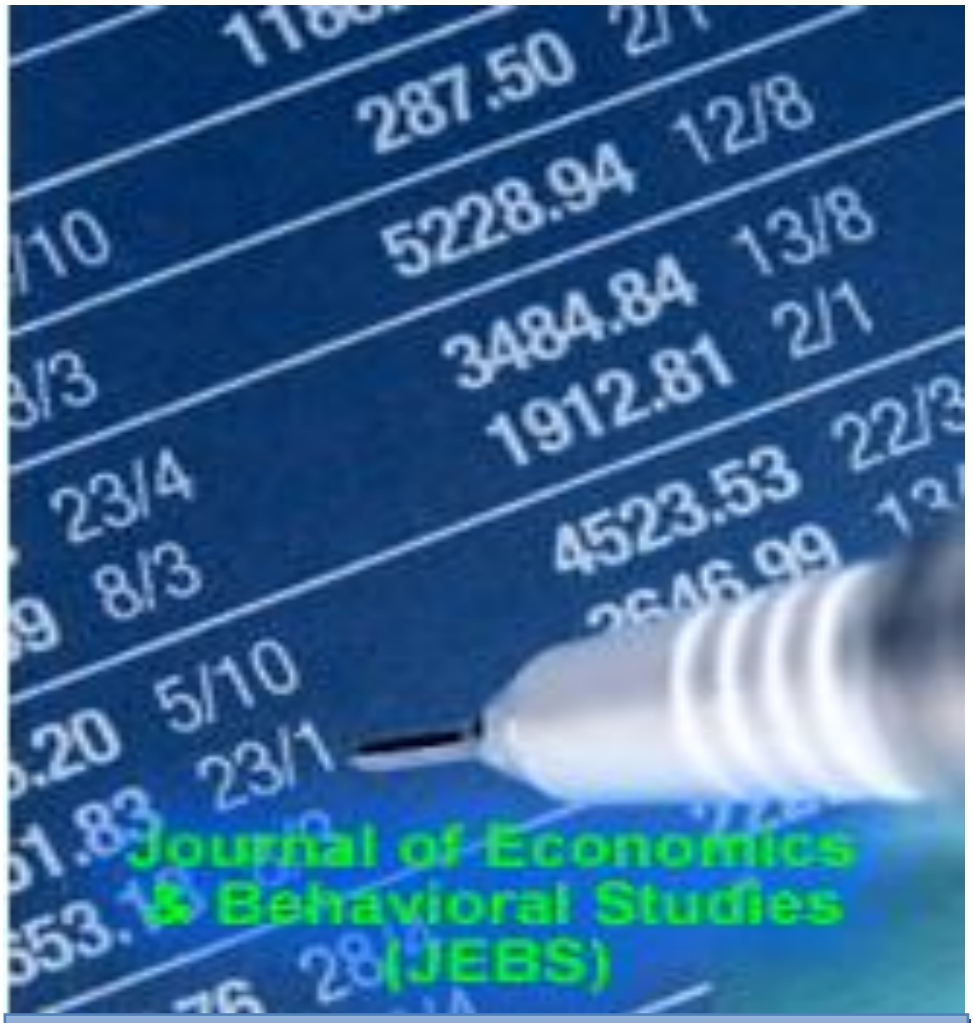

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Editorial

Journal of Economics and Behavioral Studies (JEBS) provides distinct avenue for quality research in the ever-changing fields of economics & behavioral studies and related disciplines. Research work submitted for publication consideration should not merely limited to conceptualization of economics and behavioral developments but comprise interdisciplinary and multi-facet approaches to economics and behavioral theories and practices as well as general transformations in the fields. Scope of the JEBS includes: subjects of managerial economics, financial economics, development economics, finance, economics, financial psychology, strategic management, organizational behavior, human behavior, marketing, human resource management and behavioral finance. Author(s) should declare that work submitted to the journal is original, not under consideration for publication by another journal and that all listed authors approve its submission to JEBS. Author (s) can submit: Research Paper, Conceptual Paper, Case Studies and Book Review. Journal received research submission related to all aspects of major themes and tracks. All submitted papers were first assessed by the editorial team for relevance and originality of the work and blindly peer-reviewed by the external reviewers depending on the subject matter of the paper. After the rigorous peer-review process, the submitted papers were selected based on originality, significance, and clarity of the purpose. The current issue of JEBS comprises papers of scholars from Zimbabwe, Uganda and Nigeria. Impact of Income on Gender-Based Violence, Role of Operation Wealth Creation (OWC) Program on Diary Farmers, ICT Innovation, FDI and Economic Growth, Evaluation of Work Life Balance Strategies on the Performance of Female Entrepreneurial and Building Blocks for a Model for using EDI and ERP to Improve Supply Chain Performance were some of the major practices and concepts examined in these studies. The current issue will therefore be a unique offer where scholars will be able to appreciate the latest results in their field of expertise and to acquire additional knowledge in other relevant fields.

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PAPERS

Journal of Economics and Behavioral Studies (JEBS)
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The Impact of Income on Gender-Based Violence: A Case of Matabeleland South

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Abstract: The study assessed the effects of income on gender-based violence using a multinomial logistic regression and an ANOVA test to model the cross-sectional data collected from a survey of 305 respondents in Bulilima district, Matabeleland South province, Zimbabwe. The study is significant as understanding the role of income on gender-based violence guides policymakers in eradicating gender-based violence since it entails more economic costs such as lost wages, productivity and it also drains resources from justice, health and social service which slackens the effectiveness of poverty reduction programs. The results showed that more women than men experienced gender-based violence. Also, an increase in the proportion of women engaged in any economic activity was associated with the risk of encountering sexual and emotional violence. In addition, the likelihood of experiencing emotional violence increased with every Rand in income for a woman. The study recommends the government to prioritize employment creation and financial empowerment through promoting and supporting agricultural operations so that men retain their social role of providing for the family. Furthermore, monetary policies that benefit both men and women in small and medium-sized businesses should be implemented to increase household incomes.

Keywords: *Income, Employment status and Gender-based violence.*

1. Introduction

Gender-based violence has been pervasive across all of human history. It is yet another strand in the woven fabric of institutional violence that safeguards misogynistic values by ensuring the preservation of male dominance and male control of corporate strategy institutions, all of which contribute to the retention of women and girls in the kitchen. The announcement on the eradication of gender-based violence proclaimed by the United Nations outlines violence against women as any form of abuse against women that leads to physical, sexual, or emotional damage or distress, as well as intimidation of such doings, bullying, or illogical denial of rights, whether in a formal or informal setting (Nations (UN), 1993). It comprises coercions into sex, abuse, degradation, beatings, molestation, intimate partner violence, oedipal love, forced prostitution, torment, and attempted rape are all examples of violence against women (Nations (UN), 1993). It is not acceptable to disregard acts such as defacing female genitalia and other risky traditional practices, as well as child marriages, which greatly increase maternal deaths. Although both males and females experience such abuse, its incidence continues to be higher for women and girls.

For instance, Dr. Babatunde Osotimehin indicated in his movement against gender-based violence, "At the moment, there is not a single country where women and girls are safe from abuse (UNAIDS, 2022). A home should ideally be a safe haven, but in sub-Saharan Africa, many women experience physical, emotional, mental, and sexual violence (Bamiwuye, 2014). Violence against women is prevalent in less developed areas, particularly intimate partner abuse, the position is even more perplexing (Duvvry et al., 2018). Vyas et al. (2015) asserted that formal employment may be more preventive than periodic employment and women's income was connected to a lower incidence of violence in some situations, but higher in others. While some findings from Vyas et al. (2015) have proven that the occurrence of women's intimate partner violence is reduced when women are financially empowered and possess property or land, other studies like Gupta et al. (2018) showed a positive relationship between income and violence against women. According to statistics from across the world, between 15 and 71 percent of women who have ever had a relationship have encountered physical or sexual assault by a present or ex-partner at some stage in life (Usdin et al, 2005).

Spousal violence has long-lasting impacts on women's physical and emotional health, their ability to contribute to the manufacturing of products and services and the development of their offspring. Hence, the

reduction of gender-based violence is key as it impedes development; it causes juvenile delinquencies as well as increasing criminal rates. Gender-based violence (GBV) is a common, terrible, and everyday problem that disturbs and affects every Zimbabwean in some manner. Spousal abuse is a complicated and unpleasant subject that affects one in three women (WHO, 2021). Although there are statutes regarding spousal abuse, however, it is also usual for most women to live in a state in which they are susceptible to all sorts of abuse (WHO, 2021). Emphasized that spousal violence is indeed a major cause of nearly half of the homicide cases that are submitted before the Zimbabwe Constitutional Court. Even though all forms of violence against women are acknowledged to be detrimental to one's health and rights for women, they also obstruct economic growth. In Zimbabwe's patriarchal society, it is instilled in girls and women that it is acceptable for a partner to be physically or verbally mistreated as it's a symbol of love (SAFAIDS, 2009). Although violence against women affects people from all socioeconomic levels, studies indicate that women who lack financial independence are more likely to become victims of intimate relationship abuse. Even though, it has been hypothesized that women who are more financially and socially powerful may be less vulnerable to intimate partner violence (IPV).

No interventions that seek to empower women while addressing poverty or gender disparities have yet been designed and evaluated (Usdin et al., 2005). In less developed countries, lack of income is positively correlated with gender-based violence and this position is even more troubling (Duvvury et al., 2018). The COVID-19 pandemic, price rises on basic goods, and poor harvests all combined to leave over half of Zimbabwe's population living in extreme poverty (ZIMSTAT, 2020). In the same view, Rapid Poverty Income Consumption and Expenditure Survey (Rapid PICES) 2021, (round 3) reported that 61 percent of the population overall and 71 percent of the rural population reported having food shortages (ZIMSTAT, 2021). Due to the general intertwining effects of poverty, males may turn hostile towards their relations, resulting in spousal violence because men fail to be financially responsible to their families. The main contributor to defenselessness and the inability to recover from the effects of many threats is a lack of income or financial independence. In the same view, Cameroon & Tedds (2021) discovered that women in Canada suffer poverty to a greater extent than men and that both poverty levels and instances of poverty raise the likelihood of gender-based violence. In addition, Conner (2014) asserted that the freedoms experienced by men or women who are abused by their partners are substantially restricted by a lack of income. Income has both an endowing and disempowering effect on abusive relationships.

While a perpetrator is empowered by her partner's income dependency, the independence of a victimized woman is reduced by her abuser's ability to control her through financial means (Zhang & Breunig, 2021). Furthermore, income insecurity is the utmost reason why, after gaining freedom, a woman who experiences intimate partner violence has limited choices and may eventually acquiesce to her spouse's attempts to settle (Zhang & Breunig, 2021). Thus, income instability is a tie that binds a woman to her perpetrator. Interventions designed to financially "equip" women have gained recognition in recent years as a potential strategy for lowering the risk of spousal violence among women claimed that certain circumstances and places have shown that interventions like microcredit initiatives, income support programs, and other types of socioeconomic programs have reduced women's exposure to spousal violence. However, Mayoux and Hartl (2009) revealed that even though microcredit systems enhance women's small enterprises as well as boost their confidence, they can also cause debt crises and increased vulnerability. In the same view, Bates et al. (2004) showed that women who work or start their businesses gain the freedom of income they need to exit abusive marriages or stop GBV. However, some initiatives that promote income independence might actually make the situation worse. Thus, males will employ violence against women who have a source of income as a way of putting them in their place.

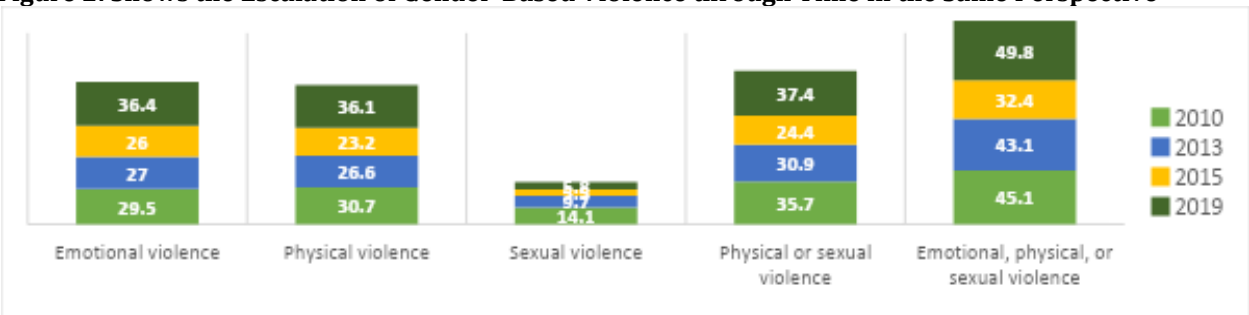
Figure 1 shows the proportion of women (15–49) who have ever been married, who experienced gender-based violence in 2019 by wealth quintiles. It also demonstrates the relationship between lack of income and gender-based violence by demonstrating the high incidence of emotional, physical, and sexual violence among women in the lowest, second, and medium welfare quintiles. Thus, women's lack of income is associated with a higher incidence of spousal violence. It is obvious that income affects gender-based violence since men may utilize women's lack of financial independence as a way to keep assaulting them. The government has a social, legal and political obligation to take necessary measures to prevent, investigate and punish acts of violence. Consequently, policies to eradicate GBV targeting women have been implemented

which includes the Gender Policy 2013-2017. Also, the High-Level Political Compact was introduced by the Zimbabwean government, the European Union, and the United Nations in 2021, an initiative to eradicate GBV and harmful practices. Although subsequent laws against domestic violence have been implemented, over 27% of women aged 15 to 49 who have ever been in a union have encountered gender-based violence by present or past partners (WHO, 2021). According to AUC-WGDD (2020), domestic violence, be it physical or verbal rose from 40.6% to 5 internationally. 25 percent of those who encountered sexual assault were women, and 62 percent of those survivors are girls aged 15 and 19 years. Emotional and physical violence was 22.1% and 15.2% in 2019, respectively (ZIMSTAT, 2019). Musasa project recorded more than 6,800 cases in 2020 and the cases increased to 26779 from January to August 2021 (Musasa project, 2021). Likewise, a total of 502 incidents of economic abuse, 349 incidents of physical assault, 413 incidents of emotional abuse, and 874 incidents of sexual harassment were recorded by the one-stop centers operated by the Ministry of Women Affairs, Community, Small and Medium Enterprises (GoZ, 2021).

Figure 1: Shows the Proportion of Women (15–49) Who Experienced Gender-Based Violence by Wealth Quintiles

Source: ZIMSTAT 2019.

Figure 2: Shows the Escalation of Gender-Based Violence through Time in the Same Perspective



Source: ZIMSTAT 2019.

Physical violence increased from 30.7% in 2010 to 36.1 %in 2019, while emotional violence increased from 29.5% to 36.4%. Despite the government's efforts to eradicate gender-based violence over the past decades, ongoing macroeconomic instability and job losses undermined these efforts. Regardless of the widespread adoption of the women's empowerment mantra, the prevalence of gender-based violence has increased. The critical question for Zimbabwean policymakers is whether income positively or negatively affects gender-based violence. Although a number of studies have been conducted on how income affects GBV, a significant proportion of these studies have been carried out in developed countries, with only a few studies by Jekwes et al. (2010) and Abramsky et al. conducted in Africa. The study was limited to a developing country, Zimbabwe, and concentrated on income and its effects on gender-based violence in Bulilima, Matabeleland South.

2. Literature Review

The section's focus is on a theoretical and empirical literature review on how income affects GBV. The income-GBV relationship theories are reviewed first, followed by a review of studies that investigated the income-GBV relationship.

Theoretical Literature: Various theoretical models suggested that income may reduce the prevalence rate of GBV or aggravate the problem of GBV, which includes:

Bargaining Models: The non-cooperative bargaining models of intimate partner violence (IPV) hypothesize that the level of intimate partner violence will be minimized by a rise in economic empowerment for women, that is, through the acquisition of income or remittances and other income from outside the marriage. This model assumes that an increase in women's financial opportunities, comparable to those of males, will reassure women that they have good options outside of marriage and lower their tolerance for abuse inside, reducing the likelihood of violence (Farmer & Tiefenthaler, 1997). A Nash-bargaining model of domestic violence by Tauchen et al. (1991) demonstrated the effect of changes in income on domestic violence. According to the method, every partner has a weakness that should provide the least amount of welfare for each party in the partnership. Given a specific amount of income transfer from her husband, a woman's level of risk is the amount of abuse she is willing to endure without divorcing him. The model postulates that an increase in the income of a man permits him to bargain for additional abuse by raising the monetary transfers to his wife. On the contrary, an increase in the woman's financial position compels him to minimize his violent behavior. Likewise, the increased income for a woman increases the household income as stipulated in the resource theory. Gelles (1997) proclaimed income resource effect reduces intimate partner violence by reducing economic constraints for the household.

Male-Backlash Model: The theory postulates that women are likely to encounter more spousal violence if their financial status defies the socially accepted male dominance and female dependence, and the challenged man might attempt to re-establish his authority over his wife by inflicting violence on her (Macmillan & Gartner, 1999). The theory further pointed out that there is a positive association between women's earnings and abuse against them, as men feel their traditional gender roles are threatened. The male-backlash theories do not consider women's rationality constraint and disregard the probability that women can choose to end the relationship (Aizer, 2007). On the other hand, patriarchal cultures don't offer women favorable options outside of marriage, which makes divorces to become rare. The lawful processes inhibit divorces as the procedures are expensive and marriage dissolution is accompanied by significant social stigma and financial misery. In traditional societies, empirical research has shown that women's financial freedom, as measured by their income or involvement in credit groups, increases the risk of violence (Sinha & Kumar, 2022).

Male Peer Support Model: The Male Peer Support approach is characterized by DeKeseredy and Schwartz (2002) as a male dependence on male coequals and the money they provide, which approves and maintains violence against women, the most significant underlying cause of woman abuse. Several poor men in the same situation have a habit of encouraging each other to abuse women who seem to threaten masculinity either by having more income, working or owning a business. Most men who lost their jobs or who do not have steady jobs such that their lives are thus less organized do interact more with male friends. Conway (2001) asserted men spent much of their time drinking and conversing about hard times or grieving about lost jobs with their peers. In addition, these men's friends view physical gender-based violence, rape, and other forms of woman abuse as valid and effective means of repossessing patriarchal authority (DeKeseredy and Schwartz, 2002). Their peers advise them that abusing women is a legitimate way of keeping them in their place. The global economic downturn, particularly in Zimbabwe, contributes to increased female abuse because many men have lost their jobs. Jobs continue to disappear as a result of economic challenges, and many girls and boys are failing to continue with their education, pressuring people to marry at a young age, which may increase abuse and poverty. If one of the partners earns more than the other, this will inevitably lead to gender-based violence especially when a woman earns better than the man. The men will instigate gender-based violence as a way of putting women in their place.

Theories Underpinning the Study: The study is underpinned by the male backlash and the male peer support model. The male backlash theory says employment status and income have a positive association with gender-based violence as men feel their gender roles are defied and hence beat their wives, a current traditional belief by most men. In addition, the male peer support theory portrays what is currently happening in Bulilima where there is low employment (4%) as stated by ZIMSTAT (2022); most males there may spend most of their time drinking with peers who influence them to beat their wives as a way of claiming back respect from a financially stable wife.

Empirical Literature: A number of empirical studies produced inconclusive results. Some studies discovered that income reduces gender-based violence prevalence rate while other studies discovered that income exacerbates it. In examining the empirical literature, we start with Abramsky et al. (2019), who investigated women's earnings and the possibility of facing gender-based violence in North-Western Tanzania which is more similar to the current study. The study discovered that at baseline and longitudinal data, higher income was associated with a decline in the previous year's physical and sexual abuse at baseline only. Also, the study supported the assertion that all women's increasing financial contributions were related to higher levels of domestic abuse, even though panel data only included controlled women. Using a different methodology, Rashada and Mesbah (2016) assessed the association between monetary disproportion and female abuse in India. Employing the Gini index, Logistic regression and a Tobit method, the connection between income disparity and spousal abuse was evaluated. The study established a connection between financial discrepancy and intimate abuse. Also, it revealed that the amount of spousal abuse increased as the Gini index also increased. The degree of education, the husband's employment, living in rural areas, being from a non-disadvantaged socioeconomic class and the socioeconomic condition of the family may function as a deterrent to violence against intimate partners.

Furthermore, it was found that a woman's probability of facing physical and sexual abuse differed according to her social group or tribe and religious affiliation. Furthermore, Sanz-Barbero et al. (2015) used a multilevel logistic regression to investigate how provincial joblessness and financial inequity affected the likelihood of a woman encountering gender-based aggression in Spain. According to the study, women in provinces with rising incomes had lower rates of gender-based abuse than those in regions with small variations in income abuse. Gupta et al. (2017) used baseline data from a randomized controlled trial of women in Mexico City to conduct a multilevel logistic regression analysis on women who were currently working to assess intimate partner violence against low-income women and associations with work-related disruptions. The study discovered that 40.6% of women who were working at the time of the survey experienced work-related disturbances as a result of Intimate Partner Violence. Furthermore, they discovered that women who had low levels of physical and sexual violence were more likely to have work disruptions than women who had high levels of physical and sexual violence and injuries or high levels of physical and low sexual violence and injuries. In addition, Muzavazi et al. (2022) assessed the causes of gender-based violence against women in low and high-income households in Zimbabwe's Manicaland Province, lending support to the relationship between income and GBV.

The study discovered that age at marriage, access to media, and having an alcoholic partner were risk factors for GBV among low-income households using binary logit regression. Age and spouse-controlling behavior, on the other hand, were significant causes of GBV in both low and high-income households. Coll et al. (2020) also examined data from 46 countries collected through surveys undertaken between 2010 and 2017 to evaluate the prevalence and disparities of current emotional, physical, and sexual intimate partner violence among women aged 15 to 49 who have ever been in a committed relationship. To measure inequalities, data were divided by household incomes, women's age, level of empowerment, polygyny status of the relationship, and place of residence. IPV preponderance differed significantly by country, spanning from less than 5% in Armenia and Comoros to more than 40% in Afghanistan. They also discovered massive disparities between countries. Women with more power and income reported less IPV, as did women whose partners had no co-wives. Variations were discovered in various countries based on the age and location of the women, but in general, younger women and those living in rural areas seem to be more vulnerable to IPV. Furthermore, Ranganathan et al. (2022) used qualitative data to assess women's economic status, male authority patterns, and domestic violence in the rural North West province of South Africa.

Adult women who had recently completed gender studies and had recently received microloans for more than a year took part in the study's in-depth interviews. The findings showed that women's ability to generate income, along with a sense of financial independence and increased social support, reinforces the concept of "power within the self." Despite the persistent social norms and gender expectations regarding women's subservience and male authority, particularly among older women, women reported higher levels of contentment and lower levels of financial stress. Younger women appeared to be subjected to abuse as well, owing to childcare and financial obligations. Greulich and Dasre (2022) investigated the relationship between women's economic engagement and physical and/or sexual domestic abuse against women in Turkey using an Instrumental Variable-approach based on cluster averages to strengthen the control for endogeneity in cross-sectional data. They distinguished between women who do not work because their partners refuse to let them and women who do not work for other reasons, as well as between formal and informal labor market activity. The study discovered that employment for women in Turkey cannot be linked to a lower risk of experiencing domestic violence; women who work in the formal labor market and earn at least the equivalent of their partner to household income are less likely to experience physical and/or sexual domestic violence than their counterparts. Although it is evident from the evaluated theoretical and empirical evidence that there is a relationship between income and violence against women, the exact nature of that relationship remains unclear. The study attempts to determine the relationship between income and intimate partner violence in Bulilima.

3. Research Methodology

The section presents the methodology used in assessing the impact of income on GBV in Bulilima. Research design, sampling methodology, Model specification and model results are discussed in this section.

Research Design

Research Area: The study focused on the Bulilima district in Matabeleland South Province. According to a thorough review of the literature on gender-based violence in Zimbabwe and some Multiple Indicator Cluster Survey (MICS) and Zimbabwe Demographic Health Survey (ZDHS) reports, this area has the highest rates of violence against women. Emotional and physical violence was 22.1% and 15.2% in 2019, respectively (MICS, 2019). The study focused on male and female abuse, although most studies exclusively look at women.

Research Design and Target Population: Descriptive method was used for the research's strategy since it gives a precise and trustworthy picture of the factors that relate to or are pertinent to the theme. To successfully obtain legitimate results, a household survey was conducted from the 15th to the 26th of May 2022 to evaluate the effect of income on gender-based violence. This study was conducted in a limited period and the use of the sample was the best option for the study. Males and females between the ages of 10 and 65 who are partnered, married, or cohabitating made up the population for this study.

Sampling Methodology: In most cases, it is difficult for investigators to observe every person in the community they are investigating directly. The study, at the first stage, thus settled for the non-probability sampling technique of purposive sampling when choosing Matabeleland South. In the second stage, Simple Random sampling was employed to choose the Bulilima district. Given the ZIMSTAT enumeration areas data from the 2012 Census, 10 out of 30 enumeration areas were selected using simple random sampling. Only after a listing of all households was complete, the households to be interviewed were chosen using systematic random selection.

Sample Size Determination: The total households from the 10 enumeration areas were (N= 932). Using the 95% confidence level and a margin of error of 5%. The Yamane's formula is employed we get

$$n = N1+Ne2$$
$$= 9321+(932*0.042)$$
$$= 374.12$$

Hence, we round up to 370 individuals. The target in each enumeration area was 37 individuals totaling 370 individuals. The interview was done with 305 individuals as some respondents were not available during field visits and some refused to be interviewed since the issue of GBV is sensitive.

Data Collection Procedures: To gather data, the study used a face-to-face interview approach through the use of a standardized questionnaire. The questions were based on the literature review and sought specific replies from the respondents about gender-based violence.

Data Measurements: *Emotional violence* was assessed using four categories that represented experiences of emotional abuse: lying, swearing, or humiliating him/her; threatening to leave him/her; making him/her feel unwelcome; and forcing him/her to leave. *Physical violence* used seven things to represent experiences of physical assault to measure. Respondents were asked if their partners had done any of the following things: Pushing, shaking, or hurling something at her; slapping her or twisting her arm; punching or beating her with dangerous objects; kicking or dragging her; strangling or burning her; threatening to use a weapon (a knife or other instrument); and twisting her arm. *Sexual violence* was measured using pressured or luring or forced sex, sexually explicit name calling, and uninvited sexual contact. *Income* was measured using the expenditure that a female or male earns monthly. *Education* was measured using the level of education that an individual has completed. *Age* was measured using the completed years of an individual. *Employment status* was measured using the current economic activity that an individual is currently engaged in or his/her source of income.

Model Estimation Procedures: A multinomial logistic regression technique was employed to evaluate the primary data on how income affected gender-based violence. Thus, the multinomial Logit model, denoted by:
Li = ln P1-P= Z = B1+B2Xi
The dependent variable is now categorical because it takes more than two values, and the dependent variable Yij= 1, if an individual i selects alternative j, where (j = 1, 2, 3 and 4 in the current cases) and = 0, otherwise
Additionally, let i1= Pr(Yij=1) ……..(1)
and = 0, otherwise
where Pr denotes probability. Hence, i1, i2, i3 and i4 reflect the likelihood that person i will select option 1, 2, 3 or 4, accordingly, those are substitutes for physical abuse, sexual assault, emotional abuse or both. If the only possibilities that an individual has are these, then surely,

i1+i2+i3+ 4=1

This is such that the total probability of all possible outcomes that are exhaustive and mutually exclusive must equal 1. The s is called the response probability. Thus, the study determines any four probabilities, the fifth one is determined automatically. The multinomial logit model is then written as:
ij =ej+jXij=44ej+jXi…… (2)

The slope and intercept coefficients' subscripts, "j," serves as a gentle reminder that these coefficients' values can vary depending on the option selected. The underlying theory on the effects of income on gender-based violence and empirical studies carried out by Sanz-Barbero et al. (2015), Aizer, (2007), Rashada and Mesbah, (2016) and Abramsky et al. (2019) provide the foundation for building the model to be considered.

Thus, the multinomial logit regression model becomes:
Li = ln P1-P= Z = B0+B1 sex+B2employstatus+B3education+B4 income+B5 age

Reliability and Validity of Data: The study ensured the data collection tool was clear and concise in order to guarantee that all the data was legitimate and dependable. The questionnaire was created after a thorough study of the literature and was built around the study objectives, which concerned the income's impact on gender-based violence. The questionnaire was pilot tested on just three households, which were not included in the sample. The questions that respondents had trouble answering during the pilot test were changed so that they had a clear meaning.

Ethical Issues: The study valued confidentiality and so, being mindful of this ethical issue, each participant's verbal consent was obtained and for minors aged 10 to 17 were interviewed separately, adult consent was gained before the child's assent. Information about the voluntary nature of participation, information confidentiality, and information anonymity was provided to all respondents. Names and other details that could reveal interviewees' identities were removed from the data to safeguard the secrecy of the data.

4. Results and Discussion

Demographic And Economic Characteristics of the Respondents: The majority of women 47% and men 45% were between the age ranges of 30 to 50 years. About 54% of women reported having completed Lower secondary education as their highest level of education while 66% of men reported having completed primary school. Furthermore, most of the women reported earning between 100 and 500 Rands per month. Also, communal farmers and own account workers other (informal business) accounted for the majority of female employment, with 60% and 18%, respectively.

Table 1: Percentage Distribution of Respondents' Demographic and Economic Qualities

AGE	Female %	Male%	Total
10 < 30	24.3	17.2	22.3
30 < 50	46.8	44.8	46.2
50 < 65	28.9	37.9	31.5
Total	100.0	100.0	100.0
Level of Education			
Degree	1.4	0.0	1.0
Diploma	0.9	0.0	0.7
Upper secondary	0.0	3.5	1.0
Lower Secondary	53.7	27.6	46.2
Primary	44.0	65.5	50.2
Never been to school	0.0	3.5	1.0
Total	100.0	100.0	100.0
Monthly Income in Rands			
100 < 500	64.2	31.0	54.8
501 < 1500	26.6	65.5	37.7
1501 < 3000	9.2	3.5	7.5
Total	100.0	100.0	100.0
Employment status (Economic Activity)			
Communal farmer	59.6	37.9	53.4
Homemaker	5.1	0.0	3.6
Own account worker other	18.4	48.3	26.9
Paid employee casual	6.9	10.3	7.9
Paid employee permanent	8.7	3.5	7.2
Sick and disabled	1.4	0.0	1.0
Total	100.0	100.0	100.0
Forms of Gender-based Violence			
Both (Emotional, Physical and Sexual)	21.6	6.9	17.4
Emotional	34.9	17.2	29.8
None	35.3	72.4	45.9
Physical	1.4	0.0	1.0
Sexual	6.9	3.4	5.9
Total	100.0	100.0	100.0
Sample size (N)	**218**	**87**	**305**

Source: Author's calculation (STATA 15).

Additionally, the study established that more females than males were victims of gender-based violence. In addition, 35% of females experienced emotional violence compared to 17% of males. The multinomial regression results are shown in Table 2 below.

Table 2: Multinomial Logistic Regression (Relative Risk)

GBV	COEF	Std. Error	z	P>z	[95% conf.	interval]
Both forms of GBV						
Education	1.009353	0.047217	0.2	0.842	0.920926	1.106271
Employ-status	1.224599	0.18789	1.32	0.187	0.906555	1.654221
SEX	0.1282378	0.064262	-4.1	0.00	0.048025	0.342424
Income	0.9995368	0.000374	-1.24	0.215	0.998805	1.000269
Age	1.03119	0.014586	2.17	0.03	1.002993	1.060178
_cons	1.125947	0.994602	0.13	0.893	0.199348	6.359523
Emotional GBV						
Education	0.9609693	0.040464	-0.95	0.344	0.884846	1.043641
Employ-status	1.845125	0.234407	4.82	0.000	1.438428	2.366811
SEX	0.1350708	0.054354	-4.97	0.000	0.06138	0.297233
Income	1.000869	0.000268	3.25	0.001	1.000345	1.001394
Age	1.024712	0.012827	1.95	0.051	0.999878	1.050163
_cons	0.577995	0.410544	-0.77	0.44	0.143656	2.32554
none	(base	outcome)				
Physical GBV						
Education	511229.7	5.27E+08	0.01	0.99	0	.
Employ-status	6.60E-08	0.00016	-0.01	0.995	0	.
SEX	5.60E-12	2.33E-08	-0.01	0.995	0	.
Income	1.001781	0.001472	1.21	0.226	0.9989	1.00467
Age	0.8661531	0.08022	-1.55	0.121	0.72237	1.038555
_cons	3.14E-61	4.45E-57	-0.01	0.992	0	.
Sexual GBV						
Education	1.059038	0.073535	0.83	0.409	0.924288	1.213432
Employ-status	1.612639	0.319268	2.41	0.016	1.094	2.37715
SEX	0.1803793	0.126298	-2.45	0.014	0.045729	0.711508
Income	0.9995121	0.000601	-0.81	0.417	0.998336	1.00069
Age	1.000192	0.020382	0.01	0.993	0.96103	1.040949
_cons	0.3205802	0.413463	-0.88	0.378	0.025593	4.015694

Source: Authors' calculations using STATA 15
Number of observations =305 LR-chi2(20) = 117.15
Prob >chi2 = 0.000
log likelihood = -318.052
Pseudo R2 = 0.1555

Both Forms of Gender-Based Violence: When a person's sex was female, there was a 13% increase in the risk of experiencing both types of gender-based violence (emotional, physical and sexual). Thus, sex had an impact on gender-based violence, with women disproportionately affected. Also, the likelihood of encountering gender-based violence increased with age. In the same view, Decker et al. (2015) proclaimed that GBV was prevalent among adolescent and young adult women in low- and middle-income countries.

Emotional Violence: An increase in the number of women engaged in any economic activity (employment status) was associated with a 1.85 increase in the risk of experiencing emotional violence. In the same vein, Gupta et al. (2017) discovered that employed women encountered intimate partner violence in Mexico. In addition, as income for a partner increased by a Rand, the risk of encountering emotional violence also increased by 1.001. The highest rate of emotional aggression was found in the economic bracket of 1001–3000 Rands. In the same view, Zhang and Breunig (2021) discovered that women who earn more than their male partners were more likely to suffer from emotional abuse than those who earn less than their male partners in Australia. Likewise, Gupta. et al, (2018) claimed that income for a woman could result in the

aggravation of power inequalities within households and thus it reinforces dynamics of reliance, income for an individual could be in vain, as it is unusual for a person living in an abusive context to hold any financial power or control of resources. Similarly, Abramsky et al. (2019) discovered that all women with increasing household financial contributions were facing higher levels of domestic abuse in North-Western Tanzania. This is consistent with the male backlash theory.

Sexual Abuse: An increase in economic activity (employment status) resulted in a 1.61 increase in the risk of sexual violence. Most of the sexual violence survivors were women in their own-account work (informal jobs such as vending and selling clothes). Furthermore, the majority of men in Bulilima (60%) spent a large portion of their free time drinking with friends. In the same vein, ZIMSTAT (2021) discovered that Matabeleland South had a low employment rate of 4%. This is consistent with the male peer support theory, which states that males spent time with peers who encourage them to restore male dominance through violence to economically independent women. In addition, an ANOVA test was employed to verify the significance of the variables on income.

Table 3: ANOVA for Gender-Based, Sex, Employ, Age, Income

Source	Partial SS	DF	MS	F	Prob >F
Model	60.9672564	70	0.870960806	13.80	0.0000
Sex	7.51611983	1	7.51611983	119.07	0.0000
Employ	6.62663376	5	1.32532675	21.00	0.0000
Age	28.9351655	41	0.705735744	11.18	0.0000
Income	18.9019178	23	0.821822514	13.02	0.0000
Residual	14.7704485	234	0.63121575		
Total	75.7377049	304	0.249137187		

Number of observations = 305 R-squared = 0.8050
Root MSE = 0.25124 Adjusted R-squared = 0.7466

The F-statistics (13.80) and its corresponding p-value (0.00) for the model show that sex, employment (economic activity), age and income explain gender-based violence. Sex, employment (economic activity), age and income, their F-statistics and associated p-values indicate that all have individual-significant effects on gender-based violence. The R2 (0.8050) shows the percentage of variation in gender-based violence that is explained by sex, employment, age and income. An ANOVA model with GBV as the dependent variable and beliefs about whether the husband or wife will beat their spouse if she or he cheats or rejects sex as the independent variables proved insignificant.

5. Conclusion and Policy Recommendations

A multinomial logistic regression for relative risk produced results that showed that people's age and sex were connected to the risk of experiencing both types of gender-based violence at a 1% and 5% level of significance, respectively. Additionally, Employ-status (economic activity) and income were found to be highly statistically significant at a 1% level of significance, when a person experiences emotional violence. When physical violence was used against a person, none of the factors were significant at any standard level. According to the study, women made up the majority of those who experienced gender-based violence. An ANOVA test validated the significant effects of sex, employment, age and income on gender-based violence. The main observation from this study is that gender-based violence is not only affected by income but it's also affected by employment status, sex and age. The government should concentrate on policies that promote financial empowerment for men and women through employment creation, encouraging and supporting agricultural enterprises, and other income-generating businesses since this may assist males reclaim their social role of providing for the family, which they felt had been stolen by women. Furthermore, the government should enact monetary policies that benefit both men and women in small and medium-sized businesses as a way of improving household income. These policies may reduce the time spent by most men drinking with peers who influence them to beat their financially stable wives. Furthermore, backlash from men who believe their societal roles were stolen by economically secure women will be reduced.

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The Role of Operation Wealth Creation (OWC) Program on Diary Farmers in Mbarara District-A Descriptive Perspective

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Abstract: Helping subsistence farmers make the leap into commercial agriculture was the driving force behind OWC or Operation Wealth Creation. The purpose of this research was to assess how the OWC program has affected the Mbarara area, dairy producers. The researchers used a descriptive study strategy and surveyed 161 dairy producers. There was a dramatic drop in poverty from 68 percent to 47 percent as a result of the 70.2% increase in milk output (using the poverty line criteria of $1.90 per day). This indicates that a majority of dairy producers (53.3%) have successfully adopted the use of currency. The major source of income in the Mbarara area is dairy farming, which is the focus of this study and sets it apart from previous studies. The advantages might be increased by enhancing post-harvest handling practices, particularly by finding ways to get the most out of milking equipment. The government should also emphasize the construction of auxiliary factories that can raise milk's value and increase the number of goods made from it. These efforts might increase agricultural productivity and decrease poverty while providing job possibilities for industrialists and farmers.

Keywords: *Operation Wealth Creation, Dairy farming.*

1. Introduction

Uganda relies heavily on agriculture; as a result, the government has implemented various programs aimed at commercializing the sector to transition farmers from subsistence farming to a market-based economy. According to the International Labor Organization (2020), the socioeconomic transformation within impoverished households has led to enhanced productivity and higher wages, resulting in the alleviation of poverty. The primary factors contributing to poverty in Africa are insufficient funding and limited financial capacity. Many families are unable to initiate income-generating economic activities due to these constraints (Africa Poverty Report, 2016). Hauser et al. (2010) argue that government-sponsored agriculture programs can facilitate rural innovation. Organic farming, the authors argue, is part of a larger movement to give rural communities more say in their food supply and pricing. Both the MAAIF (2020) and the UNDP (2019) report that the country's agricultural mechanization is low compared to other countries in sub-Saharan Africa. The disparity in agricultural mechanization has not received enough attention. Included in these initiatives are the completion of a national agricultural mechanization policy and implementation framework, the improvement of technical training for operators, mechanics, technicians, and farmers, the purchase of tractors, and the recovery and replenishment of Agricultural Mechanization Resource Centers. This will hamper government efforts to solve agricultural problems. Since Uganda's independence, many ruling regimes have made social and economic change a top priority (Booth and Golooba-Mutebi, 2012).

During the Obote I rule (1962–1972), efforts to restore and improve social service provision in war-torn regions received more attention. The NRM, formerly known as the NRA, launched a ten-point program in 1986 with the same goal in mind (Okiror, 2017). The Peace, Recovery, and Development Plan was launched in 2008 as one of several government efforts to combat poverty since then. Together with other initiatives, this strategy sought to improve the state of the North's infrastructure (African Research Institute, 2016). According to the Uganda Strategy Support Program in 2012, the country's economy has shifted from a product-based sector to a service-based sector, with the consequence that agriculture now accounts for a larger share of the country's total GDP. However, there has not been a proportionate movement in employment from agriculture to other sectors as the economy has shifted income sources (Mukwaya et al., 2012). Operation Wealth Creation (OWC) was launched in 2014 by the Ugandan government to provide farmers with free agricultural inputs such as seeds, seedlings, planting supplies, and breeding stock. This initiative's stated goal was to alleviate poverty by helping subsistence farmers make the transition to commercial agriculture (Equal Opportunities Commission Report, 2016). According to the 2017 Parliament Report on OWC, there are a number of obstacles preventing the program from being successfully

implemented. OWC was founded in 2003 when the previous program, NAADS, was reorganized. Uganda's poverty rate fell from 33.8% in 1999–2000 to 19.7% in 2012–2013.

In 2016–2017, however, that figure rose to 21.4%. The figure had dropped to 20.3% by 2019/2020 (Uganda National Household Survey, 2020). The research found that between 2014 and 2020, the number of Ugandans working in the subsistence sector dropped from 69% to 39%. Low farm gate prices, a lack of suitable storage space, and stagnant agricultural production are only some of the ongoing challenges faced by rural farmers (NDP 11, 2019). Despite the many agricultural inputs provided by the Operation Wealth Creation (OWC) program, the vast majority of farmers in the Mbarara District are still engaged in subsistence farming. Only a few farmers have made the jump from subsistence to commercial farming since the program's commencement in 2014 (OWC, 2020). Given this context, the purpose of this research is to analyze the role of Operational Wealth Creation (OWC) in facilitating the economic transformation of small-scale dairy producers in the Mbarara area.

2. Literature Review

Background of OWC: The Ugandan Vision for 2040 identified agriculture as one of its top priorities. Both versions of the National Development Plan (NDP I and NDP II) pushed for the nation to become middle-income by 2040. The Ugandan government has invested heavily in advancing agricultural automation, commercialization, and value addition with a focus on women and girls (OWC, 2015). Facilitating the transformation of 50% of subsistence farmers into commercial companies is critical to achieving the stated aim. To achieve national socio-economic change via citizen participation in productive farming to reduce poverty, Uganda's president launched Operation Wealth Creation (OWC) in July 2013. Sixty-eight percent of the population will be lifted out of poverty as a result of the program's efforts to: a) mobilize the population for commercial agriculture; b) ensure equitable distribution of farm inputs; c) promote the adoption of agricultural technology; and d) prioritize infrastructure development in rural areas. The most up-to-date information available from 2021 indicates that 8,750 projects were completed successfully and that 58,600 farmers benefited from the program. The Food and Agriculture Organization of the United Nations (2018) states that present agricultural development models in Sub-Saharan Africa have not completely incorporated agroecological concepts and technologies. Establishing local multistakeholder and participatory procedures in line with proper regulations is essential due to the multidisciplinary character of agroecology, which blends agronomy, ecology, and the social sciences.

Spending money is a must. If this initiative is going to have any kind of lasting influence on nearby communities, even outlying ones, local elected authorities and technical agents must be involved. In a 2011 report, the Bill & Melinda Gates Foundation highlighted the need for a comprehensive understanding of smallholder farming in developing countries, including farmers' living circumstances, crops grown, income, and agriculture's larger economic relevance. The major goal is to reduce hunger and poverty among farm families, so having this knowledge is essential. The paper draws attention to the lack of reliable information on agriculture and the plight of rural communities. Sub-Saharan Africa is especially hard hit by this problem since most agriculture data comes from infrequent, small-scale surveys (GoU, 2015). Both developing nations and donors would benefit from improved agricultural data accessibility and quality for more precise planning and investment forecasts in agricultural development. When compared to other nations in sub-Saharan Africa, the rate of agricultural automation in this country is low (MAAIF, 2020; UNDP, 2019). The disparity in agricultural mechanization has not received enough attention. There is a need to improve technical training for operators, mechanics, technicians, and farmers; there is not enough funding for Agricultural Mechanization Resource Centers; there is not enough of a national policy and implementation framework for agricultural mechanization; and so on. This will hamper government efforts to solve agricultural problems.

3. Methodology

Research Design, Population, and Sample: A total of 275 dairy farmers in the Mbarara District who had received OWC loans were surveyed using a cross-sectional questionnaire for this research. A total of 161 people were chosen using the Krejcie and Morgan technique. 1970 respondents filled out the surveys, and 155 of them responded. The biggest district in Uganda is Mbarara, and its home to a sizable number of cattle

keepers. Due in large part to the OWC program's distribution of dairy heifers, the district's dairy farming business has flourished (OWC, 2020). The recipients of dairy heifers were the primary focus of the investigation. The effectiveness of OWC in reducing poverty was assessed using both primary and secondary sources of information. Part of a bigger study on how the OWC initiative has helped alleviate poverty in Uganda, this report provides preliminary findings. Respondents were chosen because they were thought to have anything to do with the study being conducted. The research team gathered information on OWC program participants using secondary data culled from the organization's yearly reports. To evaluate the program's effectiveness in alleviating poverty, researchers coded the collected data before summarizing it using tables and charts. The respondents' demographic information is shown in Table 1.

Table 1: Demographic characteristics of the respondents

Variable	Category	Frequency	Percentage
Age	18-28 years	26	16.7
	29-38 years	55	35.6
	39-48 years	48	31.6
	49 and above years	49	16.1
	Total	*26*	*100.0*
Gender of the respondents	Male	101	65.2
	Female	54	34.8
	Total	*155*	*100.0*
Level of education	No education	49	31.6
	Certificate	102	65.8
	Diploma	4	2.6
	Bachelors and above	0	0.0
	Total	*155*	*100.0*

Source: Primary Data, 2023

Table 1 presents descriptive statistics indicating that the majority of respondents were male (65.2%) while females accounted for 34.8%. The age distribution of respondents shows that the largest group falls within the 29–38 year bracket (35.6%), followed by the 39–48 year bracket (31.6%). The smallest group consists of individuals aged 49 years and older (16.1%). Notably, the program appears to have had a significant impact on the youth, who possess the energy and capacity to generate income. The majority of respondents held certificates (65.8%), followed by those who had no education (31.6%). The findings indicate that none of the beneficiaries under the OWC program had a degree (0.0%). This is consistent with the program's goal of aiding farmers who are also living in poverty.

District Production Data on Agricultural Service Delivery Performance of Operational Wealth Creation in the District: Significant strides have been achieved in agriculture since Operation Wealth Creation (OWC) was implemented in 2014 to replace the National Agricultural Advisory Services (NAADS). The distribution of high-quality seeds, planting materials, livestock (dairy cattle, goats, pigs, and poultry), fish fingerlings and reeds, tree seedlings, and agricultural machinery (tractors, equipment, coolers, and spray pumps) were among the interventions implemented. Progress has been made in lowering poverty rates as a result of the aforementioned approaches. Since 2014, the expected number has dropped from 68% to 47%, as stated in the OWC Annual Report (2020).

4. Impact of OWC in the District

Status of dairy farms in Mbarara: According to the numbers provided above, the number of dairy farms and the number of dairy cows will both increase significantly between 2014 and 2020.

Table 3: Milk production data for Mbarara District

Year	2010	201 1	2012	2013	2014	2015	2016	201 7	2018	2019	2020
HI in Dairy	60898	62.828	64713	66.654	68653	70713	72834	75019	77270	79588	81920
	217176	218098	244640	251.379	258020	266687	274687	282927	291414	300156	309,145
Dairy t cattle	21.174	21810	24464	25138	25802	26669	27467	28293	29141	30016	30910

OWC Annual report (2020)

There will be a considerable increase in the number of dairy cows and families involved in milk-producing between 2010 and 2020.

Table 4: Milk production data for Mbarara district

Year	No. of coolers	Milk Production	Marketable Milk	Formal	Informal
2013	53	30 877,234	24 701,787	8 151,589	16,550,198
2014	58	32 201 327	26,561 061	8,765,150	17,795,911
2015	63	35,893,327	28,714,661	9,475,8	19,795,911
2016	95	39,013,485	31,211,588	10,299824	19,238,823
2017	98	43,349,529	34,679,623	11,444,275	23,235,348
2018	101	47,684,481	38,147,584	12,588,702	25,558,882
2019	108	51,372,188	41,097,750	13,562,257	27,535493
2020	115	56,509,405	45,207,524	14,918,482	30,289,042

OWC Annual report (2020)

Table 4 demonstrates a consistent increase in milk production within both the informal and formal market sectors. According to the table, milk production increased from 30,877,234 liters in 2013 to 56,509,405 liters in 2020. The number of liters of milk bought and sold went up from 8,151,589 to 14,918,482. From 53 in 2013, there will be 115 by 2020 as the number of coolers increases.

Table 5: Number of dairy farmers under subsistence farming

No.	Sub county	% still in subsistence farming.
1	Bukiro	65
2	Kanoni	65
3	Kashare	62
4	Biharwe	45
5	Kakiika	45
6	Kakoba	40
7	Nyamitanga	44
8	Kamukuzi	44
9	Nakabo	47
10	Rubaya	40
11	Bubaare	45
12	Rubindi	50
13	Rwanyamahembe	40
	Average	**47**

Source: Primary data, 2023

Table 5 reveals a decrease in the proportion of dairy farmers in the Mbarara district who are unable to afford $1.9, with the current percentage standing at 47%. According to the UBOS (2013), 68% of dairy farmers in Mbarara District were living below the poverty line, suggesting that 53% of them had transitioned to the money economy. The Bill and Melinda Gates Foundation (2011) states that to end hunger and poverty in agricultural communities, it is essential to comprehend the predicament of small-scale farmers in the developing world. Knowing where they are, what they grow, how much money they make, and how crucial agriculture is to the economy as a whole is all part of this. Unfortunately, the information currently available on agriculture and the well-being of farm families is insufficient and of low quality. Sub-Saharan Africa is particularly vulnerable since our knowledge is based on limited and irregular surveys, leading to generalizations (GoU, 2015).

5. Conclusion, Recommendations and Policy Implications

By easing the transition from subsistence to commercial agriculture, Operation Wealth Creation has been essential in Uganda's socioeconomic progress. The Ugandan government, including officials from local councils, may work together with farmers to classify them according to the kind of business they run, which would increase the efficiency of the program overall. Aligning the distribution of inputs and resources with the farmers' interests and passions is central to the suggested method, which strives to maximize output. The program's results show that poverty rates have effectively decreased from 68% to 47%. Nevertheless, it is imperative to acknowledge the program's shortcomings in relation to its intended goals. Efforts should be made to enhance post-harvest handling practices, specifically by promoting the utilization of milking machines.

Furthermore, it is imperative for the government to give precedence to the establishment of additional manufacturing firms that possess the capability to enhance the value of milk and diversify the array of products generated. Employment possibilities for industrialists and farmers will be created as the dairy sector expands, helping to bring down poverty levels. Industrialists and farmers alike will benefit from the expansion of the dairy sector, which in turn will help bring poverty levels down. The Ugandan government should increase its investment in research to enhance cattle management practices and discover more efficient acaricides for addressing tick infestations. Ticks present a considerable obstacle for farmers as they are responsible for transmitting diseases such as East Coast fever, leading to substantial expenses associated with cattle management. Addressing these issues will lead to improved livestock health, reduced costs for farmers, and ultimately contribute to agricultural development and poverty alleviation.

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ICT Innovation, FDI and Economic Growth: Evidence from BRICS

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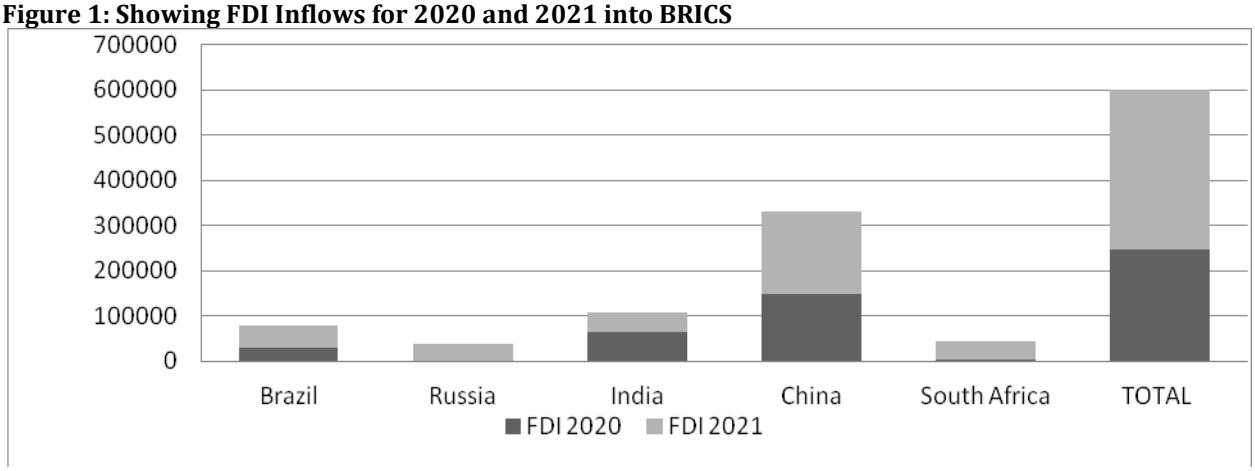
Abstract: We make a comprehensive investigation of ICT innovation, FDI and economic growth nexus for BRICS countries for the periods between 1990 and 2021 using autoregressive distributed lag (ARDL) techniques. We use input-based ICT and non-ICT resources to capture ICT innovations, foreign direct inflows, gross domestic product and quantity of labor for this economic bloc. From our estimation, the following summary can be made. ICT is found to be consistently and significantly contributing to the economic growth rate of BRICS countries. However, with the negative impact of FDI on the growth rate, its interaction with ICT input resources was found to help mitigate the negative impact of FDI on economic growth which by implication suggests that adequate ICT infrastructure complemented with foreign-oriented investment can play a formidable role in increasing the growth process of the economies of BRICS. Also, non-ICT input resources and quantity of labor growth rate were found to be necessary variables worthy of giving appropriate consideration in explaining the growth rate of the economies. The study thus suggests the higher provision of both ICT and non-ICT input resources in the BRICS and a policy to attract able hands from developing countries to turn various resources for economic progress.

Keywords: *ICT input resources, FDI, economic growth and BRICS.*

1. Introduction

In its high-level dialogue on global development, the BRICS countries emphasize the need for high investment in ICT and digitalization of the economy as part of formidable measures to stabilize their economies after the COVID-19 pandemic (BRICS summit, 2022). Before this period, specifically in their 2016 summit, BRICS countries were made aware of the importance of strengthening exchanges and trade cooperation among BRICS through a decisive effort towards developing ICT sectors in the BRICS. In a way to make this achievable, China (as one of the BRICS) soar to the position of making supporting policies, investing in the digital economy and sharing experiences for member countries (BRICS report, 2016 and Huang & Huang, 2018). There is now overwhelming evidence confirming the efforts of these countries in the development and high level of investment in information and communication technology in their countries (Faisal et al., 2020; Khan et al., 2022).

Figure 1: Showing FDI Inflows for 2020 and 2021 into BRICS



Aside from ICT infrastructure for the growth rate of BRICS, the importance of foreign direct investment to the BRICS economies has been re-iterated in the literature (see Latif et al., 2018 and Soomro et al., 2022). In the Fact sheet of the United Nations Conference on Trade and Development for 2022, stock of FDI inflows for the

four countries out of five rose respectively in the following order: Russia, by 16.2%; India, by 7.1%, China by 7.6% and South Africa, by 30.2%. The percentage for Brazil was rather found to fall by -0.4%. As for the nominal value of the FDI inflows[1] and the growth rate between the year 2020 and 2021, China remains number one in terms of value, but least in terms of growth rate. By growth rate, South Africa has the highest rate while the rate for India was negative for the year (see WIR, 2022). The forgoing however suggests the efficacy of FDI and ICT in ensuring improved economic growth for the BRICS' economies. Given the works of Latif et al. (2018) and Soomro et al. (2022), one can infer that some contributions can still be made with respect to the FDI-ICT-growth nexus for the BRICS countries. Existing literature offers evidence that the joint impact of both FDI and ICT has some implications for economic growth (see Adedoyin et al., 2020).

When the positive impact of FDI outweighs its negative impact (through environmental degradation), we will expect its overall impact on the economy to be positive and with the presence of ICT infrastructure, the impact could rather become more pronounced, otherwise the outcome could go in the opposite. It then becomes a necessity to verify this stance in the case of BRICS. Additionally, we give credence to both ICT input-based resources and non-ICT input-based resources with an available quantity of labor resources. By so doing, we account for the level of utilization of both resources with the available quantity of labor resources in the BRICS bloc. From the methodological approaches of the previous studies (i.e., OLS, FMOLS, DOLS and GMM), they mainly account for long-run analysis. However, our choice of estimation which is largely ARDL accounts for the relationship between FDI-ICT and growth for the BRICS in the long run and the short-run periods. Having information about the short-run behavior, in this case, is highly necessary as it will offer us the extent to which any shift, in the long run, can be adjusted and as a way to put the economy back in the right direction. These are the plausible contributions that this study makes to the existing body of literature.

We can therefore make a quick recap of our findings. We found ICT to be consistently contributing positively and significantly to the economic growth rate of BRICS countries, while FDI was found not to have been properly annexed to energies economic growth. Also, non-ICT input resources and quantity of labor growth rate are found to be necessary variables worthy of giving appropriate consideration in explaining the growth rate of the economies in this bloc. Additionally, the interaction of ICT and FDI growth rate is found to help mitigate the negative impact of FDI on economic growth which by implication suggests that adequate ICT infrastructure complemented with foreign-oriented investment can play a formidable role in increasing the growth process of the economies of BRICS bloc. The remainder of this study is thus structured as follows. After this section, we present a brief literature review in section 2 and we deal with methodology in section 3. Section 4 presents a preliminary analysis of our model and a summarized stylized fact on the variables of concern is presented in section 5. The main result together with the results from the alternative methodology and conclusion are respectively presented in sections 6 and 7.

2. Literature Review

Generally, literature on ICT-Growth nexus for BRICS can be categorized into three strands. The first strand focuses on the impact of ICT on economic growth (see Tariq and Tayba, 2018 and Fiodorov and Ochara, 2019) while the second strand extends the literature tentacle to investigating the joint impact of ICT and FDI in mitigating or contributing to the environmental pollution (see Haseeb et al., 2019; Bhujabal et al., 2021 and Khan et al., 2022). An additional strand has rendered effort in verifying the extent to which ICT can contribute to an increase in foreign flows into the BRICS countries (see Latif et al., 2018 and Soomro et al., 2022). We also have some works that investigate Digitalization and health nexus for BRICS (see Jiang et al., 2022). In this study, our objective is rather to re-investigate the extent to which ICT input and non-ICT input can contribute to an increase in foreign capital investment for the BRICS countries and the spillover effect on domestic economic growth. Given this view, our review in this section will solely dwell on studies that have dabbled into investigating the dynamics between ICT and FDI with respect to the economic growth of BRICS. In attempting this course, we notice very scarce studies in this regard.

[1] figure 1 compares the FDI inflows for 2020 and 2021 respectively

We hereby review them, by paying attention to their focus and area of weakness, which this study lingers on to contribute. Attributing the economic growth and FDI inflows to investment in ICT, Latif et al. (2018) investigate to evaluate the dynamics connection between ICT and Growth in the presence of other variables such as globalization and FDI inflows for BRICS countries for the periods between 2000 and 2014. The study proxies ICT with the composite index of information and communication technology which is derived through landline telephones, mobile phones, internet service, internet users and fixed broadband. Given the approach of OLS with fixed effect and additional methodologies (FMOLS and DOLS); they are able to come to terms that ICT contributes positively to economic growth while both FDI and globalization equally have a long-run impact. The study by Ulucak et al. (2020) investigates the nexus between ICT and economic growth while recognizing the role of globalization in BRICS economies in the period 1990 and 2015. They find a positive relationship between CO2 emissions and ICT. The study further accounts for the role of coal rents in ICTs and FDI in promoting the industrial revolution. However, while recognizing the important role of coal rents, ICTs and FDI on economic growth, they also consider the dampening effect of ICTs on FDI under the 4.0 industrial scenarios. Adedoyin et al. (2020) have also looked into the connection among air transportation, ICT, energy resources, FDI and growth in the United States. They particularly investigate the causal and long-run relationship among these variables and their relevance to the fourth industrial revolution (4.0 industrial).

Also, Jiang et al. (2022) have also investigated the impact of digitalization and green technology on the health outcome of BRICS countries for data spanning the periods between 1993 and 2019. With the aid of ARDL, it is revealed by their study that digitalization often leads to increasing life expectancy for BRICS members except Brazil but for the green technology, its impact is only found for Russia and China in the long run. Also, GDP and health expenditure contribute to health improvement for most BRICS countries in both runs. Soomro et al. (2022) have equally paid attention to investigating the dynamics relationship between FDI, ICT, trade openness and growth for the BRICS countries for the periods between 2000 and 2018. The study captures economic growth with Gross Domestic Product while telephone subscriptions, mobile subscriptions, broadband subscriptions, internet subscribers and secure internet savers were used to proxy ICT. With the GMM results, it was found that ICT has a positive effect on the growth for many of the BRICS countries while at the same time both trade openness and foreign direct investment cause the growth to decline. In the earlier period, Bhujabal et al. (2021) focused on the examination of the effect of FDI and ICT in causing environmental pollution in the BRICS countries. The data applies to the studies run from 1990 to 2018 and the methodological approach is pooled mean group and causality test. Their finding reveals that ICT and FDI affect environmental pollution negatively. By implication, rising ICT decreases environmental pollution significantly. On the causality, the study found the existence of causality between ICT and FDI for the concerned countries.

Sapuan and Rolly (2021) have also examined the contribution of ICT diffusion with FDI in promoting economic growth for ASEAN countries. They applied annual data from 2003 to 2017 using panel regression. The outcome of their findings gives significant importance to FDI and ICT in causing growth and development in the economies of ASEAN countries. The focus of Chien et al. (2021) is on investigating the role of ICT in mitigating the environmental effect on the growth of the BRICS economies using quantile regression. The data is annual between 1995 and 2018. The study finds that information and communication technology is effective in controlling the impact of environmental degradation on economic development at a lower emission quantile. Ofori and Asongu (2021) equally pay attention to the role of ICT (computed as usage, access and skill) and FDI with respect to inclusive growth in the sub-Sahara report. Within the period 1980 and 2019, FDI and ICT are found to exert a significant role and induce a significant portion of growth in the region. Zafar et al. (2022) critically investigate the link between ICT, tourism and trade in ensuring the environmental sustainability of BRICS countries. The data coverage for the study spans between 1990 and 2018 with cross-sectional autoregressive distribution lag (CS-ARDL). The outcome of the finding suggests a greater impact of tourism and trade on growth while ICT is found to help in accelerating a sustainable environment among the BRICS economies.

Ha and Huyen (2022) focused on the impact of digitalization in influencing foreign investment across the European region, during the time of COVID-19 pandemic. The study uses data from 23 European countries from the pre-COVID-19 era (2015 to 2019) and during the time of COVID-19 (2020) in estimating the impact of digitalization on the region. It is found that digitalization is more critical in promoting FDI flows before the

crisis and these roles enhance trading activities through electronic media in the time of COVID-19 pandemics. Along the same line, Belloumi and Touati (2022) find evidence on how FDI inflows and ICT have affected the economic growth of selected Arab countries using panel ARDL with data spanning from 1995 to 2019. It is revealed that both ICT and FDI inflows have positive and significant effects on economic growth in the long run while ICT indicators have a positive impact on FDI inflows in the long run for the selected Arab economies. In a related work, Renesa (2021) examines the impact of the COVID-19 pandemic on digital intensity and digital maturity in the ICT sectors of the Nordic countries. These countries are Finland, Denmark, Norway and Sweden. By the outcome of the analysis from the study in relation to the performance of each of the countries during the pandemic, it is found that despite the negative impact posed by the COVID-19 pandemic, the Nordic countries do better in using their level of digital transformation, digital innovation and financial capability of ICT to handle the COVID-19 situation.

Theoretical Guide: Virtually all growth theories have one or two things in common regarding the relationship between foreign capital, technological progress and economic growth. They all indicated a channel through which foreign variables and ICT can possibly be related to economic growth. For instance, the neoclassical model discussed the importance of capital accumulation in the growth process of an economy and emphasized the exogeneity of the parameter of growth which is said to be determined outside the model. This applies to other models such as neoclassical theory with a somewhat different approach. However, the endogenous model is quite distinctive, given the nature and the role attached to ICT and foreign capital. It recognizes two types of capital: the physical and the human capital. The physical can either be domestically generated or derived from foreign countries. The distinctive nature of the endogenous growth model gives credence to the economy's savings as a way of generating investment activities. When savings are sufficient enough and much higher to produce optimum investment for the economy, the excess could flow out to foreign economies in the form of foreign investment. In the same way, there is a possibility of having a shortfall of savings in the home country for needed investment activities.

The difference in the saving-investment ratio gives rise to seeking international savings to bridge the gaps and provide the opportunity for the economy to thrive. International saving of this nature is regarded as foreign capital flows, which in this case include foreign direct investment. This theoretical framework has been very famous with the AK model, developed by Frankel (1962) and which was modified by Pagano (1993). It has also been extended by Bailliu (2010), Adeola (2017) and Gabriel et al. (2019) in explaining finance-growth nexus. In this case, the aggregate output is a linear function of aggregate capital stock and technological progress of the form:

$$Y_t = AK_t \quad (1)$$

This is a standard growth function, where Y_t is the total output in period (t), K_t is the stock of capital in period (t) which is a combination of physical and human capital; and A is the technological progress of an economy (or sometimes refers to as the total factor productivity). The assumptions that are often made are: (i) that there is a constant return to scale; and (ii) that the economy produces only one good which is either consumed or invested. By assumption one, output is expected to grow at the same rate as capital stock.

In this model, we do not have to neglect human capital because by the endogenous growth model capital and labor are augmented by additional inputs in the production function, and by implication, it involves ICT. However, to align our focus on FDI and ICT as the subject matter in this study, we will assume human capital to be constant, thus we have:

$$Y_t = f(AK_t, 1) \quad (2)$$

By implication, equation 3.2 reduces the source of growth in the economy to changes in the stock of capital. However, the assumption that the economy is investing in only one type of good while holding that capital stock is depreciating in every period (t) at a rate of ρ will leaves gross investment to

$$I_t = K_{t+1} - (1-\rho)K_t \quad (3)$$

This equation implies that total investment at period (t) equals the change in capital stock (new capital stock) plus the replaced capital due to wear out. By assuming further that the economy is closed, all domestic savings equals investment.

$$\vartheta S_t = I_t \quad (4)$$

If all domestic savings are invested, then the parameter $1-\vartheta$ equals the charges by the financial intermediary for financial services rendered.

In this case, ϑ will refer to the proportion of savings left for investment purposes. To analyze the growth rate of output in this model of closed economy where investment depends on domestic savings, we have:

$$g_y = A\left(\frac{I}{Y}\right) - \rho = A\vartheta\gamma - \rho \quad (5)$$

From this equation, g_y the growth rate of output γ is the saving rate and A is the route through which technology can find its course on the economy. If we allow foreign capital into this model, the economy becomes open and foreign investors are allowed to interact and invest in the economy. In our case, through aggregate FDI, equation 3.5 becomes

$$\rho\left(S_t + FDI_{t,i}\right) = I_t \quad (6)$$

Where FDI_t is the foreign direct investment at period (t), and for the country (i) S_t is the domestic savings and I_t is the total investment. With this, the steady-state growth rate becomes:

$$g_y^* = A^*\vartheta^*\gamma^* - \rho \quad (7)$$

With foreign direct investment and ICT input base, it is expected that g_y^* will be greater than g_y , γ^* will be greater than γ and by implication I_t^* will be greater than I_t. The equation above shows how FDI and ICT (input-based) can contribute to the long-run growth of an economy. Rest on this, our empirical specification can be made by integrating FDI, ICT input-based and non-ICT input based into the equations.

3. Methodology

Again, our attention to this study is to investigate the impact of ICT input resources and FDI on the economic growth of BRICS. We further add non-ICT input resources and quantity of labor in the models. Our choice of methodology, given the features exhibited by our variables, is ARDL. Hence the functional equation model for this study can be presented as follows:

$$GDP_GR_{t,i} = F(ICT_GR_{t,i}, FDI_GR_{t,i}, NICT_GR_{t,i}, LQT_{t,i}) \quad (8)$$

Where GDP_GR is the GDP growth rate, ICT_GR, FDI_GR, $NICT_GR$ and LQT are respectively growth rate in ICT input resources, foreign direct investment, non-ICP input resources and growth rate of labor quantity for the BRICS countries. Further description of variables of choice with sources is provided in Table 1. We can then present our basic model as follows using the ARDL approach.

$$\Delta gdp_gr_{t,i} = \alpha_0 + \rho gdp_gr_{t-1,i} + \beta_1 ict_gr_{t-1,i} + \beta_2 fdi_gr_{t-1,i} + \beta_3 nict_gr_{t-1,i} + \beta_4 lqt_gr_{t-1,i} + \sum_{r=1}^{r-1}\delta_{1,r}\Delta gdp_gr_{t-1,i} + \sum_{r=1}^{s-1}\gamma_{1,j}\Delta ict_gr_{t-1,i} + \sum_{J=0}^{w-1}\gamma_{2,j}\Delta fdi_gr_{t-1,i} + \sum_{J=0}^{x-1}\gamma_{3,j}\Delta nict_gr_{t-1,i} + \sum_{J=0}^{y-1}\gamma_{4,j}\Delta fdi_gr_{t-1,i}\,\epsilon_t \quad (9)$$

$$\Delta gdp_gr_{t,i} = \alpha_0 + \rho gdp_gr_{t-1,i} + \beta_1 ict_gr_{t-1,i} + \beta_2 fdi_gr_{t-1,i} + \beta_3 (ict_{gr} * fdi_{gr})_{t-1,i} + \sum_{r=1}^{p-1}\delta_1\Delta gdp_gr_{t-1,i} + \sum_{r=1}^{r-1}\gamma_{1,j}\Delta ict_gr_{t-1,i} + \sum_{J=0}^{w-1}\gamma_{2,j}\Delta fdi_gr_{t-1,i} + \sum_{v=1}^{s-1}\delta_{3,r}\Delta(ict_{gr} * fdi_{gr})_{t-1,i} + \epsilon_t \quad (10)$$

This is ARDL $((r, s, y, w, x, z)$ where Δ is the first stage of differentiation and ϵ_t is the white noise error term. From the equation above, the short-run impact is captured by γ_1, γ_2 and γ_3 with respect to each of the variables while the long-run impact is represented by $\frac{\beta_1}{1-\rho}$, $\frac{\beta_2}{1-\rho}$, $\frac{\beta_3}{1-\rho}$and $\frac{\beta_3}{1-\rho}$ respectively for ICT, FDI, NICT and LQT. The ECM term is thus captured $1-\rho$ in this analysis. For a more comprehensive analysis of the derivation of the ARDL model of various orders, see Salisu (2022)[2].

Table 1: Variable Description

S/N	Variable	Measures	Sources
1	GDP_GR	Growth of GDP, change in the natural log	CBTED
2	ICT_GR	Growth of capital services provided by ICT assets, change in the natural log.	CBTED
3	NICT_GR	Growth of Capital Services provided by Non-ICT Assets, change in the natural log	CBTED

[2] This can be found using this link: https://www.researchgate.net/publication/363534421.

4	FDI_GR	Growth rate of Foreign Direct investment inflows	Macro trends
5	LQT	Growth of Labor Quantity, change in the natural log	CBTED

Preliminary Analysis: We devote our attention to giving information about the features exhibited by our variables of consideration for this study. Essentially, we focus on the implication of the presence of information and communication technology and activities of foreigners in terms of foreign investment in influencing the economic growth of BRICS countries for the period between 1990 and 2021. By implication, we consider the growth rate of GDP for these countries and the growth rates in ICT-based input and foreign direct investment. We further consider non-ICT input, the total quantity of labor and other variables like productive capacity index for information and communication for these countries for robustness checking in this study. The data for FDI is sourced from macro trends - an online database on FDI for over 150 countries[3] while data for other variables is sourced from conference board total economy data (CBTED).[4] Going by the information in Tables 2 to 7, the average growth rate for GDP in the entire BRICS is 3.9 for the period between 1990 and 2021 with a slightly high dispersion level of 4.76, negatively skewed (-1.04) and moderately peaked, having a value that is higher than the threshold (5.16).

This value is higher than the growth rate value for Brazil, Russia and South Africa (with respective growth rate values of 2.02, 1.58 and 2.0) but lower than that for China and India (which are 8.67 and 5.66 respectively). This implies that the average economic growth rate for China and India combined is higher than the rate for the entirety of BRICS. The growth rate for ICT input for BRICS is 19.21, higher than any other in the respective individual countries, except for China and South Africa with a growth rate of 25.72 and 20.28 respectively. This rate is highly dispersed (value of 12.13 for BRICS) and negatively sloped. As for the kurtosis, it peaked at the value of 4.98 and is statistically normal. The information about the non-ICT input shows that its average value is 4.32 with a standard deviation of 4.28 (highly dispersed). It is positively skewed and moderately flat with a value that is very close to the threshold of 3 (the value of 2.85). For this variable, the growth rate for China is highly exceptional (a value of 10.2) while that of Russia, on average was negative. There are 32 observations for each country and this makes 160 observations for the entire BRICS.

Table 2: **Descriptive Statistics for BRICS**

Variables	Mean	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	Prob.	Observations
GDP_GR	3.8823	4.7641	-1.0402	5.1644	60.0850	0.0000	160
ICT_GR	19.2073	12.1252	-0.7342	4.9850	40.6441	0.0000	160
FDI_GR	7.1189	31.8870	5.2191	39.0021	9367.3850	0.0000	160
NICT_GR	4.3168	4.2847	0.2018	2.8528	1.2301	0.5406	160

Table 3: **Descriptive Statistics for BRAZIL**

	Mean	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	Prob.	Observations
GDP_GR	2.025000	2.967	-0.566	2.796	1.766	0.414	32
ICT_GR	15.27188	6.317	-0.430	2.018	2.271	0.321	32
FDI_GR	0.246165	0.588	1.039	3.828	6.673	0.036	32
NICT_GR	2.443750	1.153	0.065	2.392	0.516	0.772	32

[3] This information can be accessed using the link: www.macrotrends.net
[4] See https://www.conference-board.org/data/economydatabase/index

Table 4: Descriptive Statistics for RUSSIA[5]

	Mean	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	Prob.	Observations
GDP_GR	1.576	5.656	-0.941	3.269	4.368	0.113	32
ICT_GR	11.855	13.804	-0.946	3.335	4.458	0.108	32
FDI_GR	0.386	0.899	0.951	3.019	4.368	0.113	32
NICT_GR	-0.448	2.768	-1.053	2.765	5.428	0.066	32

Table 5: Descriptive Statistics for INDIA

	Mean	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	Prob.	Observations
GDP_GR	5.6645	3.3336	0.2551	1.8172	2.2124	0.3308	32
ICT_GR	6.7857	1.4643	0.0019	1.8869	1.6521	0.4378	32
FDI_GR	1.0395	3.2768	-2.7149	16.8580	295.3692	0.0000	32
NICT_GR	1.2727	0.8548	0.5440	2.9814	1.5788	0.4541	32

Table 6: Descriptive Statistics for CHINA

	Mean	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	Prob.	Observations
GDP_GR	8.659	2.529	-0.124	3.329	0.227	0.893	32
ICT_GR	25.719	9.784	0.487	2.662	1.416	0.493	32
FDI_GR	0.168	0.366	3.170	12.103	164.075	0.000	32
NICT_GR	10.409	2.287	-0.335	2.673	0.741	0.690	32

Table 7: Descriptive Statistics for SOUTH AFRICA

	Mean	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	Prob.	Observations
GDP_GR	2.003	2.507	-1.325	5.557	18.083	0.000	32
ICT_GR	20.278	8.504	0.527	2.801	1.535	0.464	32
FDI_GR	2.737	7.639	3.241	13.846	212.887	0.000	32
NICT_GR	2.534	1.376	0.155	2.575	0.370	0.831	32

Stylized Facts: GDP, FDI and ICT for the BRICS: In this section, we present some stylized facts for the BRICS in relation to essential variables in this study. This includes GDP, foreign direct investment and ICT input resources between 1990 and 2022. The BRICS bloc contains five countries with similar economic structures among emerging economies. They are Brazil, Russia, India, China and South Africa. In this stylized fact, we categorized our discussion into three decades. The first runs from 1990 to 2000 and the second, from 2001 to 2010. The last decade covers 2011 to 2021. In the first decade, the growth rate in GDP for China was the highest (a value of 9.36). This is followed by that India with a growth rate value of 5.63 while the least was that of Russia which was even negative (-3.84). As for the ICT growth rate in this decade, India was the first with a rate of 32.02 and China was the second with 29.0. This was immediately followed by South Africa with a value of 25.25 and the least was for Russia, around -8.15. In terms of the FDI inflows into these countries, Brazil had about 0.46 growth rate with an average value of $1.10 million, this is far higher than that of India and South Africa put together ($0.95 million). However, the average value of FDI inflows for China was $1.77 million, higher than the inflows of Russia, South Africa and India altogether ($1.75 million).

[5] The data for Russia started from 1993 and the values for 1990 to 1992 were generated by finding the average of five periods ahead of the concerned period (e.g., for 1990, average of values for 1993 to 1997 and so on)

As for the value of GDP for these countries, China has the highest with a value of $936 million, followed by Russia, India, Brazil and South Africa with respective values of $696, $562, $283 and $225. In the second decade, all of them perform better than in the first decade. For instance, China's growth rate for GDP rises to 10.03 as against 9.36 in the previous decade. For India, it was 7.09 from a value of 5.63 for the previous year. As for the input ICT, its growth values fall for countries like South Africa [from 25.15 to 20.9] and India [from 32.02 to 27.92]. By absolute value, the average values of GDP for all these countries are $1003, $709 and Russia, $634. In the last decade, the performance of all these variables could have been more striking if not for the COVID-19 pandemic. For instance, the average growth rate for South Africa was 1.13 instead of 1.99, if we control for the COVID-19 pandemic. As for the growth of FDI stock, all of them had positive growth rates for the year 2021 except for the case of Brazil with a growth rate of -0.4. The graphical representation of our variables in Figures 2 to 6 also indicates similar patterns for GDP and ICT input resources and the impact of the COVID-19 pandemic was very obvious with a sharp fall in this period. However, the negative growth recorded by Russia in terms of GDP growth rate and ICT in the first decade could be possibly attributed to the defunct USSR from where Russia erupted which could be termed as a period of recovery after the breakaway while the high level of technological innovation and huge human capital resources could partly explain exceeding performance of China in this bloc.

Figure 2: Co-Movement among Variables for Brazil

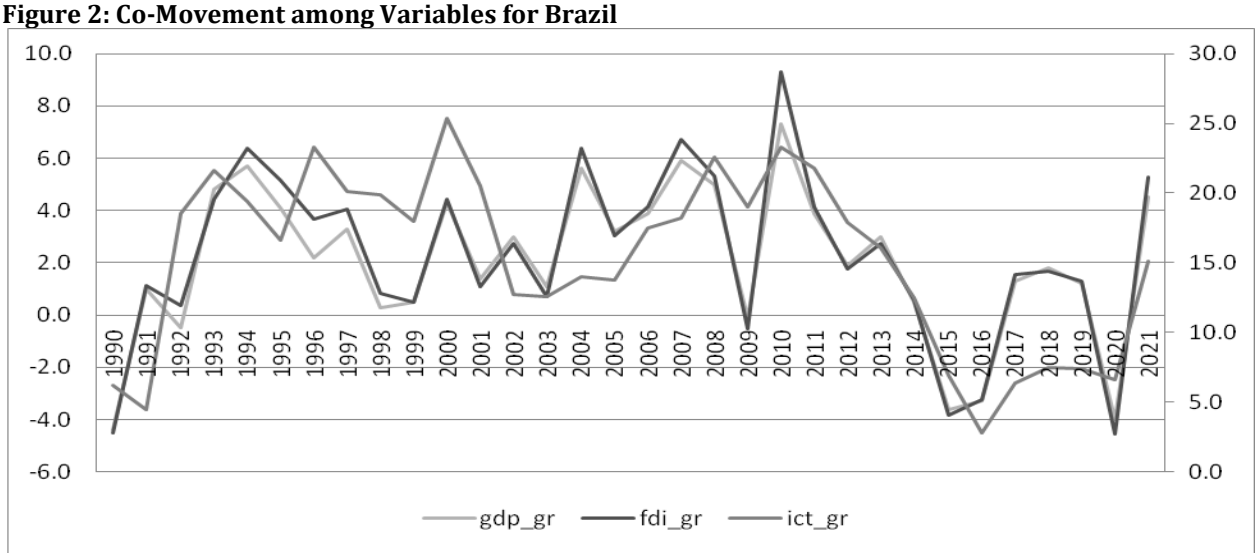


Figure 3: Co-Movement among Variables for Russia

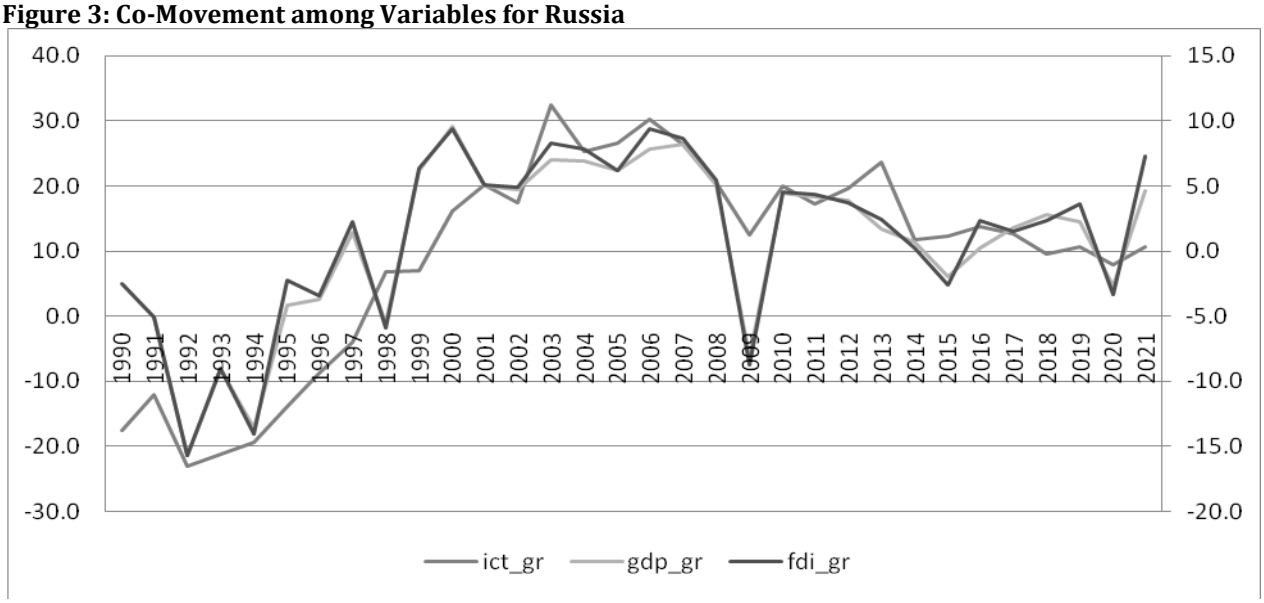


Figure 4: Co-Movement among Variables for India

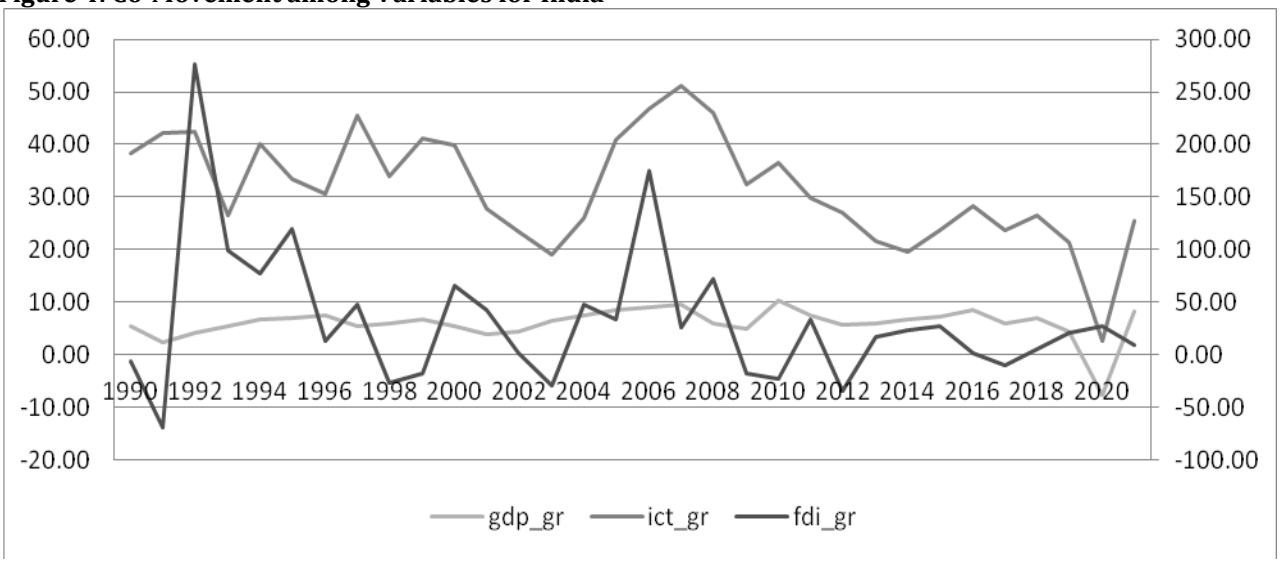


Figure 5: Co-Movement among Variables for India

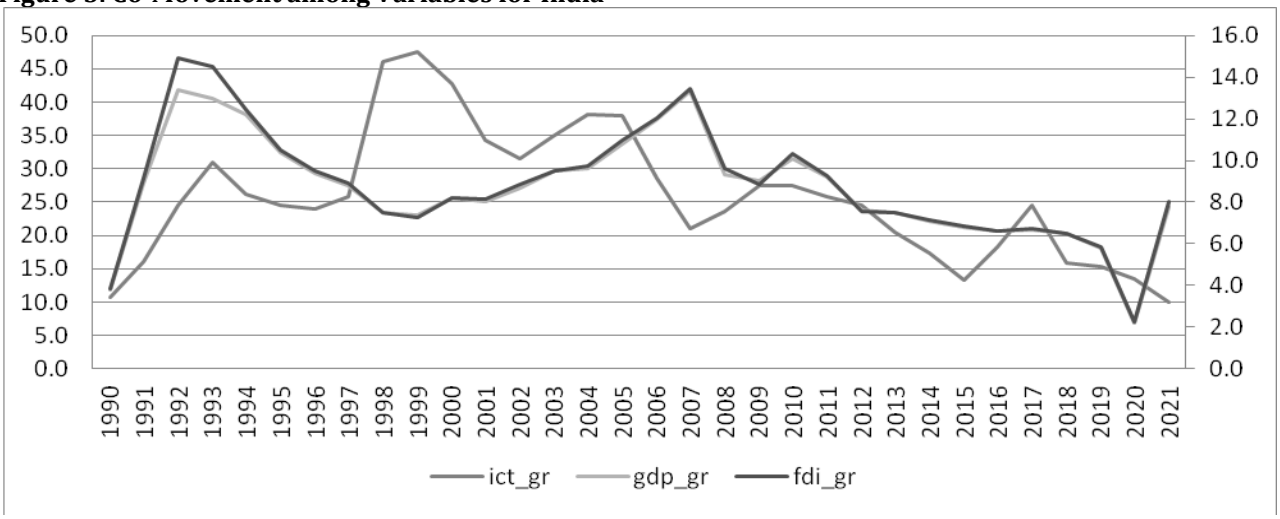
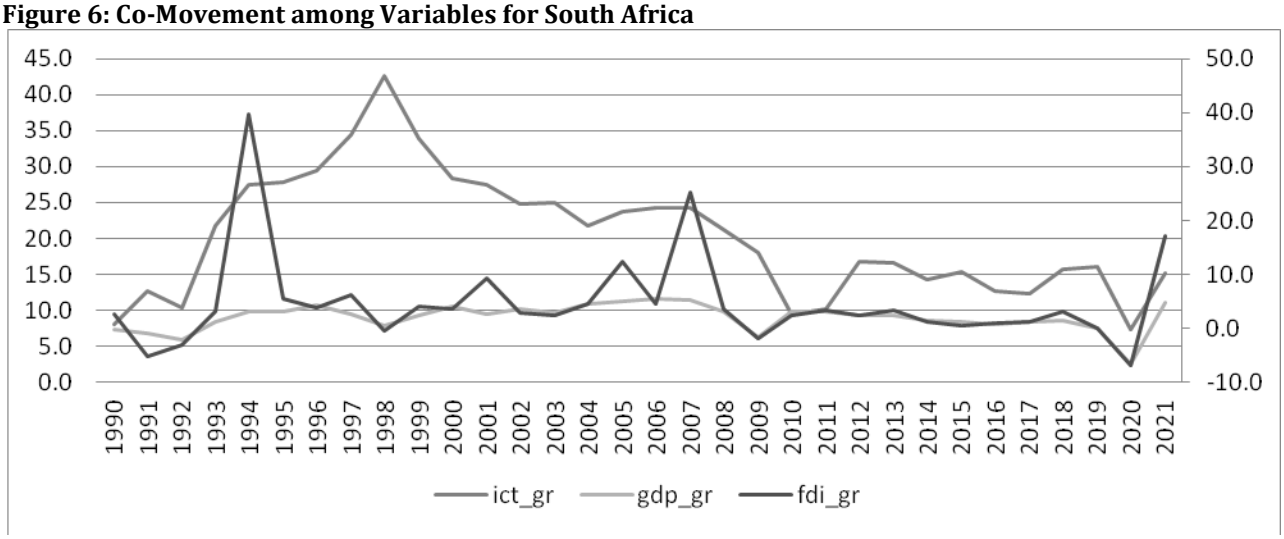


Figure 6: Co-Movement among Variables for South Africa



4. Results and Discussion

Unit Root Test: As a form of pretest for our estimation, we test for both the unit root and co-integration analysis for our variables. As shown in Table 8, we use varieties of the method to test for the unit root for our variables which include Levin, Lin and Chu (LLC), Im, Pesaran and Shin (IPS), Augmented Dickey-Fuller (ADF) and Philips Perron Fisher (PP). The results indicate that our variables are a combination of I(0) and I(1) variables. For instance, the GDP growth rate is I(0) while the ICT growth rate is I(1). Given this feature, the appropriate model that has the ability to capture this scenario is the ARDL model. Hence, our estimation is done with the ARDL estimation technique. However, another requirement for using ARDL is the establishment of a long-run relationship among the variables of choice; as such we carry out the Pedroni co-integration test. The null hypothesis of no co-integration is tested against the alternation of the presence of co-integration. The results as shown in Figures 9 and 10 rather suggest the presence of co-integration among our variables.

Table 8: Unit Root Test

Variable	LLC		IPS		ADF		PPF		
	LEVEL	FD	LEVEL	FD	LEVEL	FD	LEVEL	FD	Remarks
GDP	-1.7649[b]	-3.5292[a]	-3.0294[a]	-	26.2901[a]	-	50.613[a]	-	I(0)
ICT	-0.82575	-5.5487[a]	-1.41484[c]	-6.6440[a]	14.7162	59.976[a]	14.3461	91.672[a]	I(1)
FDI	-4.2316[a]	-	-5.4942[a]	-	48.316[a]	-	87.192[a]	-	I(0)
NICT	-0.3550	-3.4337[a]	-0.7871	-5.3530[a]	11.167	47.584[a]	9.3418	59.614[a]	I(1)
LQT	0.4036	1.9824	-3.5740[a]	-11.705[a]	31.991[a]	112.78[a]	112.08[a]	141.89[a]	I(1)

Table 9: Co-Integration Test (I)

Alt. hypothesis: common AR coefs.	(within-dimension)				(between-dimension)		
	Statistic	Prob.	Weighted Stat	Prob.		Statistic	Prob.
P- v-Statistic	0.0889	0.4646	-0.2024	0.5802	G- rho-Stats	-3.3309	0.0004
P- rho-Statistic	-4.1518	0.0000	-3.8529	0.0001	G- PP-Stats	-7.5472	0.0000
P- PP-Statistic	-7.1516	0.0000	-6.5021	0.0000	G- ADF-Stats	-3.7533	0.0001
P- ADF-Statistic	-4.1184	0.0000	-3.5272	0.0002			

Table 10: Co-Integration Test (II)

Phillips-Peron results (non-parametric)						Augmented Dickey-Fuller results (parametric)			
Cross ID	AR(1)	Variance	HAC	Bandwidth	Obs	AR(1)	Variance	Lag	Obs
Brazil	0.0760	3.8163	3.8163	0	31	0.2790	3.7193	1	30
Russia	-0.0390	10.4760	9.1803	2	31	-0.2630	10.2792	1	30
India	-0.0250	6.3303	5.4912	3	31	-0.2700	6.1822	1	30
China	0.1860	2.2156	2.3136	1	31	0.1370	2.0197	1	30
south_africa	-0.0580	3.6788	2.4212	6	31	-0.2210	3.7188	1	30

Main Result: In this estimation, we present four distinct models. In model 1; we estimate the impact of ICT growth rate and FDI growth rate on the Growth rate of Gross Domestic Products for the BRICS. The results indicate a significant and positive impact between ICT and GDP while the impact between FDI and growth rate was negative, though significant. With a one percent increase in ICT growth rate, the GDP growth rate rises by 0.27% while FDI falls by 0.95%. What we can infer from here is that many BRICS countries are rather involved in giving out innovations to other countries and not in many receivers of technological innovation from the rest of the world. In this regard, they make much use of their available ICT input for the growth process of their economy. Also, having a negative impact from FDI on economic growth is not strange in the literature. Adedoyin et al. (2020) came out with similar finding for the case of the US economy and it has

equally been offered that such a pernicious effect of FDI has accounted for more than 11% of findings on the FDI-growth nexus, which rather suggest a state of educational attainment, quality of the institution or the nature of the concerned FDI inflows (Bruno and Campos, 2013 and Agbloyor et el., 2016). In the second model, we introduce one more variable to test for the efficacy of our previous model. In such a way, we combine both input-based ICT and Non-input-based ICT with FDI with respect to the growth rate of GDP. Again, the impact of ICT and FDI remains unchanged while the impact of non-input-based ICT is found to be positive and significant.

By implication, with a one percent change in non-input-based ICT, the GDP growth rate will rise by 0.73%. In another choice of model, as presented in Table 11 where we introduce labor input, we equally found the impact of labor quantity to be positive and significant. In other words, with labor quantity combined in a single model where we have ICT input, non-ICT input and FDI growth rates, the labor quantity growth rate will contribute significantly positively to the positive. With a one percent increase in labor quantity, GDP will rise by 0.203%. Our last model is a replicate of model one, but in this case, we introduce an interactive term between FDI growth rate and ICT growth rate. The interactive term is positive and significant. A one percent increase in both ICT*FDI simultaneously will upgrade the growth rate of GDP by 0.053%. This is a further suggestion that utilization of ICT with foreign-oriented investment will often generate a plausible impact on the growth rate of any BRICS countries. In other words, input-based ICT has some spillover effect in correcting for the negative impact of FDI on the growth rate of GDP (Adedoyin et al., 2020). As a matter of consequence, the BRICS countries should be much more inclined in opting for adequate investment in ICT-based infrastructures for attraction of FDI inflows. With the availability of adequate ICT infrastructure, foreign investors will be enticed to invest in the local economy, which in a way will lead to an increase in economic growth.

Table 11: Main Model: ARDL (1, 1, 1, 1, 1)

Variables	Model 1		Model 2		Model 3		Model 4	
ICT	0.2693	10.1290[a]	0.048	3.562[a]	0.0575	2.526[b]	0.2253	6.8797[a]
FDI	-0.9529	-3.8366[a]	-0.242	-1.738[c]	-0.4595	-2.3429[b]	-1.4448	-4.8527[a]
NICT			0.734	13.444[a]	0.3742	3.1979[a]		
LQT					0.2034	2.3777[b]		
ICT*FDI							0.0534	2.3985[b]
S-R ECM	-0.5732	-3.2075[a]	-0.934	-9.163[a]	-0.7473	-7.9877[a]	-0.5751	-3.0140[a]

Note: [a, b] and [c] indicate statistical significance at 1%, 5% and 10% levels respectively.

Robustness Check: As a way of ensuring robustness for our estimation, we use an alternative proxy for ICT in our estimation. In this case, we use the productive capacity index for information and communication technology in place of the growth rate of input-based ICT in our main models. As shown in Table A11, at an individual level, PICT now has a negative impact on the GDP, but the interaction of the two variables (i.e., PICT and FDI) is positive and significant in its impact on the economic growth of the BRICS. This fact is retained in both the main models and the alternative choice. This thus gives some level of confidence and robustness for our analysis.

Table A.11: Alternative Proxy for ICT

Variables	Model 1			Model 2		
PICT	-0.0504	-4.3864	0.0000	-0.2122	-4.9555	0.0000
FDI	-0.1830	-4.1810	0.0001	-0.4740	-4.3243	0.0001
PICT*FDI				0.0426	3.3734	0.0012
S-R ECM	-0.7318	-3.9153	0.0002	-0.7189	-4.6338	0.0000

5. Conclusion and Recommendations

In this study, we pay attention to the impact of input-based ICT and FDI on the economies of BRICS countries for the periods spanning between 1990 and 2021. Additionally and unlike previous studies, we introduced variables like non-ICT input resources and total quantity of labor in our model. Our choice of methodology (which is ARDL) as suggested by the nature and features exhibited by the series of variables and which account for the long-run relationship among our variables is rather plausible. After satisfactorily testing for the stationarity of our variable and confirming the long-run relationship through a co-integration test, we then estimate our model of choice. In our estimation, we decimate our analysis into four models. For the first model, we use the growth rate of ICT and FDI against the GDP growth rate while we have the addition of non-ICT input resources in the second model. Variable measuring the growth rate in quantity of labor in BRICS is introduced to have model three while we estimate the first model with the additional interactive term between FDI and ICT in our model four. The outcomes from our findings are very striking and can be summarized as follows. One, while ICT consistently contributes positively and significantly to the economic growth rate of BRICS countries, FDI was found not to have been properly annexed to woe economic growth.

This is rather premised on the level of innovation in many of the BRICS countries which is rather to suggest that they are exporters of innovative knowledge rather than importer. Two, non-ICT input resources and quantity of labor growth rate were also found to be necessary variables worthy of consideration in explaining the growth rate of the economic bloc. Three, the interaction of ICT and FDI growth rate was found to help mitigate the negative impact of FDI on economic growth which by implication suggests that adequate ICT infrastructure complemented with foreign-oriented investment can play a formidable role in increasing the growth process of the economies of BRICS bloc. This submission is sustained with a choice of ICT variable. Emphatically, this finding suggests important roles for ICT in the production sector where the addition of foreign factors can bring about economic exploration for the BRICS. Hence, the provision of ICT input is very keen to encourage foreign impact in the process of increasing the growth rate. Also, ICT input resources and non-ICT base input deserve some accolade in this regard and with a high number of the labor force. There is a necessity for the government of each of the countries as investigated here to make adequate funding in the ICT sector which by implication will lead to more available input resources for the labor force.

Conflict of Interest: There is no conflict of interest in this study.

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The Evaluation of Work Life Balance Strategies on the Performance of Female Entrepreneurial Businesses in Harare, Zimbabwe

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Abstract: The main purpose of the study was to investigate the effects of work-life balance (WLB) approaches on the productivity of female businesswomen in Harare, Zimbabwe. A positivist paradigm, a quantitative technique and a descriptive research design were utilized during the research. A sample of 100 randomly chosen female entrepreneurs was used to gather quantitative data utilizing electronic and self-administrated structured questionnaires. Classical Linear Regression analysis, Analysis of Variance (ANOVA), and Pearson's correlation analysis were used to analyze the data. According to the study findings, female entrepreneurs in Harare integrated both work and home strategies to manage work-life balance. Employing competent and skilled workers, ranking tasks in terms of their priority levels, and scheduling work activities emerged as the highly effective work strategies from the study results. Correspondingly, the most effective home strategies involved hiring aids to lessen the workload, catering to urgent needs while at work, and placing a higher priority on family pressing issues. The results also showed a positive correlation between home strategies and business performance as well as a substantial positive association between work strategies and business performance. The study concluded that integrating work and home techniques enabled female-owned businesses to operate better. The study suggested further research be done on the work-life balance of family-owned businesses, where both the wife and the husband were involved in the day-to-day running of the business, as well as that female entrepreneurs use the aforementioned strategies to improve their work-life balance and the performance of their businesses.

Keywords: *Business performance, Entrepreneurship, Work-life balance.*

1. Introduction and Background

At the academic, corporate, governmental and societal levels, research on work-life balance has recently gained importance (McCarthy, Darcy, and Grady, 2010; Devi and Rani, 2013; Koubova & Buchko, 2013). As a result, of changes in the population, economy, and culture, interest in this field has significantly increased (Osoian Lazar & Rațiu, 2009). The number of working couples has grown, family structures are changing, there is an aging population, there are technological advancements, and there is a need to enhance human capital management, among other developments. According to Ruppanner (2013), work-family conflict develops when the demands of personal duties are incongruent with those of the productive role and vice versa. As a consequence, there is a necessity for work-life balance. Even while women have made tremendous progress towards sexual equality in fields like education, their role as the family's primary caregiver in terms of parenting and housework has not changed much (Winn, 2004, quoted by McGowan, Redeker, Cooper & Greenan, 2012). In many nations, women's increased labor force participation is the most significant factor contributing to economic growth, and the rise of women's entrepreneurship has a significant influence on economic development (Kelley, Brush, Greene, Herrington, Ali, & Kew, 2015). Given the foregoing, it was crucial to assess the work-life balance management techniques employed by female entrepreneurs in Harare, Zimbabwe.

Globally, the concept of female entrepreneurship has grown. Women in Zimbabwe have also benefited tremendously from economic prospects by starting their own businesses in various industries (Chikombingo, Munyoro, & Chimbari, 2017), giving society crucial products and services. According to Jennings and Brush (2013), multiple research has demonstrated that women business owners find it challenging to juggle their entrepreneurial endeavors with home responsibilities and personal goals. According to traditional African society, women were only allowed to perform certain tasks and occupy certain positions within the family (Kayode-Adedeji, Ige, & Ekanem, 2016). The number of women starting their businesses, however, is changing this perception (Uzuegbunam, 2016). Work-life balance has mostly been studied in industrialized Western nations, claims Lewis and Beauregard (2018). However, more research is currently being undertaken in developing nations. The authors claim that literature on work-life balance is still mostly

concerned with Western world cultural settings and mainly ignores how controversial and culturally sensitive the WLB concept is. As a result, this field still needs to be studied in-depth in emerging and developing nations where the current state of affairs differs significantly from that of advanced countries. The manner in which different groups in a wider range of job circumstances, see WLB including the self-employed, requires more study (Annink, Dulk and Steijn, 2015).

Statement of the Problem: Women are traditionally seen as having a major responsibility for the home, while males are seen as the income earners (Brush, 1992). This implies that men and women have distinct objectives and obstacles while juggling work and family. Working and raising a family are two responsibilities that influence one another simultaneously and can occasionally lead to conflict. A lot of women have turned to entrepreneurship as a result of the shifting responsibilities of women in Zimbabwe to support and augment family income (Nhuta & Mukumba, 2017). An interest in examining the natural impact of work-life balance on the success of the female entrepreneur evolved in response to this paradigm change. Socioculturally, the majority of Zimbabwean women company owners said that they still struggle to strike a balance between their personal and professional obligations (Nani, 2011).

Lewis and Beauregard (2018) assert that the manner in which family and work are viewed in relation to one another affects how WLB is experienced across cultural settings. In contrast to the more individualistic cultures of the Western nations (Gahan & Abeysekera, 2009), Zimbabwean culture is more collectivist (Harvey, Carter & Mudimu, 2000). The two environments' distinct cultures may have different effects on how people feel about work-life balance. Studies on the topic of work-life balance that focus on the perspectives of female entrepreneurs in Zimbabwe, particularly in terms of the difficulties they encounter in achieving balance and the methods they use to balance work and family responsibilities, are uncommon. In light of this, the goal of this study was to assess the work-life balance techniques employed by female entrepreneurs in Harare, Zimbabwe, a developing nation.

Research Objective: The primary objective of this study was to evaluate the strategies used by female entrepreneurs in Harare to manage work-life balance and to ascertain their impact on business performance.

2. Literature Review

Two pillars of existence for both men and women are work and family. For many female entrepreneurs who have to play numerous roles in their families and enterprises, managing the pressures of both work and home life is a constant issue (Boz, Martnez-Corts and Munduate, 2016). Multiple responsibilities can be time-consuming or significantly taxing on female company owners, which has a detrimental effect on the work they put into growing their companies (Boz et al., 2016). According to Longstreth *et al.* (1987), referenced by McGowan, Redeker, Cooper & Greenan (2012), failing to strike an acceptable balance leads to high levels of stress and impedes the firms' ability to expand economically.

The History of Work-Life Balance: The 1970s and 1980s are when the concept of work-life balance first emerged (Harrington 2007). The first was an emphasis on childcare initiatives, which came about as a direct result of the rise in British professional women joining the workforce in the 1970s and 1980s. The second was the development of Employee Assistance Programmes (EAP), which were made available in many businesses in the 1970s. The discourse surrounding flexible working arrangements for employees underwent another transformation towards WLB discourses sometime in the late 1990s [Crompton and Lyonette, 2006]. According to Harrington (2007), the shifting demographics of the workforce served as the main impetus for the work-life movement. Corporations were forced to acknowledge the increased difficulties encountered by female managers and professionals as they battled to balance having children with their career aspirations (Friedman, Christensen, and DeGroot, 1995). The problems with WLB received a lot of attention from the media in the 1990s as well (Harrington 2007). By assigning time to both work and life responsibilities in accordance with a mix of personal priorities and the demands of work and life, Yuile, Chang, Gudmundsson, and Sawang (2012) define the balance between work and home as a situation in which a variety of requirements are addressed.

The primary factors in the definition are time, priorities, and the responsibilities of work and life. However, other scholars have various definitions of work-life balance. Veiga (2010) describes WLB as a strategy for balancing the demands of work and other responsibilities including housekeeping, parenting, recreational activities and societal duties. The author goes on to say that these pursuits are necessary to sustain a medically sound and diversified existence, as well as one that is materialistic and metaphysical. WLB is described by Grzywacz and Carlson (2007) as the fulfilment of role-related expectations that are discussed and agreed upon by a person and his or her role-related partners in the work and home domains. The phrase "balance" suggests a goal of equal engagement in work and non-work activities and ignores the varied methods in which people handle occupying numerous roles, not all of which require balance (Gambles et al., 2006). Women's entrepreneurial activity has increased internationally by 10%, reducing the gender gap by 5% since 2014, according to the Global Entrepreneurship Monitor (2016/17) study. The greatest global rate of female entrepreneurship is found in Sub-Saharan Africa, which is leading the way.

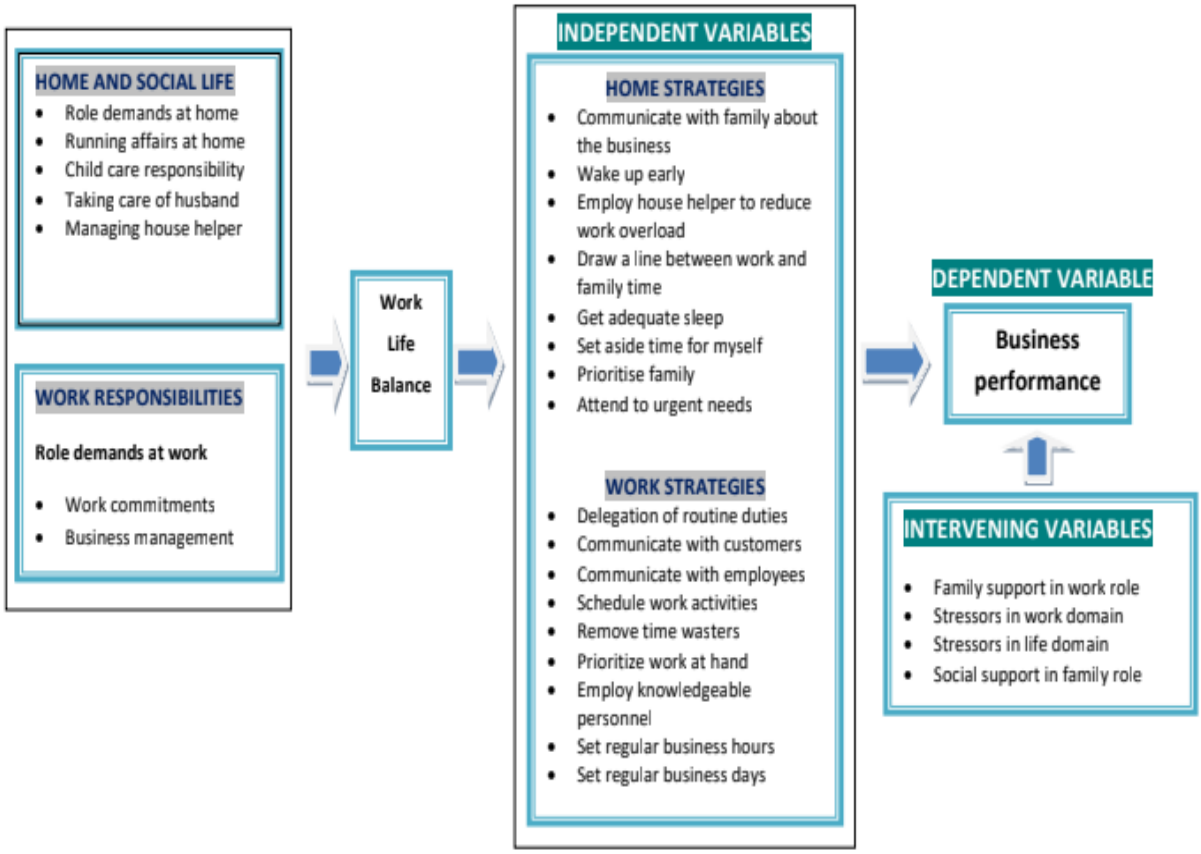
According to GEM (2016/17), 25.9% of the adult female population in the area is involved in early-stage entrepreneurial activities. Bird (2006), asserts that the disproportionate weight of family duties makes it harder for women compared to men to strike a balance between work and family. This is the case in Zimbabwe, a country with a patriarchal society where women are expected to submit to males according to tradition (Kambarami, 2006). Starting a business significantly impacts the lives of their families (Mari, Poggesi, and De Vita, 2016). These writers contend that because of the intricate responsibilities that come with the profession, becoming an entrepreneur has a detrimental impact on the home sphere. According to Fatoki's (2018) research, males had less work-life conflict compared to women entrepreneurs. This demonstrates that for female entrepreneurs, gender has a substantial impact on work-life balance. Men are more likely to be able to manage jobs and home life, according to Hoff and Mitchell's (2008), because women are expected to carry the responsibility for caring for the house and raising children. To maximize entrepreneurial success and health, it is necessary to comprehend how the balance between work and home responsibilities is crucial. According to DeWit and DeKok (2014), a prosperous and healthy entrepreneur is more inclined to give back to society and provide value to it.

Theoretical Framework: Two theories formed the basis of this investigation. The first is the Border Role theory, which focuses on the distinctions between the times, locations, and individuals connected to family and professional responsibilities (Clark 2000). According to Clark (2000), the Border Theory is a theory regarding work-family balance that contends that finding a work-family balance may be accomplished in a variety of ways, depending on elements like how similar the work and family worlds are to one another and how strong the boundaries between them are. According to this theory, individuals cross borders regularly as they commute between their homes and places of employment. The theory evaluates how WLB is influenced by domain integration and segmentation, border establishment and administration, involvement of border crossers, and interactions between border crossers (Clark, 2000). The relevance of this theory is that it suggests that female entrepreneurs might be capable of navigating seamlessly between their homes and places of work without really needing to be there. For female entrepreneurs, the notion can be a useful coping technique for reducing work-life balance. This can involve working from home or taking care of family responsibilities after hours.

The second theory is the Social Role Theory, which contends that the unequal representation of men and women in the workplace and at home is the source of stereotypes about gender (Eagly, 1987, 1997, Koening and Eagly, 2014). Women handle the majority of household chores and serve as primary caregivers. In accordance with the Social Role Theory, Amstead (2015) notes that society expects women to achieve in both their personal and professional lives. Being able to balance the responsibilities of work and home is difficult for professional women who are also mothers. The study by Amstead (2015) further demonstrates that striking a balance is impossible since female entrepreneurs frequently lack the time necessary to carry out each task effectively. Academics have recognized this inter-role conflict as one of the key issues resulting from a proportional rise in dual-earning households (Erkmen and Esen, 2014). Managing responsibilities for family and work is challenging due to the inter-role conflict. The Social Role Theory is crucial to this study since female entrepreneurs' accomplishments may be seen as personal as well as professional accomplishments. The success of female entrepreneurs begins at home, where they must perform the societally anticipated domestic duties.

Conceptual Framework

Figure 1: WLB Strategies Affecting the Performance of Female Entrepreneurs



Source: Researchers

The researchers hypothesized that a female-owned company's performance may suffer if work and family obligations are not balanced. Work and home strategies are two types of work-life balance methods that both contribute equally to corporate performance. The researchers also hypothesized that combining work and home obligations helped female entrepreneurs perform better at home. The performance of the firm owned by the female entrepreneur was enhanced by social and familial support. These take the shape of family and spouse support for the company as well as help with household activities like child care and housework.

Entrepreneurship and Home Balance: According to the theory that has developed around the topic of work-life balance, women start their businesses as a way to achieve work-life balance. Women in Zimbabwe see entrepreneurship as self-fulfilling, giving them the flexibility and freedom to manage work and family responsibilities, according to Mazonde and Carmichael (2016). They claim further that in addition to flexibility, entrepreneurship enables generating an income to raise standards of living and benefit society. The study supports the findings of Jennings and Brush (2013), who hypothesized that women's decisions to become company owners as well as strategic decisions inside their companies are significantly influenced by their family duties and other domestic responsibilities. Welsh and Dragusin (2016) also concur that women are more likely than males to cite family-related and schedule flexibility as reasons for starting their own business. This is especially true of women who have small children. Rehman and Azam-Roomi (2012) claim that women prefer self-employment over traditional work because it allows them to balance their economic activity with family and community responsibilities.

In the United Arab Emirates, female business owners claimed that they chose self-employment because it gave them the independence and flexibility to take care of family obligations. On the topic of WLB, several field investigations have been carried out in established, emerging, and developing nations. In their study on

"Women Family and Entrepreneurship: Strategies for Managing Work-Life Balance Challenges" in seven growth-oriented women businesses in Norway, Alsos et al. (2016) noted the intertwining of family life and entrepreneurial endeavors. According to the study's findings, women entrepreneurs utilized three main types of work-life balance management methods: (i) business-related strategies; (ii) home-related strategies; and (iii) business-household interface strategies. Using home offices and bringing the family's children to work were two examples of business-household initiatives. The home management techniques included asking family members for aid or hiring domestic help. Flexible work schedules were part of business plans. The majority of women defined their home and work as two distinct spheres, according to Gill's (2006) study on the work-home interaction for 23 female entrepreneurs in Montana, the United States of America.

The study found that female business owners occasionally believed these domains to be inherently at odds with one another. Segmentation evolved as a technique for establishing boundaries that would keep the worlds distinct. The female entrepreneurs established boundaries in the following ways: (a) by establishing rules and personal boundaries; (b) by separating their personal and professional lives physically; and (c) by enlisting a network of outside aid for household duties and childcare. Agarwal and Lenka (2015) agreed that entrepreneurship has become a global idea and has aided the nation's economic growth. According to research done in India, working women executives struggled to manage their personal and professional lives, which led to a problem known as role conflict. According to research by Mathew and Panchanatham (2011), conducted in south India, women entrepreneurs frequently struggle to reconcile their home and professional lives since both positions frequently conflict with one another. According to research, female business owners in South India struggle with role overload and health maintenance issues.

Time management problems, problems in taking care of dependents, and inadequate support systems. In their study on gender and work-life balance of women entrepreneurs in Pakistan, Rehman and Roomi (2012) found that the higher percentage of women in the labor force made it harder for them to juggle work and responsibilities to their families. The study also found that gender stereotypes in home responsibilities, religious requirements, and cultural norms and values made the problem worse in patriarchal nations like Pakistan. The study by Aladejebi (2018) examined how work-life balance affected female community pharmacy proprietors in Nigeria. Findings showed that the two biggest problems affecting Nigerian women who operate pharmacies were role overload and childcare. A solid support system, efficient human resource management, and time management were all mentioned as ways to promote work-life balance. According to Maziku et al. (2014), the performance of female-owned businesses in Tanzania was severely impacted by family responsibilities including reproduction, childrearing, and taking care of the family.

Their research revealed that women frequently had to close their businesses early to attend to family obligations at home and devote less time to customer service and other business-related tasks. The study also discovered that immobility, a lack of social support, and ethnicity had a detrimental impact on the success of female-owned small companies. According to Richardson, Howarth, and Finnegan (2004), the burden of family and household obligations falls disproportionately on women. Ethiopia, Tanzania, and Zambia were the three African nations where the study was carried out. The study's conclusions showed that women's enterprises suffered as a result of their obligations to their families and the home, which also limited their capacity to make money. According to Otieno (2018), the rise in the proportion of women running small enterprises is evidence that women in Swaziland are steadily gaining more authority. However, these women struggle to strike a balance between their professional endeavors, domestic duties, and personal obligations. Findings showed that women had a difficult time juggling their work and personal lives. These challenges included long hours and little scheduling flexibility, a lack of energy for household duties due to lack of time, and workplace health hazards.

3. Methodology

The primary goal of this study was to examine how female entrepreneurs combine their job and personal lives. The positivist paradigm (Guba and Lincoln, 1994), a quantitative research strategy, and a descriptive survey methodology were all employed in this study. The quantitative approach was chosen because it can be generalized to a whole population or subpopulation because it uses large samples that are randomly chosen (Carr, 1994). Quantitative research methods explain an issue or phenomenon by gathering data in numerical

form and statistically analyzing it. This study employed a descriptive survey research approach. Survey research is the methodical collection of data from respondents to comprehend and forecast some elements of the respondents' behavior (Kervin, 2004). Sixty-one thousand female business owners were included in the research (ZWMB, 2020). One hundred randomly chosen respondents made up the study's sample size. Due to its simplicity, lack of bias in the sampling process, and projectability of the study outcomes, simple random sampling was the method of choice for the researchers. The research study concentrated on businesses run and owned by female entrepreneurs who had been in business for more than a year, had at least one employee in both the official and informal sectors, and who also lived with their spouse or other dependent family members. Due to the country's diverse commercial landscape, Harare was selected. The study did not perform research on the institutions themselves; rather, it solely examined how entrepreneurs perceived these institutions (entrepreneurship and family). Before collecting the entire set of data, a pilot study was carried out with 18 participants to assess the questionnaire's validity. However, participants in the pilot study were excluded from the main investigation. Confidentiality, anonymity, and safeguarding research participants from harm were among the ethical concerns taken into account. Online, self-administered surveys with closed-ended questions were used to collect the data. IBM Statistical Packages for Social Sciences (SPSS) data analysis software was used to code and analyze the questionnaire data. To analyze the distribution's characteristics, the study's data was collated, and descriptive statistics including mean, median, standard deviation, and skewness were computed. To analyze the data, descriptive and inferential statistics were employed.

4. Results and Discussion

One hundred questionnaires in all were distributed, and 100% of them were returned. According to Muganda (2003), the response rate was regarded as sufficient for achieving the research goals. The Cronbach's alpha value was used to evaluate the questionnaire's reliability. Hisrich and Peters (2016), assert that an average Cronbach's Alpha value of 0.77, is considered to be good.

Assessing the Impact of Work-Life-Balance (WlB) Strategies on the Performance of Female-Owned Enterprises: In this study, yearly sales growth and profitability were used as the main performance indicators for female-owned businesses. The researchers employed multiple linear regression to ascertain the impact of home and work strategies on business performance. The first part of the analysis involved computing the correlation between each of the work-life balance strategies (home and work) and business performance. Srinivasan, Woo, and Cooper (1994) list a number of concepts that are used to gauge company success. Annual sales growth and profitability were employed in this study as the primary success measures for enterprises run by women. Multiple linear regression was used by the researchers to determine how home, and work strategies affected business success. Calculating the relationship between each work-life balance strategy (home strategy and work strategy) and business success was the first step in the investigation.

Correlation Analysis: The researchers calculated Pearson's correlation coefficient using IBM SPSS Statistic version 25 to determine the association between work-life balance and company success. Table 1's correlation matrix displays the results.

Table 1: Correlation Matrix

Correlations				
		Business Performance	Work strategy	Home strategy
Business Performance	Pearson Correlation	1	.854**	.569**
	Sig. (2-tailed)		.000	.000
	N	100	100	100
Work strategy	Pearson Correlation	.854**	1	.670**
	Sig. (2-tailed)	.000		.000
	N	100	100	100
Home strategy	Pearson Correlation	.569**	.670**	1
	Sig. (2-tailed)	.000	.000	
	N	100	100	100

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Researchers' compilation from IBM SPSS Statistic 25.

The findings of the correlation analysis demonstrated a strong relationship between the research variables. The performance of female-owned enterprises and work techniques are strongly and positively correlated, as indicated by the correlation coefficient (r). Pearson's correlation coefficient of 0.854, which is significant at the probability value of 0.000, indicates this link. According to the correlation coefficient (r), there is a considerable and favorable association between home business strategies and the success of women-owned businesses. This association is shown by a correlation coefficient of 0.569, which is significant with a probability of 0.000. These findings suggest that work-life balance (WLB) and business performance are strongly correlated.

Multiple Regression Analysis: The investigation was started by determining the coefficient of determination (R-square) value, which gauges the amount of variation in the dependent variable that the regression model can account for.

Table 2: Model Summary

Model	R	R-Square	Adjusted R-Square	Std. Error of the Estimate
	0.821	0.714	0.658	0.021

Source: Researchers' compilation from IBM SPSS Statistic version 25.

The correlation coefficient, R, in Table 2 illustrates the relationship between the independent and dependent variables. The findings make it evident that work-life balance and company performance are closely related. The R-value of 0.821 is a proof of this. The degree to which variations in company performance may be attributed to changes in work-life balance was described by the coefficient of determination (R-square). The R-square score of 0.714 indicates that the model accounts for 71.4% of the change in company performance. The model summary showed the SPSS output in Table 2 with the coefficient of determination, or the R-square, at 0.714, which indicates that approximately 71.4% of the variation in the data on the performance of women-owned enterprises can be explained by these two work-life balance strategies, which include home and work strategies. Table 3's findings display the ANOVA statistics.

Table 3: Analysis of Variance (ANOVA)

Model	Sum of Squares	DF	Mean Square	F	Sig.
Regression	28.4	4	7.1002	35.908	.002
Residual	11.867	55	0.21576		
Total	**40.267**	**59**			

Source: Researchers' compilation from IBM SPSS Statistic version 25**,** Critical value =14.876

The regression model's depiction of a substantial association between work-life balance and company performance is safe to conclude from the analysis of variance. The probability value of 0.002 is proof of this. The association that the regression model attempts to represent, is extremely significant since the estimated F-statistic value for the regression model is 35.908 versus the critical value of 14.876. Additionally, the ANOVA results in Table 2 showed a significant linear relationship between the changes in the dependent component, $F(3, 98) = 14.876$, $p < 0.002 < 0.05$ alpha. Predictions may be made quite well using the regression equation. Therefore, the result confirms the prediction that the population regression line's slope is not zero and that work, and home methods may be used to forecast the success of female-owned businesses at 0.05 (5%) significance and 95% confidence. The alternative hypothesis is accepted whereas the null hypothesis is rejected since the p-value is between 0.002 and 0.05. As a result, there is a strong link between work tactics and the success of female-owned firms in Harare, as well as a strong link between home strategies and company success. Regression coefficients in Table 4 suggest that work-life balance initiatives have a considerable positive impact on business success.

Table 4: Regression Coefficients

	Unstandardized Coefficients		**Standardized Coefficients**	**T**	**Sig.**
	B	Std. Error	Beta		
Constant	2.73	0.953		2.865	0.006
Work strategies	0.085	0.173	0.101	4.95	0.001
Home Strategies	0.110	0.192	0.136	3.187	0.006

Source: Researchers' compilation from IBM SPSS Statistic version 25.

Data shows that the regression equation representation is.

$$Y = 2.73 + 0.085X1 + 0.110\,X2$$

Where X1 denotes work strategies and X2 denotes home strategies. A similar analysis of the individual contribution of the variables in explaining the variation in the model was done based on the standardized coefficient results in Table 4, for example, one (1) of the independent variables, work strategies made a significant contribution to the prediction of change in performance of women entrepreneurs with beta = 0.101, p = 0.001 at 0.05. On the other hand, home strategies with beta = 0.136, p = 0.006 at 0.05 made significant contributions to the model. The beta coefficient for work strategies is 0.101 implying that an improvement in work strategies tends to boost performance by 0.101 units on average. Correspondingly, an improvement in home strategies tends to boost performance by 0.136 units on average.

5. Conclusion and Recommendations

From the research, the following findings were made:

- For female business owners in Harare, hiring knowledgeable staff, giving the task at hand priority, and planning work activities were the most effective work methods. The study came to the conclusion that hiring housekeepers to lessen work overload, taking care of urgent needs while at work, and placing family first were the best home tactics for female entrepreneurs in Harare. Additionally, using work and family techniques helped female-owned businesses in Harare operate better.
- The performance of household duties by female entrepreneurs was significantly correlated with the techniques outlined.
- Employing techniques for both the workplace and home improves performance at home. Female business owners who prioritized their families were able to spend enough time with them and yet attend social functions.
- The work-life balance of female entrepreneurs in Harare was considerably influenced by work and home strategies. Job-life balance for women business people is greatly influenced by a balance between job and household responsibilities. The research offered the following suggestions in light of its findings and conclusions. To maintain a work-life balance, female entrepreneurs in Harare should employ both work and home techniques. This may be accomplished by hiring qualified employees

and putting the job, their lives, and the current project first. Female company owners, both established and aspiring, should be proactive in their work and home life plans because they will help their companies operate better. Female entrepreneurs need training in developing work and home plans. In order to reduce the workload of female entrepreneurs and enhance the success of their firms, assistance from family and society is essential.

Contribution of the Study to the Body of Knowledge: The study was effective in evaluating the methods employed by Harare's female business owners to run their homes and businesses. The results can be utilized as a starting point for more research and as a resource for psychologists, social scientists, human resource professionals, family counsellors, female business owners, and other academics. Female business owners should work to increase the performance of their companies in terms of return on investment and growth prospects; doing so without putting their families at a disadvantage; and encouraging their family members to support them and recognize their role in the company's success and expansion. The research tried to highlight the difficulty female entrepreneurs faced juggling work and personal obligations, and it was intended to be helpful to society as a whole. The study was intended to ease and perhaps even lower societal expectations of female entrepreneurs in emerging and developing nations.

Limitations of the Study: Real numbers of female entrepreneurs in Zimbabwe were difficult to come by since some of the data from official government sources was dated. The researchers utilized the database they had obtained from the Zimbabwe Women's Microfinance Bank (ZWMB) to address this problem. Due to the COVID-19 pandemic, it was impossible to personally administer all surveys, which was another study's restriction. Seventy percent of the questionnaires were distributed online via emails and mobile phones to satisfy the respondents' desires for social seclusion.

Areas for Further Studies: The work-life balance among female entrepreneurs was the subject of this study. Further study may examine the impact of work-life balance on male entrepreneurs.

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Building Blocks for a Model for using EDI and ERP to Improve Supply Chain Performance in Ugandan PDEs

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Abstract: The study's overarching goal is to provide a theoretical foundation for the integration of EDI and ERP systems into Ugandan procurement and disposal entities' supply chains to optimize their performance. A design science approach was used as a research strategy and for data collection; a cross-sectional survey using qualitative techniques, including in-depth interviews was employed. From the findings, a model was developed for data visualization, report production, analytics, and transformation. This study therefore provides an in-depth evaluation of the effectiveness of procurement and disposal organizations in Uganda with the help of EDI and ERP technologies to enhance supply chain management.

Keywords: *Electronic Data Interchange, Enterprise Resource Planning, Supply Chain Performance.*

1. Introduction

The supply chain includes all entities engaged in the transfer of goods, services, funds, and information from, the point of origin to the customer identification process, or CIP (Smith, Yost, and Lopez, 2020). The process is made up of linked nodes that allow a commodity to be transported from the supplier to the receiver (Fichman, 2011). IT and EC play critical roles in supply chains in a variety of businesses. To achieve a competitive advantage in the changing global economy, a rising number of firms in developing countries are incorporating Information and Communication Technologies (ICTs) into their supply chain operations (Gupta, 2014). According to prevalent scholarly opinion, information and communication technology (ICT) delivers significant advantages through promoting integration inside enterprises and across supply chains. This is performed by enhancing information flow between commercial partners, discovering prospective suppliers, and lowering administrative costs. These advantages improve an organization's openness and accountability [Huemer, Liegl, and Zapletal, 2020; Katuu, 2020). Several technologies have the potential to enhance supply chain performance. This list includes, among other things, Electronic Data Interchange or EDI, electronic point of sale, enterprise resource planning, or ERP, bar code scanners, online services, electronic buying, electronic sourcing, and electronic auctioning (Klapita, 2021; Sheikh Younis, 2019; Abro, Memon, Shah and Naqvi, 2017).

This study examines the use of EDI and ERP technologies to enhance supply chain performance in Uganda's purchasing and disposing entities (PDEs). These systems provide a thorough grasp of operational efficiency. Publicly disposable entities are essential for facilitating the acquisition and disposal of assets in government organizations. Government entities follow a bureaucratic procedure when providing assets and services. This procedure includes stages such as soliciting bids, selecting the bidder with the highest bid, and exchanging and signing procurement documents in compliance with legal requirements (Almigheerbi and Lamek, 2020). This process leads to delays, which in turn leads to higher expenses for resources and labor, additional expenses for administration, reduced user satisfaction, higher capital investment, and increased storage costs (BC, 2020). Developed nations have effectively utilized Electronic Data Interchange or EDI and Enterprise Resource Planning systems in supply chain management. Developing countries have encountered difficulties in adopting EDI and Enterprise ERP systems due to their high costs and complexity. This has been especially challenging for small and medium enterprises (SMEs), as implementing these systems requires significant investments (Hueme, Liegl, & Zapletal, 2020).

Currently, there have been advancements in technology that have made Electronic Data Interchange or EDI and Enterprise Resource Planning or ERP systems more affordable and easier to implement. These applications can function on both mainframe and microcomputer platforms, leading to cost reduction (Kiggira, Mwirigi, & Shale, 2015). In Africa, countries like South Africa and Egypt, which have middle-income status, have experienced significant growth in technology adoption. The utilization of EDI and ERP systems has significantly increased among small and medium-sized enterprises (SMEs) (Kim, et al., 2019). Uganda has

witnessed a noticeable rise in the utilization of technology, specifically in the adoption of Electronic Data Interchange (EDI) and Enterprise Resource Planning (ERP) systems in supply chain management, during the past decade. However, the continued manual processing of procurement documents leads to increased delays in the procurement process (Liban, et al., 2023; Makotose, 2019). Based on the factors discussed above, the researcher proposes a conceptual framework that recommends the use of EDI and ERP systems to improve supply chain management by digitizing procurement document processing.

2. Background Literature and Hypothesis Development

Using the framework of resource dependence theory (Hillman, Withers, and Collins, 2009). This study seeks to investigate the connection between Electronic Data Interchange (EDI), Enterprise Resource Planning (ERP) and supply chain performance among Uganda's Public Development Enterprises (PDEs). The resource dependency hypothesis (Hillman, Withers, and Collins, 2009).] Postulates that the acquisition and management of resources are critical for supply chain success. Wernerfelt (1975) argues that a company's resources may be thought of in terms of its strengths and weaknesses. According to this hypothesis, ERP and EDI are useful tools that influence the efficiency of businesses, which in turn improves the effectiveness of supply chains. Enterprise resource planning (ERP) is seen as an external resource in this approach, used to improve supply chain operational efficiency. Due to the link between the supply chain and the resources needed for peak performance (Smith, Yost and Lopez, 2020), the use of ERP or Enterprise Resource Planning and EDI or Electronic Data Interchange is recommended so long as these technologies are shown to be useful. According to RDT or Resource Dependency Theory (Hillman, Withers, and Collins, 2009), supply chain performance is the degree to which an organization's supply network satisfies the requirements of its customers. Stakeholders are the many individuals and organizations that have an interest in the success of the supply chain (Eyaa, Ntayi and Namagembe, 2010). Supply chain effectiveness is largely determined by how well operations inside the chain are evaluated from the outside. Supply chain performance evaluation requires an external viewpoint, whereas internal viewpoints are primarily concerned with measuring the efficiency of internal processes (Choudhary and Jadoun, 2016).

Electronic Data Interchange and Supply Chain Performance: To enhance the performance of an organization, it is imperative that every component of its supply chain, including departments, activities, individuals, hierarchical levels, and external stakeholders, effectively collaborate. This is a result of people and activities being interdependent, where each entity influences the others (Grant, & Tu, 2013). Relationships between supply chain participants, such as bit suppliers and end users, are essential to the chain's smooth operation. The coordination of production and logistics is a defining feature of these partnerships. This form of coordination necessitates the integration of supply chains, indicating that decisions regarding production, inventory, and delivery activities of both companies are made collectively (Gorbenko, et al., 2022). The utilization of Information Technology has the potential to enhance the coordination of supply chains, especially when these technologies are employed to transcend the conventional boundaries of firms involved in the supply chain. This particular category of information technology is commonly known as an inter-organizational information system, wherein electronic data interchange (EDI) serves as an illustrative instance of such a system.

The implementation of Electronic Data Interchange (EDI) has been observed to have a positive impact on inter-organizational coordination activities and the level of integration among supply chain members (Veselá, 2017). According to Choon et al. (2010), EDIs are characterized as the electronic exchange of standardized business transactions between computer systems. Conversely, Kaeferetal (2007) defines EDI as the electronic transfer of documents or information, specifically within a business-to-business context. Electronic data interchange (EDI) can be defined as the systematic exchange of structured data between different organizations through electronic channels. The process involves the automated transmission of electronic documents or business data between computer systems, specifically between trading partners, without the need for human involvement. Emails have evolved beyond simple communication tools, as organizations now utilize them for various purposes such as transmitting bills of lading and even checks through the appropriate Electronic Data Interchange (EDI) message (Klapita, 2022). The adoption of computer-based information systems by more businesses in the latter part of the 1960s led to the realization that a sizable portion of one

computer's output serves as input for another computer (Gu, and Huo, 2021). The integration of EDI into an organization's information technology system can be done in a seamless manner.

The classification of EDI can be categorized as either integrated or non-integrated. When one firm uses EDI just to exchange documents with another, this is known as non-integrated EDI (Huemer, Liegl, and Zapletal, 2020). Valaskova et al. (2022). In this case, the company is switching from a manual transfer mechanism, like the postal service, to a telecommunications approach while keeping all of its existing paper-based operations in place. Value-added network (VAN) providers are third-party companies that support the telecommunications transfer process. According to recent research, it has been estimated that more than 70% of organizations have adopted Electronic Data Interchange (EDI) (Veselá, 2017). To achieve successful implementation of EDI within an organization, several key factors must be considered. Firstly, the establishment of appropriate corporate policies is imperative. These policies serve as a framework to guide the proper implementation of EDI, ensuring consistency and adherence to organizational objectives. Additionally, it is essential to provide employees with comprehensive training on how to effectively utilize EDI systems. This training equips employees with the necessary skills and knowledge to navigate and leverage the capabilities of EDI. Lastly, fostering a culture of employee engagement and adaptability is crucial. This entails cultivating a mindset that embraces change and the integration of EDI into daily operations. By addressing these factors, organizations can enhance the likelihood of a successful EDI implementation (Almtiri and Miah, 2020).

Enterprise Resource Planning and Supply Chain Performance: To survive in today's competitive market, businesses must increase their velocity, quality, and adaptability while decreasing expenses. Under these circumstances, competition plays a pivotal role in driving organizational performance improvement. For these organizations to attain such performance, it is crucial to have access to precise and pertinent information both internally and externally and to effectively utilize this information (Katuu, 2020). To attain the intended objective, the utilization of information technology tools and information systems, such as Enterprise Resource Planning (ERP), along with the effective utilization of information technology, assumes a crucial role. These factors have a significant impact on acquiring and sustaining competitive advantages (Abro, 2017). Enterprise resource planning (ERP), as defined by Stevens (2003), is a catchall phrase for management software that incorporates a wide range of functionalities, including those related to production, finance, marketing, and human resources. Businesses may improve their product and service coordination with the help of these modules. The Enterprise Resource Planning system facilitates the management of external stakeholder relationships and improves performance management.

The system employs a centralized database and typically depends on a shared computing platform. The system offers the user a cohesive, coherent, and standardized environment. Enterprise Resource Planning (ERP) facilitates the dismantling of conventional organizational silos within companies and establishes a cohesive horizontal structure that aligns strategy, organizational structure, processes, and technology (AboAbdo, Aldhoiena, and Al-Amrib, 2019). In terms of the Information System, the adoption of an Enterprise Resource Planning (ERP) system is commonly the biggest project performed by the corporation (Klapita, 2021). This phenomenon is particularly prevalent in organizations located in developing countries, where a significant number of operational, control, and managerial systems remain non-automated. Moreover, these organizations do not exhibit the same level of reliance on entrenched legacy systems as their counterparts in developed countries. Rather than being used to replace older systems, several studies have shown that ERPs in developing nations are used to modernize and differentiate businesses (Kim et al., 2019). A recently implemented Information System has the potential to exhibit satisfactory performance, adhere to established timelines, and remain within budgetary constraints. However, there exists a possibility that it may subsequently face user rejection, leading to its eventual termination (Almigheerbi, Ramsey and Lamek 2020).

To mitigate the risk of user rejection and subsequent termination of a recently implemented Information System, the implementer must prioritize the processes of diffusion and infusion (Gorbenk, et al., 2022). In the realm of organizational innovation literature, diffusion is employed as a metric to gauge the internal dissemination of a particular innovation, indicating the degree to which its usage proliferates among individuals, projects, tasks, or organizational entities. This measure is particularly valuable, particularly in situations where implementation takes place in a phased manner. ERP adoption may be evaluated by

counting how many users there are throughout all departments and divisions, as well as how many components are used in each module (Gupta, 2014). Infusion refers to the assessment of the level of institutionalization and integration of a system within an organization's regular operations and essential procedures. Through the process of infusion, the system undergoes profound and comprehensive integration within the organization's work system and value chain. At this juncture, the organization would decide to enhance the integration of the system and expand its capabilities through the incorporation of additional modules or applications. This would help in launching new endeavors and forming alliances with other organizations (Abro, 2017). Transparency in complex business processes, relief from transactional and data limitations, and simplification of decision-making across the board would all result from the installation and integration of multiple systems inside the firm. As a result, the company's productivity as a whole would improve dramatically.

Review of Existing Models Used to Improve EDI and ERP Performance: For organizations to thrive in the contemporary dynamic landscape, they must enhance their speed, quality, flexibility, and cost efficiency. Consequently, competition becomes a crucial factor in driving organizational performance improvement. For these organizations to attain such levels of performance, it is crucial to have access to precise and pertinent information both internally and externally and to effectively utilize this information (Grant, & Tu, 2013). To accomplish this objective, the utilization of information technology tools and information systems, such as Enterprise Resource Planning (ERP), along with the effective utilization of information technology, assume a critical role. These factors have a significant impact on attaining and sustaining competitive advantages (Kim et al., 2019). According to Stevens (2003), enterprise resource planning (ERP) refers to a comprehensive suite of management software modules encompassing areas such as production, finance, marketing, and human resources. These modules enable companies to effectively strategize and coordinate their goods and services. The Enterprise Resource Planning (ERP) system facilitates the management of external stakeholder relationships and contributes to the improvement of performance management.

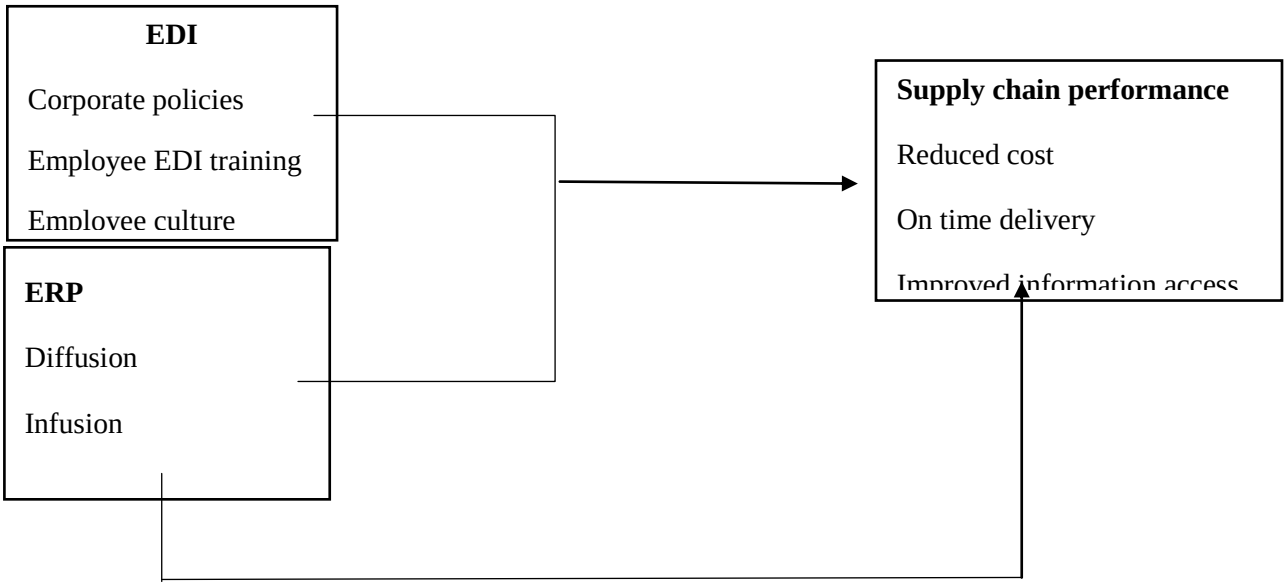
The system utilizes a centralized database and typically depends on a shared computing platform. The system offers the user a cohesive, coherent, and standardized environment. Enterprise Resource Planning (ERP) facilitates the dismantling of conventional organizational silos within companies and instead establishes a cohesive and interconnected horizontal structure. This structure ensures a strong alignment between strategy, organizational structure, process, and technology (Bulfone, 2023). In terms of the Information System, the adoption of an Enterprise Resource Planning (ERP) system is commonly the biggest project performed by the corporation (Chofreh, 2020). This phenomenon is particularly prevalent in organizations situated in developing countries, where a significant number of operational, control, and managerial systems still rely on manual processes. Moreover, these organizations do not exhibit the same level of reliance on entrenched legacy systems as their counterparts in developed countries. Rather than being used to replace older systems, several studies have shown that ERPs in developing nations are used to modernize and differentiate businesses (Sheikh Younis, 2019). A recently implemented Information System has the potential to exhibit satisfactory performance, adhere to established timelines, and remain within the allocated financial resources. However, there is the possibility of user rejection leading to the eventual termination of the system (Kim, et al., 2019).

To mitigate the risk of user rejection and subsequent termination of a recently implemented Information System, the implementer must prioritize the processes of diffusion and infusion (Smith, Yost and Lopez, 2020). In the literature on organizational innovation, diffusion is employed as a metric to assess the internal spread of usage among individuals, projects, tasks, or organizational units. This measure proves to be particularly beneficial in situations where implementation gradually takes place. The diffusion of ERP systems, or enterprise resource planning systems, is quantified by counting the number of departments and divisions that make use of them, as well as the number of users in each module (Kattu, 2020). Infusion refers to the evaluation of how thoroughly a system has been integrated into an organization's day-to-day activities and critical processes. Through the process of infusion, the system undergoes profound and extensive integration within the organization's work system and value chain. At this juncture, the organization would decide to enhance the integration of the system and broaden its capabilities through the incorporation of additional modules or applications. This would help in launching new endeavors and forming alliances with other organizations (AboAbdo, Aldhoiena, and Al-Amrib, 2019). The adoption of integrated and implemented

systems would increase transparency in complex business processes, as well as remove obstacles to information flow and decision-making. As a result, the company's productivity as a whole would see a major boost.

Conceptual Model: The theoretical framework that will inform this study will primarily draw upon the research conducted by Eyaa and Ntayi (2017). This study aims to examine the potential impact of Enterprise Resource Planning (ERP) and Electronic Data Interchange (EDI) on the supply chain performance of procuring and disposing entities in Uganda. The focus will be on evaluating the individual and combined effects of ERP and EDI on enhancing supply chain operations. The theoretical associations among the variables under investigation are depicted in Figure 1.

Figure 1: Conceptual Framework



Source: Modified from Hillman, Withers, and Collins, 2009; Barney, 1991; Kim et al., 2019; Chofreh, 2020).

3. Methodology

Research Approach: The chosen methodology employed in this study was the design science approach. Design Science refers to the systematic process of designing and studying artifacts within their respective contexts (Hevner and Chatterjee, 2010). The design science process consists of several key steps, which include problem awareness, solution suggestion, artifact development, evaluation, and conclusion.

Qualitative Study

Interviews: This entails a direct, in-person engagement between the researchers and the participants (Gray, et al., 2020). The researcher conducted interviews with multiple participants, and upon reaching the 22nd participant, no further new data emerged. Consequently, the researcher decided to conclude the process. The participants in this study were selected from a total of 10 probability density estimators (PDEs) using the sample determination method. These PDEs were chosen from three distinct categories of study participants. The researcher aimed to obtain comprehensive data by including a substantial number of respondents, allowing for the derivation of a valid conclusion. The categories of participants included in this study were as follows: Procurement officers are individuals responsible for managing the acquisition of goods and services on behalf of an organization. These individuals were deemed significant due to their active participation in evaluating products, services, and suppliers, as well as engaging in contract negotiations with their clientele.

Finance officers are individuals responsible for managing the financial activities and resources of an organization. These people are important because they have a hand in producing critical data that

demonstrates the company's financial health, such as revenue reports, management reports, and spending caps for procurement. Information and Communication Technology (ICT) officers collaborate with a chosen Public Development Entity (PDE). These individuals were deemed significant due to their engagement in the oversight and upkeep of EDI and ERP management systems. The individuals' involvement encompassed two distinct stages, specifically data collection and model testing and validation. During the interviews, the researcher asked open-ended questions to learn more about the participants' experiences with EDI and ERP, as well as their thoughts on the limitations of these two technologies in improving supply chain performance. The researcher prepared an interview guide to use as a reference point during the interviews.

Inclusion Criteria: Participants must meet the minimum age requirement of 18 years or older. Additionally, they must be employed in a position involving one of the designated PDEs. It is expected that participants possess a fundamental understanding of computer operations. Furthermore, participants must express a voluntary willingness to partake in the study and demonstrate availability and flexibility in scheduling to accommodate research needs.

Sampling Technique: Participants were selected using a purposive sample strategy, and 10 PDEs were selected using a simple random selection method for this investigation. Participants were sought out until a sufficient number of records were accumulated.
RQ1: How can supply chain management be improved in Ugandan PDEs via the use of EDI and ERP**.**
The research method used to answer this question was design science, which emphasizes making and testing a product to improve its practical performance [21]. This study strategy was chosen because it was thought to be the most suitable. A methodical process led to the discovery of the answer to this enigma.

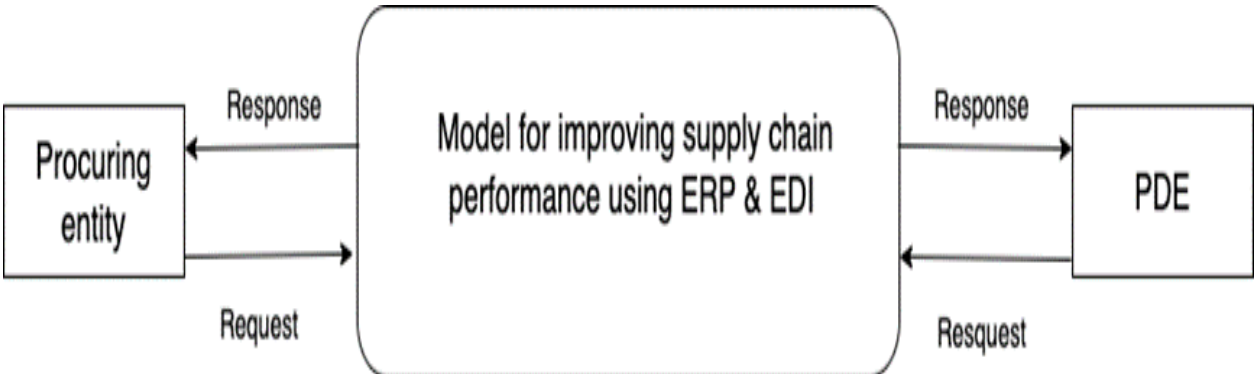
Awareness of the Problem: A meta-data search was used to analyze the pros and cons of current models and a gap in the literature was found as a result. Therefore, it was decided that a model proposing the integration of EDI and ERP would be the best strategy for improving supply chain performance. Respondent data led to requirement elicitation, which in turn inspired the creation of the suggested model.
RQ2: How can we optimize the architecture of an EDI/ERP model to boost supply chain efficiency in Ugandan PDEs?

Model Development: The solution to this puzzle was discovered through the use of model development strategies, such as the logical design of the prototype through the use of Unified Modeling Language (UML), Microsoft Workbench, and My Structured Query Language (MySQL). HTML, CSS3, JavaScript, and Hyper preprocessor (PHP) programming languages were used in the development of the EDI and ERP databases.

4. Results

The proposed framework recommends that Ugandan PDEs employ ERP and EDI systems, which consist of two modules: the procurement entity module and the supplier entity module, to boost supply chain performance.

Figure 2: Process Diagram



In this data flow diagram, the procurement entity and the PDE stand in for the business process model. Figure 3 depicts the diagram, which consists of four data stores and five operations.

Figure 3: Model Data Flow Diagram

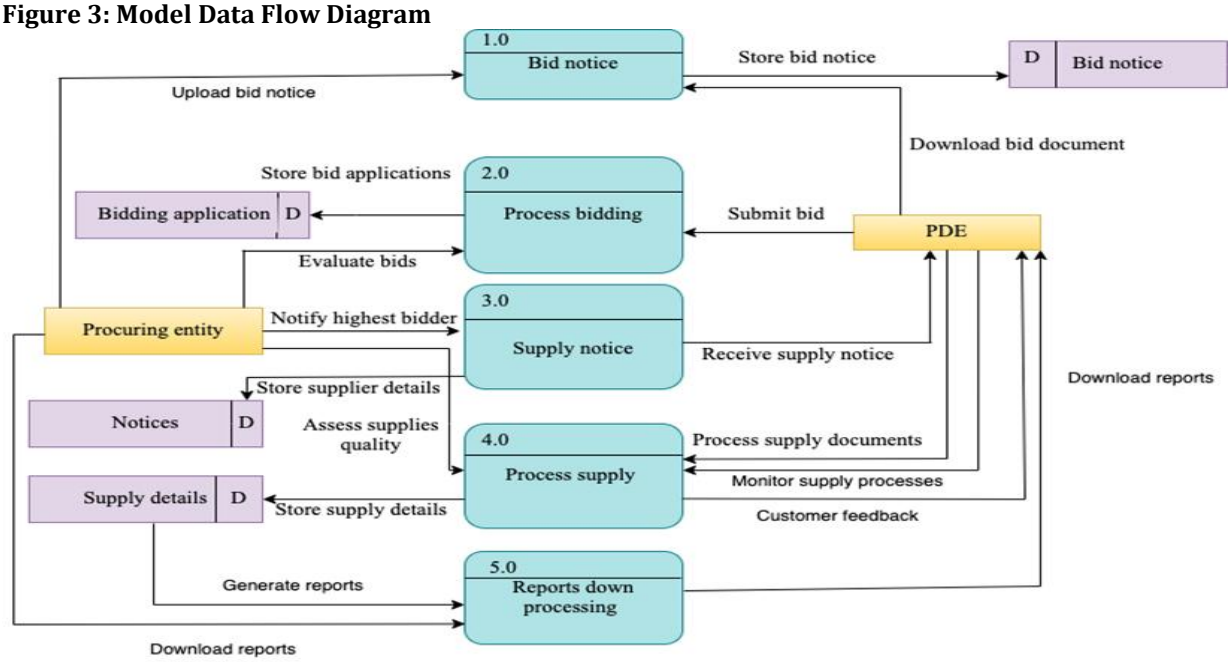
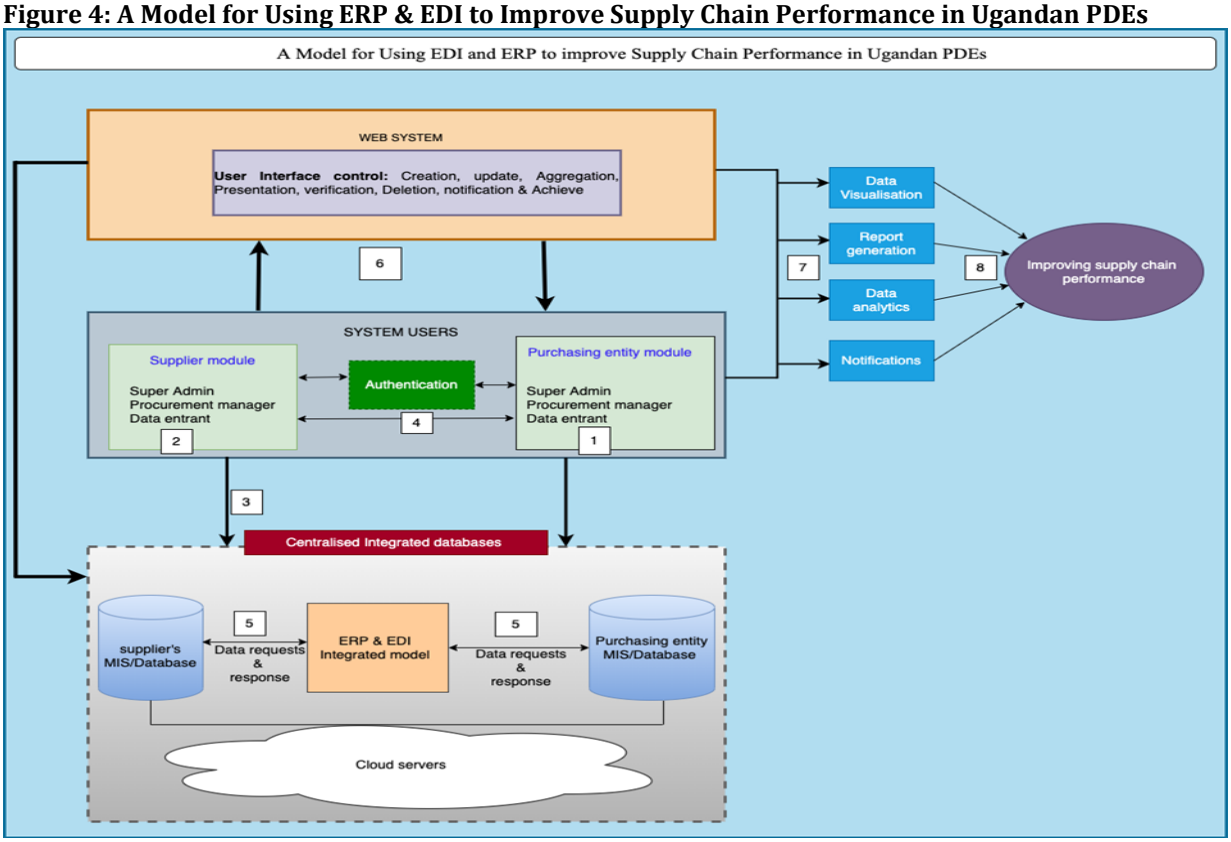


Figure 4: A Model for Using ERP & EDI to Improve Supply Chain Performance in Ugandan PDEs



Steps 1 and 2: The login procedure requires the user to provide their credentials, usually a username and password. Once the user provides these credentials, they undergo authentication to verify their identity, after

which they are granted access to the system. The system can be accessed through various devices, such as mobile phones, laptops, or desktop computers.
Step 3: the model's access to system resources is determined based on the parameters that have been triggered. It may either be granted or denied access.
Step 4: facilitates the exchange of files and data among entities.
Step 5: This stage facilitates a dynamic and engaging interaction among system users, Enterprise Resource Planning or ERP, and Electronic Data Interchange or EDI by executing various processes.
Step 6: Any user of the system has access to the functionality controls and the Data transformation controls, allowing them to change the way they see the data.
Steps 7 and 8: include automated processes such as data visualization, report generation, analytics, and transformation.

5. Discussion

This study offers a wide-ranging analysis of the supply chain's performance in Uganda right now. Further, a framework is put out to improve Uganda's supply chain by bringing together EDI and ERP software. This model is an attempt to fix the problems with current methods by making them more applicable to real-world problems. To help attain sustainable development objectives, the researcher uses a strategy that brings together academic research and real-world problems.

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