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ULK SCIENTIFIC JOURNAL
VOL. 42

ISSN 2308-5843

EDITIONS OF THE KIGALI INDEPENDENT UNIVERSITY ULK

January, 2021

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EDITORIAL

On behalf of the scientific editorial board, I extend my deepest gratitude to the great contribution made by lecturers and researchers that has made the compilation of this publication possible. The completion of this volume stemmed from their will, initiative and performance as lecturers and researchers. KIGALI INDEPENDENT UNIVERSITY ULK has always paid regards to promoting education and impacting the complete development of Rwanda through coupling teaching and research. In the same vein, the 42^{nd} Volume of ULK Scientific Journal is now out with four papers which tackle issues of national and regional concern. The authors of articles in this issue suggest scores of recommendations worthy of consideration to both policy makers and practitioners.

The first article by **Dr. KABANDANA Innocent** is entitled "**Conventional Electronic Voting Systems.**" The author discussed the essentiality of E-voting systems in the current days. It also illustrates E-voting's essential features with respect to both software and hardware-based systems as well as looking at various election models and frameworks.

Two articles have been published by Dr. SEKIBIBI et al. in this volume. The first article of theirs is entitled "**Assessing Effects of Microfinance Instutions on Empowerment of Women Entrepreneurs**" with the target population in this study being women entrepreneurs of Duterimbere Microfinance that are registered and legally accepted as customers.

The paper by **Mr. MANIRAKIZA Jean Baptiste** dubbed **"The Role of Poetry in Rebuilding a Nation: The Case of Post Genocide Rwanda"** revealed that like any other sections of Rwandans, poets have been giving the government a hand as the country struggled to recover from the overarching effects of the genocide perpetrated against the Tutsi in 1994.

The second article by **Dr. SEKIBIBI et al. is entitled, "Analysis of Macroeconomic Determinants of Exchange Rate in Rwanda"** and it analyzed microeconomic determinants of exchange rate in Rwanda with the focus being on curecny depreciation vis-à-vis the Amercian dollar.

Dr. SEKIBIBI Ezechiel

Vice Chancellor of ULK

CONVENTIONAL ELECTRONIC VOTING SYSTEMS

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Abstract:

The paper discusses the theoretical background associated with the essentiality of evaluating conventional E-voting systems and theirintegration with modern advanced internet computing. Even though the concept of E-voting gained many researchers' attention in the past, there is still no spatial secured online prototypes through which a voter can vote for a candidate by maintaining confidentiality. The recent advancement in the field of data and corresponding systems introduced internet-based E-voting systems, which are more secured as compared to the conventional offline methods.

Keywords:*Voting Systems; Electronic Voting Machines; Election Management Systems.*

1.1 EVOLUTION OF E-VOTING SYSTEMS

The election is a procedure in which voters pick their choice of delegates and express inclinations for how they will be administered. Rightness, the power to deceitful practices, cognizance, consistency, security, and straightforwardness of voting are key prerequisites for an election procedure's respectability. There is a wide assortment of various voting frameworks that depends on customary paper ballots, mechanical gadgets, or electronic tallies.

In customary paper tallies, voters pick or check their most favorite's selectable option on ballots and place them in boxes, which are fixed and authoritatively opened under exceptional conditions to warrant straightforwardness (Moynihan et al., 2004; Evans et al., 2006). The tallies are then numbered physically, which is a repetitive procedure that is liable to human mistakes. Voting works by means of mechanical frameworks. In the meantime, voters settle on their decisions by pulling down mechanical levers that relate to their most favorite decision to choose the competitors. Each lever will have a mechanical counter that reports the numberof votes for that position. These machines are not in use now. On the other hand, a couple of systems use punch cards where voters normally punch an opening in Personal Computer (PC) fathomable survey cards.

These frameworks are not dependent on account of issues in perusing cards and were supplanted by optical output gadget frameworks, allowing voters to record decisions by filling in territories on the tickets. The counts are examined using a machine scanner, and after that, the votes are checked using a PC program. In case of checking bumbles and sometimes, voters find ways to deal with votes more than once. The abnormalities will be displayed in the counts. These phenomenal cases require a repetition of election strategy. In addition, few nations intentionally presented controls of the votes occur to bend the aftereffects of a decision for specific hopefuls.

Figure 1.1 depicts the major predictors to define an efficient E-voting system. The model is designed to define the major influences to use E-voting systems in modern architecture (Patra et al., 2009).

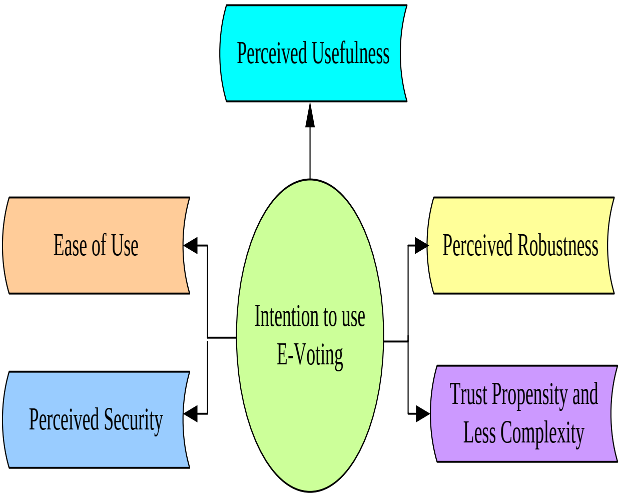

Figure 1.1: The schematic representation of E-voting Research Model

Although such disasters can be maintained with strategic distance from the legitimately examined election process, blunders can even now happen, particularly when voters' quantity is entirely substantial. Regularly, universal observing bodies are required to screen the elections in specific nations.

The headway of data and media communication advancements considers a completely robotized online mechanized election process. Notwithstanding conquering ordinarily experienced decision pitfalls, constituent votes are done continuously before the election day's over.The outcomes are naturally out. The decision procedure can be effortlessly upgraded with different elements in light of various nations' interests and necessities worldwide. E-voting is an interdisciplinary subject and ought to be connectedwith various areas, such as programming building, cryptography, legislative issues, law, financial matters, and sociological aspects.

Albeit numerous individuals have chipped away at this subject, generally, E-voting is known as a testing theme in cryptography, which results in voters' secrecy and guarantees his/her security. In any case, numerous studies caution against the selection of E-voting due to several difficulties in program designing, security, and reviewing (Grönlund et al., 2001).

1.2 ESSENTIALITY OF E-VOTING

Free and reasonable elections will prompt the decision of a well-known and great government in any democratic system. The elections process and frameworks have developed from raising hands to electronic voting machines(EVMs), mobile voting, internet voting, to individuals' voices.Their choice or supposition on any key issues of open interest will help in building a national assessment and even change of Govt.

In this century, as innovation is amazingly growing up step by step, the vast majority of the general population are utilizing the web for their everyday exercises.

The greater part of developed nations is steadier in Information and Communication Technologies. A large portion of the government's distinctive exercises or administrations are given on the web. Those nations' nationals can get to those administrations anyplace they are by utilizing cellular telephones, PCs, or any other gadgets associated with the web systems/remote systems (Limon, 2015).

Some of the online administrations are voting, shopping, sending or getting cash exchange, restorative considerations, ticket booking, grumbles, and so forth. Majorly system engineering demonstrates how the framework is composed and actualized politically so that the framework should meet the clients' needs and actualize politically to meet the clients' needs. Advanced divisions give a genuine picture ofhow vote-based system designing can succeed or falloff flat because of the quantity of instructed nationals, ICT frameworks, the economy of the nation, and so on.

Election organizational scheme is considered to be one of the markers of the majority of nations.When nation is giving equivalent rights to the qualified residents to pick their pioneers or to give their candidatures, to take part in the nation advancement by scrutinizing the legislature on how things are being done and how they need to be done (i.e. implies on perspectives of the citizens). An E-voting framework is one of the framework buildings where distinctive advances are connected to investigate, outline and actualize a dynamic framework that satisfies the client's necessities.

In our examination, we concentrate on the fates of the Election Management System (EMS) by specifying one of the most significant issues i.e., from the security aspect and thinking of more precise solutions to mitigate the issues. The framework will have solid securities in the way that the programmers can not have the capacity to enter the framework to roll out any improvement amid the enlistment of the voters and competitors from election time to till the end of decision (i.e., organization, store votes, and show the last Election results).

Jefferson et al. (2004) stated that they are creating, planning, and executing EVM made of hardware, software, and centralized servers . In hardware EMS, voters' utilize manual smart cards to station votes or mobile phone EMS (versatile) based SMS (Short Messages Services). In software EMS, voters have distinctive choices for throwing their votes, such as sending SMS using mobilephones, the internet site page-based voting framework, manual voting system, and its centralization. In server-based voting machines, all the equipment and programming of the voting machine will be associated with a central (focal) server through Wide Area Network (WAN).

The consequences of voting are arranged, put away and showed in the focal server. The election is a way to utilize the qualified inhabitants of any country to express their inclination by choosing their agent in the legislature or their urban associations. This is one of the primary pointers of a nation having a majority rule framework. Distinctive nations will have diverse methods for making elections. They may utilize customary election process (i.e., paper tally framework), punch card machine, optical scan machine, or electronic voting system (EVS). Each one of these techniques has a portion of issues.

For instance, the major issues of conventional voting systems are thatit involves n-number of polling stations, use of indelible ink, and maximum manpower. The consumption of time to vote, count, and distribute the results is more. Also, it is more prone to cheating. In the E-voting framework, issues are associated with hacking, security, network and electricity, fewer residents ready to utilize PC, infrastructure, and difficulty in trusting frameworks and check mistakes.

The principal inspiration of the E-voting framework is that efforts to establish safety are taken to secure the framework, more offices will be given, and the quantity of voters will be expanded. Numerous issues accessible to the specified framework will be settled by utilizing EVS (Jorba et al., 2007).

1.3 EFFECTIVENESS OF E-VOTING

A constituent system comprises the arrangement of principles that must be taken after for a vote to be viewed as legitimate and how votes are tallied and amassed to yield afinal result. It is a technique by which voters settle on a decision between hopefuls, regularly in a race or arrangement choice or a policy referendum. The heart of the voting system is a trust that every vote is recorded and counted with precision and objectivity. A decision is one of the standards of majority rules system where qualified residents are permitted to take an interest in the race, have equity of the natives in the nation, measure the responsibility of the chose applicant, transparence of what is occurring in the nation, and race ought to be customary free and reasonable.

The paper and mechanical frameworks were utilized, albeit a long way from flawless, were based upon truly several years of genuine encounter. Prior, there was enormous weight to supplant the (our) "obsolete" paper and mechanical frameworks with automated frameworks. Here are numerous reasons why such frameworks are appealing. These reasons incorporate cost, the pace of voting, and arrangement, which are appropriate for nationals with physical debilitations. Malkawi et al. (2016) said the uprightness of the race procedure is major to the respectability of vote-based system itself. Generally, rightness, heartiness to deceitful practices, cognizance, consistency, security, and straightforwardness of voting are all key prerequisites for the trustworthiness of a decision process. Kohno et al. (2004) said that the decision framework must be adequately robust to withstand an assortment of deceitful practices and should be adequately straightforward and understandable that voters and applicants can acknowledge the aftereffects of an election. Free and reasonable Elections will prompt the race of well-known and great Government in any Democratic

Systems).

System engineering applications in election systems will play a big role in designing and implementing a complex electronic voting system with high technology in software and hardware.The voting system will have the minimum requirements, providing different options to the candidates and voters. In our system, we will use Java Servlet Pages (JSP), HyperText Markup Language (HTML) for web design, MySql for database, TomCat for server-side to use mobile voting, internet voting, and SMS voting. In hardware, we will be using field-programmable gate array(FPGA) and Verilog for hardware description language to use a manual voting system. In our voting system, the users and candidates will use different security keys, selecting their passwords corresponding to their IDs, the system will be generating QR Code as a secure key basing on registered International Mobile Equipment Identity (IMEI) mobile number for those who are having Smart Phones, or the system will be generating OTP as secure key for those who are not having smartphones (Haller et al., 1998).

1.4 HISTORY OF VOTING PROCESS IN DIFFERENT COUNTRIES

In a democratic country, citizens have the right to elect the constitution, President/ Prime Minister, chamber of deputies/ senates, local government officials, etc. The Government organizes an election, informs the citizens, the type of election and the citizens' requirements to cast the votes. As Table 1.1 highlights, since 1700's till date, different methods are used to cast votes, from paper ballots to EVS.

Table 1.1 History of the voting process

Year	Voting Systems
1700's	Paper Ballots
1856	Australia-White Paper Ballots
1888	US adopts Australian White Paper Ballots
1920	Mechanical Lever Action
1950	Punch Card Machines
1980	Optical Scan Machines
1990	EVM
2000	Touch Screens
2009	Internet Voting
2011	Mobile Voting –Reality Show

1.4.1 Different Voting Systems and their Applications

A. Lever voting machine: Lever machine is essential to miss a gear, and every lever is allocated to compare applicants. The voter pulls the lever to survey for their most loved applicant. This sort of voting machine can number up the tallies naturally. Since its interface is not easy to use enough, giving some preparation to voters is vital.

B. Punch card: The voter utilizes a metallic opening punch to punch a clear poll gap. Consequently, it can tally votes if the voter's aperture is inadequate, the outcome is presumably decided wrongfully.

C. Optical voting machine: After every voter fills a circle related to their most loved competitor on the clear poll, this machine chooses the darkest imprint on every vote for the vote then figures the aggregate result. This sort of machine tallies up polls quickly. Notwithstanding, if the voter fills over the circle, it will prompt the blunder after-effect of optical-sweep.

D. Direct recording electronic (DRE) voting machine: This write, which is abridged to DRE, coordinates with the console; touch screen, or catches for the voter press to survey. Some of them lay in voting records, and numbering the votes is rapid. Be that as it may, the other DRE without continuing voting records are questioned about its precision.

Figure 1.2 depicts different components of the Diebold AccuVote-TSx system with the parts to be protected for the hackers.

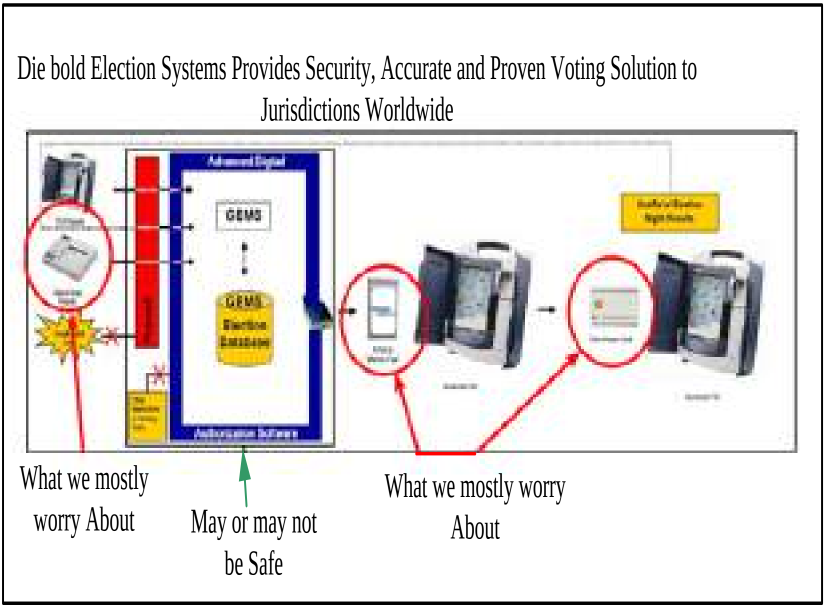

Figure 1.2: Diebold Security

The AccuVote-TSx TS and TSX are touch screen DRE voting machines that record vote on internal flash memory. It is secure and accurate Diebold AccuVote-TSx Memory card attacks are a real threat. The fact is that the incorrect [sic] results cannot be detected except by recounting the original paper ballots.

1.5 EVMS WORLDWIDE

- **Belgium**

On the 14th of October 2012, provincial and municipal elections were held in Belgium using EVM. Combination of a touch-based EVM (17"touchscreen), a bar code printer, a scanner, and an opaque ballot box (e-urn). The president's equipment is started using the USB received from the Ministry of Interior (or local elections, its equivalent at a Regional level).

Voting Booth + Barcode voting ballots:

- Use chip card reader (i.e., Barcode reader) to activate voting computer
- Use touch screen machine to mark candidates using inductive pen
- Print voting ballot

Figure 1.3 depicts the machine with the prints out a voting paper containing two parts (a machine-readable part and a human-readable part).

Figure 1.3: Voting in Belgium

- **USA**

Figure 1.4 depicts the Diebold AccuVote-TS and is more up to date. It is one of the most broadly sent electronic voting stages in the United States. In the November 2006 general decision, these machines were utilized as a part of 385 regions speaking to more than 10% of enlisted voters.

Figure 1.4: Voting System in the USA

In US, 2012 elections included many federal elections on voting day, November 6th, 2012. most highly, the 57th presidential election, senate elections (where33 seats were decided), and the house of representatives elections used EVM(to elect all 435 members of the house for the 113th United States Congress).

- **Brazil**

Figure 1.5 depicts an electronic voting machine comprised of a miniaturized scale terminal and a voting terminal. In small-scale terminals, voters are distinguished through their voting card numbers. Voters cast their polls in the voting terminal.

Figure 1.5: Voting System in Brazil

- **In India**

The Indian government introduced EVM in 2000.For initial testing, the EVM was used in few constituencies, later in 2004, and in 2009, it was introduced all over the country. Voter validates their ID card with poll-officer, poll-officer allocate a slot to vote. Voter presses button in line to the candidate name and symbol on successful voting; the voter can hear a beep sound. Figure 1.6 depicts, control and voting units of EVM.

Figure 1.6: Voting System in India

- **Namibia**

Presidential and National Assembly Elections were held on November 28th 2014. To understand how different EVS and technologies work, Electoral Institute for Sustainable Democracy in Africa (EISA) deployed technical observer teams to three countries that have used different electronic voting systems, namely the Philippines (2010) and Brazil (2010). More recently,in the 2014 Namibian general elections ,EISA deployed a pre-election assessment team ahead of and during Namibia's general elections.The Namibia general races November 28th 2014, were the principal such races in African nation leading a national race utilizing electronic voting [EISA] (Gefen et al., 2005).

Figure 1.7: Voting System in Namibia

To understand how different EVS and technologies work, EISA deployed technical observer teams to three countries that have used different EVS, namely the Philippines (2010) and Brazil (2010), and more recently, the 2014 Namibian general elections.

The introduction of EV into the Namibian elections first started being discussed in 2004. The challenges faced in the counting and tabulation processes in 2009 elections led to a delay in the announcement of the election results and the use of EVMs found itsway into the 2009 Electoral Act. As a result of this, the Electoral Commission of Namibia (ECN) began purchasing Indian-manufactured EVMs.

Electronic voting (EV) refers to the use of electronic systems to cast and count votes. It includes punch cards, optical sweep frameworks, DREs, and EVMs. It is precarious to conduct a comprehensive pilot project in different environments and at different levels (urban, rural, and remote areas) before deciding. Organizing hacking competitions where computer experts and other concerned parties are invited to find external weaknesses in the EVM to test the system is also a good exercise. Aside from money-related results, a pilot undertaking's results ought to contemplate the shareholders' trust and information.

1.6 SURVEY OF EARLIER NEAREST WORK

- **Software Block Diagram and Flowchart of EVM**

Kharche et al. proposed a "Portable voting framework" for the voter's online enlistment. Furthermore, disconnected enrolment is accessible for voters if there is an occurrence of the disappointment of online enrolment for a specific decision plan. After enrolment, the voters will cast the votes, and results will be shown, and some flowchart is appeared (Kharche et al.,. This framework to succeed mobile telephone, election commission server, election commission database, votescollection, and results from stage and election commission office were required.

Ali et al. (2013) worked on an "Effective E-voting Android Based System" for the progression in the cell phones, remotes, and web innovations offered to ascend to the new application that will make the voting procedure simple and proficient . Using SMS: every voter can vote by sending an SMS utilizing any versatile association line or any portable handset to the framework through the "Portable Switch Center". For such sort of framework, an android application is made in android telephone. The framework will begin executing a few procedures on that SMS which the voters send into the server through a system. A My-SQL database is introduced on the server-side to send an outcome back to the voter by the android framework application (Mohammed et al., 2013).

- **Hardware EVMs**

Microcontroller based EVMs

Kamaraju et *al*. (2016)show a system designed using a GSM modem as in figure 1.8. Here two mobile phones are used. One is a transmitter another one is a receiver. The receiver mobile is interfaced with the microcontroller AT89S 8252. Transmitter mobile is voter's mobile (Kamaraju et al., 2016).

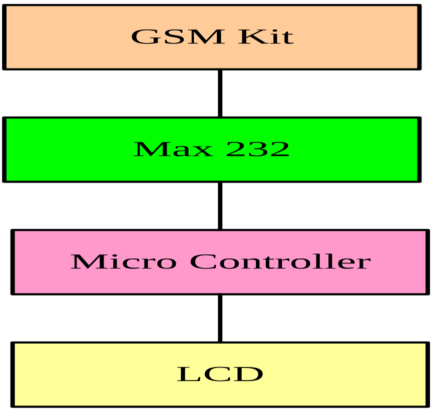

Figure 1.8: Block diagram of E-voting using SMS

- **Microcontroller Based EVM**

Figure 1.9 depicts the simplest EVM with the following components:

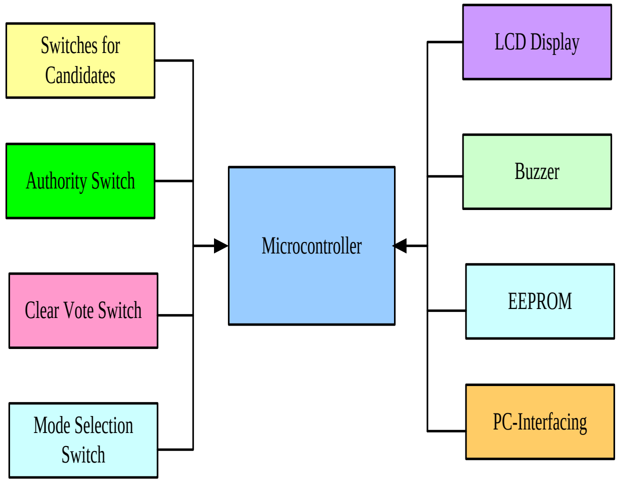

Figure 1.9: Micro-controller based EVM

1.7 CONCLUSION

This paper discussed the essentiality of E-voting systems in the current days. It also illustrates E-voting's essential features with respect to both software and hardware-based systems as well as looking at various election models and frameworks. Highlights on the evolution of E-voting systems in different countries and discussions on the effectiveness of the E-voting systems over conventional offline voting systems.

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ASSESSING EFFECTS OF MICROFINANCE INSTUTIONS ON EMPOWERMENT OF WOMEN ENTREPRENEURS

By: Dr. SEKIBIBI Ezechiel,

Dr. KADAFI Misago Isaie ,

DUKUNDANE Jean Pierre and

TWIZERIMANA Hertier

ABSTRACT

The general objective of this study will be to assess effects of microfinance institutions on empowerment of women entrepreneurs in Rwanda. The target population in this study were women entrepreneurs of Duterimbere Microfinance that have registered and legally accepted as customers. A survey was conducted as the method of systematically acquiring and recording information from the given population.

The researcher collected the information from 100 respondents by visiting places of businesses of some members who participated in the study. The research findings revealed the respondents' to capacity access on health insurance increased after joining financial institutions whereby the means respondents' capacity to access on health insurance increased from 2.65 before to 4.35 after joining micro-financial institutions by testing hypothesis, using t t-test analysis where (df)=99, p-value =1.959 (critical two tails was used) the significant level is between 0.05 above (p≥□), this implies that there is statistically significant difference between means of two sample.

Research findings shows that there is a strong positive correlation between the total loans granted by Duterimberi and the deposits that has been made by women at Duterimbere banks where the is the correlation coefficient is 0.99, this implies that when women get chance to have access on the credit, their ability to save increases. the research results indicates that there is higher positive correlation between the total loans granted to women by Duterimberi microfinance and the evolution of women clients at 0.99 , this implies that more women will join micro-finance *when banks increases its women loans portfolio.*

Keyword : micro-finance, socio-economic development , t-test

1.INTRODUCTION

Microfinance is the provision of a broad range of financial services to poor low-income households and micro enterprises. (Amin S. and Pebley A. R. 1994). Research interest in the issue of access to microfinance particularly by women has been on a resigning trend in 21st century. In developing economies, low-income women are often victims of societal suppression and abuse; while their counterparts in developed economies are victims of lending discrimination, it is therefore argued that lending to women may help empower them economically and socially. (Bennett L. and M. Golberg, 1993).

The heightened interest in the gender dimension of microfinance in recent years stems from the fact that women are often seen as instruments for societal change and development and as such, empowering them may be of great benefit to society (William ablorh, 2011). The Access to credit by women has therefore become the main subject of many global and regional conferences, seminars and workshops. Experts have widely acknowledged the substantial contribution of small and micro enterprises (of which women participation constitute larger percentage) to the socio-economic development of a nation. Therefore the need to support them to grow. It is therefore no exaggeration to state that, the most important goal, which every society in the contemporary world has set for itself, is to empower its women to be able to afford basic necessities of life such as food, clothing and shelter; as well as be part of decision making in the home and community. In many societies in Africa, which Rwanda is no exception, women are not fully integrated into the socio-economic development process and one of the possible implications is that, these societies are deprived of their full utilization of their human resource capabilities and potentials (Meyer c. 1992).

The Education, in its true sense brings some level of empowerment and once a woman is empowered it will subsequently lead to a reduction in poverty in various societies, education helps women to contribute meaningfully to development through participation in decision making which has been perceived to be the prerogative of men.

Statement of the Problem

In Rwandan historical and cultural understanding, women were less considered than men, especially in rural area and poor families. Wives controlled internal family issues such as the use of farm proceeds, but men more closely oversaw and managed the family property, leaving women with less control over household decision-making. The majority of women were employed in low skilled labor poor paid positions where they are exposed to health hazards. Moreover some government systems did not facilitate women to take initiative for business development. Then, most women in Rwanda are largely involved in advantageous positions to engage themselves in enterprises activities due to their reproductive role in their family, (PRSP, 2005).

Rwandans who are lower income earners, majority of them are women who try to do small scale businesses but they are confronted by different problems. Some of these problems are lack of access to bank loans, lack of management and technical skills, record keeping difficulties, lack of relevant information, low levels of post primary education among women and their disproportionate burden inside the home all which pose a great obstacle to their businesses' success. The resulting effects are that the lower income earner women do and ultimately fail to contribute towards the provision of their family needs such as shelter, food, clothing, education and their own needs (Watson & Dunford, 2006).

Despite having many microfinance institutions in Rwanda with their good mission in place, many poor women remain disadvantaged. The research is therefore set to identify the role microfinance institutions on development of women' entrepreneurs in general. After conducting a national coverage of reviews, the research could not find a similar subject scope being researched in Duterimbere Microfinance. Hence, the research gap to bridge after the successful completion of this study.

2. LITERATURE REVIEW

Bailey Kenneth D. (1978) defined a literature review as a systematic, explicit and reproducible method for identifying, evaluating and interpreting the existing body of recorded work produced by the researchers, scholars and practitioners. It focuses on the views and literature related to the topic given by other writers and authors. This entails mainly the definitions and all necessary details about women and microfinance institutions. **2.1. Problem associated with women entrepreneurs in Rwanda**

According to (Nsengimana, Robertson K. , and Chux ,2017) in their research that has been that has been conducted on 398 women entrepreneurs operating formal and informal business in the city of Kigali. The results suggest that women entrepreneurs face a number of challenges in running their businesses in Kigali. These challenges are not limited to among others, the lack of collateral to obtain loans, high taxes, a lack of information technology skills and access, high interest rates, high transport costs, a lack of entrepreneurial skills, but are also compounded by cultural and psychological factors. Therefore, our view is that, it will take time and the combined efforts of women entrepreneurs themselves, society, their families, government, researchers and other stakeholders to overcome these challenges.

2.2. Empirical study on the impact of micro financial institutions on socio-economic development of women

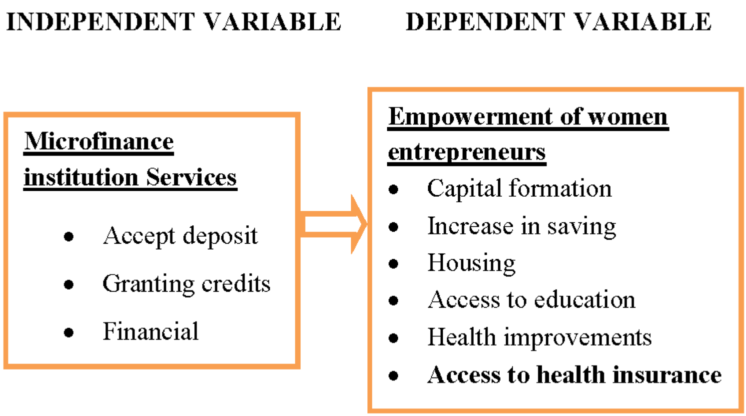
A study by (Roomi 2005), identified various obstacles faced by women entrepreneurs in Pakistan in the startup and development phases of their business. Women face a mobility barrier, which includes travel for business purposes, not only as a result of poor infrastructure but also due to the social and cultural norms that have discouraged them from going outside and moving freely from childhood. This limited mobility often restricts their choice of business, with most women engaging in businesses that do not require mobility and which also, typically, only require contact with other women, for example, beauty salons.

The women trying to develop their business face barriers like non acceptance of women's authority by male employees and find it difficult to establish credibility with customers and suppliers due to their gender (Roomi, 2005). These attitudes are not only reflected in the women's difficulty in accessing finance but this additional barrier compounds the constraints they face.

According to (S. Al-hassan 2017) in his paper where he investigates the impact of microcredit as a women's empowerment strategy. It draws from various impact assessment studies on microcredit programmes in Ghana, Cameroun and Gambia to examine issues on health and nutrition, education and skills development, income generation and, savings and investment as well as critique microcredit policies and strategies. It reveals that microcredit programmes are primarily reaching low income, moderately poor micro-entrepreneurs as target beneficiaries because majority of households have been able to acquire basic durable assets, such as bicycles, cooking pots, basins and roasters (cylinders). It concludes that microcredit programmes have positive impacts on women and the poor in spite of their challenges.

According to (Saida Parvin,2017), The study demonstrates popular beliefs about microfinance often misguide even the borrowers and they start living in a fabricated feeling of empowerment, facing real challenges to achieve true empowerment in their lives. The impact of this finding is twofold; firstly there is a theoretical contribution, where the definition of women's empowerment is proposed to be revisited considering findings from these cases. And lastly, the policy makers at governmental and non-governmental organizations, and multinational donor agencies need to revise their assessment tools for funding.

A sample of 30 employees serving in the study area; Umoja Women Entrepreneur Programme, a microfinance Institution in Nakuru Town were approached through questionnaire to collect primary data. Secondary data was collected from relevant books, journals, theses, government publications, research reports, and various web sites. Analysis of data employed descriptive statistic. It was established that availability and accessibility of microfinance institutions to women investors is way above average. Further, the study established that microfinance institutions play a positive role on women who invest in them by: increasing their well- being, access to and control of their resources, eradicating illiteracy among women, taking part in decision making in their households as well as economic decisions and finally microfinance institutions have boosted women's self-esteem.



3. RESEARCH METHODOLOGY

This section reflect on the research design of the study, data collection tools and techniques, and the hypothesis testing of the study.

3.1 Research design

The design of the study is analytical in nature. According to Bridget and Cathy (2005), a research design can be explained as the "detailed blueprint" used to guide a research study toward its objectives. According to Bailey (2005), research design provides "the glue" that holds the research project together. In this study, a mix together of descriptive and explanatory research design was adopted. This research design is both a quantitative and qualitative research in the way of quantitative measures is helped to collect statistical data from staffs and customers of Duterimbere. The sample will be representative allowed in generalization of the findings.

This research design is both a quantitative and qualitative.

The target population in this study were 4308 customers of Duterimbere Microfinance that are legally registered.

The sample size was determined by the help of YAMANE formula. Yamane (1967) provides a simplified formula to calculate sample sizes. This formula was used to calculate the sample sizes and as shown below:

$$n = \frac{N}{1 + N(e)^2}$$

Where n is the sample size, N is the population size, and e is the marginal of error (0.1).

$$n = \frac{4308}{1 + 4308(0.1)^2} = \frac{4308}{1 + 43.08} = \frac{4308}{44.08} = 100$$

3.2. Data Collection Techniques and Tools

Data collection helps to clarify the facts (Kombo and Tromp 2006). This study used primary data (questionnaire)

THE *t* TEST OF SIGNIFICANCE: DECISION RULES

Type of hypothesis	H_0: the null hypothesis	H_1: the alternative hypothesis	Decision rule: reject H_0 if
Two-tail	$\beta_2 = \beta_2^*$	$\beta_2 \neq \beta_2^*$	$\|t\| > t_{\alpha/2,df}$
Right-tail	$\beta_2 \leq \beta_2^*$	$\beta_2 > \beta_2^*$	$t > t_{\alpha,df}$
Left-tail	$\beta_2 \geq \beta_2^*$	$\beta_2 < \beta_2^*$	$t < -t_{\alpha,df}$

Notes: β^*_2 is the hypothesized numerical value of β_2. $|t|$ means the absolute value of t.

ta or *ta/*2 means the critical t value at the a or $a/2$ level of significance. df: degrees of freedom, (n − 2) for the two-variable model, (n − 3) for the three variable model, and so on. The same procedure holds to test hypotheses about β_1. (Damodar N. Gujarati, 2001).

Since we use the t distribution, the preceding testing procedure is called appropriately the t test. In the language of significance tests, a statistic is said to be statistically significant if the value of the test statistic lies in the critical region. In this case the null hypothesis is rejected. By the same token, a test is said to be statistically insignificant if the value of the test statistic lies in the acceptance region (Damodar N. Gujarati,2001).

4. RESEARCH FINDINGS

4.1.1. Age

The age of respondents is presented in the table below.

Table 4.1: Respondents age

Age	Number of respondents	Percentage (%)
Between 18- 35	20	20
between 36- 45	30	30
Above 45	50	50
Total	100	100

Source: Primary data, November 2020

The data show that the majority 50% of respondents who have been working with Duterimbere Microfinance are aged above 45 years old. This implies that women that at maturity will likely to engage in business activities due to different reasons , such as responsibilities on their families, divorce, etc…..

Table 4.2: Ubudehe category of respondents

Ubudehe category	Number of respondents	Percentage (%)
Category 2	67	67%
Category 3	33	33%
Total	100	100.0

Source: Primary data, November 2020

The majority of the respondents 67% are in category 2 followed by 33% who are in category3. In Rwanda the socio-economic categories are ranked from 1-4, depending on social-economic capacity, for example, for citizen who can have own house, plot, car, savings, are classified in categories 3. This implies that microfinance have varieties of clients but the main target clients are those women who wants to move from category 2 to category 3. (Medium-low income earners)

Table 4.3: Capacity of respondents to access health insurance

t-Test: Paired Two Sample for Means		
	Before	*After*
Mean	2.67	4.35
Variance	1.132424242	0.5126263
Observations	100	100
Pearson Correlation	0.776223345	
Hypothesized Mean Difference	0	
Df	99	
t Stat	-24.71063303	
P(T<=t) one-tail	1.95989E-44	
t Critical one-tail	1.660391157	
P(T<=t) two-tail	3.91978E-44	
t Critical two-tail	1.9842169	

Source: Primary data, November 2020

Health is directly related to the ability to work and the productivity levels and the income generated thereafter. Before getting the loans from Duterimbere Microfinance, mean score of respondents' on Capacity to pay for medical insurance was 2.67 which indicates, but after having credit at Duterimbere Microfinance the mean score on capacity to have access on health reached at 4.35 which indicate a strong mean score. This implies that credit offered by Duterimbere Microfinance enabled its beneficiaries to have access on health insurance: By using s statistical table on t-distribution, The research results shows that: degree (df) =99, p-value =1.959 (critical two tails) the Significant level is between 0.05 above (p≥□), this implies that there is statistically significant mean difference on living after they joined bank at 2.5%

TABLE 4.4. Access to electricity and potable water

In Rwanda, only 57 per cent of the population access safe drinking water that is within 30 minutes of their home. When children spend time collecting water, it often keeps them out of school. This is an issue especially for girls, who are often expected to take on the majority of household tasks.[1]

Table 4.5: Access to electricity and potable water

t-Test: Paired Two Sample for Means		
	Before	*After*
Mean	2.4	4.4
Variance	0.848484848	0.6464646
Observations	100	100
Pearson Correlation	0.872871561	
Hypothesized Mean Difference	0	
Df	99	
t Stat	-44.49719092	
P(T<=t) one-tail	1.45385E-67	
t Critical one-tail	1.660391157	
P(T<=t) two-tail	2.90771E-67	
t Critical two-tail	1.9842169	

Source: Primary data, November 2020

1 https://www.unicef.org/rwanda/water-sanitation-and-hygiene

As it represented in the above table, the respondents have revealed the information that shows the access to potable water and electricity was not the same before and after getting loan from Duterimbere. This is shown by a weak mean of 2.4 and strong mean of 4.4 after getting credit of Duterimbere and the heterogeneity standard deviation of 0.848 and 0.646 before and after indicating that respondents have common understanding on the statement above. The researchers based on the statistics concluded that the loans from Duterimbere have greatly improved the respondents' capacity. The research results shows that: (df) =99, p-value =1.66 (critical two tails was used) the Significant level is between 0.05 above ($p \geq$ □), this implies that there is statistically significant at 5% level.

4.3.4. Ability to build a house

It was important to determine what kind of house the respondents had before and after starting to use the loans from Duterimbere.

According to the WHO (2008) several illnesses result from poor housing facilities including acute respiratory infections from indoor air pollution (Pollution from burning wood, animal dung, and other bio-fuels). Therefore improving the housing conditions by either purchasing a new house, repair or extension is of interest for this analysis.

Table 6: Ability to build a dwelling house and repair

t-Test: Paired Two Sample for Means		
	Before	*After*
Mean	2.01	3.84
Variance	0.717070707	1.2266667
Observations	100	100
Pearson Correlation	0.680240764	
Hypothesized Mean Difference	0	
Df	99	
t Stat	-22.3941771	
P(T<=t) one-tail	7.72414E-41	
t Critical one-tail	1.660391157	
P(T<=t) two-tail	1.54483E-40	
t Critical two-tail	1.9842169	

Source: Primary data, November 2020

The table above aim to assess the respondents' ability to buy or build house, as presented in the above table, that respondents' ability to build or to buy a house was valued at mean score of 2 before joining micro finance, but after they joined microfinance their ability to build increased from 2.01 to 3.84. This implies that working with bank not avail the opportunities to make small scale business, but it also provide opportunities to invest in long term projects. The research results shows that: (df) =99, p-value =1.66 (critical two tails was used) the Significant level is between 0.05 above (p≥□), this implies that there is statistically significant at 5% level.

4.3.5. Contribution of Duterimbere on education of the children

Although education is supposed to be subsidized in Rwanda, money is needed to buy school uniforms and other basic needs especially for primary and secondary school.

Table 7: Capacity of women to pay school fees of their children in private schools

t-Test: Paired Two Sample for Means		
	Before	*After*
Mean	2.2	4.11
Variance	0.828989899	0.7074747
Observations	100	100
Pearson Correlation	0.489811801	
Hypothesized Mean Difference	0	
Df	99	
t Stat	-20.67719497	
P(T<=t) one-tail	5.23674E-38	
t Critical one-tail	1.660391157	
P(T<=t) two-tail	1.04735E-37	
t Critical two-tail	1.9842169	

Source: Primary data, November 2020

This shows that before getting credits from Duterimbere the mean is 2.2 means that it is founded between 2.50-4.49 which is weak but after the means increased up to 4.11. This implies that the capacity of women entrepreneurs in to pay school fees increased after joining micro finance significantly. The research results shows that: (df) =99, p-value =1.66 (critical two tails was used) the Significant level is between 0.05 above (p≥□), this implies that there is statistically significant at 5% level.

4.3.7. Respondents ‘ability to secure their future (savings)

The saving capacity of individuals whether in business or not is a sign of a good financial situation of that person. Saving is mostly done after satisfying the basic needs in a household but also it must be a good practice taught to business people.

Table 8 : Saving capacity before and after getting loan from Duterimbere Microfinance

t-Test: Paired Two Sample for Means		
	before	*after*
Mean	23410.52632	78631.57895
Variance	316223292.3	421384098.5
Observations	100	100
Pearson Correlation	0.706399968	
Hypothesized Mean Difference	0	
Df	99	
t Stat	-29.52122553	
P(T<=t) one-tail	1.22614E-49	
t Critical one-tail	1.661225856	
P(T<=t) two-tail	2.45228E-49	

t Critical two-tail	1.985523395	

Source: Primary data, November 2020

The study showed that after the beneficiaries got the loan there was a remarkable social economic development.

The research results shows that: (df) =99, p-value =1.66 (critical two tails) the Significant level is between 0.05 above (p≥□), this implies that there is statistically significant at 5% level.

4.4. Analysis of impact of microfinance on socio-economic development of women entrepreneur by using correlation

By correlation analysis the research gathered some available data at Duterimebere microfinance that can support in analysing the socio-economic development, such as the volume of deposits made by women, volume of savings, and the number of clients that have been created at Duterimbere Microfinance banks.

Table9. Function tables of variables

women .Loans FRw'000	Women deposits	current account (women)	T.Loans FRw'000
542,108	752,389	18,028	1,322,215
752,430	1,093,642	24,033	1,600,915
1,200,898	1,863,284	32,361	2,435,899
2,210,378	3,338,696	44,521	4,093,293

Source: finance report , duterimbere

Table 10. Matrix correlation between the loans and women made deposits, loans, number of women' current accounts at duterimbere banks

	Total loans	Deposits {women}	Women {loans}	Women {clients}
Total loans	1			
Deposits {women}	0.999345986	1		
Women {loans}	0.999554812	0.999305731	1	
Women {clients}	0.985610442	0.990999485	0.986290975	1

Source: research results, 2020

The research results indicates that there is higher positive correlation between the total loans granted to women by Duterimbere microfinance and the evolution of women-clients @ 0.99 , this implies that more women will join micro-finance when banks increases its women loans portfolio.

5. CONCLUSION

This paper aim to analyze the impact of micro finance institution of social economic development of women' entrepreneur in Rwanda the research findings that:

The research results revealed that, that respondent's ability to build or to buy a house increased from of 2.01 mean to 3.84 after joining microfinance institutions. This implies that working with micro finance bank, not avail the opportunities to make small scale business, but it also provide opportunities to invest in long term project.

The respondents have reported that their average saving before joining was around 78,630 Rwandan francs but after joining the micro finance institution, their savings capacity increased from 78,630Rwandan francs to 23,400 Rwandan francs.

All these benefits are attributed to good use of the loan from Duterimbere that financed clients' activities, hence saving higher money. The researchers realized that after the beneficiaries got the loan there was a remarkable social economic development.

By correlation analysis the research gathered some available data at Duterimebere microfinance that can support in analysing the socio-economic development, such as the volume of deposits made by women, volume of savings, and the number of clients that have been created at Duterimbere Microfinance banks.

The research results indicates that there is higher positive correlation between the total loans granted to women by Duterimbere microfinance and the evolution of women-clients @ 0.99 , this implies that more women will join micro-finance when banks increases its women loans portfolio.

Recommendation

Despite the positive impact of microfinance institutions on social economic development on women entrepreneurs, there are still numerous problems faced by women entrepreneurs in micro finance institutions. But the main problem faced by Duterimbere' beneficiaries is higher interest rate in comparison to the commercial banks that sometime leads them in loan defaults. On this issue we understand that banks can't risks to decrease the interest rate due to the risks associate with microfinance.'' So we like to call the help of government of Rwanda to intervene in operation of microfinance institutions:

By improving the existed approach of providing collateral on behalf of women through BDF Rwanda program. Even though there is policy of helping women entrepreneur through BDF, some of beneficiaries have reported that there is higher of being rejected for collateral program at BDF.

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THE ROLE OF POETRY IN REBUILDING A NATION: THE CASE OF POST GENOCIDE RWANDA

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ABSTRACT

Rebuilding nations that were destroyed by a number of factors or incidents calls for a number of mechanisms. Poetry as a genre of literature that emotionally portrays realities of the world is one of the factors believed to play a pivotal role in rebuilding a destroyed nation. Taking the example of Rwanda, the 1994 genocide against the Tutsi destroyed every sector of life and development in Rwanda. When the struggle to liberate the nation and stop the genocide came to a close, everything had been destroyed. The infrastructure was in shambles, the National Bank had been looted by the then government officials, people were suspecting one another, and rebuilding had to start from almost a scratch. Days after the country was liberated, a transitional government dubbed, 'Government of Unity' was instituted with mission to rebuild the country and restore peace and hope.

This new government had to resort to a number of strategies to better embrace its mission of developing the country while restoring peace and hope among Rwandans. It is at this stage that annual commemoration of the genocide perpetrated against the Tutsi was introduced. Year in, year out poets joined the rest of Rwandans to commemorate the genocide and denounce its ills. Messages of oneness, hope, reconciliation, and development were delivered on a number of occasions. With such poetic messages, politicians found it easy to urge Rwandans to join hands and shape a better future for their motherland.

This study sought to tackle the contribution of poets to rebuilding Rwanda with key indicators justifying how they contributed. Like any other human work, the researcher recommended that Rwandan poets should establish a forum binding them together to better publicize their deeds. It was also recommend that Rwandan poets should have their poems published and posted on the internet to easily be found by researchers or any other person wishing to benefit from them. Similarly, it was recommended that the Ministry of Culture should empower poets since they are not only the guardians of the language and culture but also actors of national development.

Key words: Poetry, literature, national building, unity and reconciliation.

1. INTRODUCTION

Rwanda's history goes back to the era of the iconic figure, ' Gihanga Ngomijana' believed to have initiated this land of a thousand hills. History has it that when Gihanga was at the helm of the kingdom, he made sure all Rwandans enjoyed equal rights. This legacy was passed on generations after generations. The country was under dynastic rule, but still unity and patriotism prevailed among Rwandans. There were values of love, unity, patriotism, honesty, dedication to word, and the like.

Whenever the country could be attacked by invaders, all Rwandans would stand together to defend their homeland. They would grab their spears, bows, arrows and shields to chase the enemy back. Books describing the brevity of Rwandans put it that the country was forever invincible to the extent that one King argued, "Rwanda attacks, but it is never attacked. One secret was behind the invincibility of Rwandans, their unity. It is true that when people are together with the same ambitions, they get everything they want; and nothing can do them apart as they old adage goes, "unity is strength."

However, this oneness did not perennially last. The 19th Century recognized the arrival of white explorers who were subsequently followed by their fellow colonizers in early 20th Century. Their arrival jeopardized a number of things including administration, living style, and other sectors of life. Seeing the king at the helm of monarchy scared them a bit and they thought of weakening the power this king had across the country. These white colonizers knew that the only way to dictate Rwandans was through dividing them. 'Divid et impera(divide and rule)' was their tool for gaining supremacy over the king and the rest of Rwandans.

The ideology of ethnic groups started taking a new twist. Before the arrival of white people, Rwandans were referred to as Hutu, Tutsi and Twa to respectively mean agriculturalists with less than ten cows, those with more than ten cows and those whose lives mainly depended on hunting. In other words, it was the number cows that would determine the social class one belonged to. Sometimes a son and his father could not share the social class owing to the number of cows they possessed. This was because cows symbolized wealth and greatness. Contrary to this, the white settlers built on the three social classes to harbour divisionism among Rwandans. For them, the three categories were not classes of wealth but ethnic groups. This started simmering hatred and divisionism among Rwandans ever since.

For white colonizers, it joy beyond measure to see Rwandans falling apart. Their mission was materializing. Rwanda was first colonized by Germany and later on by Belgium. During the rule of Belgians, the kingdom was overthrown to pave the way for the First republic whose reign continued the work which white colonizers had started. Hate and discrimination were highly championed by this republic. Tutsis were marginalized in almost every sector of life. Very few of them would join the army, pursue academic qualifications, or take part in decision making organs. Overthrowing of the kingdom made many

Rwandans flee the country for their safety.

Decades later, the refugees found it an option to return to their homeland by whatever means. Like any other liberating army, they had a name that bound them together, RPF (Rwandese Patriotic Front) with armed wing known as RPA (Rwandese Patriotic Army). The liberation struggle started in 1990 and ended in 1994 after more than one million Tutsi had been killed [http://cnlg.gov.rw]. The pogroms would later on be recognized by the United Nations as the Genocide against the Tutsi. [UN General Assembly Report, 2018, www.un.org/].

Having overthrown the predominantly divisive government, the liberators initiated a new government whose motto was unity, work and patriotism. This motto unequivocally tells what the vision of the new government was. It was to champion unity as the pillar of development. This is also recognized by Rwanda's Constitution of 2003 with Amendments through 2015 in its preamble which states that peace, security and reconciliation of the people of Rwanda are the pillars of development. For this government to fully embrace its desired targets, many players including poets had to lay their construction brick. Poems would be recited at various occasions and mostly during commemorations of the genocide against the Tutsi. Poems rotated around love, unity, reconciliation, development and themes instilling hope among Rwandans. Indeed, the unity and reconciliation are also promoted in Rwanda through the preamble of the Constitution of Rwanda which points out the following:

> "We people of Rwanda are committed to building a state based on consensual and pluralistic democracy founded on power sharing, national unity and reconciliation, good governance, development, social justice, tolerance and resolution of problems through dialogue."

The researcher discussed the role of poets in rebuilding Rwanda, a country whose economy was heavily shaken during the genocide perpetrated against the Tutsi.

2. PROBLEM STATEMENT

The rebuilding agenda of Rwanda has been a task many people had a stake in. Politicians led the rebuilding agenda by putting in place strategic goals towards the desired future. The country had to first of all heal from the wounds of the genocide and then chase its development goals. Along this journey, politicians have not been alone. They did not do everything singlehandedly. Poets were among other players who spread messages of hope, peace, development, unity and reconciliation to help Rwanda move faster towards a brighter future. However little is said about this unwavering contribution of Rwandan poets. They are unsung heroes. The researcher therefore wanted to pay much attention to this hidden gold and make it known by members of the human family so as to properly benefit from what the gold has to offer. Poets shine bright like the morning star. They can be seen when they recite or write their verses and stanzas. Thus, allowing this guiding star to shine uninterruptedly would be an option that will never be regretted. There is need to allow poets and empower them to stand tall and impact lives in and outside the country.

3. RESEARCH OBJECTIVES

This study was guided by two forms of objectives: The main and specific objectives as highlighted below:

3.1. Main objective

The main objective of this study was to find out the role of poetry in rebuilding a nation with Rwanda taken as a case study.

3.2. Specific objectives

The study sought to meet the following specific objectives:

- To investigate the extent to which poets contributed to rebuilding Rwanda
- To find out challenges faced by poets in their career
- To suggest ways through which these challenges can be addressed

4. RESEARCH QUESTIONS

Questions are believed to be guiding tools towards the completion of a scientific study. It is in this respect that the researcher set the following questions:

- To which extent did the Rwandan poets contribute to rebuilding Rwanda?
- What are the challenges facing Rwandan poets in their day to day life?
- What should be done to address those challenges?

5. HYPOTHESES OF THE STUDY

Aware that a hypothesis is a supposition made on the basis of limited evidence as a starting point for further investigation, the researcher formulated the following hypotheses:

- Rwandan poets contributed considerably to rebuilding Rwanda in the post genocide period.
- Rwandan poets face career challenges.

6. SIGNIFICANCE OF THE STUDY

It was after realizing that a study on the role of poets to national building is important that the researcher grabbed a pen to write. This study is therefore significant in that it will enable poets to know the unwavering contribution they have in the society to get out of their comfort zone and deliver more life transforming poetic messages. Besides, the government will find this study a source of information as it will get to know that poets are torchbearers who need to be given the floor to inspire the rest of Rwandans.

7. LITERATURE REVIEW

7.1. Origin of poetry

Unlike other literary forms that we can date to precise texts and time periods, it's a challenge to pinpoint the earliest work of poetry. In one form or another, poetry has been around for thousands of years. However, we might think of the epic poem as the first instance of poetry, appearing as early as the 20th century B.C. Jumping hundreds of years ahead, we might turn, then, to the sonnet form and its early appearance in the 13th century. Before moving into more modern poetic forms, it's important to consider Restoration poetry of the 17th century and the satirical verses of John Dryden and Alexander Pope.

Many people find it hard to tell when the first poem was written. The origin of poetry is not easy to seek out in antiquarian bookstores. However, the *Epic of Gilgamesh* often is cited as one of the earliest works of epic poetry, dating back to the 18th century B.C. Consisting of Sumerian poems, it's a text that was discovered through many different Babylonian tablet versions during archaeological excavations. Other examples of early epic poems might include the *Mahabarata* and the *Ramayana*, the latter of which has become an important narrative in both Hindu and Buddhist mythology throughout regions of Asia. [https://blog.bookstellyouwhy.com]

7.2. African poetry

As Nwachkwu,A. (2005) argues, Poetry is about the oldest literary genre in Africa. And perhaps it is also the only genre that is continually and communally created as people share common experiences. The written tradition of poetry in Africa is a comparatively recent experience which, to all intents and purposes, was encouraged by western edification and contact. Moreover, the years of denigration of African culture, the years of slavery and colonialism, of spiritual and psychological domination required the African to make some concerted effort to redress the situation. For many African writers there was that recognition that the story they had to tell could not be told fort them by anyone else no matter how gifted or well-intentioned.

The African poetry started in an oral format and later on translated into written after the introduction of formal education on the continent. Oral Poetry from Africa contains poems and songs which comment upon the whole range of human experience; poems of praise and celebration; poems to amuse and entertain; poems of love and of loss; work songs and protest songs.[http://landegwhite.com]

One example of a poem from an African poet, is Opening of the borders. Below is an extract of the poem calling for countries to champion bilateral relations and brotherhood instead of being egocentric.

It deeply touches and bothers

When closed are a country's borders:

Sealed, helpful channel of a trade

Of super grade.

They needlessly suffer,

Who chiefly feed from neighbour's offer,

To their radios, a glued concerned ear,

Wanting to a different news hear.

7.3. Rwandan poetry

As the foster Queen Mother of King Ruganzu II Ndoli (1510-1543), Nyiraruganzu II Nyirarumaga played a central role in institutionalizing the use of poetry to perpetuate the history of the reigns of Rwandan monarchs. She is considered the mother of Rwandan poetry.

Her poem, Umunsi ameza imiryango yose (the day she became the matriarch of all families), tells the story of Nyamususa, the wife of Gihanga, who founded the Nyiginya monarchy. Legend has it that Nyamususa bore three children, each of whom inherited a kingdom from their father: Kanyarwanda was bequested Rwanda, Kanyabugesera, Bugesera, and Kanyendorwa, Ndorwa.

Nyirarumaga composed this poem as a model for a new historiographic poetic form called Impakanizi. Its form can be viewed as a necklace –urunigi, in which every king's history is added like a pearl/bead –isaro. This was basically a new system of conserving the country's literature through poetry. [https://www.newtimes.co.rw]

But this has also been a blessing in disguise, considering that Rwanda is a unilingual country. The net effect is that, today, as has been the case over the years, some of the biggest names in Rwandan poetry still happen to be those that deliver their poems in their native language. For many Rwandans, poetry is one of those rare avenues through which they get to vent their grief and anger at past tragedy, especially the 1994 Genocide against the Tutsi. Poetry, therefore, also becomes an avenue through which people try to understand the politics of the day, by linking present to past. [https://www.newtimes.co.rw]

Post genocide poetry centred on themes such as peace building, unity and reconciliation. This was due to the fact that the social bond binding Rwandans together had been destroyed. As the country embarked on a rebuilding agenda, poets decided not sit inactively.It is in the same vein that poet MUNYANEZA Vedaste contributed to the drafting of the National Anthem, Rwanda Nziza. The National Anthem is a symbol of the nation as stipulated in article 9 of the Constitution of the Republic of Rwanda which states, *" The National Symbols of Rwanda are the National flag, the motto of the Republic, the Seal of the Republic and the National Anthem..."*.

Therefore, poets had to rally alongside the government to spread love and the spirit of brotherhood. They had to remind Rwandans of the values that guided their forefathers in the pre-colonial era; the values of honesty, love, patriotism, unity, brotherhood, and the like. As a typical example, the extract of the poem by Malaika Uwamahoro expounds:

"Rwanda is not Hotel Rwanda,

We will not be defined by the genocide,''

Rwanda is birds and lakes,

We are united, back home,

Where I come from.

7.4. Rwandan values

As Mukarugomwa et al. (2014) explain, “Values can be defined as broad guidelines on which the Rwandan society can be founded. They are composed of complex philosophical ideas and behaviours which reflect a person’s way of life that reveals his personality and gives him dignity as a person in his family or community. Values direct every person towards doing the right thing as well as deterring him from evil.”

Like any other country, Rwanda has values which have been in existence since time immemorial. They include, mutual respect, self-empowerment, self confidence, politeness, personal care, rwandanness(ubunyarwanda), covenant(igihango), conviviality, sharing of the first fruits of a Harvest(Umuganura), assistance, use of the Kinyarwanda language, cooperation, love, satisfaction, tolerance, humbleness, advising, fulfilling agreements, patience, honesty, gratefulness, carefulness or diligence, integrity, transparency, rapid service delivery, good customer care, good time management, fighting against injustice, prudence, fighting against corruption, truthfulness, respecting laws, being a patriotic citizen, devotion, bravery, avoid discrimination,... As the values insinuate, Rwandans are urged to be united for the betterment of their nation and their wellbeing.

7.5. Rwanda's rebirth from scratch to greatness

Destroying anything is as easy as felling off a log. But rebuilding what has been destroyed costs an arm and a leg. This is what happened to Rwanda when the liberation struggle along with the genocide perpetrated against the Tutsi took place. It is worth noting that genocide is defined by the Statute of the International Criminal Tribunal for Rwanda in its article 2 as follows: " Genocide means any of the following acts committed with tthe intent to destroy in whole or part, a national, ethnical, racial, or religious group, as such:

a) Killing members of the groups;

b) Causing serious bodily or mental harm to members of the group;

c) Deliberately inflicting on the group conditions of life calculated to bring about its physical destruction in whole or part;

d) Imposing measures indented to prevent birth within the group;

e) Forcibly transferring children of the group to another group.

Linking the definition to the context of Rwanda, the genocide against the Tutsi was committed by killing members of Tutsi ethnic group. The genocide in question was a devastating blow for all sectors of life in the country. However, the economy started taking a promising shape shortly after the genocide was stopped. To date, the national annual budget has grown bigger than ever before. *"The proposed revisions to the 2020/21 budget reflect changes in the resource envelope as well as the corresponding adjustments on expenditures. As a result of the proposed changes, the total budget is projected to rise from Frw 3,245.7 billion to Frw 3,464.8 billion showing an increase of Frw 219.1 billion."(MINECOFIN, 2021).*

8. METHODOLOGY

This study relied on a number of techniques to be accomplished. The researcher opted for techniques such as unstructured interview, questionnaire, and documentation. The unstructured interview played a significant role in gathering data and getting testimonies from the respondents on whether poetry in the post genocide era is one of the strategies used by the government to revive unity and restore peace countrywide. The questionnaire was another tool that the researcher used to come up with data. Before handing the questionnaire to informants, a sample population had to be decided on. Since there is no known forum of poets, the researcher centred on the

City of Kigali and randomly selected poets and other people who might have knowledge on poetry and its role. It is against this background that 150 respondents were randomly picked and given copies of the questionnaire to indicate what their views were. As for documentation, this was the most reliable source of information. E-books and physical libraries were visited to furnish the researcher with the data needed for the completion of the study.

9. DATA ANALYSIS AND INTERPRETATION

As earlier mentioned, 150 respondents were handed copies of the questionnaire to share their views on the role of poetry, especially the post genocide poetry, in rebuilding Rwanda. The decision to solely use 150 respondents emerged after realizing that there is no known forum of poets in Rwanda. Hence, the researcher had to randomly select his subjects. Below are statistics and more information on what the respondents provided as far as the questions they were asked are concerned.

9.1. Gender distribution of the respondents

Gender balance plays an undeniable role in making findings of a research more reliable. Owing to this, the researcher collected data from both men and women who shared their views on questions asked. The table below provides information on gender distribution of respondents.

Table 1: Distribution of respondents according to their gender

Gender	Number of respondents	Percentage (%)
Male	105	70
Female	45	30
Total	150	100

Source: Field survey results, February, 2021

As expounded in Table 1, it is clear that the majority of the respondents were male whose representation is 70% of all the respondents, while female respondents were represented at 30%. Though respondents are not equally represented in terms of gender, it is clear that both female and male respondents took part in the study and this contributes to the avoidance of bias.

9.2. Age distribution of respondents

Since respondents' perceptions may differ from age categories, the researcher deemed it worthwhile to know their gender.

Table2: Presentation of respondents according to their age

Age group	Number of respondents	Percentage (%)
Between 20-25	53	35.3
Between 26-35	61	40.6
Above 36 years old	36	24
Total	150	100

Source: Field survey results, February, 2021

Table 2 shows that 61persons corresponding to 40.6% of the respondents are aged between 26 and 35. The second group with greater percentage belongs to those aged between 20 and 25 who are represented at 35.3%. Besides, 36 respondents out of 150, i.e. 24% of the respondents are aged above 36 years. This insinuates that the respondents were all grown up enough to provide reliable information needed to complete this study.

9.3. Marital status distribution of respondents

Knowing the marital status of respondents is a prerequisite requirement in any research. The researcher deemed it necessary to inquire about the respondents' marital status since people's perceptions may vary depending on their marital status among other parameters.

Table 3: Presentation of respondents according to their marital status

Marital status	Number of respondents	Percentage (%)
Single	63	42
Married	82	54.6
Divorced	2	1.3
Widowed	3	2
Total	150	100

Source: Field survey results, February, 2021

The data from Table 3 reveal that the majority of the respondents 82 (54.6%) are married. This group is followed by single respondents 63(42%), while divorced and widowed respondents are represented at lower percentages 1.3% and 2% respectively. These figures are very promising since married people and those yet to be married are believed to be mentally stable, hence the results garnered from these respondents cannot be doubted.

9.4. Educational background of the respondents

If there is any parameter of utmost significance in carrying out a research, it is informants' level of education. When people are educated, they are mostly believed to be careful in making choices or deciding though not all of them adhere to this.

Table 4: Presentation of respondents according to their marital status

Educational background	Number of respondents	Percentage
PhD holders	2	1.3
Master's Degree	34	22.6
A-level certificate	84	56
Primary school	21	14
No formal education	9	6
Total	150	100

Source: Field survey results, February, 2021

As vindicated by statistics in Table 3, of the 100 respondents, 2 are PhD holders, 34 are Master's holders, 84, Advanced level graduates, 21, completed their Primary school while 9 have no known formal education. These statistics are beyond doubt good for conducting a study since at least the majority of the respondents can read and write, things needed to be a modern poet. However, though nine (9) respondents have no formal education, this does not mean that they vainly took part in the study.

Testifying on poetry does not require one to know how to write or read because before colonialism, Rwandans were incredible poets whose poems had metrical feet yet there were no schools. Therefore every respondent contributed significantly to the attainment of the objectives of this research.

9.5. Verification of the hypotheses

The section below analysed the answers given by respondents as well as the testimonies from the interview so as to verify the hypotheses of this study. The Likert Scale was on one hand used with respondents indicating whether they strongly agree (SA), agree (A), strongly disagree (SD), neutral (N) or disagree (D).

9.6. Respondents' views on peace messages among poets

Peace is always believed to be the pillar of any development. Aware of this, the researcher wanted to find out whether post genocide poets include peace as a theme in their messages.

Table 5: Peace messages among poets

Variable	Answer	Number of respondents	Percentage
Poets spread peace messages in the post genocide era	**SD**	0	0
	D	0	0
	N	0	0
	A	58	38.6
	SA	92	61.3
TOTAL		**150**	**100**

Source: Field survey results, February, 2021

Results in Table 5 succinctly show that 58 out of 150 respondents, i.e. 38.6% agreed that poets have been releasing poems whose themes include peace. In the same perspective, 92 out 150 respondents, i.e. 61.3% strongly agreed that peace is one of the themes that never miss while post genocide poets are composing their pieces. To supplement this, one may look at the following poem by Issai Mashingo, 'The Rains in Rwanda':

Tribal hatred fueled by the west,

When will Africa come to rest?

And understand that we are one race,

One love one place one earth,

Let's have love and peace, [Hello Poetry, 2014)

One of the interviewed respondents who preferred anonymity supplemented this and said, "As *a country whose peace was disturbed over two decades ago, our poets find it an opportunity to preach peace so that the tragedy that hit Rwanda may never happen again*."

9.7. Respondents' views on unity and reconciliation messages among Rwandans

Unity and reconciliation are some of the themes that have been leading the rebuilding journey of Rwanda. Aware of this, the researcher sought to find out whether poets play a role in championing unity and reconciliation.

Table 6: Unity and reconciliation messages among poets

Variable	Answer	Number of respondents	Percentage
Poets spread or still spread unity and reconciliation messages in the post genocide period	**SD**	0	0
	D	0	0
	N	0	0
	A	56	37.3
	SA	94	62.6
TOTAL		**150**	**100**

Source: Field survey results, February, 2021

Table 6 sheds light on respondents' views on whether Rwandan poets spread unity and reconciliation messages to continue helping Rwandans to heal and economically move forward. In view of this, 94 out of 150 respondents, i.e. 62.6% strongly agreed that poets spread and still spread unity and reconciliation messages in the post genocide period. In the same vein, 56 out of 150 respondents, i.e. 37.3% agreed that poets have been disseminating unity and reconciliation messages ever since genocide was stopped. To understand this better, one may have a glance at the following poem by Asiimwe Ruhindi, 'Ode to Motherland':

We remember not to revenge

But to learn from our history x2

To unite and save our future

A thousand candles are lit

Every year as a sign of peace

We want to pass on to

Our children and generation after them

We walk in the same rhyme [The New Times, 2019]

This poem makes it clear in its first, third and last verses that the author is testifying and preaching unity and reconciliation among Rwandans. When revenge is not the way to go, then people can reconcile and live together. If people are united, it is true as the author said that it is possible to have a brighter and shared future. The author adds that Rwandans nowadays walk in the same direction. They share good and bad as children of the same motherland. Therefore, poets have never lagged behind in preaching unity and reconciliation as tools towards sustainable economic development.

9.8. Respondents' views on development oriented messages among poets

Table 7: Development messages among poets

Variable	Answer	Number of respondents	Percentage
Development is one of the themes centered on by Rwandan poets to urge fellow compatriots to battle for their motherland's progress.	**SD**	0	0
	D	0	0
	N	0	0
	A	59	39.3
	SA	91	60.6
TOTAL		**150**	**100**

Source: Field survey results, February, 2021

As Table 7 expounds, 59 out of 150 respondents, i.e. 39.3% agreed that Rwandan poets find development as one of the themes to prioritize while passing their message across. Similarly, 91 out of 150 respondents, i.e. 60.6% strongly agreed to the variable. Still on whether poets spare some of their precious minutes on Rwanda's development as a theme, Amina Umuhoza's poem '**the sparkle of the sun', has more:**

As the tear drops cannot return to where they came from

We cannot change our past, but we change our future with

Reconciliation as the fountain of development

Ndi umunyaRwanda is the cornerstone of our solidarity and we belong to The same family as we forgive and ask for forgiveness

As visibly seen in the above poem, the author reiterates that though it is hard to take back the hands of time, it is possible to decide how the future will be like. In other words, Rwandans can shape a better future despite the darkest days they passed through. The same author adds that with reconciliation, development is within reach.

9.9. Respondents views on whether poets play a role in commemorations of the genocide against the Tutsi

Table 8: Role of poets during genocide commemoration events

Variable	Answer	Number of respondents	Percentage
Poets play a pivotal role in annual commemorations of the genocide perpetrated against the Tutsi	**SD**	0	0
	D	0	0
	N	0	0
	A	51	34
	SA	99	66
TOTAL		**150**	**100**

Source: Field survey results, February, 2021

Table 8 indicates that 99 out of 150 respondents, i.e. 66% strongly agreed that that poets play a pivotal role during annual commemorations of the genocide perpetrated against the Tutsi; while 51 out of 150 respondents, i.e. 34% agreed to the statement. Given this, the researcher deduced that the role of poets during commemorations of the genocide perpetrated against the Tutsi is remarkable. This is corroborated by The New Times (2019), *"**Through** the beautiful art of poetry, young poets and poetesses have scripted heartfelt poems with inspiring messages meant to support the country in this period of commemorating the 1994 Genocide against the Tutsi."* The poem by Eric NGANGARE, 'On Memory and Hope', is also a good example justifying the role of poets during annual commemorations of the genocide against the Tutsi:

Have faith in darkness when the stars and the moon don't shine

If you can make it through the night, well, the sun will rise like a prize

I wish you find purpose and relief before you get to rest

You survived the worst; I hope you live to see the best

For what it's worth, you're worth it [The New Times, 2019]

9.10. Respondents views on whether poets face challenges

Table 9: Challenges facing poets

Variable	Variables	Frequency	Percentage (%)
Challenges impinging on poets lives	Lack of shared forum	87	58
	Limited knowledge and skills	2	1.3
	Lack of maximum recognition	22	14.6
	Limited finances	30	20

Results in Table 8 indicate that 87 respondents, i.e. 58% agreed that the lack of a shared forum is the leading challenge thwarting projects of poets. Additionally, 30 respondents, i.e. 20% added that limited finances are also bottlenecks that put poets' dreams at stake. Also, 22 respondents, i.e. 14.6% mentioned the lack of maximum recognition as being one of the challenges facing poets; while only 2 respondents, 1.3% put it that limited knowledge and skills also some of the challenges hampering poets' projects. To interpret the statistics, one can say that the lack of a platform that binds together all poets from across the country is the major challenge that shutter down poets' aspirations. This is true of any case since unity is strength. In a bid for people with the same talents or career to succeed, they need to work together as no man is an island, as the saying goes.

In contrast, having limited knowledge and skills cannot be an impediment since poetry does not require people with the highest education; it instead requires the person with passion and talent. Thus, anyone can be a poet or poetess if they are dedicated and talented.

Based on the above data therefore, it is obvious that poets contributed and still contribute to the rebuilding of Rwanda, a country that had terribly been hit by the genocide perpetrated against the Tutsi in 1994. The economy of the nation had completely gone down, infrastructure destroyed, education maimed, and many other sectors of life being at sixes and sevens. Of course the rebuilding or restoration of the economy cannot solely be attributed to poets but they are without doubt players like any other people who played their role. Despite this commendable contribution, poets still work in a state of disarray with no clear know platform. There is no forum binding them together. They are rarely recognized. This success story and the challenges of poets therefore are facts beyond doubt that the first and second hypotheses were verified and confirmed.

10. CONCLUSION

The study at hand sought to find out the role of poetry in rebuilding a nation, Rwanda as a matter of fact. As the findings revealed the role of poets has undeniably been remarkable in the reconstruction journey of Rwanda. Like any other sections of Rwandans, poets have been giving the government a hand as the country struggled to recover from the overarching effects of the genocide perpetrated against the Tutsi in 1994. Messages of love, patriotism, development, unity and reconciliation were spread and are still being spread by poets to restore peace in Rwanda while propelling its economy.

Nowadays, Rwandans live in all corners of the planet. When one travels across the globe, they find Rwandans in almost each and every country. This has interested the political regime to be scheduling annual events commonly known as 'Rwanda Day' for visiting those Rwandans in their respective host countries so as to urge them to invest back in their home country. The annual event mostly with the President of the Republic at the forefront attracts Rwandans from all walks of life including poets.

The poets entertain their fellow compatriots in moving poems at the same time urging them to uphold patriotism and love among themselves. There is no single Rwanda Day that was organized without poets on stage.

This justifies their relevance and impeccable contribution in the rebuilding agenda. In a nutshell, the findings of this work indicated at a greater percentage that the respondents agreed that poets are the driving force towards peace and sustainable development in Rwanda.

11. RECOMMENDATIONS

Since no human work can claim to be completely perfect, the researcher recommended the following to concerned individuals and institutions:

- Rwandan poets should establish a forum connecting them and make it known among the public;
- Rwandan poets should have their poems published and posted on the internet to easily be found by researchers or any other person wishing to benefit from them;
- The Ministry of Culture should empower poets since they are not only the guardians of the language and culture but they are also actors of national development.

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ANALYSIS OF MACROECONOMIC DETERMINANTS OF EXCHANGE RATE IN RWANDA

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ABSTRACT

The main objective of this paper was to investigate the causes of depreciation of Rwandan currency against US Dollars from 1993 to 2019.

The statistics of exchange rate in Rwanda have shown that Rwandan currency has been registering depreciation over time since 1993, until end 2019 which. This highlights the fact that in past 25 years the Rwandan francs lost its value which is critical to Rwandan economy and investment in general. Therefore, this research investigates the key drivers that influence the exchange rate in Rwanda. The Rwandan purchasing power parity, exports, import, inflation rate, Gross Domestic Product and external debts have been identified as variables that influence the exchange rate in Rwanda. Data for analyzing determinants of exchange rate in Rwanda were collected from World Bank annual reports, BNR and MINECOFIN. In order to analyze data the Ordinary Least Square method was used.

Though the Rwandan currency has been recording the depreciation against US Dollars, it is worth noting that Rwanda has made notable progress in reducing external imbalances which has helped safeguard macroeconomic stability and improved prospects for long term growth. Exchange rate adjustment has been the central tool of policy adjustment, supported by public spending restraint and prudent monetary policy. Combined with targeted policies to promote domestic production, these

policies have reduced the current account deficit and should place external balances on a sustainable path over the medium term.

Research findings indicate that independent variables explain dependent variables at 86%. This goes to say that the model is fitted, i.e. variables identified are effectively those which determine exchange rate. However results from long run equation show that main factors which determine exchange rate are imports, exports and GDP. An increase of 1% of import in Rwanda increases exchange rate by 1.43% keeping all other variables constant. This implies that the more we import goods and services the more the Rwandan currency is depreciatedagainst United State dollars, because import will increase the need (demand) of United State dollar. An increase of 1% in GDP decreases in the exchange rate by 0.02%. An increase of GDP means an increase of production in long run. If production is diversified and competitive, exchange rate is appreciated because exports increase. Also, if exports increase by 1%, exchange rate decreases by 0.79%. More the country exports, more it earns foreign currencies, fewer national currency is depreciated.

Results indicate that there is cointegration as ADF value= -9.831849 is less than test critical value (-2.660720) at 1%; there is a long run relationship in the model. There is a long run relationship in the model. Residuals of the long run equation have no unit root. Also, according to econometric analysis in short run independent variables don't explain the exchange *rate rather they impact on it in the long run as we notice it previously while analyzing the long run equation. Apart from GDP probabilities of other variables are superior to the critical values of 0.01, 0.05 and 0.1.As exports and imports are the main determinants of exchange rate, the Government of Rwanda is advised to apply policies that decrease the balance of payment deficits, by implementing policies that increases the volume of exports.*

Diagnostic tests performed in this research show that multiple regression fits the data. The estimators of the model are BLUE (Best Linear Unbiased Estimator), classical assumptions should have been verified. Indeed after analyses we noticed that residuals are stationary, there is no serial correlation and there is no auto-correlation. Also there is homoscedasticity and parameters are stable.

Key word: ***Exchange rate, ppp, gdp, inflation rate, imports, exports and foreign debts***

I. INTRODUCTION

Developing countries are characterized by economic imbalances which includes budget deficit (Ngaboyisonga, 2009). Among factors of economic destabilizationin developing countries we can quote the long term decrease, budget deficit, money depreciation, inflation and balance of payment deficit. Money depreciation is harmful for the economy. Unfortunately it is an old reality in developing countries since several years due to the weakness of low developed countries products competitiveness on international market which gives birth to the trade balance deficit. The organization of international financial system and the reality imposed to countries by the market mechanism functioning at international level have played as an endogenous variable explaining money depreciation in developing countries. Indeed, the economic liberalism advocated by international financial institutions ended at money fluctuations, i.e. a floating exchange rate system.

Following the collapse of the Bretton Woods system in 1973, the fixed exchange rate system was abandoned and the countries were left to fluctuate their money. For countries adopting a floating exchange rate system, exchange rate volatility has become an inevitable fact of life. Exchange rate volatility corresponds to large fluctuations around the balance value of the exchange rate or short-term fluctuations around the long-term trends of the exchange rate (Oaikhenan and Aigheyisi, 2015)

In other words, the exchange rate volatility is a variation of the price of one currency in another currency. Volatility refers to all movements and changes that are effective in depreciation or appreciation of a currency. The profitability of foreign exchange transactions is affected by the appreciation or loss of foreign currency(Vinh and Thi, 2019)

Exchange rate volatility is associated with unpredictable movements in relative prices in the economy. For this reason, exchange rate stability is one of the main factors affecting foreign (direct and portfolio) investments, price stability and stable economic growth(Ajao, 2015).

Excessive exchange rate volatility leads to delays in investment decisions, causing uncertainty in the economy. The uncertainty that is caused by volatility also negatively affects economic growth by affecting investment and investor confidence, productivity, consumption, international trade and capital flows. (Oaikhenan, Aigheyisi, 2015).

Exchange rate volatility leads to high degree of uncertainty in ensuring price stability and economic growth and in setting macroeconomic and monetary policy targets. Finding reasons for real exchange rate volatility due to possible negative effects is important in terms of developing appropriate economic policies to minimize fluctuations.

Although there is no consensus on the causal factors of exchange rate volatility, many factors have been identified in the literature. Some factors are mostly country-specific.

Trade openness, capital flows, economic growth rate, level of financial development, foreign reserve level, external debt and the current exchange rate regime are among the commonly mentioned factors. The extent to which each factor affects exchange rate movements depends on the method used, the period of analysis and the economic conditions prevailing in each country.

Rwanda is not exempted from the sad reality of money depreciation i.e. the fluctuation of exchange rate. During the decade 1980, following recommendations of international financial institutions Rwanda moved from stationary exchange rate to floating exchange rate. From that period, the country started experiencing money depreciation i.e. the decrease of Rwandan Francs value compared to foreign currencies. Thus, one can wonder which factors explain this fluctuation.

Therefore, the main purpose of this article is to analyze determinants of exchange rate in Rwanda in order to identify which factors explain the volatility of exchange rate in Rwanda in long run i.e. from 1993 up to 2019. In particular, the article focuses on the explanatory factors to money depreciation in Rwanda.

II. LITERATURE REVIEW

1.1. Theoretical literature review

In this theoretical literature review key the concepts exchange rate and other concepts related to the topic are defined. Also theories related to exchange rate as well as its determinants have been defined.

1.1.1. Key concepts definition

1.1.1.1. Exchange rate

An exchange rate is the rate at which one national currency is exchanged for another. It is also regarded as the value of one country's currency in relation to another currency (*Arthur, Steven and Sheffrin, 2003).*

1.1.1.2. Purchasing power parity

Purchasing power parity (PPP) is a measurement of prices in different countries that uses the prices of specific goods to compare the absolute purchasing power of the countries' currencies. In many cases, PPP produces an inflation rate that is equal to the price of the basket of goods at one location divided by the price of the basket of goods at a different location. The PPP inflation and exchange rate may differ from the market exchange rate because of poverty, tariffs, and other transaction costs (Krugman and Obstfeld, 2009).

1.1.1.3. Trade balance

The balance of trade, commercial balance, or net exports (sometimes symbolized as NX), is the difference between the monetary value of a nation's exports and imports over a certain time period (*O›Sullivan, Arthur; Sheffrin, Steven M. 2003). S*ometimes a distinction is made between a balance of trade for goods versus one for services. The balance of trade measures a flow of exports and imports over a given period of time. The notion of the balance of trade does not mean that exports and imports are «in balance» with each other.

1.1.1.4. Balance of payment

Balance of payment (BOP) can be defined as a relationship between the country's earning from abroad and its expenditures from abroad. According to (Sloman, John 2004) the balance of payments takes into account payments for a country's exports and imports of goods, services, financial capital, and financial transfers.

1.1.2. Theories on exchange rate

Several authors have theoretically discussed the concepts exchange rate focusing on its prediction and its connection with other macro economic variables. Therefore in this part of the research theories on exchange rate prediction have been presented. Theoretical determinants of exchange rate have also been discussed.

1.1.2.1. **Exchange rate prediction**

According to (Krugman and Obstfield 2009). Purchasing power parity is defined as measurement of prices in different countries that uses the prices of specific goods to compare the absolute purchasing power of the countries› currencies.

In many cases, PPP produces an inflation rate that is equal to the price of the basket of goods at one location divided by the price of the basket of goods at a different location. The PPP inflation and exchange rate may differ from the market exchange rate because of poverty, tariffs, and other transaction costs. PPP exchange rates are valued because market exchange rates tend to move in their general direction, over a period of years. There is some value to knowing in which direction the exchange rate is more likely to shift over the long run (Krugman and Obstfeld, 2009).

In neoclassical economic theory, the purchasing power parity theory assumes that the exchange rate between two currencies actually observed in the foreign exchange market is the one that is used in the purchasing power parity comparisons, so that the same amount of goods could actually be purchased in either currency with the same beginning amount of funds. Depending on the particular theory, purchasing power parity is assumed to hold either in the long run or, more strongly, in the short run. Theories that invoke purchasing power parity assume that in some circumstances a fall in either currency's purchasing power (a rise in its price level) would lead to a proportional decrease in that currency's valuation on the foreign exchange market.(Krugman and Obstfeld, 2009)

1.1.2.2. Determinants of exchange rate

Exchange rate is connected to several other macroeconomic variables. Its appreciation or depreciation is among factors taken into consideration to conclude on whether the economy is stable or not. The most important variables that determine exchange rate are: net export, GDP, external debt, net exports, purchasing power parity, and inflation.

a) Net exports

One of the studies dealing with these factors was elaborated by Hau (2002). Particularly, the author analyzes the openness of an economy and its impact on real exchange rate movements. H claims that trade integration and real exchange rate volatility are structurally linked and there is a negative correlation between them. As support, he uses a small open economy model with a tradable and a non-tradable sector. The solution of this model indicates that more open economies have a more flexible aggregate price level. This flexibility reduces the effect of unanticipated money supply shocks. It further results in lower real exchange rate volatility for countries with a higher openness of the economy.

b) **Gross Domestic product**

Purchasing power parity is an economic term for measuring prices at different locations. It is based on the law of one price, which says that, if there are no transaction costs nor trade barriers for a particular good, then the price for that good should be the same at every location (Krugman and Obstfield 2009).

Ideally, a computer in New York and in Hong Kong should have the same price. If its price is 500 US dollars in New York and the same computer costs 2000 HK dollars in Hong Kong, PPP theory says the exchange rate should be 4 HK dollars for every 1 US dollar.

Poverty, tariffs, and other frictions prevent trading and purchasing of various goods, so measuring a single good can cause a large error. The PPP term accounts for this by using a basket of goods, that is, many goods with different quantities. PPP then computes an inflation and exchange rate as the ratio of the price of the basket in one location to the price of the basket in the other location. For example, if a basket consisting of 1 computer, 1 ton of rice, and 1 ton of steel was 1800 US dollars in New York and the same goods cost 10800 HK dollars in Hong Kong, the PPP exchange rate would be 6 HK dollars for every 1 US dollar.

The name purchasing power parity comes from the idea that, with the right exchange rate, consumers in every location will have the same purchasing power. The value of the PPP exchange rate is very dependent on the basket of goods chosen. In general, goods are chosen that might closely obey the law of one price. So, ones traded easily and are commonly available in both locations. Organizations that compute PPP exchange rates use different baskets of goods and can come up with different values.

c) Purchasing power parity

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d) **External debt**

External debt (or foreign debt) is the total debt which the residents of a country owe to foreign creditors; its complement is internal debt, which is owed to domestic lenders. The debtors can be the government, corporations or citizens of that country. The external debt is irrelevant to the underlying currency. The state debt is split between debt denominated in the national currency and debt denominated in any foreign currency (IMF, 2015)

Kouladoum (2018) shows that external debt positively and significantly affects the real exchange rate at 5% significant level. Moreover, debt servicing affects negatively and significantly real exchange rate.

e) **Inflation rate**

Inflation is defined as persistent increase in general price level.When the inflation rate of a country raises, the purchasing power of money declines, the paper currency depreciates internally, and then the foreign currency appreciates. If both countries have inflation, the currencies of countries with high inflation will depreciate against those with low inflation. The latter is a relative revaluation of the former. According toTejvan (2019) if there is a depreciation in the exchange rate, it is likely to cause inflation to increase.

1.2. Empirical review

Several authors have been interested to the exchange rate and its relationship with other economic variables. In their article Khin et Al. (2017) investigated the exchange rate volatility on macroeconomic determinants in Malaysia using time series data from January 2010 to August 2016. The study employed the econometric analysis such as Vector Error Correction Method (VECM), Johansen Cointegration Rank test and Granger Causality test to derive the long-run and short-run relationships among the variables. The VECM model results indicated a significant and positive short-run relationship between exchange rate, consumer price index (CPI), and the lagged of the exchange rate. Besides, there is also a significant and negative short-run relationship between exchange rate and money supply.

However, interest rate is negatively and statistically insignificant related to exchange rate. Johansen Cointegration Rank test revealed the presence of cointegration and long-run relationship among the variables. The outcome of Granger causality test confirmed a bidirectional causal relationship between exchange rate and money supply. Both CPI and interest rate pointed their unidirectional causalities toward exchange rate. In addition, efforts on structural and institutional reforms are needed for financial sectors in order to deal with the changes caused by exchange rate volatility.

Paper employs the Partial Least Squares Structural Equation Modeling approach to analyze the impact of inflation, monetary policy rate, current account balance, money and quasi money supply per GDP, annual GDP growth rate and the total external debt on the Cedi to the US dollar exchange rate in Ghana with data spanning 1975–2014. The results show that the macroeconomic variables explain 82% of the adjusted variance in the cedi-dollar exchange rate with monetary policy rate, inflation and current account balance contributing 8.2%, 10.5% and 19.2% respectively.

Money and quasi money supply per GDP, total external debt and annual GDP growth rate contribute 15%, 14.9% and 15.1% respectively to the explained variance in cedi-dollar exchange rate. Whereas monetary policy rate, inflation and current account balance have negative relationships with the cedi-dollar exchange rate, money and quasi money supply per GDP, total external debt and annual GDP growth rate have positive relationships with the cedi-dollar exchange rate. These results underpin the conclusion that inflation, monetary policy rate, current account balance, money and quasi money supply per GDP, annual GDP growth rate and the total external debt are significant predictors of the cedi-dollar exchange rate in Ghana (Adusei and Yaw, 2017).

The study empirically investigated the factors explaining the volatility of the bilateral exchange rate of the naira to the U.S. dollar, using data for 1970-2013 period. The EGARCH modeling technique was used. The empirical evidence indicated that volatility of the naira exchange rate was characterized by clustering, strong leverage effect and moderate degree of persistence. It was found that increased net capital flows, greater integration of the Nigerian economy into the global market, deepening of the nation's financial system, favorable crude oil prices, increase in the level of external reserves as well as economic growth were germane to dampening conditional volatility of the country's exchange rate. It was also found that external debt and monetary expansion had the potential to exacerbate volatility in the exchange rate. Policies recommended to mitigate volatility of the exchange rate included greater integration of the economy into the global market, which implies diversification of the country's export base, less reliance on external borrowing, building up and maintaining a robust external reserves position, financial system development and use of contractionary monetary policy to control broad money growth.(Olowe, R. A. 2009).

The study of Ishak (2020) shows that Trade Openness, Reserve Assets, and Stock Market Index negatively and significantly determined The Exchange-rate volatility. Productivity positively and significantly determined The Exchange-Rate Volatility. While Bank Intervention positively but not significantly determined The Exchange-Rate Volatility and Inflation negative but not significantly determined The Exchange-Rate Volatility. In order to reduce the exchange-rate volatility, the authority will reduce productivity and increase Trade Openness, Reserve Assets, and Stock Market Index.

Researches of Zerrin (2018) ended at results that there exist a long-term relationship between the variables reveal that LGFCF, LMONEY and LTRADE positively affects significantly, while LFDI, LGDPC, LGGEXP negatively affects real effective exchange rate volatility. Conclusion- The rise in domestic investment (LGFCF), money supply (LMONEY) and trade openness (LTRADE) increases the real effective exchange rate volatility, while the rise in foreign direct investment (LFDI), output (LGDPC) and government expenditures (LGGEXP) also reduces the real effective exchange rate volatility

However results of a research led by Juraj(2007) show that economic openness has a calming effect on exchange-rate volatility, news significantly affects volatility, and flexible regimes experience higher degrees of volatility. The extent of all these effects varies substantially across country.

III. RESEARCH METHODOLOGY

3.1. Introduction

Research methodology is a systematic way to address a problem. It displays how research is to be or has been carried out. Essentially, these are procedures used by researchers to go about their work describing, explaining and predicting phenomena. It is also defined as the study of methods with which knowledge is gained. It aims at providing the work plan to research (Rajasekar et Al., 2013)

Research requires use of tools or instruments to collect data and this chapter intends to make an overview of such tools. In this chapter, topics like research design,sample size, data collection, model specification, data analysis and processing will be developed

3.2. Sample size

For the purpose of this study, the sample has been taken from yearly data ranging from 1993 to 2019. This goes to mean that 26 observations have been selected. The reason behind is that an econometric analysis requires a long period to make results predictable.

3.3. Research design

Research design is a plan, structure and strategy of investigation so conceived as to obtain answers to research questions or problems. The plan is a complete scheme or program of research which includes an outline of what the researcher will do from writing the hypotheses and their operational implications to the final analysis of data (Kerlinger quoted by Ranjit, 2011).

This research requires the use of quantitative data. Time series annual data from 1993 up to 2019 were used. In economics and business fields, researchers often obtain data relating to a phenomenon over a time of period. Such data are called a time series. A time series is a set of ordered observations of a quantitative variable taken at successive points in time in terms of years, months, weeks, days or hours (Krishnaswami O.R. and Ranganatham M., 2011).

3.3. Data collection

For the sake of this research, secondary data were used. The secondary data are those which have already been collected by someone else and which have already gone through statistical process. In case of secondary data the nature of data collection work is merely that of compilation. Secondary data may either be published data or unpublished data.They can provide a useful source from which to answer, or partially to answer the research question.

The data required for the study were obtained from secondary sources that were used to investigate the relationship between dependent and independent variables. In the study, 26 years data (1993 to 2019) were collected from different source such as World Bank annually reports, BNR annual reports and MINECOFIN.

3.4. Model building

The study analyzed relationships between one research variable and several independent variables. The independents variables were measured using Gross domestic product (GDP), Inflation (IF), purchasing power parity (PPP), foreign debts (FD), imports (impt), and exports (expt). One USD/RWF was used as dependent variable

The functional form of the econometric model will be written as:

$Y = \beta 1 + \beta 2X + u$: *where* $\beta 2$= an estimated parameter, y=dependent variable, x= independent variables, and u=disturbance or error term

$$\mathbf{1Usd/Rwf = \beta 1 + \beta 2mpt_t + \beta 3PPP_t + \beta 4GDP + \beta 5FD_t + \beta 6Infl_t + \beta_7 expt_t + u}$$

Where:

Impt stands for imports

PPP stands for Purchasing Power Parity

GDP stands for Gross Domestic Product

Infl stands for inflation

Expt stands for exports

FD stands for foreign debts

Table1: Expected signs and parameters for the econometric model

Parameters	$\beta 2$	$\beta 3$	$\beta 4$	$\beta 5$	$\beta 6$	$\beta 7$
Expected signs	+	+	+	+	+	+

Source: The author

3.4. Data analysis and processing

In order to verify whether external debt has an effect on Rwanda economic growth from an economic point of view, an econometric analysis was carried out on data with exchange rate as endogenous variable. In this case, the E-views software is unavoidable. However, other methods such as analytical methods have been used.

To reach objective of this study, an econometric analysis has been used carried.

Modeling the determinants of exchange rate was the most important analysis conducted in this research. The model will be tested for Rwanda. The model to be developed here is a multiple regression model with several variables. In this research, time series have been used for the period 1993 up to 2019.

Data analysis has been done following these steps:

i) Data collection from World Bank, BNR and MINECOFIN

ii) Data transformation where needed

All data have been transformed into logarithm before regression in order to facilitate interpretations in terms of percentage.

iii) Time series determination

Data used for the econometric analysis were time series, that is, annual data from 1993 to 2019

iv) Stationarity test

Before the regression the unit root characteristics of the data were done. The stationarity test was done in order to allow using the Ordinary Least Squares (OLS) because when the series are non-stationary, OLS cannot be used. They may be a spurious regression.

The ADF is used to verify whether there is stationarity or not. When $ADF_{cal} < ADF_{crit}$: There is no unit root. Time series are stationary. In the opposite case series are not stationary.

v) Estimation of the long run equation

It helped to calculate coefficient and probability in order to determine the long run relationship between external debt and economic growth. The decision rule is such as the probability calculated must be inferior to the probability critical (1%, 5% or 10%). Also, in order to conclude that there is a positive long run relationship between endogenous variable and exogenous variables, coefficients should be positive, otherwise there is a negative relationship.

vi) Cointegration test

The objective of this test was to check whether residuals from the long run estimated model are stationary. There is cointegration when ADF calculated value is less than critical value at 1%, 5% or 10%. In this case, residuals of the long run equation have no unit root.

vii) Estimation of the short run equation

Error Correction Model was performed in order to test whether there is a short run relationship among variables in the model. There is a short-term relationship in the model when probabilities of independent variables are below 1%, 5% or 10% critical values. Also, coefficients must be positive.

viii) Interpretation of results

All results were explained in order to verify whether results reached are connected to the main objective of the research, that is, to study the existence of relationship between external debt and economic growth in Rwanda.

ix) Correlogram squared residuals

This test is done in order to test auto-correlation. Non-autocorrelation assumption should be respected in the choice of the model.

The correlogram squared residuals tested whether the model contains any problem of residuals. There is autocorrelation when the error of period t influences the error of the following period t+1. There is no autocorrelation in the model when the probability calculated is greater than 1%, 5% or 10% critical value.

x) Normality test

Normality test has been performed on residuals to see if they are normally distributed through the Jacque-Bera test. When the Jacque-Bera probability is greater than critical probability (1%, 5% or 10%), the Ho is accepted i.e. residuals are normally distributed.

xi) Serial correlation

This test was performed in order to know whether there is absence of serial correlation or not.

In fact, the no serial correlation is one of classical assumptions that should be verified to say that the estimation is BLUE. The Ho of absence of serial correlation is accepted when the probability of $\chi 2$ is greater than 5 %, in the contrary case, it is rejected and the model has serial correlation.

IV. PRESENTATION AND DISCUSSION OF RESULTS

Analyzing the determinants of exchange rate in Rwanda was the main objective of this research. To reach that objective, an empirical analysis has been conducted. The main purpose of the econometric analysis was to test the long run relationship between exchange rate and purchasing power, inflate rate, gross domestic products, imports and exports. In order to establish the longrun relationship the Johansen co integration test and VECM test model were used.

1.1. Stationary test

Stationary (Unit root) is very important to examine whether the variables are either stationary at level I(0) or stationary at first difference I(1) before proceeding to the co-integration tests. This is because most of the finance and economics variables are non-stationary in their original form. To check the stationary of variables separately in the log forms, Augmented Dicky-Fuller test (ADF) test has been used.

Table 2: Stationarity test at level

Variables	T statistics	Prob	1%level	5%level	10%level	Comment
Lusdrwf	-2.547177	0.1170	-3.7240	-2.9862	-2.632	Non stationary
Lppp	-0.297746	0.9120	-3.7240	-2.9862	-2.6326	Stationary
Linfl	-4.117462	0.0006	-3.7240	-2.9862	-2.6299	Stationary
Limpt	0.599351	0.9867	-3.7240	-2.9862	-2.6326	Non stationary
LGDP	-11.16442	0.0000	-3.7240	-2.9862	-2.6326	Stationary
LFDA	-0.406515	0.8936	-3.7240	-2.9862	-2.6326	Non stationary
LEXPT	-0.392767	0.8961	-3.7240	-2.9862	-2.6326	Non stationary

Source: Econometric analyses

At level (0) only 3 variables (lppp, linfl, and lgdp) are stationary whereas (lfda, lexpt, limpt, lusdrwf) are non stationary. ADF calculated is superior to ADF critical. There is unit root.Whereas the model requires that all residuals to be stationary distributed. Therefore, researchers proceeded with the stationarity test at the first difference

Table 3: Stationarity test at the first difference

Variables	T statistics	Prob	1%level	5%level	10%level	Comment
Lusdrwf	-3.342845	0.0000	-3.73785	-2.9918	-2.6355	stationary
Lppp	-7.169389	0.0000	-3.7240	-2.9862	-2.6326	stationary
Linfl	-6.287913	0.0240	-3.73785	-2.9918	-2.6299	Stationary
Limpt	-4.810615	0.0008	-3.7378	-2.9862	-2.6355	stationary
LGDP	-8.438335	0.0000	-3.7378	-2.9918	-2.6326	stationary
LFDA	-3.739657	0.0100	-3.73785	-2.9918	0.0012	stationary
Lexpt	-4.046123	0.0049	-3.7378	-2.991	-2.6355	stationary

Source: Econometric analyses

From the results of the stationarity test at the first difference, series that were not stationary at level become stationary after the first difference, they are integrated of order one (I (1)). ADF calculated is inferior to ADF critical at 1%, 5% and 10% level margin of error. Therefore multiple the regression can be used.

1.2. Long run equation related to determinants of exchange rate

The following equation as presented in chapter three related to the research methodology are regressed using Eviews 11 to assess the impact of foreign debts, ppp, import, exports , inflation and Gdp on exchange rate (USD/Rwf).

Equation: **1Usd/Rwf= β1 + β2impt$_t$+ $\beta 3PPP_t$+ β4GDP+ β5FD$_t$+ β6Infl$_t$+β$_7$expt$_t$ + u**

Table 4: Results for long run equation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LPPP	-1.571458	0.604505	-2.599579	0.0171
LINFL	0.010202	0.035714	0.285646	0.7781
LIMPT	1.431859	0.362219	3.953024	0.0008
LGDP	-0.020010	0.075561	-0.264819	0.7939
LFD	-0.199816	0.112367	-1.778237	0.0906
LEXP	-0.790957	0.222393	-3.556581	0.0020
C	5.596313	4.794625	1.167206	0.2569
	0.862565	Mean		

Source: Econometric analysis

After the regression results obtained as regards the long run equation are presented as follows

1. If LPPP increases by 1%, unit of Rwandan franc to buy USD (LRWFUSD) decreases by 1.57%

2. If LINFL increases by 1%, unit of Rwanda francs to buy USD (LRWDUSD) increases by 0.0102

3. If LIMPT increases by 1%, unit of Rwandan francs to buy USD (LRWFUSD) increases by 1.43

4. If LGDP increases by 1%, Unit of Rwandan francs

to buy USD (LRWFUSD) decreases by 0.02

5. If LFDA increases by 1%, unit of Rwandan francs to buy USD (LRWFUSD) decreases by 0.19

6. If LEXP increases by 1% , the unit of Rwandan franc to buy USD (LRWFUSD) decreases by 0.79

After the regression results obtained as regards the long run equation are presented as :

LRWFUSD=-1.57*LPPP+0.0102*LINFL+1.43*LIMPT-0.02LGDP-0.19LFDA-0.79LEXP+5.59

R square = 0.86 ~ 86% .

P.VALUE = 0.017 for LPPP, 0.7781 for LINFL, 0.0008 for LIMPT, 0.7939 for LGDP, 0.0906 for LFDA, and 0.0020 for LEXP.

Discussion of results in long run

Based on the research that has been extracted from E-views independent variables explain dependent variables at 86%. Also, research results show that there is positive relationshipbetween Rwandan currency depreciation, imports and inflation. This implies that the more we import goods and services the more the Rwandan currency depreciation in terms of united state dollar, because import will increase the need (demand) of united state dollar, As demand of united state dollar increases the price (cost) increase, the results indicates the positive relationship between currency depreciation and inflation. The inflation affect the currency depreciation whereby it increase input cost of exports which makes Rwandan' export less competitive on international markets which will results in trade deficits which will therefore results in currency depreciation

The research results shows that negative relationship between Rwandan currency depreciation (LRWFUSD) with external debts, purchasing power parity index, exports volume, and gross domestic products.

External debts are not always economically good on countries' economy. But In Rwanda it is different story. Rwandan government used external debts to finance long terms projects, such as construction of hydro power stations, hospital, roads, national security. And those long term projects require a long payback period. That's why results indicate the positive correlation in long run. In fact when we invest in long terms projects at the end it brings a return (foreign currencies) that has an indirect external effect on private investments and production.

Purchasing power parity indicates the quantity of local currency needed to purchase the products of foreign product. The relative price of goods is linked to the exchange rate through the theory of purchasing power parity. As illustrated, PPP tells us that if a country has a relatively high inflation rate, then the value of its currency should decline, as the purchasing power of Rwandan francs increases the Rwandan currency appreciate.

Also, results show among variables selected, exports, imports, purchasing power parity and foreign debt are the most significant to explain the exchange rate as their probability are less than the margin of error of 10%. Economically it is meaningful because Rwanda imports more than it exports. Therefore there are less foreign currencies entering in the country compared to foreign currencies leaving the country.

1.3. Co-integration test results

The co-integration test was about to is to test the stationarity of the residuals. Results indicate that thereis cointegration as ADF value(-9.831849) is less than test critical value (-2.660720) at 1%; there is a long run relationship in the model. Residuals of the long run equation have no unit root. As long as there is cointegration, researchers proceeded with the Error Correction Model to see if there is also a short run relation among variables of the model.

1.4. Vector error correction model (ECM)

ECM is performed to test whether there is a short run relationship among variables in the model and it is done once we have a long run relationship. For each set of cointegrated variables there exists a valid error-correction representation of the data. This correspondence is expressed in the error correction term added in the ECM. The E.views7.1 generated results presented in the table below:

Table6: Results for Vector error Correction

Variables	Coefficient	Prob.
Speed of adj.	-0.007737	0.2546
LRWFUSD	0.481861	0.0013
LPPP	0.224142	0.1912
LINFL	0.008756	0.2098
LIMPT	0.100154	0.4996
LGDP	-0.106938	0.0077
LFDA	-0.012864	0.7665
LEXPT	-0.0222	0.7364
C(9)	-0.048352	0.0419

Source: Econometric analysis

After the regression equation of ECM, model is:

*DLRWFUSD =-0.007737*RESIDLR1 + 0.224142*DLPPP + 0.008756*DLINFL+0.100154*DLIMPT-0.106938*DLPGDP-0.012864LFDA-0.0222LEXPT-0.04352*

R-squared= 0.958536

Probability values are 0.1912, 0.2098, 0.4996, 0.0077, 0.7665 and 0.7364 respectively for LPPP, LINFL, LIMP, LGDP, LFDA and LEXP

These results show that in short run apart from LGDP other variables are not significant in short run since their probabilities are superior to the critical values of 0.01, 0.05 and 0.1. According to econometric analysis in short run independent variables don't explain the exchange rate rather they impact on it in the long run as we notice it previously while analyzing the long run equation.

1.5. Diagnostic test

The diagnostic tests performed on our regression are residual test and stability test.

1.5.1. Residual tests

a) Correlogram squared residuals

The test aims at showing whether the model contains any problem of residuals. Below are the hypotheses of the test:

Ho: Absence of autocorrelation of errors

H1: Presence of the autocorrelation of errors

Table 7: Probability of errors

Number of lags	1	2	3	4	5	6	7	8	9	10	11	12
Probabilities	0.37	0.46	0.62	0.39	0.51	0.41	0.45	0.55	0.64	0.68	0.76	0.822

Source: Results of the regression from the software E-views

These results confirm that there is no autocorrelation in the model because up to 12th lag the probability is greater than 1% critical value.

b) **Normality test**

Using E-views software, JACQUE-BERA was performed and the probability of JACQUE-BERA is equal to 0.97, greater than 1%. When the Jacque-Bera probability is greater than critical probability (1%, 5% or 10%), the Ho is accepted. The calculated probability is greater than critical probability; the Ho is accepted. The residuals are normally distributed. The normality of residuals shows that the residuals are stationary.

c) **Serial correlation**

The non-serial correlation is one of classical assumptions that should be verified to say that the estimators are BLUE. The following are the hypothesis of this test:

Ho: Absence (no) of serial correlation

H1: Presence of serial correlation

The Breusch–Godfrey test is a test for serial correlation. The Ho is accepted when the probability of χ^2 is greater than 5 %, in the contrary case, it is rejected and the model has serial correlation.

According to results of the analysis, there is no serial correlation in the model; the probability of χ^2(0.0742) is greater than 5%. The null hypothesis of the no serial correlation is accepted because the probability of χ^2 is greater than 0.05 (5%).

d) **Heteroscedasticity**

The heteroscedasticity test is performed to see whether the variance of residuals is constant and if the classical assumption of homoscedasticity is respected. The following are the hypothesis of the test:

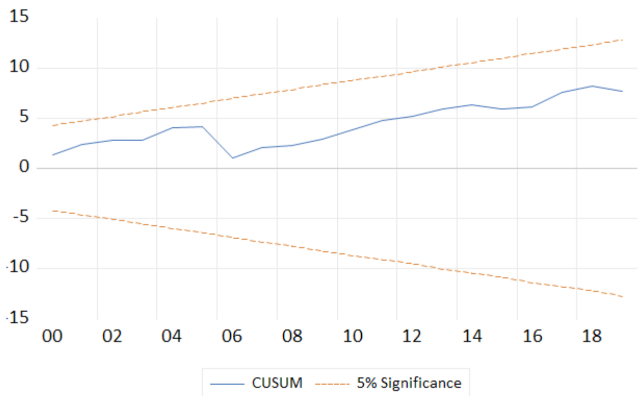
Ho: No heteroscedasticity (presence of homoscedasticity)

H1: Presence of heteroscedasticity (absence of homoscedasticity)

According to results found from the Breusch-Pagan-Godfrey test, the probability of $\chi2$ (0.8466) is greater than 10%, therefore the null hypothesis of presence of homoscedasticity is accepted. There is homoscedasticity, the variance of residuals of the model under consideration is constant.

1.5.2. Stability test

Stability test is conducted by the CUSUM TEST which tests are based on the cumulative sum of recursive residuals. The cumulative sum is plotted with the 5% critical lines and parameter instability is found when the cumulative sum goes outside the area between the two critical lines. The graph below was generated by E-views:



Parameters are stable because the cumulative sum does not get outside the area of two critical lines at 5% significance. This test is very important in Econometrics because when the parameters are stable, the predictions are possible with the model.

V. CONCLUSION AND RECOMMENDATIONS

5.1. Summary of results

The main objective of this paper was to investigate the determinants of exchange rate in Rwanda from 1993 to 2019. The research ends at results that Rwandan francs has been deteriorated compared to united state dollar USD. The research shows that exchange rate USD/RWD was 122 in 1993, while in March 2021 it is 980. It means that in past 25 years the Rwandan francs lost its value which is critical to Rwandan economy and investment climate in general.

Based on the research that has been extracted from E-views 11, the research results indicate that independent variables explain dependent variables at 86%. This goes to say that the model is fitted i.e. variables identified are effectively those which determine exchange rate. However results from long run equation show that main factors which determine exchange rate are imports, exports and GDP. An increaseof 1% of import in Rwanda ends at an increase of 1.43% increase of exchange rate. This implies that the more we import goods and services the more the Rwandan currency depreciation in terms of united state dollar, because import will increase the need (demand) of united state dollarAn increase of 1% in GDPends at a decreases of 0.02 in the exchange rate. An increase of GDP means an increase of production in long run. If production is diversified and competitive, exchange rate is appreciated because exports increase. Also, if exports increase by 1%, exchange rate decreases by 0.79%. The more the country exports, the more it earns foreign currencies fewer exchange rates depreciate.

Results indicate that there is cointegration as ADF value= -9.831849 is less than test critical value (-2.660720) at 1%; there is a long run relationship in the model. There is a long run relationship in the model. Residuals of the long run equation have no unit root.Also, according to econometric analysis in short run independent variables don't explain the exchange rate rather they impact on it in the long run as we notice it previously while analyzing the long run equation.Apart from GDP probabilities of other variables are superior to the critical values of 0.01, 0.05 and 0.1.

In order to make sure thatthe regression is meaningful **diagnostic tests** have been performed. The estimators of the model should be BLUE (Best Linear Unbiased Estimator), a set of classical assumption should be verified. After testing the short run, the supplementary tests are necessary to verify these classical assumptions. The diagnostic tests performed on our regression are residual test and stability test. The most important residual tests performed during this study were Jacque Bera test (to test whether residuals are normally distributed), the correlogram squared residuals**(** totest whether the model contains any problem of residuals i.e. there is no autocorrelation), the serial correlation and the Breusch-Pagan-Godfrey test (to test whether there is hetescedasticity or homoscedasticity)

JACQUE-BERA test was performed and the probability of JACQUE-BERA is equal to 0.97, greater than 1%. When the Jacque-Bera probability is greater than critical probability (1%, 5% or 10%), the Ho is accepted. The calculated probability is greater than critical probability; the Ho is accepted. The residuals are normally distributed. The normality of residuals shows that the residuals are stationary.

The serial correlation results indicate that the prob. value is greater than 0.05. This implies that there is no serial correlation in the model. Results related to the correlogram squared residualsconfirm that there is no autocorrelation in the model because up to 12th lag the probability is greater than 1% critical value.According to results found from the Breusch-Pagan-Godfrey test, the probability of $\chi 2$ (0.8466) is greater than 10%, therefore the null hypothesis of presence of homoscedasticity is accepted. There is homoscedasticity, the variance of residuals of the model under consideration is constant.

The Stability test shows the parameters are stable because the cumulative sum does not get outside the area of two critical lines at 5% significance.

5.2. Conclusion

During 25 past years money depreciation has been among characteristics of economic destabilization in Rwanda. Rwandan Francs has lost its values compared to foreign currencies, especially US dollar. Results of this research show that all variables identified as determinants of exchange rate are correlated to exchange rate. The coefficient of determination or r-squared is 0.86. It means that the model is fitted. Imports, exports and GDP have been identified as main factors that explain exchange rate. More Rwanda imports, more it needs foreign currencies and more the supply of Rwanda Francs increases compared to the demand of foreign currencies. However if the country exports more it getssupply of foreign currencies increases. An increase of GDP means more production and more exports. Diagnostic tests performed in this research show that the regression is meaningful. The estimators of the model are BLUE (Best Linear Unbiased Estimator), classical assumptions should have been verified. Indeed after analyses we noticed that residuals are stationary, there is no serial correlation and there is no auto-correlation. Also there is homoscedasticity and parameters are stable.

5.3. Recommendations

Based on the research data, the results shows that the volume of imports has been increasing continuously and research results indicates that exchange rate and volume of imports are negatively correlated, as imports of goods and services increases, the more we need united state dollars, which results in currency depreciation. In order to control the stability of local currency the government of Rwanda should take the necessary measures on how it can reduce its macro-economic imbalance, especially the one related to money depreciation.

i) In order maintain balance between export and import government of Rwanda should invest heavily in investment portfolio that has a direct impact on volume of export such as agriculture, mining, etc ,

ii) In order to promote industrial sector and make it more competitive, the Government should reduce taxes on imported raw materials

iii) Government should sensitize investors to help it implement the strategy of import and exports substitution

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