in the oil and gas business sector.

Keywords: Electronic Fiscal Devices, Regulatory Authority Actions, Individual Related Factors, Effective Utilization of EFDs, Oil and Gas businesses

Introduction

Electronic Fiscal Devices (EFDs) are computerized devices that are useful for recording and reporting sales transactions, and when effectively used, they offer several advantages to both, businesses and the tax authorities. Effective utilization of EFDs, refers to the extent to which users employ EFDs beyond a formal requirement, leveraging them as beneficial tools for improving business performance and tax compliance through consistent issuance of receipts, tracking of business transactions, streamlining of tax return filing, and timely provision of accurate information to tax authorities and other stakeholders (Malima *et al.*, 2021; Casey & Castro, 2015). Potentially, this can enhance businesses' accounting and management systems, increase their transparency and credibility, and reduce their operational costs and risks (Casey & Castro, 2015; Eilu, 2018a & 2018b). For the tax authorities, it can ensure tax compliance through facilitating monitoring and collection of tax revenue more efficiently and effectively, and reducing tax evasion and fraud (Malima *et al.*, 2021 & 2020). However, effective utilization of EFDs depends

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on various factors, such as the design and implementation of the devices, the compliance and cooperation of the taxpayers, the support and enforcement of the tax authorities, and the awareness and education to the public in general (Fjeldstad, 2019; Fjeldstad *et al.*, 2020).

Due to their inherent advantages, many governments around the world have adopted EFDs to facilitate tax collection. The first country to introduce EFDs was Italy in the 1980s, as a way of combating tax evasion and fraud in the retail sector (Casey & Castro, 2015). Subsequently, other developed countries such as Japan, South Korea, and Latin America followed suit (Fjeldstad *et al.*, 2019). In East Africa, Kenya was the first country to implement EFDs, followed by Tanzania in 2010 and Rwanda in 2014. However, the deployment of EFDs in Kenya and Tanzania has encountered significant challenges (Eilu, 2018a; Casey & Castro, 2015). In response to these challenges, stern regulatory actions such as audits and surprise visits were taken to ensure effective usage of EFDs in general retail shops and oil and gas businesses particularly the refuelling centres (Mnyawi *et al.*, 2022 URT, 1995). Besides, in the process of acquiring EFDs, suppliers are mandated to offer training and other supportive services to facilitate proper use of EFDs. Additionally, users are expected to report any problem or errors with the EFDs to the tax authority for maintenance purposes.

Therefore, the practical implications of intermediaries for EFD usage, particularly in the Oil and Gas (O&G) sector, are significant. For instance, in Tanzania, the O&G business operations, are primarily active in the downstream value chain segment where refuelling centres are located. For this country and others, the O&G industry is also a major source of tax revenue (Penplusbytes, 2017). Thus, ensuring accurate tax collection in this industry is crucial for fiscal sustainability and economic development. EFDs play a vital role in ensuring tax compliance by providing real-time sales data, reducing fraud, and facilitating audits (; Fjeldstad *et al.*, 2019). However, understanding how effectively the EFDs can be utilized is a complex process due to various factors, including the need for synergy and cooperation among different stakeholders. Potentially, meaningful insights can be gained by examining the interplay between regulatory actions, user's attributes, and their impact on EFD utilization. Institutional theory and information system theories also are considered as relevant to this study. The former shedding lights on the nature and influence of regulatory actions (David *et al.*, 2019; DiMaggio & Powell, 1983; Oliver, 1991; Scott, 2013, 2005), while the latter, through the Technology Acceptance Model [TAM] (Davis, 1989; Venkatesh *et al.*, 2000) and Theory of Planned Behaviour [TPB] (Ajzen, 1991), on the nature of individual related factors and their linkage to EFD utilization.

Closer look into empirical studies, regarding EFD implementation, indicate existence of knowledge gap as most studies focus on different issues such as the effect of taxpayer attitude and perceptions on EFD adoption or usage in different sectors like grocery retail business and hospitality industry (Dafi & Chille, 2023; Kira, 2016; Malima *et al.*, 2020). Others, on the different challenges associated with the use of EFDs (e.g., Lukurunge & Raphael, 2023; Ramsa *et al.*, 2024), and the impact of EFDs on tax collection (e.g., Lubua, 2023; Malima *et al.*, 2021; Chege *et al.*, 2015; Mahangila *et al.*, 2018; Eilu, 2018b). In contrast, this study zeroes in on the oil and gas industry. It examines the interplay between regulatory actions and individual factors as key drivers for the effective utilization of EFDs. Study aimed to address the following objectives:

- i. To examine the extent to which regulatory actions, encompassing both supportive services (e.g., training and IT-related services) and coercive measures (e.g., monitoring and enforcement measures), influence the effective utilization of EFDs in the oil and gas refuelling centres.
- ii. To assess how individual-related factors, including attitude, perceptions and behaviours associated with EFD usage, mediate the relationship between regulatory actions and effective utilization of EFDs.

The significance of the study can be considered based on its contribution to the literature on EFD implementation especially in the O&G industry. While previous EFD studies have focused on different sectors and constructs, they have largely overlooked the interaction of regulatory and user factors in influencing EFD utilization. This study fills this gap by examining how regulatory actions and individual factors influence EFD utilization in Tanzanian O&G refuelling centres. Study provides a comprehensive theoretical framework combining institutional theory, TAM, and TPB to analyse EFD utilization. Also, practical insights for enhancing EFD utilization and tax compliance touching different stakeholders e.g., policymakers, regulators, users of EFDs, and academics (in terms of inspiring future research on EFD implementation).

Theoretical Review

This study employed Institutional Theory, Technology Acceptance Model (TAM), and Theory of Planned Behaviour (TPB). Institutional Theory posits that actors, influenced by prevailing social and cultural norms, values, beliefs, and rules, adopt certain structures, practices, and policies to gain legitimacy, stability, and intelligibility (Scott, 2013; Lawrence *et al.*, 2011; Hallett & Hawbaker, 2021; Battilana *et al.*, 2009). In the context of EFD usage, this theory elucidates how regulatory actions by the governments and tax authorities provide both institutional supportive services and coercive pressures, which in turn affect user's attitude, perceptions and behaviour towards EFD usage. However, this theory overlooks other factors such as individual attributes, which are seen as important drivers of EFD usage. Issues like these are readily provided by information system theories such as TAM (Venkatesh *et al.*, 2003; Davis, 1989) and the TPB (Ajzen, 1991).

According to TAM, users' acceptance and use of a technology are based on their beliefs and attitudes towards it, focusing on their perceived usefulness and ease of use. These perceptions are also influenced by external variables such as system characteristics and social influence. Perceived usefulness refers to the extent to which a user believes that using a particular system would enhance their job performance or outcome, such as tax compliance and business efficiency. Conversely, perceived ease of use refers to the belief that using a particular system would be free of effort or difficulty. For example, a user may believe that using EFDs is easy and convenient, without requiring much training or technical support. From TPB, key ideas include perceived behavioural control focusing on an individual's attitude and behaviour towards EFD usage. According to Ajzen (1991), the use of any technological devices is more likely to be enhanced when one believes that he/she has all the necessary resources and abilities including knowledge, skills and equipment.

Empirical Evidence and Hypotheses Development

Regulatory Actions Influencing Effective Utilization of EFDs

Regulatory actions encompasses the enforcement of formal rules, policies, and laws that guide or restrict organizational and individual behaviour, supported by sanctions and enforcement mechanisms (Scott, 2013). Specifically, for EFDs, these actions refer to the implementation of policies and measures by governments or their institutional agencies (i.e., tax authorities) that mandate or encourage the use of EFDs by business entities. For instance, Tanzania introduced the EFD Act in 2010, requiring all VAT-registered taxpayers to use these devices when issuing receipts (Chege *et al.*, 2015). Similarly, Kenya implemented the Electronic Tax Register (ETR) system in 2005, mandating all businesses with an annual turnover above Kshs 5 million to use these devices for recording sales transactions. The introduction of these devices is significant as it can influence EFD usage. However, depending on the level of acceptance, establishing authoritative rules, routines, and norms of conduct for technological advances such as EFDs, may sometimes necessitate the use of coercive pressures to facilitate compliance (DiMaggio & Powell, 1983; Lawrence *et al.*, 2011). Arguably, this may not always be the case, as some users may comply due to the perceived value of EFDs in terms of improving their job performance or business efficiency/performance (Casey & Castro, 2015; Eilu, 2018a & 2018b).

Therefore, regulatory actions can have both the direct and indirect influences on effective utilization of EFDs by providing incentives or disincentives for using EFDs properly and consistently. For example, a panel data study by Casey and Castro (2015) in Rwanda that introduced EFDs accompanied with a series of incentives for taxpayers who adopted EFDs early or voluntarily (e.g., tax rebates, subsidies, training, and technical support); the country experienced significant increase in the adoption and use of EFDs. However, a study by Kira (2016) drawing from hotels and restaurants in Dodoma (Tanzania) found that the enforcement of EFDs was met with resistance and evasion. Non-compliance was associated with the perceptions that; the machines posed a threat to their business survival and profitability. Taxpayers resorted to various strategies to avoid using EFDs or engaged in data manipulation coupled with issuing manual receipts, underreporting sales or tampering with EFD machines. Similarly, Malima *et al.* (2020) focusing on fear of receiving punishment from the tax authority; did not have significant impact on the rate of EFD usage among small businesses in Arusha (Tanzania). Based the reviewed literature and discussion presented so far, the following hypotheses were developed:

H1a: Regulatory supportive services influence utilization of EFDs.

H1b: Regulatory coercive measures influence utilization of EFDs.

Regulatory Actions and Individual Factors for Effective Utilization of EFDs

Regulatory actions alone may not be sufficient to ensure effective utilization of EFDs, as they may face challenges such as lack of awareness, technical problems, corruption – among others, closely associated with acts like tempering with the normal functioning of EFDs or other social norms that contradict the institutional rules (Mandari & Koloseni, 2017; Kira, 2016). Potentially, there could be an indirect effect on effective utilization of EFDs through individual/personal factors as observed by other distantly related studies (Al-Emran *et al.*, 2019; Nahlawi *et al.*, 2020; He *et al.*, 2018; Akour *et al.*, 2006). For example, Akour *et al.* (2006) examined how culture (considered as part and parcel of institutional elements (Scott, 2013)) affected the acceptance of internet technologies by managers in the context of Jordan. Besides the direct relationships between culture and technological acceptance, they also examined the indirect effect of TAM

variables to see if they actually influenced the relationship between culture and technology acceptance. Findings revealed that some cultural elements such as power distance and collectivism appeared to have positive and significant effect on managers' use of internet. Conclusively, authors suggested that culture played a significant role in influencing the use of internet technologies. However, different cultural dimensions had different impacts on the TAM variables and internet usage in Jordanian context (Akour *et al.*, 2006).

In the context of EFD implementation, there are several studies that focus on EFD adoption/acceptance/usage taking into account the effect of TAM variables or other theoretical perspectives. For example, Magese and Chindengwike (2021), in Tanzanian small hospitality industry found that individual perceived ease of use and usefulness of EFDs as having positive and significant effect on EFD usage. In the same context and businesses, Malima *et al.* (2020 & 2021) examined factors such as experiences and level of education and fear of punishment by tax authority. Their findings suggest that positive impact on EFD usage may result from user having adequate experience and education while fear of punishment by tax authority may not have positive and significant effect on EFD usage. These studies, generally indicate supportive regulatory actions e.g., incentives and training may bolster individual factors hence enhancing EFD utilization. Conversely, strict regulatory actions such as penalties and audits may decrease perceived ease of use and perceived usefulness of EFDs for users with low motivation and trust in EFDs. Therefore, three different hypotheses were developed focusing on regulatory actions (H2a and H2b) and individual related factors (H3):

- H2a: Regulatory supportive services influence individual related factors associated with EFDs usage.
- H2b: Regulatory coercive measures influence individual related factors associated with EFDs usage.
- H3: Individual related factors influence effective utilization of EFDs.

Mediating Role of Individual Factors on Effective Utilization of EFDs

In this study, the mediating role of individual/personal factors on effective utilization of EFDs is conceptualized as the process through which individual attitudes, perceptions and behaviours, shaped by various regulatory actions, influence the outcomes associated with the use of EFDs (Hadi *et al.*, 2016; Akour *et al.*, 2006). Perceived ease of use and perceived usefulness are similar to personal/individual factors in that they reflect the cognitive and affective evaluations of users towards technology usage and act as mediators to explain how institutional elements may affect effective utilization of technological advances. For example, Akour *et al.* (2006) posed the individual factors (TAM variables) as mediating variables while examining the impact of cultural dimensions on managers' intentions to use the internet. Their results indicated that both perceived usefulness and perceived ease of use mediated the relationship between cultural dimensions and managers' intentions to use the internet in Jordan. Based on this, the following hypotheses were developed:

- H4a: Individual related factors towards EFDs usage mediate the influence of regulatory supportive services and effective utilization of EFDs.
- H4b: Individual related factors towards EFDs usage mediate the influence of regulatory coercive measures and effective utilization of EFDs.

Conceptual Framework

Conceptual framework delineates how various types of regulatory actions influence the effective utilization of EFDs, taking into account the mediating role of Individual Related Factors (IRF). Figure 1 illustrates these hypothesized relationships.

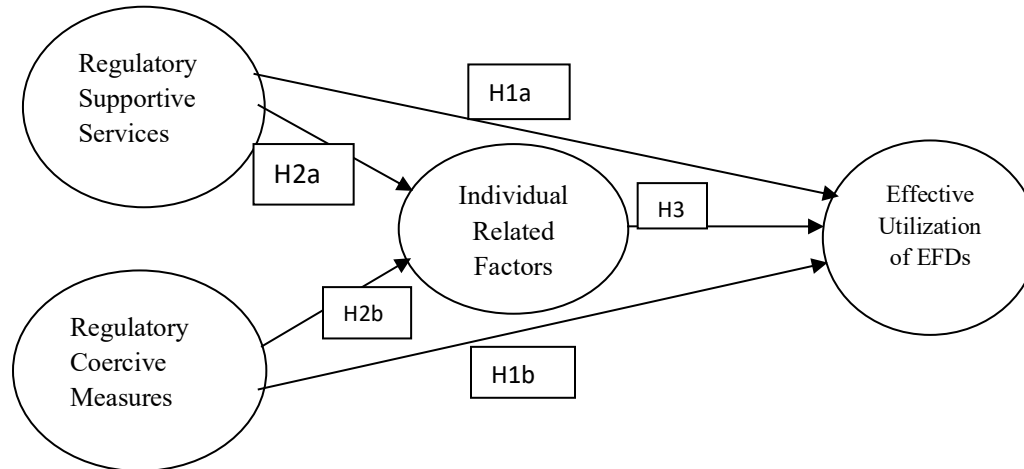


Figure 1: Conceptual Framework
 Source: Synthesized from Lit. Review

Research Methods

Data were gathered from oil and gas refuelling centres in Dar es Salaam and Coast regions. The study focused on EFD users in settings where EFDs support tax compliance. A questionnaire was designed to capture items that reflect well the different construct indicators to enhance validity and reliability (DeVellis, 2016; Nunnally & Bernstein, 1994; Spector, 2005). Balancing the number and quality of items was crucial to avoid a complex questionnaire (Diamantopoulos *et al.*, 2012), minimize the burden of questionnaire filling/completion, and reduce redundancy among indicators (Streiner & Norman, 2008). Study key constructs and their respective indicators were developed by borrowing key ideas from previous studies to suit the present study (Davis, 1989; Ajzen, 1991; Casey & Castro, 2015; Mahangila *et al.*, 2018; Malima *et al.*, 2021). Three major types of constructs including, Individual Related Factors (IRF), Regulatory Authority Actions (RAA), and Effective Utilization of EFD (EFDU) were developed.

IRF was used to capture individual attitudes and perceptions towards EFD usage with key indicators consisting of perceived usefulness, perceived ease of use, and perceived behavioural control (Venkatesh *et al.*, 2003; Ajzen, 1991; Davis, 1989). RAA reflected the different types of regulatory actions aiming at promoting or enforcing EFD, and was decomposed into two levels; Regulatory Supportive Services (RSS) and Regulatory Coercive Measures (RCM) (Casey & Castro, 2015). The former reflected the different actions that encourage EFD usage such as training, easy access to EFDs, and IT support (Mahangila *et al.*, 2018; Casey & Castro, 2015). Conversely, RCM captured the experienced enforcement measures such as penalties, regular checks, and EFD usage monitoring. Conversely, EFDU was captured by looking into EFD usage to comply with legal requirement, and enhancing one’s responsibilities and business performance. Key indicators aimed at measuring the frequency, accuracy, timely records, and reliability (Malima *et al.*, 2021). Frequency and accuracy assessed the number of times and the correctness

of EFDs in issuing receipts while timely records and reliability reflected the promptness and consistency of EFD, the degree of trust and dependence on EFDs for issuing receipts without failures or breakdowns, respectively (Mahangila *et al.*, 2018; Malima *et al.*, 2021).

Several lead questions and scale items were used, and measured using a 5-point Likert scale with the following options: 1: Strongly Disagree (SD); 2: Disagree (D), 3: Neither Agree nor Disagree (N); 4: Agree (A), and 5: Strongly Agree (SA). The use of the 5-point Likert scale was considered relevant to the study in order to enhance precision and reduce measurement error (Cooper *et al.*, 2006; Kothari, 2004). Data collection was achieved through personal administered questionnaire through scheduled appointments and subsequent follow-ups to ensure a high response rate. In total, 101 study participants were consulted, comprising of managers (30) and financial controllers (20), which accounted to 45%, and pump attendants (51), accounting for 55%. Regarding data analysis; this was achieved by using Partial Least Squares Structural Equation Modelling (PLS–SEM) under SmartPLS 4 Version 4.0.9.5. This software was selected due to its predictive relevance, ability to handle small samples, capacity to manage models with latent variables and convenience due to its lack of strict data distribution assumptions (Hair *et al.*, 2019; Hair *et al.*, 2017; Henseler *et al.*, 2016). The chosen tool also facilitates well exploratory testing of phenomena, which is valuable for validating variables that may not be fully understood (Hair *et al.*, 2021).

Study Findings

Profile of Respondents

Respondents were drawn from six oil and gas companies operating refuelling centres in Dar es Salaam and Cost regions, Tanzania. The visited research sites and corresponding number of participants are as follows: Total Energies (40), Puma (19), Oil Com (15), Lake Oil (11), Camel Oil (8), and Gap Oil (8). Further details on the profile of respondents are given in Table 1.

Table 1: Respondents' Profile

<i>Profile Category</i>	<i>Profile Group</i>	<i>Freq., n = 101</i>	<i>%</i>
Gender	Female	42	41.6
	Male	59	58.4
	Total	101	100
Age	Below 20	3	3.0
	20-30	33	32.7
	30-40	49	48.5
	40-50	13	12.9
	50-60	3	3.0
	Total	101	100
Education	Primary School	3	3.0
	Secondary School	58	57.4
	Certificate	11	10.9
	Diploma Degree	10	9.9
	Bachelor Degree	18	17.8
	Master's Degree	1	1.0

	Total	101	100
Experience (No. of years)	< 1	7	6.9
	1-3	45	44.6
	4-5	28	27.7
	6-10	20	19.8
	>10	1	1.0
		101	100

Table 1 shows that large number of the respondents had worked with the refuelling centres for more than 1 year indicating that they had adequate experience regarding the use of EFD. For this study, this implied that respondents were in a good position to understand and respond well the key issues of interest to study.

Testing for Hypothesized Relationships

As typically observed in PLS–SEM, two stage model evaluation was employed starting with the one assessing the quality of study constructs [measurement model assessment], followed by the examination of the direction and significance of the hypothesized relationships [the structural model] (Hair *et al.*, 2022; Latif, 2020; Hair *et al.*, 2021). Measurement model allowed the assessment of the quality and validity of the constructs and their indicators using criteria such as factor loadings, Cronbach’s alpha, Composite Reliability (CR), and Average Variance Extracted (AVE). The results for this are summarised in Table 2.

Table 2: Measurement Model Assessment

Latent Variable	Indicator	Mean	t-Value	Factor loading	Cronbach's α	CR (Rho a)	AVE
Regulatory Supportive Services	RSS_1	4.406	18.358	0.81	0.713	0.719	0.635
	RSS_2	3.921	14.100	0.778			
	RSS_3	4.347	16.516	0.801			
Regulatory Coercive Measures	RCM_1	4.683	8.455	0.697	0.753	0.841	0.666
	RCM_2	4.376	46.785	0.9			
	RCM_3	4.396	17.133	0.838			
Individual Related Factors	IRF_1	4.248	22.163	0.822	0.824	0.851	0.598
	IRF_2	4.099	15.457	0.805			
	IRF_3	4.287	4.595	0.524			
	IRF_4	4.307	43.811	0.873			
	IRF_5	4.386	20.113	0.793			
EFD Utilization	EFDU_1	4.02	9.249	0.677	0.852	0.859	0.577
	EFDU_2	4.485	17.878	0.79			
	EFDU_3	4.505	17.936	0.798			
	EFDU_4	4.525	26.999	0.835			
	EFDU_5	4.416	10.802	0.732			
	EFDU_6	4.228	11.238	0.713			

Table 2 reveals that all construct indicators' factor loadings, except for three items (RCM_1 = 0.697, IFR_3 = 0.524, and EFDU_1 = 0.677), surpass the conventionally recommended threshold of 0.7. Generally, indicators with loadings between 0.40 and 0.7 should be considered for removal only if their deletion increases the internal consistency reliability or convergent validity above the suggested threshold values (Hair *et al.*, 2021; Hair *et al.*, 2011; Latif, 2023). However, the decision to remove a specific indicator should also consider the constructs' theoretical relevance (Hair *et al.*, 2021; Hair *et al.*, 2011; Latif, 2023). The results show satisfactory AVE, Cronbach's alpha, and composite reliability (Rho_a). Specifically, all the latent variables have high AVE values, ranging from 0.577 to 0.666, which are above the recommended threshold of 0.5 for reflective constructs. This served as an indication that the latent variables captured more than half of the variance of their indicators and have high convergent validity (Hair *et al.*, 2019; Hair *et al.*, 2017; Hair *et al.*, 2011). For Cronbach's alpha and CR values, their values range from 0.713 to 0.852 and from 0.719 to 0.859, respectively, exceeding the recommended threshold of 0.7 for reflective constructs (Hair *et al.*, 2019; Hair *et al.*, 2017). Theoretical relevance of the three construct indicators (Penalties/fines for not using EFD [RCM_1], power and ability to use EFD [IFR_3], and frequency of use [EFDU_1]) appeared is significant considering their practical application in the business world. Therefore, these indicators were retained to enhance the study's context-specific relevance. Furthermore, the reported model measurement results indicated that the construct indicators measured the same construct in a consistent and coherent manner, thus demonstrating high internal consistency reliability (Hair *et al.*, 2019; Hair *et al.*, 2017; Hair *et al.*, 2011). As shown in Table 2, the t-values range from 4.595 to 46.785, exceeding the recommended threshold of 1.96 at a 5% significance level. This suggests that the construct indicators used are significantly different from zero, thereby indicating stability and robustness (Hair *et al.*, 2019; Hair *et al.*, 2017). In addition to these tests, discriminant validity tests were conducted on the data to assess potential collinearity and ensure the uniqueness of the constructs.

Collinearity and Discriminant Tests

The Variance Inflation Factor (VIF) was used to test whether predictor variables were highly correlated, which could negatively affect the estimation and interpretation of the path coefficients (Hair *et al.*, 2022; Hair *et al.*, 2018). The results, as reported in Table 3, indicated that all construct indicators surpassed the commonly accepted threshold values (i.e., $VIF \leq 5$ and tolerance values ≥ 0.2).

Table 3: Collinearity and Tolerance Test Results

Indicator	VIF	Tolerance
RSS_1	1.345	0.743
RSS_2	1.409	0.710
RSS_3	1.449	0.690
RCM_1	1.312	0.762
RCM_2	1.742	0.574
RCM_3	1.786	0.560
IRF_1	2.464	0.406
IRF_2	2.195	0.456
IRF_3	1.335	0.749
IRF_4	2.701	0.370

IRF_5	2.025	0.493
EFDU_1	1.562	0.640
EFDU_2	1.981	0.505
EFDU_3	1.964	0.509
EFDU_4	2.287	0.437
EFDU_5	1.673	0.598
EFDU_6	1.520	0.658

Source: Data Analysis Results (2024)

Satisfactory results, as reported in Table 3 indicated that there were no significant multicollinearity issues in the measurement model suggesting that study indicators provided independent and unique information to their respective latent variables without significant interference (Hair *et al.*, 2019; Hadi *et al.*, 2016). Furthermore, Fornell-Larcker criterion was employed to ascertain the discriminant validity of the constructs as presented in Table 4.

Table 4: Fornell Larker Criterion Discriminant Validity Test

Latent Variable	EFDU	IRF	RCM	RSS
EFDU	0.794	0.759	0.635	0.661
IRF	0.759	0.773	0.547	0.696
RCM	0.635	0.547	0.816	0.76
RSS	0.661	0.696	0.76	0.797

Source: Data Analysis Results

As shown in Table 4, all the diagonal elements are greater than the off-diagonal elements, suggesting that each construct is more strongly related to its own indicators than to other constructs (Fornell & Larcker, 1981; Hair *et al.*, 2021). This implies that the Fornell-Larcker criterion was met for all the constructs, demonstrating good discriminant validity.

Direct Effect Structural Model Results

The direct effect structural model tests were conducted to examine the causal relationships between endogenous and exogenous variables, while controlling for the mediator variable (Hair *et al.*, 2017; Nitzl *et al.*, 2016). This involved examining the path coefficients, which reflect the standardized regression coefficients – expected to be significant to align with the theoretical expectations in the study. Bootstrapping techniques, and significance tests were used to obtain the *t*-values and *p*-values for the path coefficients. As indicated in Table 5, three out of the five tested hypothesized relationships for the direct effects met the established threshold criteria (i.e., *t*-values > 1.96 for a two-tailed test at a 5% significance level, and *p*-values < 0.05 for a significant path coefficient) (Hair *et al.*, 2017).

Table 5: Direct Effects Results

	Path Coeff (β)	t – values	<i>p</i> -values
IRF -> EFDU	0.636	7.308	0.000
RCM -> EFDU	0.286	3.448	0.001
RCM -> IRF	0.043	0.334	0.738

RSS -> EFDU	0.001	0.012	0.991
RSS -> IRF	0.663	4.943	0.000

Source: Data Analysis Results

Table 5 reveals significant positive effects of Individual Related Factors (IRF) and Regulatory Coercive Measures (RCM) on Effective Utilization of EFDs (EFDU), with path coefficients of 0.636 and 0.286 respectively. Additionally, Regulatory Supportive Services (RSS) significantly and positively influence IRF, with a path coefficient of 0.663. However, the influence of RCM on IRF and RSS on EFDU were not statistically significant, with path coefficients of 0.043 and 0.001 respectively. These results confirm three out of five hypothesized relationships, indicating the research model strong explanatory and predictive power. Status of hypothesized direct relationships can thus be presented as follows.

Table 6: Status of Hypothesized Direct Relationships

	<i>Hypothesis</i>	<i>Supported/Not supported</i>
H1a:	Regulatory supportive services influence utilization of EFDs.	Not Supported
H1b:	Regulatory coercive measures influence the utilization of EFDs.	Supported
H2a:	Regulatory supportive services influence individual related factors associated with EFDs usage.	Supported
H2b:	Regulatory coercive measures influence individual related factors associated with EFDs usage.	Not Supported
H3:	Individual related factors influence utilization of EFDs.	Supported

Model Fitness and Predictive Relevance Using R² And Q²

While R² provides for the proportion of the variation in the DV explained by the predictors, Q² measures the model's predictive power as reflected in its ability to predict future observations (Latif, 2020; Hair *et al.*, 2022). Q² is particularly useful in assessing the model's external validity – results of the two tests are summarized in Table 7.

Table 7: Model Predictive Relevance Using R² and Q²

<i>Endogenous LVs</i>	<i>R² Value</i>	<i>Interpretation</i>	<i>Q² Value</i>	<i>Interpretation</i>
EFDU	0.687	Substantial	0.421	Good
IRF	0.485	Moderate	0.424	Good

Table 7 shows that the endogenous variables, EFDU and IRF, demonstrated substantial and moderate explanatory power respectively, aligning with the rule of thumb proposed by Hair *et al.* (2022). The model also exhibits good predictive relevance for both EFDU and IRF, as indicated by positive Q² values (Latif, 2020). The R² of 0.687 for EFDU suggests that the model can explain about 68.7% of its variance, supported by a Q² value of 0.421, indicating strong predictive relevance. For IRF, the R² value of 0.485 indicates about 48.5% of its variance can be explained by the used model. Q² value of 0.424 also suggesting good predictive relevance of the mode. These results suggest EFDU is more influenced by the exogenous variables (RSS and RCM) and

IRF than IRF is by the exogenous variables, implying there are other factors also influencing the variance and prediction of IRF.

Analysis of the Mediating Role of IRF

The mediating role of IRF on the influence of regulatory actions was examined using the bootstrapping technique – a resampling method for estimating the direct effects, total indirect effects, specific indirect effect, and total effects, along with their associated significance levels (Hair *et al.*, 2022; Hair *et al.*, 2017; Zhao *et al.*, 2010; Preacher & Hayes, 2008). Table 8 provide summarized results at this level.

Table 8: Results of the Mediation Analysis

	<i>t – values</i>	<i>p - values</i>
RCM -> IRF -> EFDU	0.335	0.738
RSS -> IRF -> EFDU	4.181	< 0.001

Table 8 reveals two distinctive results: The indirect effect of RCM on EFDU through IRF being not significant while the indirect effect of RSS on EFDU through IRF being significant. Table 9 provides basis to examine and understand more the mediating role of IRF between the two types of regulatory actions.

Table 9: Juxtaposing the Total and Direct Effects Results

	Total Effects			Direct Effects		
	Path Coeff (β)	t – values	<i>p</i> -values	Path Coeff (β)	t – values	<i>p</i> -values
IRF -> EFDU	0.636	7.308	<0.001	0.636	7.308	<0.001
RCM -> EFDU	0.313	2.319	0.02	0.286	3.448	0.001
RCM -> IRF	0.043	0.334	0.738	0.043	0.334	0.738
RSS -> EFDU	0.423	2.878	0.004	0.001	0.012	0.991
RSS -> IRF	0.663	4.943	<0.001	0.663	4.943	<0.001

Table 9 reveals that both the direct and total effects of IRF on EFDU are 0.636, indicating no indirect effect. The direct effect of RCM on EFDU is 0.286, while the total effect is 0.313, suggesting partial mediation by IRF (Baron & Kenny, 1986; Hayes, 2018). The direct effect of RSS on EFDU is 0.001, but with a total effect of 0.423, indicating strong mediation by IRF. In summary, the results show that IRF partially mediates the effect of RCM and strongly mediates the effect of RSS on EFDU. There are also some direct effects of RCM and RSS on EFDU not mediated by IRF, suggesting that while IRF is not a necessary condition for RCM and RSS to influence EFDU, it does amplify or enhance the effect of RCM and RSS on EFDU (Baron & Kenny, 1986; Hayes, 2018). This indicates that the presence of IRF strengthens the relationships between RCM and RSS and EFDU by providing an additional pathway through which RCM and RSS can influence EFDU. In other words, IRF amplifies the effect of RCM and RSS on EFDU by partially explaining how RCM and RSS influence EFDU. The study findings can thus be used to confirm the earlier developed study’s hypotheses regarding the mediating role of IRF, as summarized in Table 10 that follows.

Table 10: Status of Hypothesized Mediating Role of IRF

<i>S/N</i>	<i>Hypothesis</i>	<i>Supported/Not supported</i>
H4a:	Individual Related Factors (e.g., perceptions, attitude and behaviour) towards EFD usage mediate the relationship between Regulatory Supportive Services and Effective Utilization of EFD.	Supported
H4b:	Individual Related Factors (e.g., perceptions, attitude and behaviour) towards EFD usage mediate the relationship between Regulatory Coercive Measures and Effective Utilization of EFD	Partially Supported

Discussions of the Findings

The findings of this study largely confirm that regulatory actions positively influence the effective utilization of EFDs (EFDU), and that Individual Related Factors (IRF) play a pivotal role in mediating these relationships. However, the strength of this influence on exogenous variables varies depending on the nature of the regulatory actions, namely Regulatory Supportive Services (RSS) and Regulatory Coercive Measures (RCM). Specifically, RSS significantly influences IRF but not EFDU, and RCM appears to have a significant impact on EFDU but not IRF. This underscores the critical role of IRF in EFD utilization. Findings also show that the effects of regulatory actions on EFDU and IRF differ – while RCM appears to have a positive, significant influence on EFDU, RSS, although not significant, also positively influences EFDU. These findings align with the institutional theory (Scott, 2013) and are supported by empirical studies such as Casey and Castro (2015), who found that improved EFD usage in Rwanda was partly associated with regulatory supportive services including training.

However, these results contrast with other studies that found strong regulatory actions negatively affected EFD usage (Kira, 2016; Malima *et al.*, 2020). As noted earlier, key actors resisted using EFDs due to perceived costs and risks. The differences in results between the present study and previous ones may be due to differences in focus. Previous studies focused on grocery retail stores and the hospitality industry. Users in these business contexts may have had different characteristics and motivations. The current study's O&G companies operating refuelling centres may have had more resources and capacity to comply with regulatory actions or they may have perceived EFDs as being more beneficial and less costly to use.

The study findings also show that the influence of regulatory actions on IRF varies. While RSS appears to have a strong, significant effect on IRF, RCM does not significantly influence IRF towards EFD usage. To a large extent, these results align with key ideas of institutional theory (Scott, 2013; Oliver, 1991) and are supported by empirical studies such as Akour *et al.*, (2006) and Malima *et al.* (2020). Furthermore, the path coefficient between IRF and EFDU appears to be significant, indicating that IRF has a positive, direct effect on EFDU. This finding is consistent with information system theories such as Technology Acceptance Model (TAM) (Davis, 1989) and Theory of Planned Behaviour (Ajzen, 1991). The finding is also supported by some empirical studies (Akour *et al.*, 2006; Magese & Chindengwike, 2022; Malima *et al.*, 2021), which suggest that individual related factors can influence the effective utilization of technological advances such as EFDs of interest to this study.

Additionally, study findings indicate that IRF partially mediates the influence of RCM and strongly mediates the influence of RSS on EFDU. There are also some direct effects of RCM and RSS on EFDU not mediated by IRF, suggesting that while IRF is not a necessary condition for RCM and RSS to influence EFDU, it amplifies their influence. These findings align with both the institutional theory and the TAM, which suggest that institutional pressures from external actors can affect the cognitive and affective evaluations of users towards technologies or business practices, which in turn affect their acceptance and actual usage behaviour (Scott, 2013; Davis ., 1989). This finding is also consistent with previous empirical studies that have found that individual related factors mediate the relationship between regulatory actions and the actual usage of technological advances (Hadi *et al.*, 2016; Akour *et al.*, 2006).

Conclusion and Implication of the Study

This study investigated the influence of regulatory actions, namely Regulatory Supportive Services (RSS) and Regulatory Coercive Measures (RCM), on the Effective Utilization of EFDs (EFDU), considering the mediating role of Individual Related Factors (IRF). Data collected from 101 EFD users in Tanzanian Oil and Gas refuelling centres were analysed using Partial Least Squares Structural Equation Modelling (PLS–SEM) offered by SmartPLS4. The findings show that RSS and RCM have varying effects on EFDU, with a positive and indirect effect through IRF. IRF partially mediates the effects of RCM and strongly mediates the effects of RSS on EFDU. These findings have different implications for various stakeholders. For tax authorities, such as TRA, it is recommended to implement regulatory actions that create both benefits and costs for EFD users. These actions can influence EFDU both directly and indirectly through their influence on IRF. The tax authorities should consider the diversity of EFD users in terms of their IRF, which can affect how EFD users perceive and respond to different types of regulatory actions. For the government and policymakers, they are advised to support tax authorities in developing regulatory actions that enhance the effective utilization of EFDs. These actions are more likely to improve tax revenue collection and reduce tax evasion. Promoting effective utilization of EFDs can only be achieved by creating a conducive environment for EFD usage, taking into account the interests and characteristics of different actors involved in EFD implementation. Users of EFDs are also encouraged to comply with EFD regulatory actions to improve their task/job performance and businesses. It is important to develop a positive attitude and behaviour (IRF) towards EFD usage to effectively utilize EFDs and reap the inherent benefits of using EFDs.

For academics, it is important to continue studying/researching the different factors influencing the effective utilization of EFDs. The study recommends the use of both institutional and information technology theories such as TAM and TPB to better understand how external institutional forces interact with individual related factors, and their impact on EFDU usage. Further studies are recommended to extend the present study regarding EFD usage focusing on different types of regulatory actions – how these are perceived by users of EFDs and their effect on EFD usage in different types of business contexts. Also, how other types of mediators and moderators may affect the relationship between regulatory authority actions and EFDU.

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