ROMANIAN ECONOMIC AND BUSINESS REVIEW

Statement of Purpose

The *Romanian Economic and Business Review* (ISSN 1842-2497) intends to provide a forum for academic analysis of the economic phenomena and institutions affecting the world economy in general, and Romania, in particular. *REBE* examines a wide variety of phenomena related to economic growth and business development and attempts to publish high quality research focusing on the role of institutions and public policy, within both a national and international context. *REBE* encourages cross-disciplinary research work of Romanian and foreign scholars.

Indexed and/or *Abstracted* in:
EBSCO; EconLit; ProQuest; DOAJ; Index Copernicus; RePec

Author Information

The ROMANIAN ECONOMIC AND BUSINESS REVIEW (REBE) is a refereed journal published four times annually by the Romanian-American University. The editors invite submissions of articles that deal with important issues in economy and business. Papers that focus on specific phenomena and events affecting Romanian economy are particularly encouraged. Because REBE seeks a broad audience, papers should be comprehensible beyond narrow disciplinary bounds.

Manuscripts should not exceed 8,000 words and must conform to the REBE's style requirements, which are guided by The Chicago Manual of Style (14th edition). All submissions must include a cover sheet explaining the scope of the article, and including the authors' names and affiliations, telephone and e-mail address. The text should be single-spaced. References are cited with parentheses using the author/date/page style. *Example*: (Marcus, 2005, p. 74). Authors should use footnotes, not endnotes to add only short comments. Bibliography should include only references cited in the text, in the alphabetical order of authors. An abstract of no more than 200 words should be included.

Submission of a paper implies that the paper will not be submitted for publication to another journal unless rejected by the REBE editor or withdrawn by the author, and that it is an original work. All submissions should be sent to the journal Editor:

Dr. Bogdan Glăvan
Romanian-American University
Bulevardul Expoziţiei nr. 1B
Bucureşti
E-mail: bogdan.n.glavan@gmail.com

Subscription rates:
Institutions - $100/year
Individuals - $30/year

ROMANIAN ECONOMIC AND BUSINESS REVIEW

FALL 2020 **VOLUME 15** **NUMBER 3**

PRO UNIVERSITARIA BUCUREŞTI 2020®

ISSN 1842 – 2497

ROMANIAN ECONOMIC AND BUSINESS REVIEW

CONTENTS

The Impact of Resource-Based Circular Economic Models in Japan

Bianca Yamaguchi[*]
Toru Takahashi
Cristian Iulian Vlad
Hiroaki Kaneko
Ana Damaschin

Abstract

This paper illustrates the impact of education and digital technology adoption within the local community in Nagaoka (Japan) while proposing a business model focused on an increase in the creation of social value based on services, as opposed to incumbent models based on increasing the manufacturing and selling of physical products. The authors analyze the supply chains network common to local businesses to help them establish an active exchange of waste and bi-products for a more effective recycling and a more sustainable remanufacturing system.

By taking into consideration all 17 of the United Nations' Global Sustainable Goals (SDGs), this research work individually on the achievement of Goal 12 (Responsible production and consumption) on the one side, to establish the essential steps for a more viable resource-based circular economic model, with an application on manufacturing businesses, from the other hands, to create a sustainable, waste-free, closed-loop supply chain system in rural Japan.

The methodological and conceptual-theoretical and practical architecture of this analysis is built to provide insights on the current state of affairs regarding essential resources. The focus is naturally on a centralized system for collecting and analyzing data on the availability of global resources (both raw and recyclable) to help small/medium enterprises and public organizations make more sustainable decisions.

Keywords: *Education, digital technology, circular economy, sustainable decisions, Nagaoka*

JEL Classification: O13.

[*] Bianca Yamaguchi is a Nagaoka Review Senior Editor, Japan. E-mail: yamaguchi.bianca@gmail.com;
Toru Takahashi is a PhD. student at Bucharest University of Economic Studies, Romania, and Managing Director at Globis International Education, Japan E-mail: t-takahashi@globis.co.jp
Cristian Iulian Vlad is a PhD. student at Bucharest University of Economic Studies, Romania, Founder & CEO at JCE Japan Creative Enterprise, and Talent & Transformation Associate Partner, Global Business Services at IBM Japan. E-mail: cristian@japancreativeenterprise.jp
Hiroaki Kaneko is a PhD. student at Bucharest University of Economic Studies, Romania, and Senior Director at Globis University, Japan E-mail: h-kaneko@globis.co.jp.
Ana Damaschin is a PhD. Student in International Relations and European Studies at Babeş-Bolyai University, Faculty of European Studies, Romania, and Associate Professor at Nagaoka University of Technology, Japan. E-mail:damaschinana1@gmail.com;

Introduction

In recent years, in Japan have been lively discussions surrounding resource efficiency and circular economy. In the context of constructing a sustainable global society, the high national interest for the topic was made even more evident than before, and the Japanese government has taken significant steps to develop a circular economy policy framework. As such discussions go beyond the traditional scope of recycling and focus on increases in the product, it's became clear that the topic is influencing not only the recycling industry but manufacturers as well as service providers, and the industry as a whole.

In this paper, the authors explore how the representatives of the three social sectors: Governmental, Educational, and Entrepreneurial have cooperated to lead the rural area of Niigata, specifically around Nagaoka city, Japan, towards becoming more sustainable, while simultaneously boosting the local economy. To better understand the current situation and to be able to monitor progress, the authors explain how the circular economic model has improved the local infrastructure and how the concept of closed-loop systems has been adapted to local needs by improving efficiency and reducing waste.

The circular economic model has two cycles: a biological one and a technical one. This paper illustrates the natural cycle by providing evidence of an efficient farm-to-table and organic waste reduction system, using the example of a local conglomerate called SUZU Group.

Starting with the assessment of how locals have adapted by producing and consuming mostly local products through farm-to-table practices. But also, their slow and steady shift from reliance on production for most of their income to reliance on services and a sharing economy instead. The authors then investigated the social transition towards sustainability by examining supply chains and initiatives from local corporations that supply other raw materials, such as gas and oil. Also, providing information on local initiatives regarding efficient management of waste and byproducts, such as the use of biomass and microbial genetics.

In the case of cooperation between the education sector and the government, this paper illustrates an initiative done by the city hall together with the local technological university. Through practical examples, the authors of this paper show how technological innovations developed locally, the RPA and robots have helped efficient both the city hall's bureaucratic processes and how the local manufacturing companies have benefited from innovation.

The main goal of this paper is to propose a centralized network, an online and easily accessible platform that connects local governmental bodies, educational institutions, local businesses, and local producers to minimize the loss of waste and byproducts and to create a more sustainable, circular, ethical, locally fueled region, and allow a smooth transition towards the achievement of the SDGs, with focus on goal nr. 12 "Responsible production and consumption."

1. Theoretical conceptual framework

According to the Ellen MacArthur Foundation, a Circular Economy (also called circular economic model, closed-loop model, donut model, or doughnut economics), is a

cyclical, sustainable system that is opposed to the Linear Economic Model of "take-make-sell-use-waste" industrial model.

The circular economic model focuses on a cyclical model of make-use-remake, focusing on positive society-wide benefits. It entails gradually transitioning from the consumption of finite resources to designing waste out of the system. Underpinned by a transition to renewable energy sources, the circular model builds economic, natural, and social capital. It is based on three principles:

- ❑ Design out waste and any toxic chemicals or pollutants
- ❑ Continue to keep products and materials in use
- ❑ Regenerate natural systems (Ellen MacArthur Foundation, 2017).

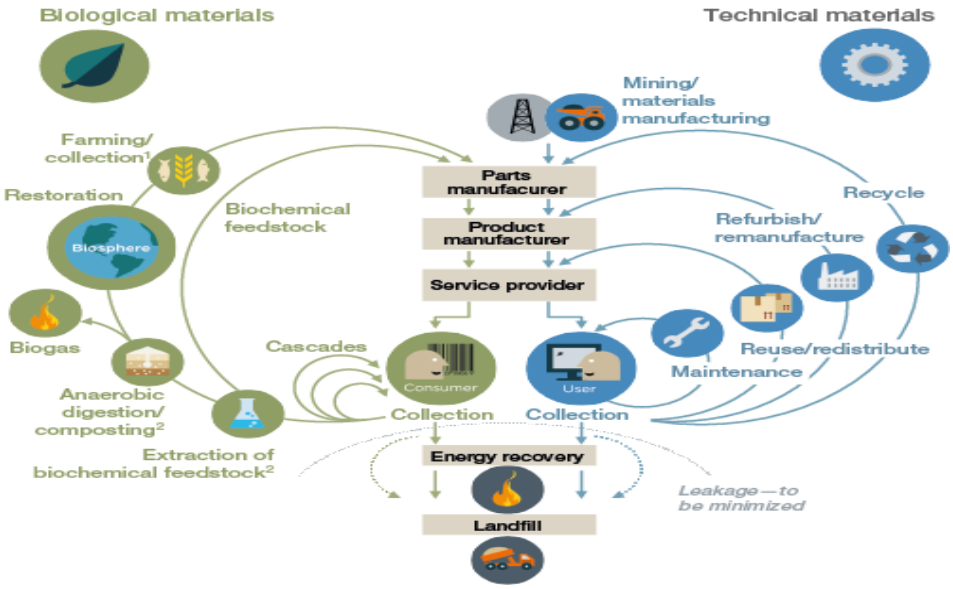


Fig. 1. Butterfly Diagram
Source: Ellen MacArthur Foundation, 2017. What is the circular economy concept? https://www.ellenmacarthurfoun; dation.org/circular-economy/concept

Interpreting Figure 1 based on the circular economy model example, one can see that the model has two cycles: a biological one and a technical one. The biological cycle contains all the processes that are directly related to natural systems, like farming, composting, biochemical products, etc.

For better understanding, the technological cycle contains all the processes that are related to human activity, especially technology, and are mostly present in industrial settings, like refurbishing, remanufacturing, and recycling. In all cases, the circular model is based on the assessment of the entire cycle of a product, from extraction to production, to disposal, and proposes a design that eliminates waste from all of its processes, and improves the efficient use of the resources all across the supply chain. It has benefits both from a business stance and an environmental standpoint as well.

One other concept present in the model is local production, to reduce the carbon footprint of transportation, along with the environmental and economic positive impact of using locally produced and manufactured products. Another critical factor in the model is the use of renewable energy.

2. Circular economy in Japan

Across most developed nations, landfill remains the primary means of waste disposal. Many countries are attempting to minimize the amount of waste going to incinerators and landfill sites by developing recycling programs. (McCarthy, 2016). As we can see from Figure 2, in OECD countries, their efforts have had varying degrees of success. The results can be explained in terms of countries' access to information, resources and everyday situations they face. Now, successfully dealing with change in today's volatile and complex global business landscape is more important than ever. Recent OECD data show that most OECD countries have experienced improvements in material productivity. From the Figure 2 we can notice that material productivity and recycling race increased significantly in Germany, Korea, the Netherlands and more moderately in countries such as Japan, Canada and Greece.

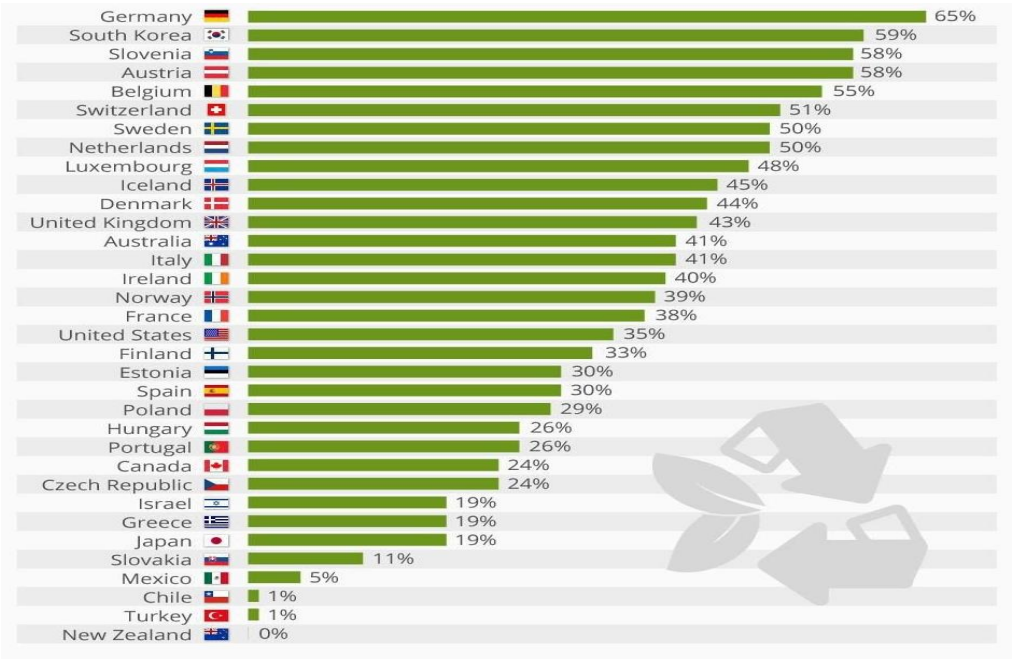


Fig.2. The Countries Winning the Recycling Race. Recycled and composted waste as a share of total municipal waste in OECD countries (2013)
Source: OECD

A circular economy (CE) can be defined as an economic model aimed at the efficient use of resources and has the potential to lead to sustainable development while

decoupling economic growth from the negative consequences of resource depletion and environmental degradation (Morseletto, 2020). It is important to note that there are many benefits to the application of the circular economy in business:

1. The existing recovery system is not optimal. To be more specific, only 17 out of 40 chemical elements used in the manufacturing of a mobile phone can be recovered for remanufacturing.
2. The carbon footprint of most products begins in the manufacturing process, with around 75% when it comes to phones, tablets, and laptops. Electric vehicles have roughly double the embodied carbon of internal combustion vehicles (Tecnologia libre de conflicto, 2020).
3. Mining and refining of finite virgin materials can be reduced. For example, the extraction of 1kg of gold produces 18773kg of CO2.

The circular economy refers to the closed circuit of consumption, where waste is not produced, and additional resources are not introduced. And Japan is actively promoting it. Japan is one of the developed countries that, at the local, regional, and national levels, has implemented the circular economy model to improve the living standards of its citizens and further contribute to the successful development of the country. Since the early 2000s, Japan has been advancing the 3Rs (Reduce, Reuse, Recycle) effort ahead of the rest of the world and has been steadily making achievements (e.g., reducing final disposal and improving the recycling rates). Meanwhile, as significant changes are seen in economic and social situations at home and abroad, global society, against the backdrop of population and economic growth, faces the need to transform from a linear economy based on mass production, mass consumption, and mass disposal pattern to a circular economy (Ministry of Economy, Trade and Industry, 2020).

Also, in 2000, the Basic Act on Establishing a Circular Society was passed. This was the reaction to a number of problems related to waste in the late 1990s. These included the high generation of waste, difficulty in finding new waste treatment facilities and an increase in illegal dumping. It is also a push to promote recycling efforts even further. The law comes in twofold. One, it dictates a move away from mass production, mass consumption and mass disposal. Two, to guide the development of laws for individual waste and recycling. In order to keep the above law relevant, the Plan of Establishing a Circular Society is reviewed and updated about every five years. This is done by the Central Environmental Council. On June 19, 2018, the 4th plan was decided. There are three main drivers in the plan. First, a regional revitalization through a circulation system. Second, the full circulation of resources' life cycle. And finally, the appropriate processing of waste or regeneration of resources (Ministry of the Environment, 2018).

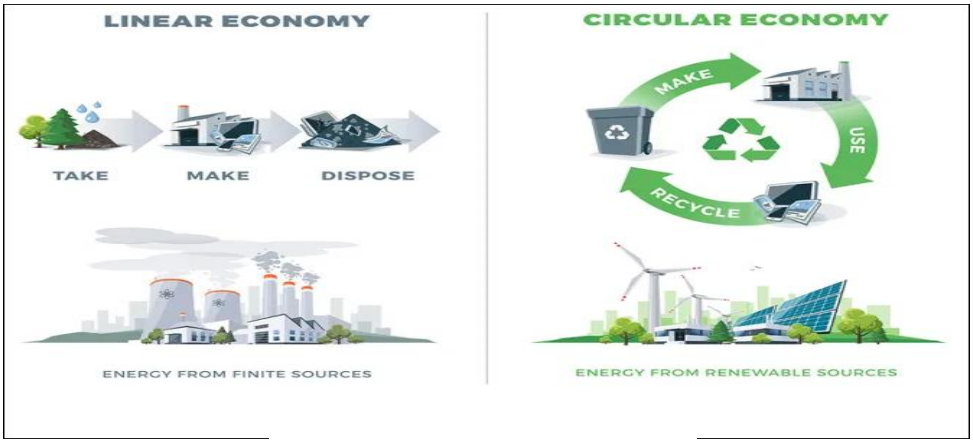


Fig.3. Basic Act on Establishing a Circular Society (2018)
Source: Ministry of the Environment

According to Google Trends since the beginning of 2019, the awareness of the circular economy in Japan has risen exponentially. As more Japanese citizens and businesses discover how they can make the world a better place, and circular economy became one of the tools.

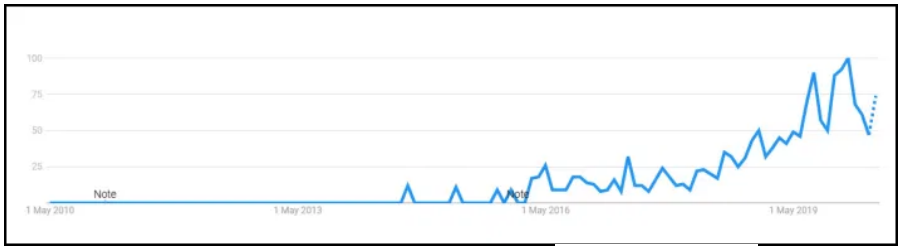


Fig.4. Circular Economy Trends in Japan. The rising popularity for "circular economy" on Google Trends. **Sourse**: trends.google.com

3. Recycling in Japan

Japanese recycling rates are high: 98% of metals. In 2007, 5% of Japan's waste was landfilled. Japan's appliance recycling laws ensure that the great majority of electrical and electronic products are recycled. Of these appliances, 74–89% (Ministry of the Environment, 2010), of the materials they contain are recovered. Many of these materials go back into the manufacture of the same type of product (Panasonic, 2015). To show that Japan has a good capacity for dealing with waste. Upon researching, we have found that Japan's initiative of going circular began in the 1990s.

1) Due to geographical challenges such as mountainous topography and volcanoes as well as large population density, there is limited space for landfill. Japan had little options left but to search for alternatives to landfill since the 1950s, and in the 1990s started moving away from incineration following dioxin-related health concerns (such as hormonal interference, developmental and reproductive disorders, altered immune system, as well as cancer)

2) Recycling and remanufacturing are enticing in Japan due to the country being a major industrial manufacturer with limited domestic materials such as metal and mineral. The significance of access to raw materials is not to be downplayed, especially in the circular economy policy in Japan.

3) Collaboration plays a huge role in the business culture in Japan, resulting in a comprehensive approach in the action and measures applied.

3.1.1. Measuring the circular economy

The Japanese assessment of the circular economy at a national level includes:

1) Resource productivity indicator. Measuring the use of material in proportion to the GDP

2) Material cyclical use rate indicator. Measuring the rate of material reuse in proportion to total material usage by the economy

3) Output indicator. Measuring landfilled waste quantity

4) Target associations. Linking indicators to sector-specific measures which could sometimes be industry-specific targets

5) Societal effort. Measuring the effort within the society toward a circular economy. From a macro perspective of considering environmental factors impacting the market for rental, leasing or sales of products such as reusable packaging, to a micro perspective of impact of an increase in prices of production factors towards the sales of a particular product (e.g. sales of disposable chopsticks in proportion of the population utilizing reusable chopsticks).

4. Public Cooperation

The public plays a vital role in separating out recyclables, in paying recycling fees directly and in holding companies to account when necessary. Manufacturers also do their part (Association for Electric Home Appliances 2007) by using more recycled materials, and making longer-lasting products that are easier to repair and recycle.

Here are 4 key features of the collection and recycling system:

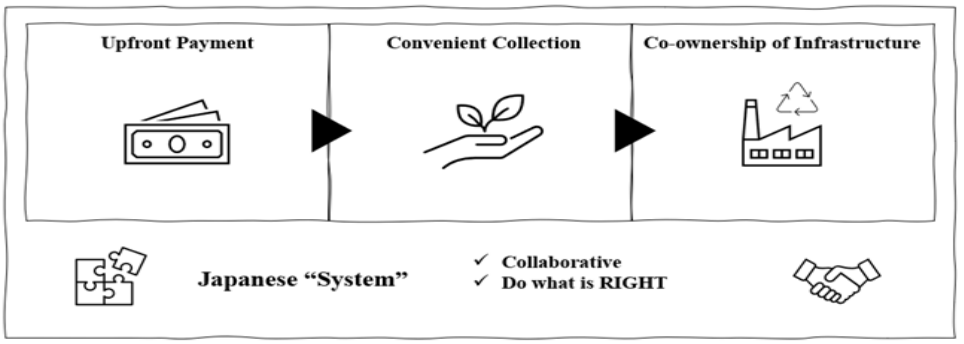


Fig. 5. The 4 key features of the collection and recycling system in Japan
Source: Designed by Lim Michelle based on the 4 key features of the collection and recycling system, 2020

1. Upfront Payment:

In regard to electronics, payment for transportation and recovery is done at the point of purchase. As such, there is no disincentive for customers in participating at the end of the product life. Penalty for illegal waste dumping is hefty in Japan.

2. Convenient Collection:

With a well-designed system in place for the collection of old appliances for recycling, it becomes more challenging not to opt for recycling. When retailers sell a product in-store or deliver a new appliance, the old appliance is also collected. In regard to old IT equipment, it could be requested by the manufacturer for a doorstep collection to be done by the local authorities, or for it to be brought by specialized companies.

3. Co-ownership of Infrastructure

Companies in Japan consider long-term investments in recycling infrastructure. In order to ensure manufacture consider the benefits from recovering materials and parts, a consortium of manufacturers are required by law to run the disassembly plants. One great benefit of owning the recovery and manufacturing facilities is that the companies could experience the struggle of disassembling products that are poorly designed. Companies now have the incentive to consider redesigning their products to ensure easy disassembly and recovery of recyclable parts.

4. The Japanese "System"

Collaboration is the backbone of the Japanese system whilst incentivising people to do what is right, shaping the public enthusiasm of the Japanese. With consistent and strong appreciation for honesty, the lack of looting following the Fukushima earthquake further solidifies the importance of the system. Not only did the system bring value to the society but also to the profitability of the country, with the reuse and recycling economy of Japan employing 650,000 people and worth £163 billion in 2007 (7.6 % of GDP).

5. Technological Cycles

5.1. Description of the recovery of a unique material

Japan has a very successful car industry and is steadily shifting to hybrid and electric vehicles, which require a supply of rare earth metals for their NiMH batteries. Rare-earth elements are well dispersed throughout the planet's crust, but very rarely occur in commercially viable quantities. So, their production is associated with serious environmental risks: mining creates large, toxic, slightly radioactive ponds and the refining process requires the use of hydrochloric acid. Poor practices have been blamed in the past for serious pollution of agricultural land and watercourses (Bailey, Mancheri and Karel, 2015).

In contrast, life-cycle analysis of recycling neodymium, a rare earth, suggests it has a human toxicity score 80 per cent below that of mining (The institution of environmental sciences, 2015). Japan has always sought steady access to raw materials for industry, and thus in 1999 began recovering rare-earth elements in car batteries as part of a wider effort to recover steel. However, until 2012, these rare-earth metals were mixed into stainless steel, making them unavailable for use in new batteries. Chinese restrictions on exports, starting in 2010, provided a catalyst for the development of a battery-to-battery recycling process, which showed how national government leadership, company collaboration, and

effective reverse logistics combined to enable a novel material to be recovered. With China's announcement of rare-earth mineral export restrictions, the Japanese Ministry of Economy, Trade, and Industry (METI) introduced a grant program in accelerating the commercialization of rare-earth recycling technology.

As Honda and Japan Metals and Chemicals Company (JMC) had already spearheaded a collaboration on an effective but expensive method of rare earth recovery, the grant enabled investment into improving the technical aspects of their process. Now, about 400 tonnes of rare earth can be recovered per year by the recycling facility operated by JMC and Honda (The Institution of Environmental Sciences, 2015).

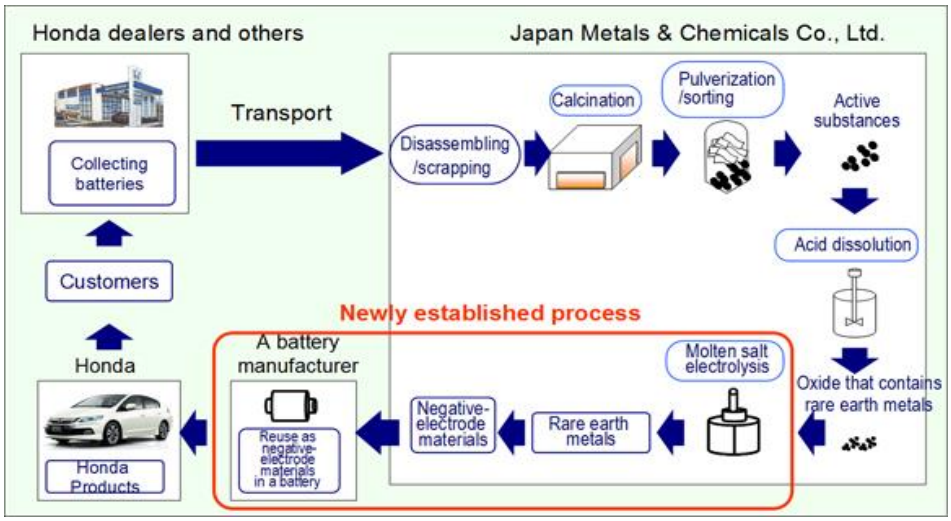


Fig. 6. Honda 's process for recycling nickel-metal hydride batteries
Source: Honda in America, https://hondainamerica.com/news/honda-establishes-worlds-first-process-to-reuse-rare-earth-metals-extracted-from-nickel-metal-hydride-batteries-for-hybrid-vehicles/

With further research and development, Honda succeeded in the extraction of metallized rare earth with a purity of more than 99%, which is as high as newly mined rare earth metals. The process was created through a newly established process of molten salt being applied to the extracted oxide. The metallized rare earth could be directly used by nickel-metal hydride batteries as negative-electrode materials. The new process has also enabled an extraction of rare earth metals above 80% in nickel-metal hydride battery (Honda, 2013).

According to the study, the commercialization of new recycling process stretches across the supply chain to include:

a) The Government- the industrial policy supports recycling by including collection requirements as well as setting spending target on innovation;

b) Corporations- even before the pressure on rare earth resources, corporations had a head start in investing in collaborative research and design for recycling;

c) The Public - public expectations form the basis of the need for recycling to be promoted.

6. Transition to Renewable Energy

6.1. Study Case – INPEX (INPEX, 2008)

Nagaoka is home to an oil and natural gas extracting corporation called INPEX. In this paper, the authors analyze how a company that relies heavily on non-environmentally friendly processes for their income are striving to shift towards renewable energy and more sustainable practices.

6.1.1. Geothermal energy development

Geothermal Energy is run by a gas corporation called INPEX in the city of Minami Nagaoka. INPEX continually explores the business potential of various types of renewable energy such as geothermal, which has synergies with conventional oil and gas development, but also wind power and photovoltaic power generation.

Geothermal power generation comes from the rotation of turbines, by using steam extracted at the surface from groundwater, which had been initially heated by extremely hot underground magma. Geothermal is considered a precious, clean energy source because it has low CO2 emissions. Compared to the other types of renewable energy, geothermal energy is also stable and is not influenced by the weather or the changing of seasons

Since 2011, INPEX has been constantly participating in the joint development studies on geothermal energy in Oyasu, Akita Prefecture and Amemasu, Hokkaido. For the sake of this study, 7 exploratory wells were drilled in the Oyasu area while 6 others were drilled in the Amemasu area during 2013-2017. In 2018, flow tests were conducted at the two wells. In the meantime, an environmental impact assessment has been conducted as a step toward initializing commercial operations in the Oyasu area.

INPEX is also making efforts in geothermal energy development initiatives outside of Japan. In June 2015, INPEX became part of the Sarulla Geothermal Independent Power Producer (IPP) Project. IPP is the world's largest single-contract geothermal power project located in Sarulla, Indonesia. The power generated from the project is sold to Indonesia's government-owned electricity company over a period of 30 years.

INPEX aims to become an integrated energy company that contributes to a stable energy supply to broader communities, so it put a lot of effort into commercializing renewable energies and reinforcing Research and Development activities for the next generation.

6.1.2. Photovoltaic power generation

When it comes to photovoltaic power generation, large-scale systems with a power generating capacity of 1MW or more are called Mega Solar facilities. Since the 2011 Tohoku Earthquake, which was followed by a tsunami, the expectations for even greater photovoltaic power generation capabilities have expanded to try and mitigate the concerns regarding power supply shortages. Mega Solar facilities are extensively being promoted throughout Japan.

In the year 2013, INPEX started the process of generation and supply of electricity at its first photovoltaic power generation system with a maximum output of 2MW, in the city of Joetsu, Niigata Prefecture. In July 2015, the second photovoltaic power generation

system began operations also at a maximum output of 2MW. The INPEX Group refers to the 2 photovoltaic power generation systems as "INPEX Mega Solar Joetsu". The 2 photovoltaic power generation systems are expected to generate, together, around 5,330,000kW of electricity per year, which is the equivalent of the annual power consumption of approximately 1,600 households (INPEX, 2015)

a) Wind power generation business

INPEX is currently in the process of developing an onshore wind power generation business in Japan. The company plans to use its experience to proactively pursue business development opportunities in the offshore wind power generation sector, both inside and outside of Japan.

b) Artificial Photosynthetic Chemical Process

Recently, hydrogen has been considered to have tremendous potential as the ultimate renewable energy resource. This is because, when combusted, hydrogen produces only water as a bi-product. Hydrogen can also be made into hydrocarbon fuels and chemicals, when mixed with CO2 gas, making hydrogen an exceedingly clean source of energy.

INPEX is part of the “Japan Technological Research Association of Artificial Photosynthetic Chemical Process” commissioned by NEDO (New Energy and Industrial Technology Development Organization) and is also part of an R&D project which aims to produce chemical products, such as plastics and hydrocarbon fuel from hydrogen obtained through the decomposing of water using catalysts that use solar energy and CO2.

6.1.3. CO2 Methanation

INPEX is currently developing methanation technology as one of its core technologies. The company aims to create technologies which transform electricity into hydrogen, hydrogen into methane and methane into electricity. It is also engaged in building an "electricity-hydrogen-methane value chain" that uses INPEX's existing methane production and transportation system.

Methanation is a technology that converts carbon dioxide into methane. INPEX has been part of a project commissioned by the New Energy and Industrial Technology Development Organization (NEDO) to develop technologies which effectively utilize CO2. What INPEX does is it evaluates the technological development and production sequence of carbon capture and utilization (CCU) technology which produces and effectively utilizes methane using a high concentration of CO2 emitted from thermal power plants and hydrogen produced using electricity from renewable energy sources.

6.1.4. High-capacity lithium-ion battery

INPEX has been a constant supporter of ELIIY Power Co., Ltd., which develops, manufactures and sells lithium-ion batteries. The company's high-capacity lithium-ion batteries can store electricity generated from renewable energy sources like solar and wind. It can provide access to this electricity any time. Their initial goal was to contribute to the conservation of the global environment using a more effective renewable energy source that can generate enough power in time with the increase in demand.

7. Biological cycles

7.1. Local Production

Analyzing the evolution of the Niigata prefecture in the past years, it should be noted that the Nagaoka area contains fertile soil, clear and cold phreatic water streams, and clean air, which makes it an excellent area for growing rice. As such, there are 17 sake breweries in Nagaoka city, putting Niigata prefecture at the top in both production and consumption quantity of sake, and its economy relies heavily on the selling.

Heavy snowfall and hot and humid summer climate combine to make the Nagaoka Vegetables a brand vegetable that takes advantage of nature. "Nagaoka Vegetables" refers to plants that have passed the following criteria set forth by the "Nagaoka Vegetables Brand Association" made up of farmers, consumers, Agricultural organizations and marketers in and around Nagaoka City in Niigata Prefecture (Nagaoka Incorporated Association of Tourism and Conventions, 2020).

7.2. Farm-to-Table Study Case

7.2.1. Omoinohoka (Local to table, 2018**)**

Competition, innovation, and growth have been investigated in the literature, and the interaction between them has been debated since the days of Schumpeter. Ever since Schumpeter's vision of the lone and creative entrepreneur, innovation and creativity have been essentially viewed as a black box, unknowable and random. Not surprisingly, with innovation and creativity viewed as such, the field of strategy predominantly focused on how to compete in established markets, creating an arsenal of analytic tools and frameworks to skillfully achieve this. Certainly, Japan has not always had sustainable development strategies, many industries, particularly in the manufacturing sectors, rapidly expanded in Japan after World War II. The development of these industries was underpinned by firms; successful activities including innovations. During a period of rapid growth, Japanese firms expanded and gained market share while competing with domestic and foreign rivals. At the same time, a substantial number of creative products developed by Japanese firms emerged and dominated the market. However, many industries stagnated during the so-called lost few decades after the collapse of the bubble economy due to reduced competitiveness and inactive innovation (Honjo, 2017).

Based on these historical cases, it is important to note that strategic creativity can be unlocked systematically, to better understand this formula we analyzed Japanese models of the circular economy. These patterns have allowed the development of tools and methodologies to systematically link innovation to value and reconstruct industry boundaries in an opportunity-maximizing way (Mauborgne; Kim,2015).

7.2.2. Fish Market Street

At the local level, the crowded fish market boasts of a large number of shops providing fresh marine products at reasonable prices. "Crab", "namban ebi shrimps", and "grilled squid" are at the top of the lists of local shoppers and tourists. The biggest fish market street is Aramachi, Teradomari, in Nagaoka.

7.2.3. Kumatsu Farm

One example is a local eggplant in the shape of an actual egg, called "The Roots of Shun". Eggplants are a popular vegetable seen commonly on the dinner table of any Japanese household, but few know eggplants are a very popular vegetable in Niigata Prefecture, famous for rice production.

An interesting fact is that taking advantage of the hot and humid weather, Niigata produces as many as 20 different varieties of eggplants from region to region. At the same time, they have different shapes and textures, so the locals have formed a unique food culture, cooking these diverse varieties in ways that best match each variety's character.

"Kinchaku eggplants" are nutritious specifically because they are grown in Nagaoka. Niigata has long been a place of eggplant farming because farmers could grow eggplants in the idle period between rice planting and harvesting, when rice farmers are at their busiest, and also because Niigata has hot, humid summers perfect for growing eggplants.

Nagaoka is a basin surrounded by mountains, so it is especially humid. In the summer it is hot and humid, and in the winter, the snow is also very moist. The soil is sedimentary soil from the Shinano River, making it rich in minerals. Kobayashi grows eggplants at his outdoor farm naturally as possible (i.e. with no cover). He deliberately gives them no water so that the eggplants suck up moisture from the soil and grow larger over time, becoming shiny, tight and rich in flavor. The harvest time is from around June to October.Niigata has the largest farming area for eggplants in the country, yet eggplants from Niigata are hardly known, because most of the eggplants are consumed within the prefecture. The residents of Niigata use different varieties of eggplants for different dishes.

The Japanese also have the tradition of passing on the seeds and the food culture. They create a bond between the producer and the chef. Kobayashi's family have been eggplant farmers since the Edo period (1603–1868), and have been passing on their eggplant seeds in Nagaoka from generation to generation. Kobayashi has the responsibility of preserving these Kinchaku eggplant seeds and passing them on to future generations. The locals say that the phrase "chisan chisho" (locally produced, locally consumed) actually means the human body and soil are inseparable. A local said "If you eat the food grown in the place you grew up, you will stay healthy." (Inoue and Tachibana, 2016).

7.2.4. The SUZU Group

The SUZU Group is one of the very successful local businesses who use farm-to-table practices. They only use local, seasonal vegetables to produce and sell not only fresh vegetables to restaurants, hotels and markets, but also processed products, such as sauces, pastes, creams and jams. They have multiple sub-companies: a food truck, a cafe, a restaurant, a canteen, a fast-food delivery service, an online shop and even a local gourmet magazine. All work on delivering local products to the locals. Restaurant SUZU365 (Inoue and Tachibana, 2016) for example, is a delicatessen-style restaurant with dishes created with ample ingredients from Nagaoka, is the outlet Kobayashi recommends, saying it is the liveliest restaurant in Nagaoka right now. The owner and chef Sho Suzuki born in Nagaoka. He runs a few restaurants with the concept of connecting local food ingredients and people, dispatching the attractiveness of Nagaoka's food. Countless times, chef Sho Suzuki has talked about the importance of passing on traditional, local culture, food to future generations.

7.2.5. Yamakoshi Town

Found in the Koshi district, Yamakoshi is home to many terraced rice fields, and the location of a devastating earthquake that destroyed the village, forcing hundreds of people to abandon their homes for years.

The town is very well known locally for its thriving tourism. The tourist information office, besides being filled with information about what to do in the city, it also serves the center to rent E-bikes and even Electric Rickshaws. They pointed out the importance of a safe and environmentally-friendly transportation method for tourists, to protect as much as possible clean mountain air, crucial for creating high-quality crops.

The story of the Chūetsu Earthquake spread around Japan, and people offered money, food and even their homes to help the villagers who were now left homeless. They completely rebuilt the town and most of the locals returned to doing business as usual. Once back, the locals were determined to make the town sustainable, environmentally-friendly, based on local production and consumption, and turned to tourism and providing services to better increase their economy.

These services include e-bike and electric rickshaw rentals, visitation of alpaca and koi fish farms, visitation and vegetable or fruit picking on agricultural farms, visitation of sake breweries, hot spring resorts, farm-to-table restaurants, hand-crafting experiences, open air markets and historical locations.The activities are specific to every season, so as to protect the natural seasonality of the local environment (Nagaoka City Tourism Planning Division, 2017).

8. How The Education Sector is Supporting the Shift Towards Sustainability and Circular Economy

8.1. Study Case - Nagaoka University of Technology

8.1.1. Online Magazines

The Nagaoka University of Technology has made visible efforts to support research in the realm of sustainable development, as well as actively attract foreign input, through the publication of two bilingual (Japanese and English) magazines.

One is “Transactions on Gigaku” (Transactions on Gigaku, 2012), a free online magazine whose focus is on the science and technology related to “gigaku”, a term coined by the university itself in the year of its opening. The mission of this journal is to be a secure network for innovations in science and technology and the development of the next generations of high-level human resources. This journal, therefore, covers education and research activities in broad areas, including innovations in sustainability (GIGAKU Press, 2014).

The other is a social site called the Nagaoka Review, which is dedicated to open collaboration by establishing a communication channel in English to share information and promote cooperation between Japan and the world. The social site aims to share the latest news relating to technology and innovation across the globe to encourage the participation of local University students such as the students of the Nagaoka University of Technology to contribute to society through technological collaboration.

Besides that, the site aims to open the opportunity for cross-country and industrial cooperation in innovation. Through academic research, the young generation expresses

their concern for today's society, and the university fully contributes to their practical achievement. Also, it mirrors society's interests for a better adaption of the sustainability and circular economy to the challenges that we are living in today. The following examples are just some of the academic contributions to the local community with a substantial social impact.

8.1.2. Microbial Genetics and Biomass

Professors Wataru Ogasawara and Yosuke Shida's research is about how biorefinery technology can aid in converting biomass, a renewable carbon source, to bioethanol, food, fiber, and chemical source for industry. The most important and difficult step of the biorefinery process is saccharification, extracting available sugars from biomass, to address this issue, we use the filamentous fungus Trichoderma reesei (T. reesei) as a model organism. In order to understand, the fungus T. reesei is one of the most efficient producers of glycoside hydrolases, such as cellulolytic and xylanolytic enzymes, that convert biomass to sugar. By using advanced analysis techniques, such as comparative genomics, transcriptome, and ChIP analysis, a better understanding of the complexity of gene expression and enzyme production in these microorganisms has been gained. They have developed several breakthrough technologies for the biorefinery process, with the ultimate hope of contributing to building a cleaner and sustainable world (Nagaoka University of Technology, 2014) .

8.1.3. Environmental Biochemistry

Another mentionable research was done by professors Yoshio Kera, Shoji Takahashi, and Katsumasa Abe's. The study focuses on enzymes and microorganisms, which can efficiently specifically catalyze various chemical reactions below 100°C under atmospheric pressure. They are, therefore, useful to develop safe, energy-saving, and eco-friendly processes and devices. Their laboratory is focused on microbial degradation of environmental pollutants, biological production of chemicals and biofuels, and physiological roles and applications of D-amino acid-metabolizing enzymes. The ongoing research activity includes the identification of novel and valuable enzymes and microorganisms from the environment and genomic information, the genetic and protein engineering to improve their properties, and the creation of bioprocess and analytical methods using these enzymes and microorganisms (Nagaoka University of Technology, 2014).

8.2 RPA (Robotic Process Automation) at Nagaoka City Hall

In a world of close to 9 billion expected by 2030-including 4.9 billion new middle-class consumers (Kharas, 2010), the challenges of expanding supply to meet future demand are unprecedented. These new consumers offer fantastic opportunities for businesses, and the next industrial revolution is already under way, with digital technologies already transforming many products and market sectors (Weetman, 2016). Based on this fact, it is essential to note that the Robotic Process Automation (RPA) is attracting attention, and we will begin by giving an example of how one local governmental institution has used innovation to improve its services for social good.

At the initiative of the city council, Nagaoka City Hall from Japan has decided to buy, experiment with, and, in December 2018, implement an RPA software called WinActor to be used at the city hall to provide the citizens with better services. The initiative also included providing training to city hall employees. RPA stands for Robotic Process Automation, which is a form of business process automation technology utilizing the idea of software robots. RPA allows business operations with personal computers to be completely automated.

In order to achieve efficiency of business processes, the city experimented on data processing operations through utilizing RPA as part of the Nagaoka-based technological innovation project. For instance, at one of the divisions of the city office, the data of employees' health checkups were processed via RPA, which can reduce manual working hours on personal computers by 117 hours per year. Therefore, the staff would be able to use these hours for other more human-based services. According to a survey conducted by the Ministry of Public Management, Home Affairs, Posts and Telecommunications, less than 4% of municipalities across Japan have so far introduced RPA in their data processing operations (Digital Labor Labo, Works ID, 2020).

At a session held at City Hall Plaza – Aore Nagaoka on January 10, 2019, the city gave reports about the experimental results of utilizing RPA. Mayor Tatsunobu Isoda stressed that the city would be able to provide better services for citizens based on such business efficiency acquired through utilizing RPA (Nagaoka International Affairs Center, 2019).

8.3. Prize-winning energy reducing robot

Another one of Nagaoka city's initiatives at providing locals with incentives for innovation is the Students' Startup Support. This project developed to help students launch new businesses and have welcomed their first student-entrepreneur. Based on the new technology of cycloid reducers, which are used in the joints of industrial robots, students and graduates of the National Institute of Technology, Nagaoka College established a robot-manufacturing company and named it Ju-ichi, Oishi Corporation (Oishi Machine Inc., 2003).

It is relevant to note that the City of Nagaoka provided financial support for the corporation to establish its business. A cycloid reducer is a device attached to a motor that efficiently produces power at a lower rotational speed. Renovating the basic structure and gears, the company has achieved higher strength along with downsizing and lightening the device. This technological renovation allows the method to be applied in nursing-care robots and household electrical appliances (Nagaoka International Affairs Center, 2019). On January 9th at Nadec BASE (on Ote Street), Oishi Corporation introduced the newly established corporation.

9. Sustainability

9.1. Sustainable Data Centers

Started in Nagaoka city, a data company called Data Dock is running the Niigata Nagaoka Data Center in Niigata Prefecture Japan, and this cold region data center is said to be the model site for the world's first sustainable data center. It is a new business model that satisfies environmental, societal, and economic aspects.

The daily operations of the data center produce excess energy such as groundwater, waste heat from IT equipment, and heat from melting snow. The data center's model converts these excess to support hydroponics activities such as aquaponics farming at the Aquaponics Nagaoka Plant. This model is expected to serve as a case study for prospective data centers with the desire to operate sustainably. Data Dock, specifically, hopes to adopt this business model to cold regions of Japan. This model is also registered for the J-credit scheme – a voluntary carbon offsetting scheme administered by the Japanese government.

9.1.1. J-SCHEME

The J-Credit Scheme is designed to certify the amount of greenhouse gas emissions reduced and removed by sinks within Japan. Under the J-Credit Scheme, the government certifies the amount of greenhouse gas emissions (such as CO2) reduced or removed by sinks through efforts to introduce energy-saving devices and manage forests, as "credit."

This scheme, which was created by expansively integrating the Domestic Credit Scheme and the Offset Credit (J-VER; Japan's verified emissions reduction) Scheme, is administered by the central government. Credits created under the scheme can be used for various purposes, such as achieving the targets of the Nippon Keidanren's Commitment to a Low Carbon Society, and carbon offset (Japan Federation of Economic Organizations, 2016).

Scope of J-Credit Scheme

a) Projects:

- Endeavors that contribute to the reduction of emissions recorded in Japan's GHG Inventory.
- Endeavors that contribute to the enhancement of removals recorded in Japan's GHG Inventory (Japan Greenhouse Gas Emission Reduction, 2017).

b) Types of greenhouse gases:

The substances listed in Article 2, Paragraph 3 of the Act on Promotion of Global Warming.

Countermeasures (Act No. 117 of 1998) subject to the Scheme. Specifically, these are the following gases:

- Carbon dioxide (CO2);
- Methane (CH4);
- Nitrous oxide (N2O);
- Those hydrofluorocarbons (HFCs) specified by Cabinet Order;
- Those perfluorocarbons (PFCs) specified by Cabinet Order;
- Sulfur hexafluoride (SF6);
- Nitrogen trifluoride (NF3).

c) Certification period:

The starting date of the certification period of an emission reduction project is the date of application for registration of project or the date when monitoring becomes possible,

whichever is later. However, for a forest management project, because removals are computed in units of one fiscal year, the starting date of the certification period is the first day of the fiscal year containing the date of application for registration of project. When the forest management plan, which covers the areas of a forest management activity to be registered, is not valid on the first day of the fiscal year without reasonable excuse, the certification period starts on or after the validation date of the forest management plan.

The ending date of the certification period is the date when 8 years have elapsed from the starting date of the certification period, or March 31, 2031, whichever is earlier. Any identical emission reduction or removal activities with once-registered projects, of which the certification periods have ended, may not be registered again (Japan Greenhouse Gas Emission Reduction, 2017).

d) Purposes of J-Credits

The purposes of J-Credits are as follows. Some uses may be restricted by the programs, etc. that use J-Credits, depending on the attributes of the project participant or the type of project.

- Keidanren's Commitment to a Low Carbon Society
- Reporting of emissions after adjustment under the Greenhouse Gas Accounting and Reporting

System based on the Act on Promotion of Global Warming Countermeasures

- Reporting of joint energy efficiency projects in periodic reporting under the Act on the Rational Use of Energy (Act No. 49 of 1979)
- Voluntary Carbon offset (Japan Greenhouse Gas Emission Reduction, 2017)

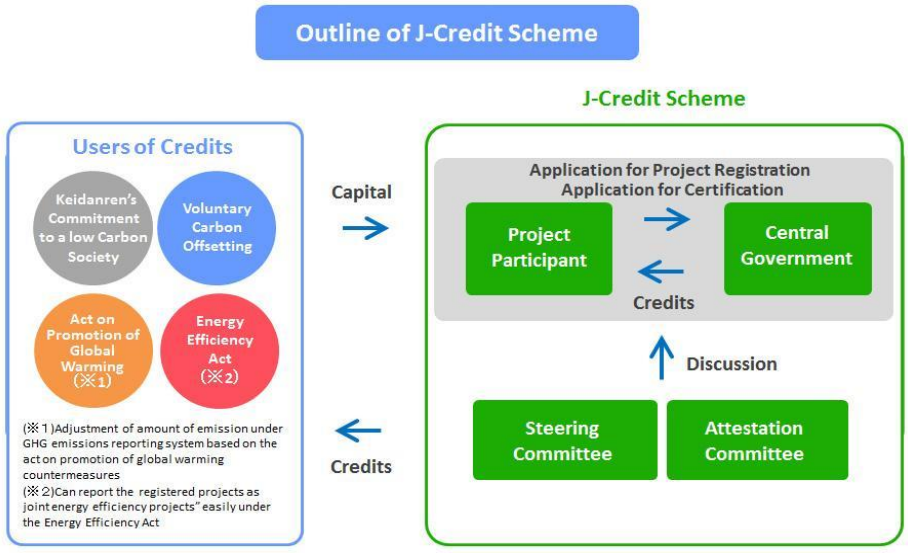


Fig. 7. Outline of J-Credit Scheme
Sourse: Japan Federation of Economic Organizations,
official site, https://japancredit.go.jp/english/

Conclusion

Analyzing the standard supply chains network for local businesses in the local community of Nagaoka (Japan) we intended to illustrate the impact of education and digital technology adoption within the local community in Nagaoka (Japan) while proposing a business model focused on an increase in the creation of social value based on services, as opposed to incumbent models based on increasing the manufacturing and selling of physical products, in order to help the local businesses to establish a suitable alternative and an active exchange of waste and bi-products for a more effective recycling and a more sustainable remanufacturing system.

It is important to remark that contextually the circular economic model has been used successfully to improve both the throughout the research mentioned companies' efficiency and the quality of their outputs, with a very beneficial impact on the local community. Following the technological cycle, bright illustrations of a fruitful collaboration between the governmental bodies represented by Nagaoka city hall, the educational sector constituting the Nagaoka University of Technology, the entrepreneurial sector in the form local businesses, both big and small, and the local community, in and around Nagaoka city could be seen.

Today's long biological cycle of the circular economic model in Nagaoka (Japan) has been at the heart of industrial development and has generated an unprecedented level of growth. Our results and analysis illustrate clearly how small local businesses (Fish Market Street, Kumatsu Farm, The SUZU Group, and Yamakoshi Town) have benefited from the local production of rice, vegetables, and sake. But also, by leveraging the domestic output and using it to attract tourists and improve the local economy.

Cities play a central role as motors of the global economy, and in Nagaoka, at the local level, the opportunities of a circular economy span across economies, the environment, businesses, and citizens. Moreover, all of these benefits gathered together to offer a promising vision for a regenerative and restorative economy in the future. In the content of the present research, we presented examples of how the local research programs have helped with the dealing of biological waste are shown, by using innovative systems of compost and microbiological decomposition mechanisms. Concerning the use - and shift towards the purpose - of renewable energy, a keen interest of the local big oil and gas company (The INPEX Group) and its efforts to go renewable in the future can be seen.

As such, to continue to support the collaboration between sectors, we proposed a centralized network in the form of an online platform whose goal is to become a shared pool of knowledge and the free exchange of information between the four sectors: the. The platform can be used to assess, understand, support, and even encourage the expansion of the application of the circular economic model and the shift towards more sustainable processes and renewable energy. We hope that this platform will also become a replicable example for other cities and prefectures in Japan, and beyond, as green development, circular economy model, and sustainability, as well as coordination and cooperation, will become compulsory traits of future Japanese/worldwide policies and politics.

References

1. Ahn, Sanghoon, (2002), Competition, innovation and productivity growth: a review of theory and evidence. OECD Economics Department Working Papers. https://doi.org/10.1787/182144868160.
2. Andrews, Kenneth R, (1971), The concept of corporate strategy. Irwin, Homewood, Illinois.
3. Association for Electric Home Appliances, (2007), *Product Assessment Manual (4th edn): executive summary* AEHA, Tokyo. https://www.aeha.or.jp/assessment/en/english}flame.html, (accessed 25.07.2020).
4. Auerbach, Paul, (1988), Competition: the economic of industrial change, Basil Blackwell, Cambridg.
5. Bailey, Gwendolyn; Mancheri, Nabeel; Karel Van Acker, (2015), Sustainability of permanent rare earth magnet motors in (H) EV Industry. Journal of Sustainable Metallurgy, Volume 1. No.1. DOI 10.1007/s40831-017-0118-4, https://www; researchgate.net/publication/315916975_sustainability_of_permanent_Rare_Earth_Magnet_Motos_in_HEV_Industry, (accessed 31.07.2020).
6. BBC News Europe, (2010), Hungarian chemical sludge spill reaches Danube. BBC News Europe, www.bbc.co.uk/news/world-europe-11491412, (accessed 17.07.2020).
7. Benton, Dustin; Hazell, Jonny, (2015), The Circular Economy in Japan. https://www.the-ies.org/analysis/circular-economy-japan (accessed 31.07.2020.
8. Digital Labor Labo, Works ID, (2020), What are the issues faced by local governments and government agencies and how to utilize RPA?__https://digital-labor.roboroid.jp/government-office-rpa/, (accessed 20.07.2020)
9. Donald, Frances, (2020). The three stages of the global economic recovery. https://www.manulifeim.com/institutional/global/en/viewpoints/market-outlook/three-stagesglobaleconomicrecovery?cid=ASEN_MIM_IN_PS_AdWords_ GI2H20_MarketIntelligence_GA_CS_TA_00_BR_00_00_AW_00_20200728_EconomicImpact_EconomicImpact&utm_source=PS&utm_medium=AdWords&utm_campaign=GI2H20_MarketIntelligence&utm_term=EconomicImpact_EconomicImpact&utm_content=ASEN_MIM_IN_GA_CS_TA_00_BR_00_00_AW_00_20200728&gclid=Cj0KCQjw6575BRCQARIsAMp-ksPu-ogpD6cOJCOF62SRNOk7K_9wyvHLuEXlKZpAi4e1p-Rtbf-FpewaAhHCEALw_wcB, (accessed 20.07.2020).
10. Ellen MacArthur Foundation, (2017), What is the circular economy concept? https://www.ellenmacarthurfoundation.org/circular-economy/concept, (accessed 19.08.2020)
11. Ellen MacArthur Foundation (EMF). Delivering the circular economy - A toolkit for policy makers; Ellen MacArthur Foundation: Isle of Wight, UK, 2015.
12. GIGAKU Press, Nagaoka University of Technology, 2014. Transactions on GIGAKU. Special issue of 1st International Conference on Energy, Environment and Human Engineering (ICEEHE)-2013, Vol. 2. No. 2, p. 1.
13. Honda, (2013), World's first process to reuse rare Earth metals extracted from nickel-metal hydride batteries for hybrid vehicles, https://phys.org/news/2013-03-world-reuse-rare-earth-metals.html, (accessed 19.08.2020).
14. Honjo, Yuji (editors), (2017), Competition, innovation, and growth in Japan. 1st Edition, Springer Nature Singapore Pte Ltd. p. 2.

15. Inoue, Asako; Tachibana, Satoshi, 2016. The roots of shun. Locally produced and consumed food is the best. Shun Gate. The perfect seasons of Japan, https://shun-gate.com/en/roots/roots_50.html, (accessed 22.07.2020).
16. INPEX, (2008), Renewable Energy.https://www.inpex.co.jp/english/business/renewable/ (accessed 27.07.2020).
17. Japan Federation of Economic Organizations, (2016), J-Credit Scheme, https://japancredit.go.jp/english/, (accessed 20.08.2020).
18. Japan Greenhouse Gas Emission Reduction/Removal Certification Scheme (J-Credit Scheme), (2017), Implementation Outline. Ver. 4.1, p.4. https://japancredit.go.jp/english/pdf/documents/01_youkou_english.pdf,(accessed 20.08.2020).
19. Kharas, Homi, (2010), The Emerging Middle Class in Developing Countries, OECD Development Center, Working Paper No. 285, p. 27 https://www.oecd.org/development/pgd/44457738.pdf, (accessed 27.07.2020).
20. Lahti, Tom; Wincent, Joakim; Parida, Vinit, (2018), A definition and theoretical review of the circular economy, value creation, and sustainable business models: where are we now and where should research move in the future? MDPI. Sustainability, vol.10, Issue 2799, pp. 1-19, doi:10.3390/su10082799.
21. Lim, Michelle, (2019), RPA: The cornerstone of co-creating the future of work. https://nrev.jp/2019/10/30/rpa-co-creating-the-future-of-work/ (accessed 20.07.2020).
22. Local to table, 2018. Facebook. https://www.facebook.com/omoinohoka/ (accessed 22.07.2020).
23. Mauborgne, Renee; Kim, W. Chan, (2015), Blue Ocean Strategy. How to create uncontested market space and make the competition irrelevant. First eBook Edition. Harvard Business Review Press Boston, Massachusetts, p. 13.
24. McCarthy, Nil, (2016), The countries winning the recycling race (Infographic). Forbes. https://www.forbes.com/sites/niallmccarthy/2016/03/04/the-countries-winning-the-recycling-race-infographic/#3fb0c9e22b3d, (accessed 17.07.2020).
25. Ministry of the Environment, (2010), Establishing a sound material-cycle society: Milestone toward a sound material-cycle society through changes in business and life styles. Government of Japan, Tokyo. http://www.env.go.jp/en/recycle/%20smcs/a-rep/2010gs_full.pdf, (accessed 25.06.2020)
26. Ministry of Economy, Trade and Industry, (2020), Circular Economy Vision 2020 Compiled. https://www.meti.go.jp/english/press/2020/0522_003.html, (accessed 25.06.2020).
27. Morseletto, Piero, (2020), Targets for a circular economy. Resources, Conservation and Recycling, Volume 153, https://doi.org/10.1016/j.resconrec.2019.104553, (accessed 19.08.2020).
28. Nagaoka International Affairs Center, (2019), An Endeavor Leading Other Municipalities An Experimental Introduction of "RPA" in Nagaoka City Office. Konnichiwa Nagaoka, Vol.333, p.1. https://www.city.nagaoka.niigata.jp/kurashi/cate13/chikyuhiroba/file-kon/vol333.pdf (accessed 20.07.2020).
29. Nagaoka Incorporated Association of Tourism and Conventions, (2020), Nagaoka has a wide variety of delicious foods. http://www.nagaoka-navi.com/foods.html, (accessed 22.07.2020).
30. Nagaoka City Tourism Planning Division, 2017. My Tour of Nagaoka. The Echigo Nagaoka Tourist Guidebook with Maps. Let your heart be light in the serenity of Nagaoka, pp. 1-17, https://www.city.nagaoka.niigata.jp/ kurashi/cate13/chikyuhiroba/file/maitabi-en.pdf, (accessed 24.07.2020).

31. Nagaoka University of Technology, Department of Bioengineering, https://bio.nagaokaut.ac.jp/~en/research/microbial_genetics_and_biomass_utilization.html (accessed 27.07.2020).
32. Oishi Machine Inc., (2003), _https://www.oishi-machine.com/en/04aboutus.html, (accessed 22.07.2020).
33. Ogunmakinde, Olaborne Emmanuel, (2019), A review of circular economy development models in China, Germany and Japan. MDPI. Recycling, vol.4, Issue 27, pp. 1-14. doi:10.3390/recycling4030027.
34. Panasonic, (2015), Our approach to resources recycling, https://www.panasonic.com/global/corporate/sustainability/eco/%20resource_sp.html, (accessed 25. 06.2020).
35. SUZUTIMES vol. 17, (2019), Special Feature: TABI BAR from SUZUVEL debut! http://suzugroup.com/ (accessed 24.07.2020).
36. Tecnologia libre de conflicto, (2020), The Environment and Electronic Devices http://www.tecnologialibredeconflicto.org/en/environment/, (accessed 19.08.2020).
37. The institution of environmental sciences, (2015), The circular economy in Japan. https://www.the-ies.org/analysis/circular-economy-japan, (accessed 31.07.2020).
38. Transactions on Gigaku first edition, (2012), https://www.nagaokaut.ac.jp/e/gigaku/archive.files/TOG_vol1.pdf, (accessed 24.07.2020).
39. Wee, Amanda, (2020), Data Dock setting an example for sustainable data centers. https://zenbird.media/data-dock-setting-an-example-for-sustainable-data-centers/, (accessed 27.07.2020).
40. Weetman, Catherine, (2016), A circular economy handbook for business and supply chains. Repair, remake, redesign, rethink. 1st Edition. Kogan Page Ltd, New York, p. 2.
41. Hirose, Tachishige, (2009), Gomi he no michi, Daisanbunmei-sha.
42. Yolin, Christine, (2015), Waste Management and Recycling in Japan Opportunities for European Companies (SMEs Focus); EUJapan Center for Industrial Cooperation: Tokyohttps://www.eujapan.eu/sites/default/files/publications/docs/waste_management_recycling_japan.pdf (accessed 31.07.2020).

Women Formal Employment in the Private Sector of Egypt

Hend Hassan[*]

Abstract

Egypt is an emerging economy facing immense economic as well as social challenges. The 102 million population count can either pose a heavy load to a country struggling to rise to its potential or can offer a workforce capable of economic growth and hence prosperity. It is crucial to realize that by ignoring half of the potential workforce we are forgoing half of the human capital diminishing –therefore- both economic growth and economic development.

Despite the extensive arguments advocating women as a vital labor resource in the economy, women participation in economic activity in Egypt is still subdued relative to men.

It is the aim of this paper to shed lite on the employment setting of women in the private sector of Egypt, the challenges they face in this sector and the vital role they play as supporters for their households despite the discussed challenges. Conclusions reveal that women in Egypt still lack social, economic, and legal tools needed to empower them in order to fulfill their vital role in the economy despite the fact that they are highly educated.

Keywords: *Labor Gender Disparity, Labor Market, Women Employment, Women Empowerment, Egypt*

JEL Classification: J7, J0, E24, J16, J19, K4

1. Introduction

The aim of this paper is to shed light on the current environment pertaining to women in the formal private sector of the Egyptian labor market and the challenges they face in this sector. Empowering women and incorporating them as vital members and partakers in the economic environment is not a luxury anymore but rather a necessity. Despite that women in Egypt still lack social, economic, and legal tools needed to empower them in order to fulfill their role in the economy.

Succeeding the introduction, the problem statement and the research methodology are portrayed followed by an inspection of literature review relating to the effect of gender inequality on women labor participation in Egypt. The aforementioned is attempted through a portrayal of the effect of gender parity on economic activity and labor participation. Afterwards, the paper provides an overview of the employment setting for women in Egypt and the apprehensions of maintaining employment in the formal private sector in Egypt. Following the literature review the paper presents the findings of empirical work conducted in Egypt to support the theoretical hypotheses.

[*] Hend Hassan is PhD. student at the Bucharest University of Economic Studies – Romania. Email: hend.elsaiid@gmail.com.

The paper then concludes that the fact that women economic empowerment and agency is widely recognized as a prerequisite to development, is demonstrably acknowledged by the Egyptian State. However, in spite of the sincere exertions of the government, a lot remains to be achieved in order to bridge the women labor participation gap in Egypt relative to global indices.

2. Problem Statement and Research Methodology

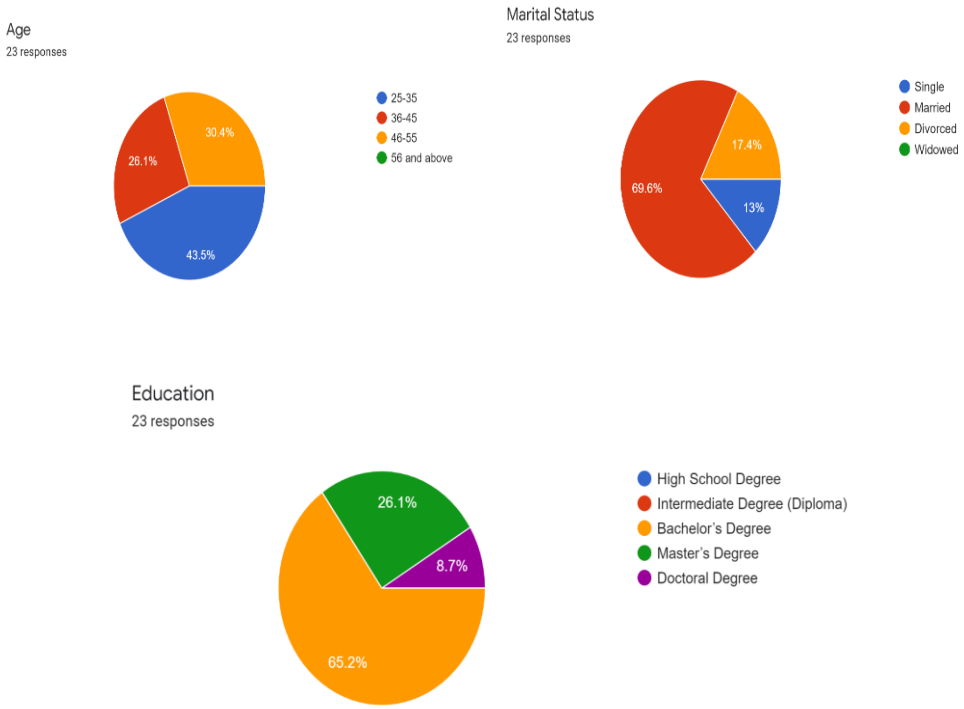
Economic activity that secures own income is deemed essential for empowering women and allowing them agency and supremacy over vital life choices. Although worthy enough as a cause, women economic empowerment is not solely about granting them social justice, it is also about its vitality to the wellbeing of the entire society. According to the United Nations Department of Economic and Social Affairs Population Division, the female % to total population in Egypt has registered 49.8% in 2020 (Countrymeter, 2020), yet Egypt ranks among the highest 10 countries in the world with regards to the gender gap (USAID, 2017).

The IMF stipulates that if the female contribution in the labor force is elevated to the same level of the male participation rate in addition to granting them proper access to employment opportunities, this would result into an increase of up to 34% in the GDP of the country (USAID, 2017). Regrettably, in spite of the countless opinions instating women as an essential labor resource in ensuring and accelerating economic growth and development, women participation in economic activity is still subdued relative to men.

In addition to its situation as an emerging economy -with all the challenges contingent on that- a host of non-economic factors add to the uniqueness of the situation of Egypt: social, cultural, religious -to name a few. The matter that has drawn the interest of a lot of researchers to focus their work on the case of Egypt. Subsequent to its importance, an immense body of literature is devoted to topics pertaining to economic participation of women as a vital contributor to the labor force, particularly in developing countries like Egypt.

This paper aims to offer a perspective on the current situation of women employment in the private sector of Egypt and the role they play as providers for their families. In an attempt to reach this end, the paper implies a scrutiny of the literature, proving that gender inequality adversely impacts women participation in economic activity in general and in the Egyptian labor market in specific. This is in addition to an empirical study that supports the preceding notion through examining: (1) the impact of earned income on women empowerment; (2) the financial contribution of women to the household; (3) the suitability of working conditions in the private the sector for women; (4) the impact of reproductive burden on career choices.

The instrument used to achieve the empirical work is a semi structured guided questionnaire displaying objective multiple choice questions as well as open ended questions to give the interviewees better opportunity to express their points of view and hence a richer insight for the researcher. The questionnaire was administered in Egypt in November 2019 and comprises the participation of 23 women from different age groups, marital status, education levels, and different occupations to display diversity. The criteria for choice are age 25 to 50; holder of a university degree; working in the private sector.



The women interviewed are divided into 3 focus groups and can be categorized into three main professions: education, medical/clinical, and business services. Each focus group had a group leader heading it acting as a liaison and facilitator. Prior to dispensing the questionnaire, the researcher met with each group leader and explained the aim of the research and thoroughly clarified the process of investigation.

The questionnaire has been implemented using Google forms software to enable the retrieval of all responses. The software also allows a separate visibility for each recipient answer to every question on a separate sheet. Google Form Software automatically creates a summary of all the responses making it possible to have all the data input in a Google Spreadsheet, therefore generating quantitative data, displaying visual representation, and facilitating cross analysis. All the questions are displayed on the header first row of the spreadsheet displayed in the same order as in the Google Form.

Research Limitation

The sample size accessible to the researcher is insufficient for establishing definitive statistical conclusions. The small sample size is a function of time constraints since it is not conducted in the country of residence. Another limitation of the sample is that the majority of the participants came from the same sector, namely, the education sector. The sector barely exhibiting any visual disparities relating to equal pay and suitable work conditions which is not the case of other businesses in the private sector.

It is important to note here that it is not the intention of the researcher to concentrate on education employment as a representative of the private sector, it is however inevitable owing to the fact that it attracts many women because of the previously stated benefits.

3. Literature Review

3.1 Gender Parity as a determinant of Economic Activity and labor Participation

Despite the extensive arguments advocating women as a vital labor resource in enhancing economic growth and development, women participation in economic activity is still lagging relative to men. Collier specifies four distinctive aspects - hinging on 'social conventions'- that restrain women from properly participating in economic activity. First is the existing discernment that extends beyond the household to the labor market and access to credit and funding. Second is the fact that 'role models' in economic and production activity tend to be highly 'gender-specific'. Meaning that boys tend to follow the example of men preceding them while girls feel inclined to follow in the foots of other women. Consequently, when a new economic opportunity emerges if it is assumed by a man it will automatically, thereafter, be readily available to men rather than women. Third is the distribution of responsibilities and compulsions within the household that falls primarily on the shoulders of women that make them reluctant to surge their burden by more labor outside their domicile. And lastly -and foremost demanding- is the duty of reproduction that is the entire responsibility of women with what it entails in terms of time, physical and mental health strain on them (Collier, 1989:8, cited in Miller & Rasavi, 1995).

Palmer builds on the verdicts of collier and takes the notion of reproduction burden way further as he labels it a 'reproduction tax' on women labor that they have to submit prior to engaging in any other labor activity. In this sense the 'reproduction tax' levied on women not only limits the time at their disposal to participate in economic activity but also confines their choice solely to work opportunities suitable to their household obligations. Evidently, the economic consequent is misallocating a valuable resource exemplified in the forgone opportunity of women productivity, which is a distortion to the market forces leading to extensive economic inefficiency (Palmer, 1991:163 cited in Miller & Rasavi, 1995). Macro-economic policies -thereafter- have been criticized by many researchers for its male bias, Elson calls on policy makers to grant some attention to 'human development aggregates' instead of just "considering the monetary aggregates of productive economy and ignoring the human resource aggregates of the reproductive economy (Elson, 1993, cited in Miller & Rasavi, 1995, P.27).

3.2 The Employment Setting of Women in Egypt

Recent statistics have revealed that 30% of the Egyptian households are entirely supported financially by women in addition to an evident percentage co-supporting their families. In 2018 the Central Agency for Public Mobilization has released statistics stipulating that 14% of Egyptian families are headed by women (El-Behary, 2018).

Currently, employment apprehensions are central to every policy deliberation in Egypt. It is at the core of the economic goals of 'Egypt's 2030 Strategy' that aim to reduce the unemployment rate to 5% (ILO, 2016 A). The unemployment rate has stayed

almost constant since 2014 around the 13% figure. However, this figure -like any other aggregate statistics- does not reflect the variations relating to different social clusters in the society. As such the differential employment ratios pertaining to different age groups, ethnic groups, inhabitant groups (urban/rural, upper/lower Egypt, or rich/marginalized areas) or genders are not accounted for. Of course -needless to say- gender issues cut across all these mentioned categories. This is as women tend to make the majority of those who are likely to be underemployed, to exit the workforce -based on discouragement- and to be among the marginalized social groups.

Therefore, despite the fact that unemployment poses a critical apprehension literary to every citizen -seeking a job- in any given society, it can be asserted without hesitation that the pursuit is by far more intense when it comes to women who are naturally more venerable in the job market. This is especially true in a country like Egypt where the general consensus is that in times of economic hardship and limited job opportunities men should come first as they are perceived to be more deserving and more entitled while a woman work is perceived as an accessory . Consequently, while male unemployment for the age of 15+ rests on a 6.8% threshold corresponding female unemployment hovers around 21.4% (Al-Masry Al-Youm, 2019).

The labor office – falling under the jurisdiction of the Ministry of Manpower – administers all policies initially mandated by the Ministry. It is also responsible for the provision of all services pertaining to employment or required by those who are actively pursuing a job. A survey conducted in 2006 provided that over 90% of workers with a formally paid job received information that aided them in attaining this job via one of the labor offices. That being said, when considering women job seekers, a number of inadequacies have been detected. First, there has been no eminent effort of offering any special services to women specially for those raising infants or young children. Second, no exerted work on toning the employers' requests with the qualification of those listed at the office as seeking a job has been detected. Finally, the lack of provision of any sound counselling to the named women diminished their opportunity in being properly prepared to purse the available jobs (JICA, 2018).

In light of the above, the International Labor Organization has issued a report suggesting the subsequent recommendations to the Egyptian administration in order to boast the employment rate of the youth in general and that of women in particular. The named recommendations include integrating and supporting women through decent working conditions and environments that take in consideration the women role as care takers for their families. Make more information available on the different industries and sectors hiring women as well as enhancing the skills of women and coaching them into becoming competitive enough for acquiring these jobs.

It is worth noting that a number of amendments have been made to the labor law pertaining to women. Examples of these amendments are; the exemption of women from working the night shift in the industrial sector (No. 183 of 2003); granting women with a nursing infant the right to either sign in – to her job – one hour late or sign out one hour early (No. 155 of 2003 and the Child Act); as well as extending maternity leave from three months to four months (No. 126 of 2008). This is in addition to excluding women from partaking in jobs endangering them (Article 90). The legislation also grants women

a maximum of two –three month- paid maternity leaves (Article 91) in addition to an unpaid childcare leave for up to six years (Article 94), to be taken once or subdivided for different children (JICA, 2018).

3.3 Gender Disparity in the Egyptian Labor Market

Gender gap is defined by the World Economic Forum as the "difference between women and men as reflected in social, political, intellectual, cultural, or economic attainments or attitudes" (World Economic Forum, 2017). The Egyptian labor law is gender equitable if not even favorable to women, that being said however, it can pose a hurdle rather than a privilege to many women seeking job opportunities. This is as -in absence of specified female quotas- many employers especially in the private sector are not in favor of recruiting women consequent to their law stipulated rights of maternity leave, nursing hour and childcare service provision. All of which making women a more expensive option to employers compared to men recruits, therefore resulting into more discrimination than support towards women and hence defying the whole essence of the law.

Profound manifestation exists in the literature displaying the humble labor participation of women in the formal economy. The percentage of women participation in labor force as a ratio of the total labor market fluctuates pending the demand of that market that primarily hinges on whether male workers are available to satisfy this demand or not. Although no obstinate cultural norms are detected regarding the employment of women in particular careers, it is undoubtful that consenting their participation in certain fields depends - for the most part - on that is perceived as modest, appropriate and the repercussions of such employment opportunity on her domestic obligations (Dorlet, 2005). It is important to note here that the political ideology -inaugurated in Egypt amid the 1960s - promoting for more women participation in economic activities has not been complemented by support schemes for these women. The state has continued to take women reproductive obligations and domicile duties as given basically as part of their biological disposition (Dorlet, 2005), delegating the entire responsibility of child-caring to women rather than endorsing a 'shared responsibility approach' (Elmenoufi, Ibrahim, Elkashawy 2017).

As such through the years little attention has been given to helping women balance their responsibilities at the household with those at the work place in a way that caters for both their productive and reproductive function, the matter that possesses a constraining challenge to women up to this date (Dorlet, 2005). The latter justifies the ILO statistics indicating that only one out of three women leaving work to attend to family related obligations manages to resume work again (Elmenoufi, Ibrahim, Elkashawy 2017).

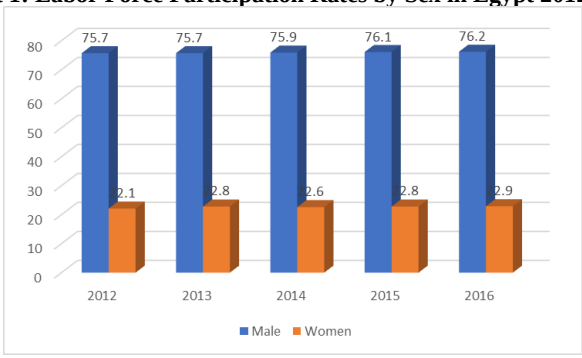
Equitable job opportunities for both men and women in the labor market is at the core of gender parity and hence women economic empowerment. Nevertheless, attaining gender equality with regards to economic activity extends beyond being a matter of social righteousness and fairness to an inevitability for economic growth and hence development. Unfortunately, however, Egypt rates among the lowest female participation in labor force amid the entire world where only one in four females is economically active (ILO, 2016 A). Women participation in economic activity in Egypt, therefore, hinges around 23% which is almost half as much as the world's average for women participation in economic activity registering 53% (ILO, 2018). This is while a survey by the Central Agency for Public Mobility and Statistics - in 2019- asserts that female

participation in the labor force in Egypt is less than 20.9% compared to 79.1% for males **(**Al-Masry Al-Youm, 2019).

Additional statistics pertaining to workforce participation -in 2015- display substantial gender disparity, where female participation in the labor market register a humble 22.8% resulting into a diminished employment rate of 19.6% Moreover, data indicates that a significant percentage of female employees -amounting to 35%- are unpaid for their work compared to 5% only for males (Ilo.org., 2016).

Egyptian women not only face higher challenges in finding a new job but also struggle to keep it for extended periods of time subsequent to the hardship they encounter in balancing their productive and reproductive roles. This is in addition to the social discrimination they face in the job market, all leading to a 25% female unemployment rate -in 2015- compared to 8.3% for males (Ilo.org., 2016). Chart 1 depicts the gender disparity in labor force participation in Egypt for the period between 2012 and 2016.

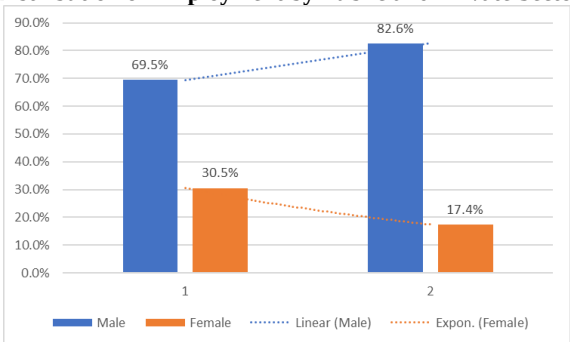
Chart 1: Labor Force Participation Rates by Sex in Egypt 2012-2016



Source: ILO KILM statistics http://www.ilo.org/global/statistics-and-databases/ WCMS_424979/lang--en/index.htm [accessed 30 August 2016].

Furthermore, women only hold 17% of the private sector employment while men hold a substantial 83% of this sector. Likewise, women participation in the public sector employment amounts to 31% as opposed to 69% male participation (ILO,2016).

Chart 2: Distribution of Employment by Public and Private Sectors in 2014



Source: Calculations based on CAPMAS statistics (2014). "Annual bulletin for labor force survey 2014".

Moving forward, in 2017 the Statistical Yearbook shows that male employees have registered 20 million as opposed to only 5.4 million women employees, women participation –therefore- in the labor force has only amounted for a humble 23% (JICA, 2018). Moreover, a comparison between the unemployment rate by gender –in 2016- has shown an evidently higher unemployment rate for women registering 23.6% as opposed to 8.9% for men.

Nevertheless, what is even more alarming is that 88.9% of those who are unemployed have finished higher education (university graduate or post graduate level), which points out a much higher education level of women compared to men with equal qualifications. What further asserts this notion is the fact that only 3.2% of the unemployed women are found to be illiterate compared to a 6.4% illiteracy rate among unemployed men (JICA, 2018).

Table 1 demonstrates what is previously mentioned as it shows the highest group of unemployed women to be those who hold a university degree or higher amounting to 31.3% in 2017. The figures also show the immense parity in the percentages of men and women participating in the job market despite holding the same academic credentials. All of which confirming the pressing need for the enforcement and timely implementation of the above-mentioned recommendations.

Table 1: Participation in Labor Force and Unemployment Rate by Sex & Education 2017 (in 00s)

Education Status	Total	University Degree or Higher	Upper Intermediate	High School Diploma	Below High School	Read & Write Level	Illiterate
Labor Force							
Total	**294,743**	**56,582**	**13,558**	**5,121**	**39,693**	**28,929**	**53,531**
Males	224,730	35,905	10,236	4,065	32,523	26,053	40,459
Females	70,013	20,677	3,322	1,056	7,170	2,873	13,072
Unemployed							
Total	**34,681**	**11,777**	**1,460**	**200**	**2,728**	**825**	**1,171**
Males	18,530	5,299	613	119	2,336	498	928
Females	16,151	6,478	847	81	392	327	243
Unemployment Rate (%)							
Total	**11.8**	**20.8**	**10.8**	**3.9**	**6.9**	**2.9**	**2.2**
Males	8.2	14.8	6	2.9	7.2	1.9	2.3
Females	23.1	31.3	25.5	7.7	5.5	11.4	1.9

Source: Compiled based on CAPMAS, 2018, Statistical Yearbook – Labor

Another distressing report shows that the participation of women of age 15 and above - in the labor force- is only 22% compared to 75% for men, while globally women account for 52% of the labor force. The same report indicates that women's labor participation between the ages of 15-24 is 20% compared to 53% for men (UNISEF, 2011).

The substantially high unemployment rate for women - who have a university degree or above- is not only attributed to the lack of sufficient job opportunities in the private sector but also to the equivalent insufficiency of opportunities in the public sector relative to the increasing number of yearly graduates. In spite of that a lot of women will still be

waiting in line in hope of an opportunity opening in the public sector that is known to require less skill level as a criterion for hiring. This is since despite the high degrees some of the women hold, they tend to lack the proper skills that would make them competitive enough in the private sector, i.e. language, computer, leadership skills, etc.

Many business owners claim that finding employees -especially fresh graduates- with the needed skill level and qualifications poses an evident challenge to them. Subsequent to this incongruity, a substantial percentage of the 800,000 graduates entering the job market annually with high degrees experience profound hardship in procuring matching job opportunities (ILO, 2018). Naturally, the situation is more dire when it comes to women seeking appropriate jobs consequent to their confinement with many other social, physical and cultural hindrances.

The immense demand of female graduates for government and public sector employment is also a function of the discernment of the private sector against women stemming from discriminatory social norms discouraging female employment within certain occupations. Additionally, the labor regulation pertaining to maternity leave and working hours preferential treatment elevates the cost of hiring females, further discouraging the private sector from employing them (Mensh, 2003, cited in Dorlet, 2005). As such the public sector becomes their only resort otherwise, they are obliged to turn to the informal work sectors, where they would have to consent to lower wages, low to no benefits or job security together with incongruous work environment.

3.4 The Paradox of the Education Sector

An assessment conducted by the World Bank Gender Unit assesses that the conventionally solid correlation between the education achieved and participation in the labor force is diminishing. This is consequent to a shrinking public sector -traditionally a chief employer for educated women- coupled by frail opportunities available for them in the private sector. Despite the fact that a higher ratio of men is being employed in the majority of sectors, certain sectors remain to be dominated by female employment. Quantifiable research attest that specific sectors are more accepting to women than others, especially to those who are married.

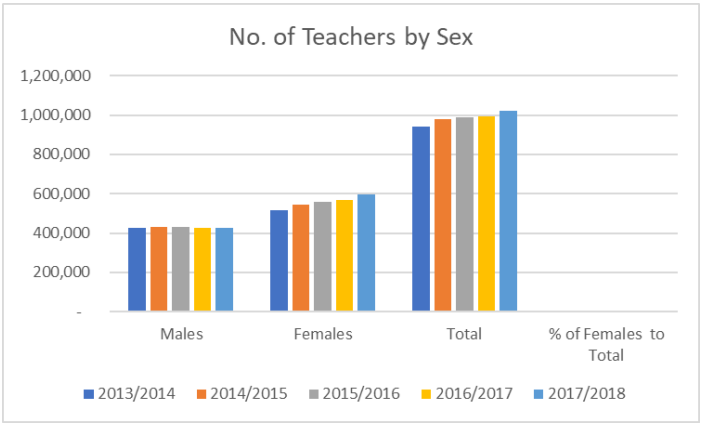
The education sector – that show a substantial demand for women hires – employs 48.1% of women. Table 2 and chart 3 below confirms that women continue to seek more jobs in the education sector where they believe will be more accepted and where the working conditions will allow a more suitable balance for their productive versus reproductive responsibilities. The numbers show a steady increase in the numbers of women employed by the mentioned sector -between the years 2013 to 2018- as opposed to stable to lower numbers of men seeking the same job during the same span of time.

Table 2: No. of Teachers by Sex 2013-201

Sex	2013/2014	2014/2015	2015/2016	2016/2017	2017/2018
Males	424,999	431,650	430,464	426,056	427,904
Females	517,826	545,415	559,043	566,741	595,929
Total	942,821	977,065	989,507	992,797	1,023,833
% of Females to Total	55%	56%	56%	57%	58%

Source: Compiled based on CAPMAS, 2018, Statistical Yearbook – Education, Data supplied by the Ministry of Education

Chart 3: No of Female Teachers versus Males 2013-2018



Source: Compiled based on CAPMAS, 2018, Statistical Yearbook – Education, Data supplied by the Ministry of Education

4. Findings of the Empirical Research

The findings of the research can be clustered into three distinct themes: (1) the impact of earning own income on women empowerment; (2) the significant role women exhibit as providers for the household; (3) challenges facing women in the private sector of Egypt. The following section will utilize the responses of the sample participants to shed light on these themes in an attempt to better comprehend the employment environment facing women in Egypt and what justifies their limited participation in the labor market. This is while establishing -through the carried investigation- the importance of having a paid job and earning income on attaining women empowerment.

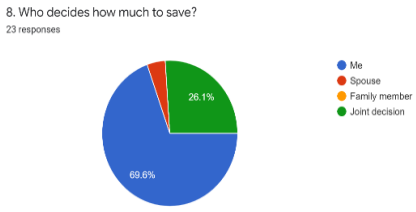
4.1 The Correlation between Earning Income and Women Empowerment

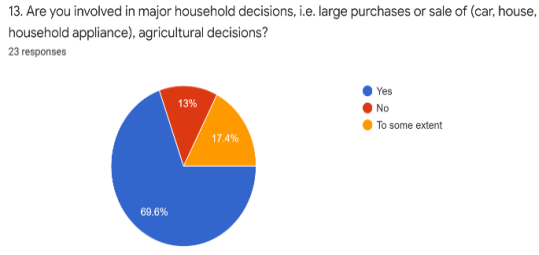
Various studies stipulate the positive correlation between wealth or working for money and women empowerment as manifested in greater participation in decision making. Women undeniably are more empowered when they have access to a paid job that secures a consistent income and when this income constitutes a significant percentage of the total household earnings. In the sample surveyed 95.7% of the women indicated having their own income, 100% of which confirmed that the source of this income is a paid job.

The following indicators will be used to establish the positive relationship between earning income and women empowerment: having a bank account; making decisions regarding savings; making decisions pertaining to substantial purchases; making reproductive decisions; making decisions relating to having a job and earning money.

All the participants affirmed having a bank account and 87% confirmed that they exercise agency over when to assume employment and earn own income. When asked about saving decisions 69.6% of the women asserted the ability to decide how much to save and 60.9% said they were able to decide when and how to spend these savings, while the rest responded that it was a joint decision with the spouse. Only one participant

out of the sample indicated that her husband takes all decisions relating to saving. Moreover, 69.6% of the women stated being able to make decisions regarding purchasing major acquisitions (i.e. house, car, appliances, etc.). The manifested agency women possess over saving and spending decisions -as conveyed by the data- stems from the fact that these women are earning money and contributing to the household finances. Therefore, it can be asserted that a positive correlation exists between earning own income and women empowerment.

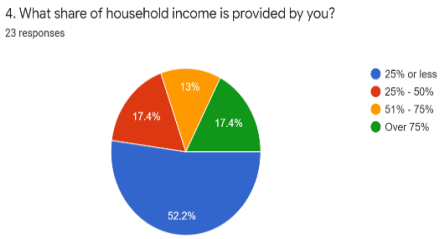


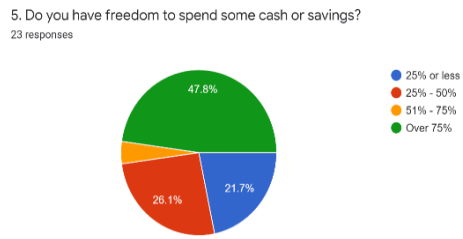


However, when asked about the ability to negotiate reproductive decisions only 56.5% out of the women interviewed indicated that they are always capable to do so while 34.8% said sometimes. Being conservative about discussing such matters is attributed to cultural inclination, nevertheless a financially independent women is more able to make such decisions.

4.2 Women Contribution to the Household Income

The vast majority of working women make substantial contribution to the total income earned by the household. Nevertheless, such significant financial contribution to the earnings of the family does not necessarily translate into supremacy over household decision making. Through the sample a wide range of responses convey full control over the household income to no control at all.



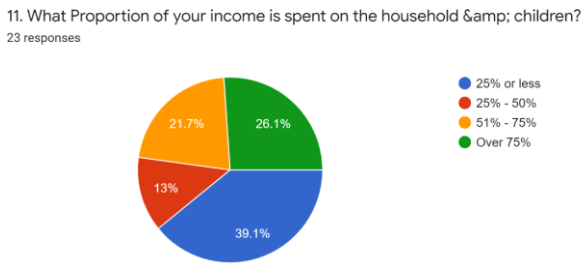


When asked about the share of household income they provide almost 48% indicated providing more than 25% of the family income out of this percentage 17.4% provide up to 50% of the income, 13% provide up to 75% while 17.4% provide more than

75% of the household income. However, when asked about the power they possess over-spending cash or saving 47.8% -almost half the sample- indicated having control over 50% or less of the income out of this percentage 21.7% have control over 25% or less of the income. Moreover, when asked whether they feel comfortable discussing household finances with their spouses when they were not in agreement 21.7 % answered: no. when asked why among the responses were: "it felt awkward", "it caused fights and disputes", "he is unclear regarding anything concerning money", "he always perceives it as an acquired right that I support with my entire income."

It is important to note here that despite the aforementioned, earning own income is still among the chief influences enabling women empowerment. This is as 47.8% indicated having control over more than 75% of spending decisions and even the ones displaying less control over financial decision making in the household would not have any power over such decisions if they were not earning money and contributing income.

It is also crucial to signify here that the majority of working women in Egypt seek employment out of necessity rather than luxury as they assume a crucial role as sole providers or co-providers for their families. When women in the sample were asked about the percentage of their income they spend on the children and the household almost 60% indicated spending more than 25% of their income for that purpose. Out of this percentage 13% provide up to 50% of their income, 21.7% provide up to 75% and 26.1% provide more than 75% of their income to children and household expenses. The numbers therefore, clearly manifest that women act as providers for their families which defies the prevailing argument deeming men more worthy of job opportunities because they are bread winners of their families while women's work is merely an accessory to the household expenses.



4.3 Challenges Facing Egypt in Private Sector Employment

Work/life balance is among the principal challenges deterring women participation in economic activity. Conclusions from a Time-Use Survey conducted in 2015 signify that women in Egypt are almost entirely responsible for care taking and housework responsibilities even when they have paid jobs (Zeitoun, 2018). Only 3 out of the 23 participants stated they receive some form of help with household duties from their spouses. Moreover, research show that household obligations assigned to women do not decrease upon their employment (Zeitoun, 2018). In the sample 60% of the married women in the sample stated that they spend 8 to 9 hours a day on their paid job while

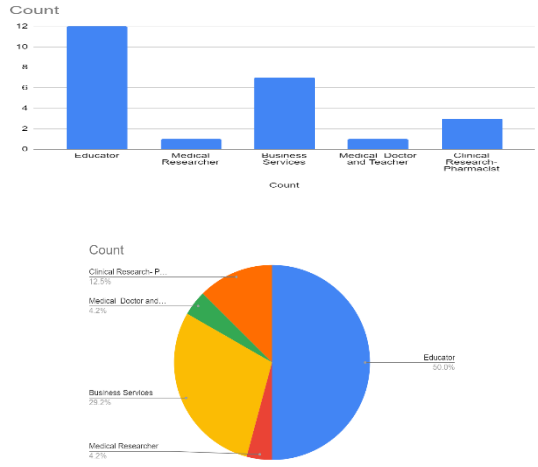
50% indicated that they spend 4 to 5 hours a day on housework. This "double burden" can dissuade women from seeking employment and committing to a job as it becomes highly challenging to maintain a career, which explains why a lot of women exit the job market post marriage consequent to household and reproductive obligations.

Public mobility is also an important determinant in facilitating women participation in economic activity. When asked whether you are able and feel safe to use public transportation/travel in public spaces 47.8% of the participants replied that they do not and that they actually avoid using public transportation in fear of their safety. Even those who can afford private transportation in Egypt struggle with heavy traffic, overcrowding, harassment, and the cost encountered to go to work, all of which pose hindrances to women participation in the labor force, especially when coupled by the long work hours of the private sector.

Women preference for public sector employment in Egypt is justified by unsuitability of work conditions in this sector for women -especially married ones- manifested in unequal pay, lessened environment safety, harassment, lack of childcare services, and extended working hours. The mentioned apprehensions not only cause women to refrain from labor participation but also influence their career choices if they have to assume employment.

As indicated by numerous studies in the literature, the education sector is deemed one of the most hospitable employment sectors for women even if it operated within the private sector canopy. Although it is not the intention of the research to concentrate on women employed by this sector it is inevitable as 50% of the research participants - although not deliberately chosen-held jobs within the education system consequent to the suitability of the work conditions.

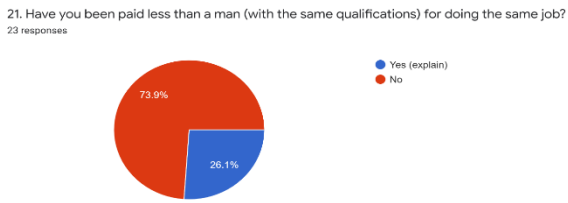
Chart 4: Sample Distribution by Occupation



To achieve insight of the **work conditions** challenges confronting women in the private sector of Egypt the suitability of the following indicators are addressed: (1) work hours; (2) safe enviroment (3) harassment; (4) availability of childcare services. The

responses yeild a critical observation, essentially, all the participants proclaiming the suitability of work hours, the safty of enviroment, the absence of harasment and the availability of childcare facilities are all working in the education sector. Participants employed within business services and medical/clinical industries all asserted otherwise. The matter that justifies women opting for employment in the education sector even when they were more qualified for the job offered, which is proven by the fact that some of the teachers interviewed are engineers and doctors and holders of Ph.D.

Lastly, the problem of **unequal pay**, it is well-known that in the labor markets of many developing as well as developed countries, women who are equally as qualified as men are still earning significantly less. Berniell and Sánchez-Páramo postulate that in earning prospects, women have a lesser chance to have formal job opportunities, they usually earn less than men for doing the same work (Duflo, 2012). To combat this injustice, Article 9 in the 2014 Constitution stipulate that the Egyptian State "shall ensure equal opportunities to all citizens without discrimination" therefore contesting any discernment against women. The government as well as the public sector abide by this legislation and enforce equal pay schemes, regrettably however, this is not the case in the private sector. This is confirmed by a study -in 2015- attesting that the private sector pays women 34% than their male counterparts despite the Labor Law provisions stipulating for equal compensation, which evidently demotivate women from seeking employment in the private sector.



There are exceptions -of course- of this predicament as vastly exhibited in the education sector even the privately owned and managed segment of it, which is verified by the research participants responses. When asked whether they have been paid less than a male colleague for doing the same job 73.9% said no while 26.1% said that they do. It is worth noting here that the sample participants affirming receiving equal pay chiefly hold education posts, all indicating that this sector provides more equitable opportunities for women. Those who affirmed receiving less elaborated that they are receiving the same as a male working less or getting the same pay as a less experienced male. Justifications alternated between: "having less negotiating power", "men are stronger in getting what they want", and "Simply we are in man environment, so everything is for men first".

5. Conclusion

Presently, Egyptian women are still constrained by the social and cultural framework stereotyping women role in the public arena in spite of the diversity of their contributions to the economy and the multiplicity of the economic roles they play as orderly, unregulated and care labor. Despite the preceding women's access to employment opportunities -specifically in the private sector- remain limited by work/life balance struggle, challenging

public mobility, frail enforcement of labor laws that permit unsuitable work conditions, unequal pay as well as diminished 'gender-sensitive' policies.

In spite of the evident discernment and gender-based milieu women are subjected to in the workplace, Egyptian women bear economic burdens and contribute to spending on the family, either in partnership with men or as the primary breadwinners of the family. Findings of the research affirm that women in Egypt are not working for luxury or merely for their independence but are rather obligated out of the necessity of supporting their families, if not as the sole providers then as co-providers for essential. It is therefore irrational to limit their access to equal labor opportunities based on the predisposition that men are the providers of their families and hence more worthy of claiming work opportunities.

The research shows concreate evidence of the positive correlation between having a paid job thus earning own income and women empowerment. Contributing to the collective income of the family gives women rights to share in vital decision making in the household which is normally not possible for them otherwise. Through making sizeable contributions to the necessities of the household they earn the right to make decisions pertaining to saving, spending, and making substantial purchases.

Through the years -however- little attention has been given to helping women balance their responsibilities at the household with those at the work place in a way that caters for both their productive and reproductive function, the matter that possesses a constraining challenge to women up to this date (Dorlet, 2005). Evidently, women economic participation positively correlates with the adequate recognition and protection of their needs, rights as well as physical and mental security in the workplace, the matter that entails sincere exertions on behalf of the government as well as employers.

Women preference - in Egypt- for public sector employment is justified by the discrimination they face in the private sector, owing to the anticipated higher cost associated with hiring them. Consequent to their reproductive and care taking role employers believe women are not a good investment, which is reflected in diminished growth opportunities and discriminatory compensation. This is in additions to the unsuitability of work conditions in this sector for women -especially married ones- manifested in extended working hours, lack of childcare facilities, and unequal pay.

Nevertheless, this research detects an exception to the aforementioned apprehensions, namely, in the education field even when it is operated within the private sector. The singularity of the educational sector is that it offers women equal opportunity in recruiting, compensation, and promotion. Moreover, presents decent work conditions in terms of reasonable hours, safe environment, equal pay, and opportunity for growth as well as child-care services. Thus, enabling more participation in the labor market and hence better chances of women empowerment.

References

1. Al-Masry Al-Youm, (2019), *CAPMAS issues population report for International Women's Day - Egypt Independent*. [online] Egypt Independent. Available at: https://ww.egyptindependent.com/capmas-issues-population-report-for-international-womens-day/
2. El-Behary, H., (2020), *14 Percent of Egyptian Families Depend On Female Breadwinners: CAPMAS - Egypt Independent*. [online] Egypt Independent.

Available at: <https://egyptindependent.com/14-percent-of-egyptian-families-depend-on-female-breadwinners-capmas/>

3. Countrymeters.info, (2020), *Egypt Population (2020) Live — Countrymeters*. [online] Available at:<https://countrymeters.info/en/Egypt#:~:text=The%20sex%20ratio%20of%20thelower%20than%20global%20sex%20ratio.>
4. Dorlet, J., (2005), *Women and Micro Credit: Towards an Understanding of Women's Experiences in Cairo, Egypt*. [online] Digitool.library.mcgill.ca. Available at: http://digitool.library.mcgill.ca/webclient/StreamGate?folder_id=0&dvs=1557671339689~444&usePid1=true&usePid2=true (Elmenoufi, Ibrahim, Elkashawy 2017).
5. Duflo, E., (2012), *Women Empowerment and Economic Development*. [online] Economics.mit.edu. Available at: https://economics.mit.edu/files/7417.
6. Ezzat, M., (2018), مؤسسة [online] .والسكان للتنمية المشرق مؤسسة | المرأة لعمل الإقتصادية القيمة .والسكان للتنمية المشرق. Available at: http://www.almashreqfoundation.org/economic-value-of-womens-work
7. Miller & Razvani, (1995), *From WID to GAD: Conceptual Shifts in the Women and Development Discourse | Publications | UNRISD*. [online] Unrisd.org. Available at: http://www.unrisd.org/80256B3C005BCCF9/(httpPublications)/D9C3FCA78D3DB32E80256B67005B6AB5 (ILO, 2015)
8. Ilo.org., (2016), *A National Assessment of Women's Entrepreneurship Development in Egypt*. [online] Available at: https://www.ilo.org/empent/areas/womens-entrepreneurship-development-wed/WCMS_551168/lang--en/index.htm
9. ILO, (2016A), *Decent Work in Egypt 2015 Results*. [online] Ilo.org. Available at: https://www.ilo.org/wcmsp5/groups/public/---africa/---ro-addis_ababa/---sro cairo/documents/publication/wcms_482054.pdf
10. ILO, (2018), *Decent Work in Egypt 2017 Results*. [online] Ilo.org. Available at: https://www.ilo.org/wcmsp5/groups/public/---africa/---ro-addis_ababa/---sro-cairo/documents/publication/wcms_618591.pdf
11. Japan International Cooperation Agency JICA, Country Gender Profile, Arab Republic of Egypt Survey Report, (2018), Open_jicareport.jica.go.jp. (2018). [online] Available at: http://open_jicareport.jica.go.jp/pdf/12305181.pdf
12. UNICEF. org., (2011), Egypt MENA *Gender Equality Profile Status of Girls and Women in the Middle East and North Africa*. Reginal Office for the Middle East and Africa. Available at: https://www.unicef.org/gender/files/Egypt-Gender-Eqaulity-Profile-2011.pdf
13. Usaid.gov., (2017), *Gender Equality and Women's Empowerment | Egypt | U.S. Agency for International Development*. [online] Available at: https://www.usaid.gov/egypt/gender-equality-and-womens-empowerment.
14. World Economic Forum, (2017) *What Is The Gender Gap (And Why Is It Getting Wider)?*. [online] Available at: <https://www.weforum.org/agenda/2017/11/the-gender-gap-actually-got-worse-in-2017/#:~:text=The%20gender%20gap%20is%20the,or%20economic%20attainments%20or%20attitudes.
15. Zeitoun, N., (2018) *Egypt: Women Economic Empowerment Study*. [online] World Bank. Available at: <https://www.worldbank.org/en/country/egypt/publication/egypt-women-economic-empowerment-study>

An Overview on Leadership Styles for Organizations

Cenk Lacin Arikan[*]

Abstract

Leadership is undeniably a major factor in today's highly competitive business environment where the organizations thrive to create and sustain competitive edge over their rivals. In order to do that, motivating and leading the human capital within the organizations stand out as important remedies that can cure other shortcomings of an organization and help to build employee involvement that cannot easily be imitated by the competitors. In that regard, contemporary leadership has a significant role whereby it may energize the dormant potential in the organization, offer creative solutions, deal with the problems of turbulent times, and deliver these in such a way that is unique and very difficult to replicate. Thus, modern day management relies more on the human factor of organizations which can only be managed through effective leadership. In today's global business environment, almost all resources, except for the human resources, can be imitated to a certain extent. In other words, leadership style that nurtures and cultivates the human capital of an organization in the right way may be a source of sustainable competitiveness that will be too difficult for the competitors to replicate. This study aims to provide an overview of the major leadership styles that organizations may find useful for their specific needs. By providing such an overview, it is hoped that researchers and practitioners alike benefit from these perspectives and have a chance to shed light on their current problems and future objectives.

Keywords: *leadership styles, management, workplace*

JEL Classification: M10, M20

Introduction

Leadership studies have been in the focal point of organizational studies for nearly five decades. Many researchers assert that leadership is critical for the success of organizations (Kumar and Kaptan, 2007). Without effective leadership companies struggle to find direction and motivation in their journeys as they go through certain rough paths. Even in times of success, the issues of sustaining such accomplishments become important. In that regard, employees find it difficult to keep their competitiveness without successful leadership (Lussier and Achua, 2007). Motivating and leading members of the organization toward common goals and aligning daily activities with the overall mission and goals are strategic and critical aspects of organizational performance.

[*] Cenk Lacin Arikan is at the American University of the Middle East, Kuwait. E-mail: cenklacin.arikan@aum.edu.kw

Thus, leaders and their leadership styles appear as significant determinants of the success or failure of organizations (Bass et al., 2003).

Leaders appear in all settings, whether at the project team, department or company level. They naturally emerge based on the conditions and the needs. Leaders can also have official standing in the hierarchy of the organization. Here, it is worth mentioning the difference between managers and leaders. Managers may not necessarily possess the attributes of a leader and leaders do not necessarily have to be managers. In other words, there may be real life instances where the formal managers do not act as leaders (Bargau, 2015). Thus, it can be said that the hierarchy of an organization is definitely a factor to consider in leadership studies. However, leadership is a concept that may go beyond formal hierarchical positions displayed in an organization.

Leaders possess different attributes and they adopt different styles when they motivate and lead their subordinates (Chiang and Wang, 2012). Some leaders are more people oriented and some leaders are more process oriented, and yet some are only output or results oriented. Leaders' personal characteristics, the values of the organization, and the specific task at hand may be among the the determining factors shaping the leadership style (Alkahtani, 2016). Therefore, leadership style is successful only if there is a good match between the leader and the organizational setting. In other words, somebody can be a great leader in a certain situation in a specific period of time. However, the same leader may not perform nearly as well in other settings where the organization, its values, the employees, or the tasks differ. We see this in organizational life very frequently where a successful business leader cannot always show the same performance when the situations change. For example, when a leader is transferred to another firm, even in the same industry, sometimes the performance levels fluctuate greatly despite increased amount of experience.

Robbins (2009) claims that leadership styles have multiple effects. Leaders, through the way of their execution, may actually influence the formulation of organizational strategy. They may also have significant input in the implementation stage of the strategy. Arikan and Enginoglu (2016) assert that "the boards, executives, and top management teams naturally play significant roles in determining the strategic direction and how the strategy gets translated into everyday execution" (p.1). But not only that, leaders-through their leading styles- affect their subordinates' commitment and contribution. In other words, effective leaders have the potential to bring out the better in their employees. Enginoglu and Arikan (2016) argue that "only very powerful individual characteristics within the firm possess traits that affect other people" (p.21). This is especially important in today' business environments where leaders can make a difference by tapping into the soft skills of their employees like creativity and exceptional customer relationships. Such potential can be a source of differentiating value in the mind of the customers if utilized effectively.

In an attempt to understand different leadership styles and create a more thorough perspective of the construct, this paper highlights the major approaches and hopes to bring a comprehensive compilation of significant studies. Several implications for managers and researchers are derived and implied in order to open a gateway into more fruitful discussion and to inspire further studies.

Different Styles of Leaders

Like many other concepts and constructs in organizational studies, leadership lacks a unified definition. One of the major reasons for this is the great extent leadership reaches. Leaders can be found in formal as well as informal groups. Leaders also can evolve in time and may change their attributes, depending on personal growth and situational characteristics. Moreover, the same leader may act as a subordinate or a subordinate may act as a leader depending on the situation. Therefore the contingent nature of leadership should be taken into account in all leadership related issues.

A commonly accepted definition by Robbins and Coulter (2009) emphasizes three aspects of leadership: 1) leadership is a process, 2) leadership affects people, and 3) leadership facilitates attaining organizational goals. Their approach is noteworthy because it explains so much in a concise manner. Being a process implies its dynamic and evolving nature because it entails steps whereby the subordinates accept the leader's role whether he/she is a formal or informal leader. Also, because it is a process, the relationship between the leader and the followers may change into a different one as time goes on. The followers may become very committed to their leader or they may lose their faith and start to experience loosening of the relationship. Secondly, leaders are the ones that influence people. In other words, they are the kind of people that can make you do things you would not normally be doing. Leaders have the ability to appeal to people's feelings and they can change the subordinates' behavior. Therefore leaders are effective. Thirdly, leaders engage people by motivating and leading them into achieving organizational goals. Thus, they help subordinates and energize them into getting the results and reaching accomplishments.

Northouse (2015) asserts that leadership styles include three major components. Firstly, they give direction to employees. Secondly, they enable the execution of determined plans. Thirdly, they help motivate people and keep them committed to the organizational goals. In this regard, leaders are enablers that affect their subordinates and they do this with a vision in mind. Based on these, we can say that the same group of employees in the same company with the same goals may very well achieve quite different results under different leadership styles. On the other hand, according to Daft (2014) leadership is a two way relationship where both the leader and the followers affect each other and evolve over time. Obviously, this is a more dynamic way of approaching leadership.

Leadership can affect the performance both directly and indirectly in an organization (Manzoor et al., 2019). Furthermore, obedience to authority by the employees may result even in certain unethical behaviors that may jeopardize the people, organization, and even the society as a whole to some extent (Zhilla et al., 2018). Thus, leadership style is critical in an organization's life. Because leadership has direct impact on the human capital and consequently on the corporate culture of an organization, it can be a major source of inimitable success or competence (Arikan, 2019). The major leadership styles that have been cited by academicians in the literature over the years seem to focus on three categories: 1) Transactional, 2) Transformational, and 3) Laissez-faire leadership styles.

Transactional Leadership Style

Transactional leadership can be traced back to Burns (1978). Burns (1978) claims that this kind of leadership in essence is an exchange. When the leader and followers agree on an exchange of certain outcomes such as monetary or even emotional results, then there is a mutual relationship between the two parties. Ivey and Kline (2010) assert that when the requirements are met, then both sides exchange value they previously agreed on. However, it is limited to what the "transaction" is. In other words, it does not involve deeper levels of commitment or contribution. In a sense, the transaction limits the involvement of the subordinates within the realm of the exchange. Both parties know what the transaction is and they keep each other liable for that. Erhart and Nauman (2004) argue that in transactional leadership, followers have very limited likelihood to go beyond the prescribed relationship.

It can be said that in transactional leadership basic expectations and rewards are exchanged for the relationship to continue (Bass, 1985). So, when a clearly defined task has been completed by the follower, a reward of some value is to be presented by the leader to that follower. This can be of economic or psychological nature. In the same scenario, when the follower fails to perform a clearly defined task, then a punishment or the lack of that certain reward is in use. In both cases, transaction is completed as expected. In other words, there is almost no room for uncertainty and both sides know what will happen in the form of a reward or punishment.

It can be said that this kind of a leadership style is very effective when things are simple, well defined and not changing much in nature over time. It is an efficient way to communicate the desired goals and values to followers. Furthermore, Northouse (2007) argues that developing a follower is of no concern for the transactional leaders who prioritize the achievement of the desired goals and objectives. In transactional leadership, goals and objectives need to be clarified as much as possible. Actually, this is beneficial for the transactional leader as well since he/she is in a way binding himself/herself for the possible future outcomes. It only helps to clarify the goals and objectives so that the followers' efforts are not wasted in vain and the leader's kept promises earn the leader a good name for the future. However, needless to say, the focus in transactional leadership is to attain the short term goals. Therefore, there is very minimal if any concern regarding developing the employees. In transactional leadership employee development would be considered mostly as a cost item.

Politis (2002) emphasizes the importance of role clarification and the specificity of the tasks for the followers under transactional leadership. Once again, this is to maintain the efficiency of the transactional leadership style. In this way, there is no room for ambiguity and all efforts can be concerted to achieve such clear objectives. Of course, in transactional leadership leaders are expected to provide clear feedback as to the progress of the task at hand but yet again this is to ensure the achievement of the goals as much as possible. Aarons (2006) argues that there are many appropriate uses for transactional leadership and these situations may be categorized as highly standardized processes.

Appreciation would also be a value of exchange as long as it is an outcome of a transaction under transactional leadership. But apparently, pay and other forms of quantifiable rewards are the more popular values under exchange in the transactional

leadership style. Yahaya and Ebrahim (2016) claim that such exchanges are completed between the leader and the followers because of the inherent value promised and not because of any devotion to work or the organization.

According to Bass and Avolio (2004) the components of transactional leadership are threefold: 1) Contingent Reward, 2) Active Management by Exception, and 3) Passive Management by Exception. Contingent reward means that after clear goals have been set and both sides know about them, the performance of the followers take place. In the event of goal achievement, the promised values whether in monetary or other forms are delivered to the followers as an exchange. If the goals are not met, then under contingent reward a punishment or a criticism of some sort may happen. Active management by exception means that the leader takes an active role in monitoring the tasks while the subordinates are performing their assigned duties. For example, if the task is preparing a report and the leader intervenes in order to correct certain mistakes or to enforce certain rules while report preparation is still in progress, then this would be active management by exception under transactional leadership. Gill (2006) claims that in passive management by exception, leaders wait for the outcome and then intervene. In passive management by exception, leaders do not interfere during the process. So, as an example if the leader interferes only after the report has been prepared, then this would be passive management by exception.

Transformational Leadership Style

Transformational leadership is a far more recent approach. Judge and Piccolo (2004) argue that especially in the past two decades, transformational leadership theory has been the most influential among other leadership theories. Transformational leadership style concentrates on the personal development of the followers based on their unique needs. Appreciation is an important part of the leader-follower relationship in transformational leadership style (Stone et al., (2004). Therefore, in transformational leadership style, the leader invests in the followers by trying to understand them and discovering their true individual needs. The leader, then, acts as a mentor or a coach where the main goal is to enable the advancement of the follower to his/her true potential. Yulk (2010) asserts that because of this nature of the relationship, in transformational leadership leaders are perceived to be more trustworthy, respectful, and admirable in the eyes of the followers.

Limsila and Ogunlana (2008) emphasize that in transformational leadership style problem solving, initiative taking, and creativity are much more used by the employees. In transformational leadership style, the organizational and task related boundaries are less strict where the subordinates have more room for growth and flexibility. Thus tolerance for failure is inherently higher in transformational leadership than in transactional leadership. The leader tries to assist the followers in their journey to grow and become more capable. In this regard, the leader's role also is different. The leader has a more guiding and enabling role where he/she tries to facilitate the followers' development so the followers will become more confident, competent and committed to the organization and organizational goals.

Collective gains are emphasized rather than personal gains under transformational leadership style (Lussier and Achua, 2007). In transformational leadership style the leader

sees him or herself as someone who inspires the followers. In this way, the leader also has more room to grow and advance. The tasks that require a lot of complexity and demand high creativity more often than none need to be conducted by highly skillful and competent workforce. In order to motivate and lead them, transformational leadership style seems to be more applicable.

According to Bass and Avolio (2004), there are four major components of transformational leadership style: 1) Idealized Influence, 2) Inspirational Motivation, 3) Intellectual Stimulation, and 4) Individualized Consideration. Idealized influence means that the leader is a natural role model where he/she shows great capability on his/her own and deserves the admiration of the employees. Under idealized influence the followers want to become like their leader and strive to do so. Thus, the leader shows the way by being the example and with the charisma he/she possesses can influence and persuade the followers to become a better version of themselves. Inspirational motivation means that the leader inspires and motivates the followers by raising their spirits and creating commitment and loyalty. Intellectual stimulation allows followers to be able to question the status quo and be innovative in thinking. Here, the leader stimulates group decision making (Hoyt, et al., 2006). Followers are encouraged to think outside the box and speak their minds without being afraid of punishment or criticism. By intellectually stimulating the followers, the leader facilitates problem solving and initiative taking. Individualized consideration means that the leader does not treat every follower the same way, quite the contrary, goes the extra mile to mentor each one of the followers taking into account their individual level of development and needs. Appreciation and delegation are also conducted on individual basis. In essence, all the four components of transformational leadership style are utilized in order to transform the promising employees into prospective leaders of the future. Therefore we can say that transformational leadership style considers the leader-follower relationship as a very viable investment in terms of human capital and willingly invests in their employees because it does not regard this as a cost item.

Laissez-Faire Leadership Style

Laissez-Faire literally means "let them do" in French language. In this regard, laissez-faire leadership style refers to non-interference leading mode where the leader has minimum regulatory duties if any. In other words, in laissez-faire leadership style we may talk about no-leader-presence (Lewin, Lippitt, and White, 1939). Goodnight (2011) argues that in this leadership style decision making is left totally to subordinates where they assume the authority and the responsibility. The employees make their own action plans as to how they want to go about achieving organizational goals. Obviously, even in today's contemporary business environments, laissez-faire leadership style is not suited for every employee or even every company.

Theory X type managers would be natural opponents of this type of leadership because they would argue that the employees would be too lazy and not responsible enough to fulfill their duties. On the other hand, Theory Y might be more supportive and prone to this leadership style because naturally they believe that employees will strive to do the best for the company if they are left alone without the monitoring of supervisors.

Still, it is apparent that laissez-faire leadership style is the most extreme case where autonomy is fully delegated to subordinates. Still, there are some good examples in today's world where a certain version of laissez-faire style is applied and it successfully achieves the end goals both in financial performance aspect and in employee satisfaction, organizational commitment, and low turnover aspects. W.L. Gore Incorporated and Semco are just two of the most well-known examples of successful implementation of "participative management" where the employees hire the managers, everyone has access to all meetings and information, goals and objectives are set and managed by the employees themselves, etc. Successful companies that apply participative management seem to be the real laissez-faire styles of modern economy. Needless to say, most companies under laissez-faire leadership style will not go that far and constitute a somewhat diluted version of such extreme examples.

Bhatti et al., (2012) emphasize that in laissez-faire leadership style there is no one explicit way of achieving the common objectives. Even though this may sound very chaotic at first glance, it nevertheless opens gateways into new horizons. Employees are not bound by the "norms" nor are they compared against set "thresholds". In this regard, laissez-faire style seems to really deserve its name. In laissez-faire leadership style top management makes a bold commitment whereby they decide to trust the people and their potential at their maximum. This allows creativity and out of the box thinking which would totally be out of question if the leadership was any other way. This might be the reason why usually jobs in these types of organizations are heavily sought after. However, not everyone is suited for these companies or jobs. If, as an employee, you are hesitant to take responsibility or cannot deal well with uncertainty, then these kinds of organizations may be too challenging for you. Below is a summary comparison table depicting the differences between the three major leadership styles.

Table 1: Comparison of Major Leadership Styles

	When to use	How to use	Who is best suited
Transactional Leadership Style	*Simple tasks *Realistic expectations *Specific aims and goals	*Very clear goals *Well defined rewards and punishment that the followers value	*Leaders who are short term goal oriented *Followers who want very definite results
Transformational Leadership Style	*Comlicated tasks *Undefined outcomes and unlimited results	*Appreciation *Empowerment *Tolerating mistakes	*Highly capable workforce *People who are learning oriented
Laissez-Faire Leadership Style	*Need for high creativity *If the workforce is capable of handling high uncertainty	*Let employees determine the goals *Mutual trust *Autonomy	*Teams or companies capable of self-managing *Top management fully supporting this philosophy

Conclusion

Leaders motivate their subordinates and lead them into achieving organizational goals. There are different ways of leading. Literature shows us that there are basically three major categories of approaches to leadership styles; transactional, transformational, and laissez-faire. There is no one best way to lead a group. There are a multitude of factors that come into play when we consider the leadership styles. Personal affinities may be one of them. As a leader you might be more prone to a certain style, in other

words, your personality traits may be close to a specific leadership style. Your organization's expectations may be another factor. Your subordinates' levels of skills and capabilities may also be critical factors in determining the most appropriate leadership style. All in all, leadership style is only going to be effective if there is a good match or correlation between the leader and the followers.

When an organization is considering different candidates for a leadership position, all the aforementioned factors ought to be taken into account, but at the end of the day, the quality of the fit between the leader and the followers will be decisive. For example, a very capable transformational leader will undeniably have a very difficult time managing a group of employees who require very clear step by step instructions and cannot handle any uncertainties. For such a workforce, a transactional leader would be much more effective. But, yet again, that same successful transactional leader will not be able to exert much impact among a group of employees who are highly capable, skillful, and very much learning oriented. In this case, a transformational leader who goes the extra mile to mentor or coach those employees will be much more suitable. Only a truly transformational leader will be able to appreciate the extra commitment such a workforce can bring. By empowering the subordinates and tolerating their mistakes, a transformational leader can turn those employees into possible leaders of the future for the organization.

Leadership can occur without the strict boundaries of formal hierarchy. Thus, informal leaders in the organization may emerge naturally as team leaders or project leaders. If top management is aware of leadership styles, then this knowledge may well be used to spot such leaders. The organization can invest in these leaders and benefit from them in the appropriate areas. A common trap most organizations fall into is to expect the same from everyone. As a department chief you may be a very potent leader, but on the other hand, you may not be so fit for a project team leadership position per se. It is up to management to decide on the potential of the leaders and to make a better fit with them and the subordinates.

Practitioners of all levels may benefit from the study by examining themselves and their employees more critically. They may prefer to receive more in-depth feedback from each other to have a more thorough understanding of each other's expectations. A mismatch between the leaders and the subordinates do not necessarily mean they are incompetent. A better match with the appropriate leader may bring out more potential of the same group of employees. Also, as emphasized particularly in the laissez-faire leadership style, sometimes the leadership style allows the employees to self-manage without the need of a leader altogether. Of course, not all organizations are suitable for this, but it shows us that some groups actually require a totally different view of leadership. Researchers may also benefit from the analysis by considering more longitudinal studies which seem to be a rarity in the area of leadership. Longitudinal studies that keep following a certain group of individuals may highlight how leadership styles over time may be needed in different settings for an organization. Thus, the current study may provide some perspective and ideas to nourish the discussion regarding different leadership styles. Finally, future research on how these leadership styles may affect organizational commitment at different levels may provide researchers and practitioners alike with more enhanced understanding of the constructs.

References

1. Aarons, G.A., (2006), *Transformational and transactional leadership: Association with attitudes toward evidence-based practice*. Psychiatric Services, 57(8), 1162-1169.
2. Alkahtani, A.H., (2016), *The influence of leadership styles on organizational commitment: The moderating effect of emotional intelligence*. Business and Management Studies, 2(1), 23-34.
3. Arikan, C.L., (2019), *The role of organizational culture in creating sustainable competitiveness.* Conference Proceedings of the International Journal of Arts & Sciences, 12(1), 45-50.
4. Arikan, C.L. and Enginoglu, D., (2016), *A contemporary approach to strategic leadership.* International Journal of Information Technology and Business Management, 47(1), 1-6.
5. Bargau, M.A., (2015), *Leadership versus management.* Romanian Economic and Business Review, 10(2), 181-188.
6. Bass, B.M., (1985), *Leadership and Performance Beyond Expectations.* The Free Press, New York, NY.
7. Bass, B.M., Avolio, B.J., Jung, D.I., and Benson, Y., (2003), *Predicting unit performance by assessing transformational and transactional leadership.* Journal of Applied Psychology, 88(2), 207-218.
8. Bass, B.M. and Avolio, B.J., (2004), *Multifactor Leadership Questionnaire: Manual and Sample set.* 3rd edition., Mind Garden, Redwood City, CA.
9. Bhatti, N., Maitlo, G.M., Shaikh, N., Hashmi, M.A., and Shaikh, F.M., (2012), *The impact of autocratic and democratic leadership style on job satisfaction.* International Business Research, 5, 192-201.
10. Burns, J.M., (1978), *Leadership.* Harper & Row, New York, NY.
11. Chiang, C.F., and Wang, Y.Y., (2012), *The effects of transactional leadership and transformational leadership on organizational commitment in hotels: The mediating effect of trust.* Journal of Hotel and Business Management, 1(1), doi:10.4172/2169-0286.1000103
12. Daft, R.L., (2014), *The Leadership Experience.* Boston: Cengage.
13. Enginoglu, D. and Arikan, C.L., (2016), *Creating a corporate entrepreneurship strategy for competitive advantage.* International Review of Economics and Management, 4(1), 14-28.
14. Erhart, M.G. and Nauman, S.E., (2004), *Organizational citizenship behavior in work groups: A group norms approach.* Journal of Applied Psychology, 89(6), 960-974.
15. Gill, R., (2006), *Theory and Practice of Leadership.* Sage Publications, London.
16. Goodnight, R., (2011), *Laissez-faire leadership.* In G.R. Goethals, G.J. Sorenson, and J. MacGregor Burns (Eds.), Encyclopedia of leadership. London, England: Sage.
17. Hoyt, C.L., Goethals, G.R., and Riggio, R.E., (2006), "Leader-follower relations: Group dynamics and the role of leadership", in Goethals, G.R. an Sorenson, G.L.J. (Eds), *The Quest for a General Theory of Leadership.* Edward Elgar Publishing Inc., Cheltenham, 96-122.
18. Ivey, G.W. and Kline, T.J.B., (2010), *Transformational and active transactional leadership in the Canadian military.* Leadership & Organization Development Journal, 31(3), 246-262.

19. Judge, T.A. and Piccolo, R.F., (2004), *Transformational and transactional leadership: A Meta-analytic test of their relative validity.* Journal of Applied Psychology, 89(1), 755-768.
20. Kumar, C.R. and Kaptan, S.S., (2007), *The Leadership in Management: Understanding Leadership Wisdom.* APH Publishing, New Delhi.
21. Lewin, K., Lippitt, R., and White, R.K., (1939), *Patters of aggressive behavior in experimentally created "Social Climates."* The Journal of Social Psychology, 10, 269-299.
22. Limsila, K. and Ogunlana, S.O., (2008), *Performance and leadership outcome correlates of leadership styles and subordinate commitment.* Engineering, Construction and Architectural Management, 15(2), 164-184.
23. Lussier, R.N. and Achua, C.F., (2007), *Effective Leadership.* 3rd edition, Thomson South-Western, OH.
24. Manzoor, F., Wei, L., Nurunnabi, M., Subhan, Q.A., Shah, S.I.A., and Fallatah, S., (2019), *The impact of transformational leaderhsip on job performance and CSR as Mediator in SMEs.* Sustainability, 11(2), 436-449.
25. Northouse, P.G., (2007), *Leadership Theory and Practice.* 4th edition, Sage Publications, Thousand Oaks, CA.
26. Northouse, P.G., (2015), *Leadership: Theory and Practice.* Sage Publications, Thousand Oaks, CA.
27. Politis, J.D., (2002), *Transformational and transactional leadership enabling (disabling) knowledge acquisition of self-managed teams: The consequences for performance.* Leadership & Organization Development Journal, 23(4), 186-197.
28. Robbins, S.P., (2009), *Organizational Behavior.* New Jersey, NJ: Prentice Hall.
29. Robbins, S.P. and Coultar, M., (2009), *Management,* 10th edition, Pearson Education, Inc.
30. Stone, A.G., Russell, R.F., and Patterson, K., (2004), *Transformational versus servant leadership: A difference in leader focus.* Leadership & Organization Development Journal, 25(4), 349-361.
31. Yahaya, R. and Ebrahim, F., (2016), *Leadership styles and organizational commitment: Literature review.* Journal of Management Development, 35(2), 190-216.
32. Yulk, G.A., (2010), *Leadership in Organizations*. 7th edition, Prentice Hall, Upper Saddle River, NJ.
33. Zhilla, F., Abou Daher, L., Arikan, C.L., and El-Khoury, M., (2018), *Conceptualizing the determinants of ethical decision making in business organizations.* Problems and Perspectives in Management, 16(4), 30-41.

Is the Accounting of the Future Online?

Elisabeta Andreea Budacia,
Lucian C-tin Gabriel Budacia[*]

Abstract

The quality of accounting services is a set of dynamic characteristics, as the demands of modern technology impose the permanent creation and realization of new modern "products" with superior traits and performance on the delivery process. The evaluation of the quality of accounting services implies the appraisal of the final result, as well as of the actual delivery of the service; practically, the quality of the service cannot be separated from the activity of providing it.

Today, the difference between an average service and a high quality one is given by the efficiency with which the people from the provider's team work together and the systems through which they deliver the service.

The relationship between entrepreneurs and accountants is inevitable, as accounting is a mandatory activity by law, but also a useful one. Providing high quality accounting services depends on the manner in which the provider and the beneficiary interact.

Key words: the quality of accounting services, provider of accounting services, online accounting

JEL Classification: L 84, M 40

1. Aspects regarding the quality of accounting services

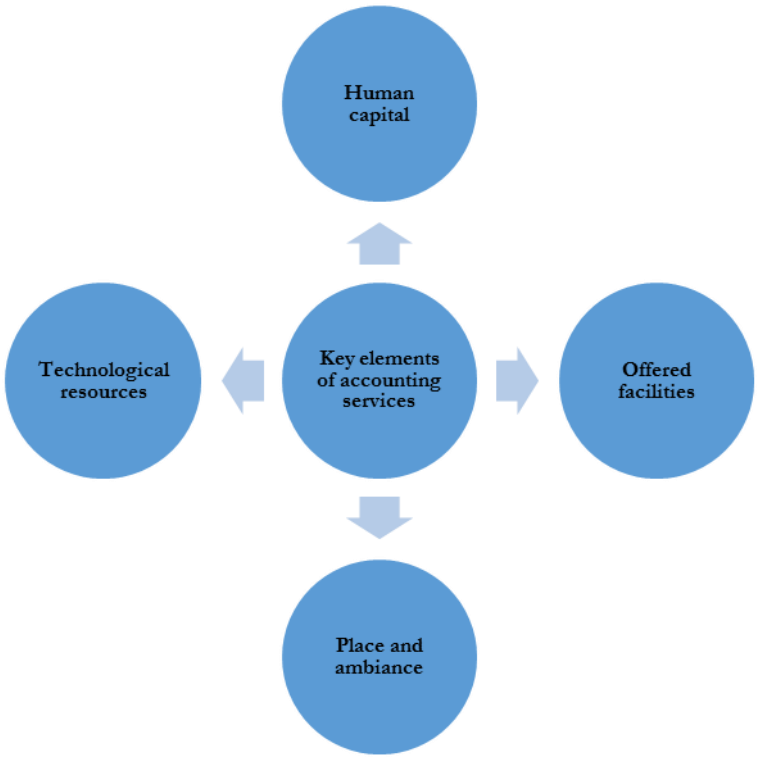
In approaching quality, the starting point is, first of all, ***the use value*** seen as the totality of characteristics which make products and services useful to individuals and society, differentiating them on the basis of the utility/need they satisfy. The fact that the quality characteristics of products are created in the production and delivery process, allows us to take into consideration not only the quality of a product, but also the quality of a process.

The quality of accounting services is a set of dynamic characteristics, as the demands of modern technology impose the permanent creation and realization of new modern "products" with superior traits and performance on the delivery process. The diversity of economic activities, on the one hand, and the necessity of improving the quality of the delivered services imply unitary activities, which can be grouped in a ***quality spiral*** as follows:

[*] Elisabeta Andreea Budacia, PhD., is Associate Professor at the Romanian American University in Bucharest. E-mail: andreea.budacia@gmail.com
Lucian C-tin Gabriel Budacia, PhD., is Lecturer at the Romanian American University in Bucharest.

The spiral of the quality of accounting services:	1. Familiarization/study of the activity of the accounting services' beneficiary
	2. Planning the provided activities
	3. Receiving the documents
	4. Verifying the documents
	5. Resolving/remediation of possible problems concerning incomplete/unclear/lack of documents etc.
	6. Actual registration in the accounting software
	7. Generating the documents
	8. Filling in and submitting the declarations
	9. Delivering the file to the beneficiary

When he or she "buys" an accounting service, the client has, apparently, too few visible elements in order to evaluate it. Upon a first glance, certain aspects seem important, such as: the place and ambiance in which the service is provided, the personnel's behavior, the submission of the declarations in due time, the correct registration of the documents, the other benefits offered by the company. More often than not, the criteria for appraising the quality of the accounting services cannot be fully known and understood by the beneficiary, because they reside in the provider's knowledge and the way in which the respective knowledge is made available for the beneficiary and here we refer to the legal/fiscal information that the provider puts at the beneficiary's disposal, the manner in which the provider brings fiscal solutions for the beneficiary's business etc. Below are presented the key elements of accounting services in a synthetic form.



The evaluation of the quality of accounting services implies the appraisal of the final result, as well as of the actual delivery of the service; practically, the quality of the service cannot be separated from the activity of providing it. The result of the service delivery represents only half of its quality, the other half being determined by the impressions accumulated by the client while the service was being provided.

The quality of accounting services is the result of the comparison between the client's expectations and the experience the client has while the services are being provided, but also of the interaction with other organisms which can appear and which have an important role regarding the set of the respective services, among which are state institutions such as the National Agency for Fiscal Administration, the Directorate General for Local Taxes etc.

Quality is defined by clients; they are the ones who ultimately appreciate the good, average or poor quality of the service. Other appraisals are irrelevant or insufficient anyway. The starting point in perceiving the quality of the service is represented by the manner in which the provider delivers the service in relation to what the consumer expects. In the case of accounting services, quality cannot be a goal in itself; it has to be based on the clients' desires and needs, but also on legal aspects.

Each employee of a service company contributes in one way or another, more or less visible, to the positive or negative perception of quality. A small number of persons may be involved while the service is being provided, but their activity also depends on the rest of the employees who do not have a direct contact with the public and who are also responsible for the delivered quality. The company's entire personnel contribute to the creation of quality and if one employee does not carry out his or her duties appropriately, then the service will be affected.

Today, the difference between an average service and a high quality one is given by the efficiency with which the people from the provider's team work together and the systems through which they deliver the service. The system through which a provider delivers the service is not always something visible, easy to recognize by the client and this is the reason why as long as the providers continue to find, for the time being, the resources to compensate the use of systems which are not well developed, then the clients will not focus their attention on this aspect. However, problems may occur when one of the irreplaceable resources, namely time, is wasted constantly by the provider in solving certain issues without the beneficiary having a significant added value.

2. The provider of accounting services

A good accountant is one that has the time to offer solutions to his or her beneficiary. The difference between a good accountant and a mediocre one is given by one thing, in most cases: the larger amount of time dedicated to the beneficiary's business instead of his or her own company data. Qualified accountants from the majority of providers of accounting services are real experts, good quality professionals, but they are too busy with processing the client's data and they have little time left to do anything else, thus creating a substantial deficit right in the area where their expertise and experience can solve many problems that entrepreneurs have to deal with. 10 extra minutes in order to respond to a question asked by the entrepreneur even during the month-end closing makes all the difference.

A good provider of accounting services is one who makes sure that the qualified accountant has the time to offer information to the client any time the entrepreneur needs it, not after the accountant has finished processing data and closed the financial month end. In this sense, it is preferable to have a provider of accounting services who permanently develops not only employees, but also internal systems in detail so that the data can be used easily.

For entrepreneurs, communication means much more than being in contact with their accountant via e-mail, phone or Whatsapp. Communication in accounting means first of all the entrepreneur's access to recent financial information which is based on accounting information.

3. Traditional accounting services vs. modern accounting services

In the paradigm of the traditional accounting services, the idea is that, best case scenario, for one month, almost two months, the entrepreneur has access to this information after the accountant closed the month end. This is the moment when an entrepreneur can send an e-mail or phone the accountant and ask for details regarding certain unpaid invoices, expenses or anything else he or she would like to know.

These are some of the problems involved by the traditional providing/delivery of accounting services. Therefore, the respective clients, the ones who outsource accounting services, have to deal with them in the absence of technology in the present accounting services: outdated information (from the previous closed month) and the impossibility to make quick decisions based on certain data which should be available, even on the mobile phone.

Thus, the following question emerges: can it be done differently? Can accounting be adapted to the needs from the business area?

The answer is affirmative only in the context of implementing modern technologies and finding solutions for the delivery of accounting services in real-time. Of course, financial accounting, the VAT registry, the monthly trial balance, the mandatory accounting records, the balance sheet, tax declarations, the submission of the remuneration documents at the Labour Inspectorate and REVISAL remain unchanged, but the processes through which they are obtained and the sets of documents they are based on can be processed and made available for the entrepreneurs in another way.

Accounting benefited from technology, accounting record programs actually making the activity of accountants easier. For example, in the USA, accountants understood many years ago (since the 1980s) that software automation can free much of their time, thus avoiding the waste of countless hours in introducing numbers in columns and giving them the opportunity to focus on services which add value to the client, such as specialized advice. However, in Europe and especially in Eastern Europe, there were certain reservations in adopting the software, as accountants were under the impression that automation was going to replace them. The truth is that in regards to online digital accounting, accountants are not replaced, but "improved"/helped with digital instruments in order for them to be able to work with many more companies. Accounting changes through digitalization and only in this way the entrepreneurs' desire to receive accounting services with added value becomes concrete reality.

Due to the manner in which accounting documents are processed, the accountant will not be able to see the present, he or she will only look back, 30 days ago at least; this is the reality of traditional accounting services. This shortcoming of traditional accounting can be surpassed by using mobile and cloud technologies and artificial intelligence that online accounting companies include in their regular accounting services.

A system which uploads fiscal documents when they are issued can generate for the entrepreneur (the services' beneficiary) different reports which reflect the financial situation in real-time: income for the current month, expenses for the current month, profit, advances/reimbursements, frozen assets, available funds, monthly balance sheet, cash flow. Such information is available for the entrepreneurs on the mobile phone or laptop and through a message system they can ask qualified accountants certain questions.

4. Conclusions

The relationship between entrepreneurs and accountants is inevitable, as accounting is a mandatory activity by law, but also a useful one. Providing high quality accounting services depends on the manner in which the provider and the beneficiary interact; building a long lasting relationship should be based on the following aspects:

- Handing over the documents in due time, according to the calendar agreed by both parties (preferably in writing);
- The documents should be complete and written correctly, but also ordered properly;
- Fast communication – on both sides;
- Respecting the accountant's instructions;
- Respecting the accountant's work schedule, but also understanding the pressure that the entrepreneur has to deal with;
- No hurry in filling in the declarations;
- Respecting the accountant's duties;
- More financial education;
- Going from compliance and traditional services to services with added value;
- Standardisation of services;
- The help of technology.

Online accounting offers a series of advantages to the beneficiary:

- Making records in real-time, not in a delayed manner;
- Offers information immediately to the beneficiary;
- The work is done in stages and the work load is not concentrated in a short period of time anymore;
- The possibility to offer certain solutions/answers to the beneficiary when the financial-accounting event takes place;
- Making decisions based on immediate and real information.

The future of accounting is online!

References

1. Campbell, D., Loumioti, M., (2013), *Monitoring and the Portability of Soft Information*, Working Paper, no. 13-077, Harvard Business School, USA.
2. Ceran, M.B., Güngör, S., Konya, S., (2016), *The Role of Accounting Information Systems in Preventing the Financial Crises Experienced in Businesses*, Economics, Management and Financial Markets, vol. 11, no. 1, pp. 294-302.
3. Comin, D.A., Ferrer, M.M., (2013), *If Technology Has Arrived Everywhere, Why Has Income Diverged?*, NBER Working Paper Series, no. 19010, Harvard Business School, USA.
4. Gallani, S., Krishnan, R., Wooldridge, J.M., (2015), *Applications of Fractional Response Model to the Study of Bounded Dependent Variables in Accounting Research*, Working Paper, no. 16-016, Harvard Business School, USA.
5. Ghasemi, M., Shafeiepour, V., Aslani, M., Barvayeh, E., (2011), *The Impact of Information Technology (IT) on Modern Accounting Systems*, Procedia – Social and Behavioral Sciences, vol. 28, pp. 112-116.
6. Lim, F.P.C., (2013), *Impact of Information Technology on Accounting Systems*, Asia-Pacific Journal of Multimedia Services Convergent with Art, Humanities, and Sociology, vol. 3, no. 2, pp. 93-106.
7. Liyan, L., (2013), *The Impact of Information Technology on Accounting Theory, Accounting Profession, and Chinese Accounting Education*, WHICEB 2013 Proceedings, Paper 103, pp. 748-753.
8. Moldof, A., (2014), *Bitcoins, an All-Digital Currency and How It Affects Financial and Managerial Accounting*, part II, Internal Auditing, vol. 29, no. 3, pp. 36-39.
9. Mostyn, G.R., (2012), *Cognitive Load Theory: What It Is, Why It's Important for Accounting Instruction and Research*, Issues in Accounting Education, vol. 27, no. 1, pp. 227-245.
10. Thapayom, A., Ussahawanitchakit, P., (2015), *Accounting Information System Excellence and Goal Achievement: Evidence from Information and Communication Technology Businesses in Thailand*, The Business and Management Review, vol. 7, no. 1, pp. 309-321.

Testing the Effectiveness of Johnsonian Approach using India's Balance of Payments

Kubendran, N.[*]

Abstract

The main aim of the study is to test the relevance and effectiveness of Harry Johnson's monetary approach using Balance of Payments Account and Money supply in India. The study uses annual data from 1991 to 2018, especially since the execution of LERMS in 1991. This study uses the Augmented Dickey-Fuller and Philips-Perron test for stationary conditions. In order to detect automatic equilibrium process under flexible exchange rate system and to analyse short-run long-run relationship, the study employed Autoregressive Distributed Lag-Error Correction Model (ARDL-ECM) for analysis. The test results from the ARDL model depicts that there is a long-run association between BOP and independent variables like Exchange rate, money supply and capital outflows. ARDL-ECM model did not found any causality in the short run. Also, the study did not find any automatic restoration process in India Balance of Payments since LERMS. So this study found less relevance of monetary approach/Johnsonian approach in solving disequilibrium in India's Balance of Payments. Also, the study observed that the role of monetary policy is not effective in the context of India's BOP. In the present scenario, this may not be an issue for an emerging economy like India. But in the long run, in order to achieve external equilibrium based on Mundell-Flemings assignment rule, the study strongly recommended Friedman's monetary rule for the effectiveness of monetary policy.

Keywords: *Balance of Payments, ARDL Model, Exchange Rate, Current Account Adjustment, Capital Movements, Money Supply*

JEL Classification: C32, E51, E52, F14, F31, F32

1. Introduction

The Balance of Payments (BOP) is a statistical statement that systematically summarises overall economic transactions of the resident of the reporting country with the rest of the world, during a specific period of time, usually a year. The BOP account visibly points out the stability, sustainability and performances of the economy, especially in the external sector front. The surplus in the BOP account is mostly not an issue but the deficit is a major issue for all nations, which needs to be eliminated.

Many economists developed their own models and theories to eliminate issues in the BOP. Among all the theories, three approaches occupy significance in the context of Balance of Payments and International Trade as a whole. The approaches are; Marshall-

[*] Kubendran, N. is Associate Professor at the Narsee Monjee Institute of Management Studies. E-mail: n.kubendran@nmims.edu.

Lerner's Elasticity approach, Sydney Alexander's Absorption approach and Harry Johnson's Monetary approach.

The first two models suggested a devaluation of domestic currency for the problem of Balance of Payments. Marshall-Lerner's condition gave a solution to BOP problem via the price effects of devaluation by making imports costlier and exports cheaper, provided that there should be an appropriate level of elasticity of demand for exports and imports. Similarly, Sydney Alexander's Absorption approach gave a solution to the BOP problem via the income effect of devaluation by increasing the demand for domestic-made commodities in the reporting country as well as the rest of the world. Here, the problem of both of the approaches is that it focuses only on current account, especially exports and imports of goods. So, the two models have their own limitations in solving the issues in BOP account.

Many empirical studies proved the importance and significance of Harry Johnson's monetary approach to the problem of the Balance of Payments. Several economists are also proved the superiority of the Monetary Approach over Elasticity approach and Income approach due to its focus on overall Balance of Payments and not only on merchandise trade.

Monetary Approach to BOP is mainly associated with Harry Johnson, Jacob Frenkel, Robert Mundell and Marcus Fleming. Other economists also investigated the BOP problem via monetary approach includes Michael Mussa, David Hume, Rudiger Dornbusch and D Kemp. The basic proposition of the monetary approach is that the problem of BOP is always and everywhere a monetary phenomenon.

According to Harry Johnson's Monetary approach, BOP disequilibrium is mainly because of changes in **money supply or money demand**.

It can be stated as

$$\Delta M^s / \Delta M^D = \Delta B$$

The process in which the changes in **money supply** affects BOP is stated as

$$M^s = M^D = B$$

Suppose, the central bank increases in money supply which will lead to creating a deficit in the current account as well in the capital account. It can be stated as;

$$\uparrow M^s \rightarrow \uparrow P \rightarrow \uparrow M_s \,\&\, \downarrow X_s \rightarrow -CAD \rightarrow -B$$

Similarly

$$\uparrow M^s \rightarrow \downarrow i \rightarrow \uparrow K_o \rightarrow -KA \rightarrow -B$$

$$-\text{CAD} \,\&\, -\text{KA} \rightarrow -B$$

Just the opposite case will occur when the central bank of the country decreases its money supply.

According to Harry Johnson, **Money demand** is a stable function of the price level, income and interest rate. It can be expressed as

$$M^D = \text{f}\,(P, Y, i)$$

In the above equation, P and Y are denoted as price level and nominal income which is direct proportion to money demand. Whereas i is denoted as the interest rate which is inversely related to money demand. Since money demand is a stable function of the price level, income and interest rate, Johnsonian approach did not give much importance to money demand in influencing Balance of Payments but money supply occupies significance.

Johnson defined money supply is a multiple of a monetary base that consists of domestic money supply and the stock of foreign exchange reserves. It can be stated as

$$M^S = \mathrm{DM} + \mathrm{RM}$$

Therefore, any changes in P, Y, i, DM and RM will affect money supply and money demand, which in turn affects the Balance of Payments.

The Johnsonian model can be applied to improve or correct disequilibrium in the Balance of Payments under fixed and flexible exchange rate systems. Under a fixed exchange rate system, the BOP is highly monitored and controlled by the Central Bank via accommodating flows. Whereas in the flexible exchange rate system, market forces play a significant role in determining the exchange rate, which in turn corrects BOP disequilibrium automatically through autonomous flows.

In the present scenario, the majority of the countries are following either a flexible exchange rate system or managed float exchange rate system. So, the present study tries to test the relevance and effectiveness of Harry Johnson's monetary approach to the problem of balance of payments under a flexible exchange rate system.

The government of India has introduced the Liberalised Exchange Rate Management System (LERMS) in 1991 and it came into effect from 1992. Since then the exchange rate of the rupee is mainly determined by the market forces. To test the effectiveness of Harry Johnson's monetary approach to BOP under flexible exchange rate system, the study chooses India's BOP account since the implementation of LERMS (1992) occupies significance.

Several eminent economists tested monetary approach to Balance of Payments. Of Which, some of them like Robert Mundell (1968, 1971), Mc Kinnon (1968), Jacob A Frenkel (1971), Harry G Johnson (1968, 1972, 1977) Swaboda (1973) and Michael Mussa (1974) are the significant approaches offers clear cut evidenced that proved the effectiveness of monetary policy in the context of Balance of Payments disequilibrium. After the 1980s, especially under openness regime, the role of monetary policy on external sector equilibrium and Balance of Payment variables lacks significance and raises doubts about various theories offered by Robert Mundell, Harry Johnson, Michael Mussa and so on. In continuation of the above, the present study tries to estimate the relevance of monetary approach to Balance of Payments. Especially, the study connects Harry Johnson's monetary approach using India's Balance of Payments since the implementation of Liberalised Exchange Rate Management System (LERMS 1992).

Milton Friedman, Harry Johnson, Mundell-Fleming, David Hume, Michael Mussa and others proved the relevance and effectiveness of macroeconomic policies (Monetary & Fiscal Policy) in achieving external and internal sector goals (BOP Equilibrium & Full Employment). Among all the approaches, Harry Johnson's approach occupies

significance in the background of the Balance of Payments. In this context, the present study tries to test the effectiveness of Harry Johnson's monetary approach using India's Balance of Payments account. Therefore, the present study attempts to answer the following research questions; To what extent India's Balance of payments account responds to the changes in the money supply? Does BOP disequilibrium restore automatically under a flexible exchange rate system, especially after the implementation of the Liberalised Exchange Rate Management System (LERMS) in India in 1992? Does the change in money supply have more impact on the capital account than in the current account? How effective the Harry Johnson's monetary approach in solving issues in India's Balance of Payments? Against the background and research issues, the major objectives of the study are to evaluate the effectiveness of Monetary policy under a flexible exchange rate system, especially since the implementation of LERMS in India in 1992. It will be interesting to compare the effect of changes in the money supply on the current account as well as in the capital flows. So that the relevance of Harry Johnson's Monetary Approach to BOP can be investigated. For this purpose, the present study uses twenty-seven years of secondary data since the inception of LERMS in India in 1992 to till date. The required data were collected from various national and international sources like Handbook of Statistics on the Indian Economy (RBI), Report on Currency and Finance (RBI), Global Financial Development Report of World Bank report and Balance of Payments manual of IMF.

2. Literature Review

Friedman, Milton (1948) analysed the monetary and fiscal framework in the context of economic stability. He found that the explicit control of the quantity of money by the government and the explicit creation of money to meet fiscal deficit will influence inflationary effect in the economy. This problem cannot be rectified with fiscal discipline. Instead, eliminating government control on the quantity of money with the balanced budget will provide a solution to economic fluctuations. Also, he articulated several interesting questions relating to the effectiveness of the monetary policy. Some of them are; how important change in the supply of money compared with changes in the demand for money? Are transaction variables most important in determining the demand for money? How elastic is the demand for money with respect to interest rates? When changes in demand or supply occur that produce discrepancies between the quantity of money that the public holds and the quantity it desires to hold, how rapidly do these discrepancies tend to be eliminated? Does the adjustment impinge mostly on prices or mostly on quantities? Is the adjustment to sharp changes over short periods different in kind or only in degree from the adjustment to slower changes over longer periods? For all the above questions, he concluded that full adjustment to monetary disturbances takes a very long time and affects many economic magnitudes. If the adjustment were swift, immediate, and mechanical, as some earlier quantity theorists may have believed, or, more likely, as was attributed to them by their critics, the role of money would be clearly and sharply etched even in the imperfect figures that have been available. But, if the adjustment is slow, delayed, and sophisticated, then crude evidence may be misleading, and a more suitable examination of the record may be needed to disentangle what is systematic from what is random and erratic (Milton Friedman, 1970).

Johnson, Harry G (1972) developed a new approach to the theory of Balance of Payments and BOP adjustment. This new approach plays a dominant role in the British Economy during the 70s when devaluation failed to produce the desired result. This new approach is originated from the original work of J. J. Koopmans and Robert A Mundell. The new approach mainly focused at the forefront of analyzing the monetary aspects of adjusting BOP instead of price aspects. The new approach also focuses on relative price changes but not on the direct influence of excess demand for and supply of money on the balance between income and expenditure. Specifically, not on total acquisition and disposal of funds whether through production and consumption or through borrowing and lending, and therefore on the overall BOP..

Mussa, Michael (1974) tested the efficacy of the monetary approach to Balance of Payments analysis. The study set forth the most relevant and important principles of monetary policy and tested the same in a simple model of trade and payment behavior. The study found that the money demand function and money supply process plays a central role in the balance of payments analysis, especially in the long run. The study concludes stating that the monetary approach is not identified with the view that "only money matters," nor is it asserted that the monetary approach is encompassed in any single, specific, theoretical model. Reasonably, it is argued that the monetary approach incorporates an extensive course of models that share certain elementary features but can vary in many central respects, mainly about short-run processes of adjustment.

Frenkel, Jacob A and Carlos A. Rodriguez (1975) correlated monetary approach to the Balance of Payments in the context of portfolio balances. Their aim was to analyse the adjustment mechanism using a small country with the condition of full employment with trading commodities, securities and money. Frenkel and Rodriguez focused on both restricted and open economic perspectives, especially, the impact of money supply on inter-temporal trade, accumulation of real and financial assets in the balance of payments.

Magee, Stephen P (1976) reviewed The Empirical Evidence of Monetary Approach to the Balance of Payments and Exchange Rates under fixed and flexible exchange rate system. This approach did not pay attention to a single country experience or single approach, it focuses the effect of monetary policy to BOP and exchange rate by considering the approaches of Robert Mundell (1968, 1971), Harry Johnson (1972), Arthur Laffer (1979), Ryutaro Komiya, Rodriguez Dornbusch (1971) and Jacob Frenkel (1971). Stephen Magee concluded by stating the demand for nominal money balance is mainly determined by the price level, real income and the interest rate. Similarly, the supply of money equals the money multiplier times the supply of high powered money. Also, he observed that the domestic supply and demand for money are equated and international reserves are separated from high powered money.

Johnson, Harry G (1977) analysed Monetary Approach to Balance of Payments Theory and its Implications. The main aim of his analysis is to introduce to a wider audience an emerging approach to the balance of payments theory and policy, generally described as "the monetary approach", to describe the theoretical differences between this approach and previous approaches (See Johnson, Harry 1972).

Frenkel, Jacob A, Thorvaldur Gylfason and John F Helliwell (1980) correlated Monetary and Keynesian approaches in the context of Balance of Payments analysis and

found the difficulties of empirical estimation in the short run. The study contrasted some principles of the Monetary and Keynesian approach and reformulated a more general model by taking essential features of both. The study observed that long term modeling is required to test the composition and growth of foreign and domestic portfolios. The short term model paid no attention to evaluate the role and expectations concerning interest rate, prices, GDP, taxes, government expenditure and so on. A more complete analysis would have to incorporate these features within modeling that considers long-run effect.

Mayer, Thomas (1980) well-articulated the scholastic work of David Hume with respect to Monetarism. The study focuses on twelve important propositions of monetarism on Hume's perceptions and found Hume is explicitly a monetarist on quantity theory, transmission process, the stability of the private sector, short term inflationary effect on output and private market economy. Also, the study found Hume is implicitly a monetarist in terms of the irrelevance of allocation and the focus on the price level as a unit rather than on individual prices. Hume was indifferent and strongly opposed monetarist position to inflation.

Kannan R (1989) applied the monetary approach to the balance of payments in the context of the Indian Economy from 1968 to 85. The study attempted to analyse whether the disequilibrium in the money market affects the balance of payments or not. The study has been done by using the Jonsonian Approach (1972) and Mundellian Approach (1968). Also, the study compares Elasticity approach and monetary approach using India's BOP statistics from 1968 to 85 when India followed a restricted exchange rate system. The study has applied Granger and Sims causality test and found that an exogenous change in domestic credit led to causes a more than proportionate change in international reserves. Also, the study found that the central bank actively sterilizes the impact of the changes in forex reserves on money supply. Finally, the study concluded by stating that the disequilibrium in the money market has a significant effect in Balance of Payments.

Raghavan V S and M. K. Saggar (1989) tested the applicability of the Monetary Approach to Balance of Payments using India's BOP data from 1960 to 1981. By taking the inapplicable conditions from past studies, this study tries to verify the relevance of monetary approach in the context of Indian Economy during the restricted exchange rate system. Like Kannan (1989), this study also uses Granger and Sins causality test and invalidated the core proposition of MBOP that domestic credit creation feeds to BOP deficit. Granger test proves a strong causal relationship between forex reserves with domestic credit.

Khatiwala, Yuba Raj (1992) tested the applicability and relevance of the monetary approach to the balance of payments in the context of the Nepalese economy. The study uses OLS method and found an inverse relationship between domestic credit and reserve flow. But the study also found a positive relationship between real income and prices with reserve flow, which is contradictory to Keynesian approach on the balance of payments. Based on the observation that all goods are traded, the study inferred that the increase in domestic credit led to an increase in prices which in turn affects the balance of payments via increased transaction demand for nominal money. Finally, the study concluded by suggesting that the monetary authorities should restrict domestic credit to counteract additional demand for nominal money so that the monetary policy objectives can be met without affecting the goods market, capital market and foreign exchange assets.

Bhattacharya, Indranil and Partha Ray (2007) assessed monetary policy stance by observing various monetary policy announcements in India from 1973 to 1998. This study used Vector Auto-Regressive (VAR) framework and found that the monetary policy seemed to have been more effective in price control than output growth. The impulse response from the VAR model depicted the success of monetary policy in inflation control rather than on GDP reflecting proactive monetary management in a regulated environment. So the study recommended the necessity of future analysis of monetary policy in the pre and post the 90s to trace causal impact on growth-inflation trade-off.

Hutchison, Michael M, Rajeswari Sengupta and Nirvikar Singh (2010) investigated the applicability of the discretionary monetary rule of the Reserve Bank of India in relation to Taylor-type rule. The study estimated an exchange-rate-augmented Taylor rule for India for a period of 28 years from 1980 to 2008. The study compares monetary policy effects during the pre- and post-liberalisation periods in order to capture the potential impact of macroeconomic structural changes on the RBI's monetary policy conduct. The study found that the output gap appears to be important to RBI rather than consumer price inflation and exchange rate changes.

Imoisi, Anthoni Ilegbinosa, Lekan Moses and Bosco Itoro Ekpenyong (2013) analysed monetary policy and its implications for the Balance of Payments stability in Nigeria. To evaluate the effectiveness of monetary policy on the Balance of Payments of Nigeria, the study uses 30 years of time series data and applied OLS technique. The study uses BOP as the dependent variable and money supply, Interest Rate and Exchange Rate as independent variables. The study found a positive relationship between the dependent and independent variables. Especially, Money supply and interest rates are highly significant and positive relation with BOP, whereas exchange rate was positive but not significant to the BOP.

Odili, Okwuchukwu (2014) correlated the exchange rate and balance of payments of Nigeria using Auto-Regressive Distributed Lag (ARDL) model. The main aim of the study is to detect the short-run and long-run dynamic relationship between BOP and other independent variables like exchange rate, exports and imports. The study has applied the Elasticity approach and monetary approach to Nigerian Balance of Payments. The study found a positive and significant relationship in the long run, whereas in the short run, the study found a positive coefficient but statistically insignificant.

Tijani, Julius O (2014) conducted an experimental study on the effect of various monetary instruments in the Balance of Payments account of Nigeria during 1970-2010. The study was done by using a linear regression model and found a positive relationship between BOP with domestic credit, exchange rate, and balance of trade. Whereas, the inflation rate and gross domestic output are inversely related to the BOP. Overall, the study observed that the monetary measures constitute immensely to BOP position causes disequilibrium. So, monetary measures can be used as an instrument to make the adjustment in Balance of Payments.

Osisanwo, Sheriffdeen and Bolade Abolaji Adesoye (2019) examined the impact of monetary policy on the Balance of Payments of Nigeria using annual data from 1980 to 2015. The dynamic econometric study observed a long-run relationship between

monetary policy and BOP of Nigeria. Similarly, Onuchuku, Chukueggu, Nenber and Wosu (2018) also found a strong relationship between monetary policy and BOP of Nigeria. They confirmed apriori expectations between money supply, interest rate, exchange rate and GDP of Nigeria.

Senyefia, Oduro-Okyireh and Eunice (2019) observed that the BOP in Ghana is purely a monetary phenomenon, both short-run and long-run relationship exists between monetary policy variables and BOP variables. Exchange Rate, Net Domestic Credit, Inflation Rate and Interest Rate are found to have a significant influence on the BOP position in the long run. Also, Net Domestic Credit and Broad Money Supply have a highly significant effect on the BOP position in the short run.

2.1. Research Gap

Having adequate examination from the past studies, it is not easy to refuse the fact that the monetary approach to the balance of payments is still an unsolved phenomenon. From the literature survey, it is observed that some studies confirmed concrete evidence by establishing the effect of monetary policy on BOP. Several other studies, especially after 1980s invalidated the effective role of monetary policy on Balance of Payments. Theoretically (Robert Mundell, Michael Mussa, Jacob Frenkel, Harry Johnson and Milton Friedman), it is clear that the expansionary monetary policy leads to create short-run deficit in BOP and LR surplus or equilibrium in BOP through price adjustment mechanism. The main objective of the study is to test the above relationship and offer appropriate evidence from the Indian context since the introduction of Liberalised Exchange Rate Management System (LERMS).

3. Methodology and Data

After reviewing extensive scholarly work in the past and the significance of co-integrating money supply with BOP variables, the present study chooses Autoregressive Distributed Lag-Error Correction Model (ARDL-ECM) model for analysis. This study mainly focuses on the impact of changes in money supply on the Balance of Payments account via the Exchange rate, Interest Rate, Inflation Rate and Openness in the short run as well as in the long run. The error correction approach is very useful and appropriate for estimating and comparing short term and long term effects of a one-time series with the other time series. Therefore, ARDL-ECM approach occupies significance for this study. Before applying the ARDL-ECM approach, this study first uses the Augmented-Dickey Fuller unit root test to check whether the selected time series is stationary or not. After grasping the stationary conditions, the study ARDL bound test for co-integration. After that, the study will employ ECM framework to establish a link between Dependent variable (Variables in BOP account) with several independent variables like Money Supply, Exchange Rate, Inflation Rate, Interest Rate and Openness of the Economy. Finally, the Granger Causality test will be applied to check the causal relation between Money supply and BOP variables in India. All the estimates and analysis will be done by using E-views 8 software.

3.1. Model Specification

In order to test the effectiveness of the Johnsonian approach in the context of India's Balance of payments, the study uses the Balance of Payments as a Dependent variable and Money Supply as the major independent variable. Also, the study includes Exchange Rate, Interest rate, Inflation Rate and Openness as other explanatory variables for analysis. Based on the background and literature survey, the study will estimate the following functional form;

$$\mathbf{BOP} = f(MS, ER, CAD, CO) \quad (1)$$

Where BOP is Balance of Payments, MS is Money Supply, ER is Exchange Rate, CAD is Current Account Deficit and CO is Capital Outflows from India.

The model can be rewritten in a linear equation form;

$$\boldsymbol{BOP_t} = \alpha_0 + \alpha_1 MS_t + \alpha_2 ER_t + \alpha_3 CAD_t + \alpha_4 CO_t + U_t \quad (2)$$

In order to evaluate the short-run and long-run relationship between money supply and balance of payments variables, this study uses the Autoregressive Distributed Lag-Error Correction model (ARDL-ECM). The ARDL model first verifies long-run causality between the variables and then it checks short-run causality and the speed of adjustment using error correction term. Therefore, the present study uses ARDL-ECM approach using the transformed log-linear model which are as follows:

$$\begin{aligned}\boldsymbol{\Delta ln\ BOP_t} = \alpha_0 &+ \sum_{k=1}^{P1} \alpha_1 \Delta ln\ BOP_{t-1} + \sum_{k=1}^{P2} \alpha_2 \Delta ln\ MS_{t-1} + \sum_{k=1}^{P3} \alpha_3 \Delta ln\ ER_{t-1} \\ &+ \sum_{k=1}^{P4} \alpha_4 \Delta ln\ CAD_{t-1} + \sum_{k=1}^{P5} \alpha_5 \Delta ln\ CO_{t-1} + \Omega\ ECT_{t-1} + \beta_1 ln\ BOP_{t-1} \\ &+ \beta_2 ln\ MS_{t-1} + \beta_3 ln\ ER_{t-1} + \beta_4 ln CAD_{t-1} + \beta_5 ln\ CO_{t-1} \\ &+ U_t \quad (3)\end{aligned}$$

In the equation, $\boldsymbol{\alpha_1, \alpha_2, \alpha_3, \alpha_4}$ and $\boldsymbol{\alpha_5}$ are the short-run coefficients of the explanatory variables. Similarly, $\boldsymbol{\beta_1, \beta_2, \beta_3, \beta_4}$ and $\boldsymbol{\beta_5}$ are the long-run coefficients. Ω is the coefficient for measuring the speed of adjustment for equilibrium in the ECM model.

3.2. Granger Causality

In the Granger Causality Test, the directional relationships between two variables are very sensitive which can be used efficiently by using the optimal number of lags in the model. It can be inferred from the computed statistical values, based on the given equations, if the beta coefficients become zero or less than the conventional value of 0.05 and the computed F statistic is low for the first hypothesis in the equation (1) indicate that the lagged MS do not possess in the regression (Accepting null hypothesis). This means Money Supply in India does not Granger cause Current Account Deficit, similarly for other beta coefficients in the first hypothesis of the rest of equations. When we move to the second hypothesis which states that the Current Account Deficit does not Granger

cause Money Supply in India if the computed F statistic is low or P-value is less than the conventional value, we can reject the hypothesis and infer that the Current Account Deficit does not Granger cause Money Supply in India. Similar results can be derived for other beta coefficients in the second hypothesis of the rest of equations.

3.2.1 Causality test for the changes in Money Supply and BOP variables in India

To test causality between the changes in Money Supply in India with the Variable in India's Balance of Payments, the following model developed by Engel and Granger, (1987) will be used. The models are;

(a) Money Supply and Current Account Deficit in India

$$MS_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i}\, MS_{t-i} + \sum_{i=1}^{n} \beta_{2i} CAD_{t-i} + u_{1t}$$

$$CAD_t = \beta_3 + \sum_{i=1}^{n} \beta_{4i}\, CAD_{t-i} + \sum_{i=1}^{n} \beta_{5i} \mathrm{MS} + u_{2t} \qquad (4)$$

(b) Money Supply and Capital Outflows from India

$$MS_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i}\, MS_{t-i} + \sum_{i=1}^{n} \beta_{2i} CO_{t-i} + u_{1t}$$

$$CO_t = \beta_3 + \sum_{i=1}^{n} \beta_{4i}\, CO_{t-i} + \sum_{i=1}^{n} \beta_{5i} MS_{t-i} + u_{2t} \qquad (5)$$

(c) Money Supply and Balance of Payments (Net) in India

$$MS_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i}\, MS_{t-i} + \sum_{i=1}^{n} \beta_{2i} BOP_{t-i} + u_{1t}$$

$$BOP_t = \beta_3 + \sum_{i=1}^{n} \beta_{4i}\, BOP + \sum_{i=1}^{n} \beta_{5i} MS_{t-i} + u_{2t} \qquad (6)$$

(d) Money Supply and Exchange Rate in India

$$MS_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i}\, MS_{t-i} + \sum_{i=1}^{n} \beta_{2i} ER_{t-i} + u_{1t}$$

$$ER_t = \beta_3 + \sum_{i=1}^{n} \beta_{4i}\ ER + \sum_{i=1}^{n} \beta_{5i} MS_{t-i} + u_{2t} \qquad (7)$$

(e) Exchange Rate and Balance of Payments in India

$$ER_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i}\ ER_{t-i} + \sum_{i=1}^{n} \beta_{2i} BOP_{t-i} + u_{1t}$$

$$BOP_t = \beta_3 + \sum_{i=1}^{n} \beta_{4i}\ BOP + \sum_{i=1}^{n} \beta_{5i} ER_{t-i} + u_{2t} \qquad (8)$$

where, MS = Money Supply, CAD = Current Account Deficit, CO = Capital Outflows, BOP = Balance of payments and ER = Exchange Rate.

4. Analysis and Results

To analyse the relationship between money supply and balance of payments in India and to test the effectiveness/relevance of Harry Johnson's monetary approach to the balance of payments, this study is designed at four stages. The first stage verifies stationarity conditions using Augmented-Dicky Fuller (ADF) and Philips Perron's (PP) unit root test. Stage two uses ARDL bound test and long-run causality. Stage three uses error correction term to evaluate short-run causality and the speed of adjustment for equilibrium. Finally, Engel-Granger causality will be employed to verify directional causality between two variables separately.

4.1. Unit Root Test

The present study uses two popular unit root tests, namely, Augmented-Dickey Fuller Test and Philips Perron test for unit root and stationary conditions. The results are given in Table 1.

Table 1 - Unit Root Test ADF & PP method

Variables	Augmented-Dickey Fuller		Philips-Perron	
	Level	First Difference	Level	First Difference
BOP	0.0001	0.0000	0.0001	0.0000
MS	0.6351	0.1121	0.6170	0.0011
ER	0.2218	0.0001	0.2318	0.0001
CAD	0.2458	0.0012	0.2000	0.0012
CO	0.8883	0.0009	0.8899	0.0009

(Source: Computed from RBI data using E-Views 8th version)

It is clear from the test results that the selected variables are almost non-stationary at level and stationary at first difference except money supply. Also, it is noted that the ADF and PP results revealed that the BOP variable is stationary at a level and first difference. So, it is observed from the unit root test that it is necessary for the study to employ the ARDL model for analysis.

4.2 Autoregressive Distributed Lag Model (ARDL Approach)

A literature survey reveals that the variables should be non-stationary at I(0) and Stationary at I(1) to apply major econometric techniques for analysis. Variables selected in this study are also fulfilled almost all criteria for the application of ARDL model. The ARDL model is highly appropriate for this study for two reasons. The first one is, the independent variables are a mixture of I(0) and I(1). The second reason is that the study will try to establish the short-run and long-run causality between money supply and BOP variables. The reason is to test Johnsonian notion on money supply and BOP variables i.e.., an increase in money will create temporary disequilibrium in BOP in the short run and it will be automatically restored in the long run under flexible exchange rate system.

First, the study uses the ARDL long-run model with various lags using Akaike Info Criterion (AIC) and Schwarz Criterion (SIC) for lag selection. Since the number of observations is less than 30 and low AIC and SIC value observed for lag 1, the study chooses lag 1 for analysis and the results are given in Table 2.

Table 2 - ARDL test results for long run Causality

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.742213	0.841386	-2.267384	0.0397
LBOP(-1)	-0.145408	0.346632	-6.189291	0.0000
LM1(-1)	-0.948960	0.539731	-0.956368	0.3551
LER(-1)	0.115541	0.603784	3.791321	0.0020
LCAD(-1)	0.014550	0.206357	0.070507	0.9448
LCO(-1)	-0.197504	0.293664	-0.027079	0.9788
R-squared	0.903505		Mean dependent var	0.773106
Adjusted R-squared	0.834580		S.D. dependent var	11.14769
S.E. of regression	4.533977		Akaike info criterion	5.161257
F-statistic	13.10850		Schwarz criterion	6.697563
Prob(F-statistic)	0.000018		Hannan-Quinn criteria.	6.310006
Durbin-Watson stat	2.388935			

(Source: Computed from RBI data using E-Views, 8th version)

After getting results for the selected model, it is highly necessary for the study to check the stability of the model and the occurrence of serial correlation. For this purpose, the study uses Breusch-Godfrey's serial correlation technique and the results are given in Table – 3.

Table 3 - Breusch-Godfrey Serial Correlation LM Test:

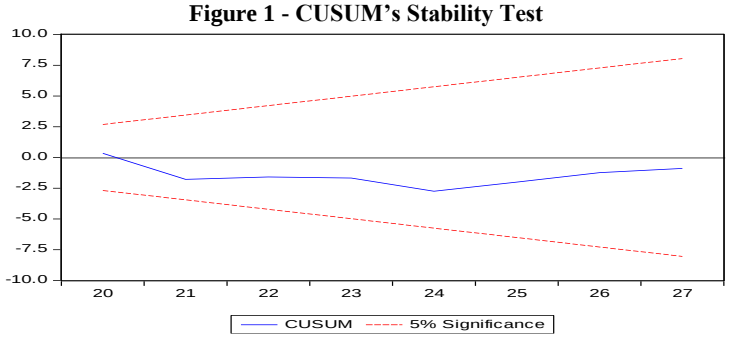
F-statistic	1.166200	Prob. F(1,13)	0.2998
Obs*R-squared	2.058068	Prob. Chi-Square(1)	0.1514

Source: Computed using the information in table 2.

It is flawless from table 3 that the probability for observed chi-squared value is 15.14 percent lead to the rejection of the null hypothesis. Meaning that the model does not have any serial correlation and it satisfied the criteria for a good model.

After completing the serial correlation, the study also tried to check the stability of the model using CUSUM's stability test. The results are;

Figure 1 - CUSUM's Stability Test



From figure 1, it is clear that the blue line falls in between the two red lines (2 dotted lines: within ± 2 s.e bands). Meaning that the model is stable at 5 percent level of significance. So the study observed that the model is highly stable without any serial correlation.

Now the study will focus upon bound test to check the long-run association between the variables. Before analysing the bound test, the study needs to apply Wald test for F-statistic and chi-square values for long-run causality.

Table 4 - Wald test for long-run causality

Test Statistic	Value	df	Prob
F-statistic	4.693279	(4, 8)	0.0303
Chi-square	18.77312	4	0.0009

Table 5 - ARDL Bound Test Results

Variable	F-Statistic	Lower Bound	Upper Bound
Ln BOP	4.6932	2.86	4.01

(Source: Computed)

From table 4, the observed F-statistic value is 4.7 and the probability value is less than 5 percent leads to the rejection of the hypothesis. Meaning that the selected variables are not equal to zero indicated that there is a causality between the variables. Also, it is clear from table 5 that the observed F statistic value of 4.7 is greater than the Pesaran (2001) upper bound value of 4.01 leads to the acceptance of the alternative hypothesis. From the ARDL bound test and Wald test statistics, the study rejects the null hypothesis and inferred that the variables have long-run causality.

The long-run test statistics from Table 2 reveal that the exchange rate (LER) and current account deficit (LCAD) have a positive correlation and the other two variables like money supply (LM1) and capital outflows (LCO) have a negative coefficient. The only exchange rate has a positive coefficient (0.11554) and statistically significant value (0.0020). It states that, in the long run, 10 percent increase in exchange rate leads to improving India's BOP at a low rate of 1.15 percent. The positive coefficient for the current account value also supports this argument. All the other dependent variables are not statistically significant (high prob values) proves less relevancy of Johnsonian approach. As per the Johnsonian approach, an increase in money supply leads to a decrease in BOP via trade deficit and capital outflows. But this study observed negative coefficient and statistically insignificant value of 35 percent for money supply and 94 percent for capital outflows also proves less relevance of Johnsonian approach in India's Balance of Payments.

After observing the long run test results, it is necessary for the study to focus on short-run causality using the error correction term.

4.3. Error Correction Model

In order to correlate short-run and long-run relationships, the study needs the inclusion of Error Correction Term (ECT) using residuals of the model. The error correction model is more or less similar to the basic ARDL approach with ECT values and the results are given in Table 6.

Table 6 - ARDL – ECM test results for long run Causality

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.433473	0.370222	1.904149	0.3779
D(SERIESLBOP(-1))	0.303488	0.167938	1.807146	0.0875
D(LM1(-1))	-0.880450	0.241126	-0.003651	0.9971
D(LEXC(-1))	0.462021	0.205621	2.246899	0.0374
D(LCAD(-1))	-0.949960	0.196754	-0.482816	0.6350
D(LKAOUT(-1))	0.690825	0.350418	1.526014	0.1444
ECT(-1)	**-0.559939**	0.318916	-4.891380	**0.0001**

R-squared	0.827529	Mean dependent var	0.773106
Adjusted R-squared	0.770038	S.D. dependent var	11.14769
S.E. of regression	5.345800	Akaike info criterion	6.421996
F-statistic	14.39420	Schwarz criterion	6.763281
Prob(F-statistic)	0.000005	Hannan-Quinn criteria.	6.516654
Durbin-Watson stat	2.096643		

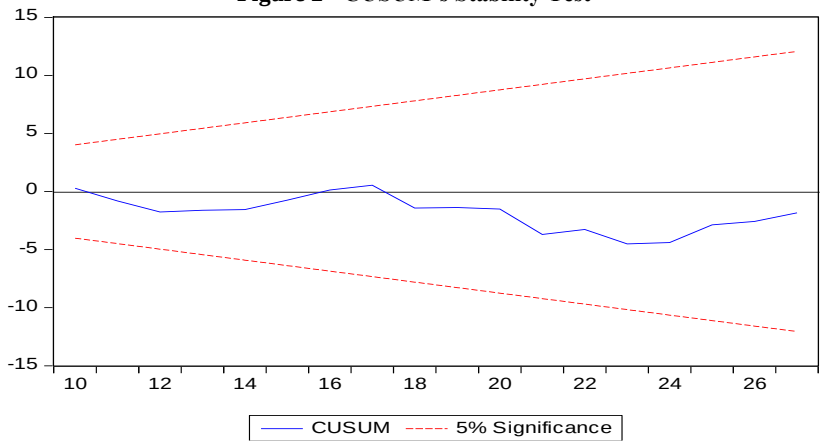
(Source: Computed from RBI data using E-Views 8th version)

In the first part of the ARDL analysis, the study observed long-run causality between the selected variables (at a low significant level). So the criteria for satisfaction of the ECM approach is that the ECT coefficient should be negative and the probability value for the error correction term should be less than 5 percent. It is clear from table 6 that the observed ECT coefficient is negative (-0.559939) and the ECT prob value is less than 5 percent (0.0001) confirmed the efficiency of the model. Still, the study needs to check serial correlation and stability of the model. For this purpose, the study again uses Breusch-Godfrey's serial correlation technique and CUSUM's stability test at 5 percent level of significance. The results are as follows;

Table 7 - Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.111157	Prob. F(1,17)	0.7429
Obs*R-squared	0.162405	Prob. Chi-Square(1)	0.6870

Figure 2 - CUSUM's Stability Test



From table 7, the study has observed the high chi-squared value of 68 percent leads to the rejection of the null hypothesis and confirms that the model has no serial correlation. Similarly, CUSUM's test also confirms the stability of the model which is clearly seen from figure 2 (blue line falls within ± 2 s.e bands). After observing the non-occurrence of serial correlation and stability test, the study has applied Wald test. The Wald test results 17 percent probability for F-statistic and 12 percent probability for Chi-Square value leads to the rejection of the null hypothesis. It states that there is no causality between money supply and balance of payments variables in the short run.

The ARDL-ECM test results from table 6 clearly pointed out that there is no causality in the short-run (high prob values) and there is causality in the long run (ECT prob 0.0001). The only exchange has low significant values in the short run. This means, in the short-run, a 10 percent increase in the exchange rate will lead to change BOP by 3 percent. Except for exchange rate, all the independent variables are statistically insignificant to India's BOP in the short run. Some variables established negative coefficients, but it doesn't matter when they are statistically insignificant. This means, the short-run relation clearly invalidated the relevance of Johnsonian approach to India's Balance of Payments. But the ECT coefficient value of -0.559939 and ECT probability value of 0.0001 confirms the existence of long-run causality. It can be inferred that there is a long-run relationship exists in the whole system and getting adjusted at the speed of 55 percent towards the long-run equilibrium. The high R^2 value of 0.8275 shows the goodness of fit of the model. The Durbin Watson value of 2.1 confirms the non-existence of autocorrelation in the data series. The F-Statistic value of 14 percent and low pro value (0.000005) also proves that all the repressors in the model are statistically significant for analysis.

Table 8 - Pairwise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.	Result
LM1 does not Granger Cause LCAD	25	1.66592	0.2142	No causality
LCAD does not Granger Cause LM1		2.88111	0.0795	
LM1 does not Granger Cause LEXC	25	1.82798	0.1866	No causality
LEXC does not Granger Cause LM1		0.11754	0.8897	
SERIESLBOP does not Granger Cause LEXC	25	0.89768	0.4233	Unidirectional causality
LEXC does not Granger Cause SERIESLBOP		5.30074	0.0142	
LM1 does not Granger Cause LKAOUT	25	4.85208	0.0191	Unidirectional causality
LKAOUT does not Granger Cause LM1		0.08953	0.9147	
SERIESLBOP does not Granger Cause LM1	25	0.06804	0.9344	No causality
LM1 does not Granger Cause SERIESLBOP		0.91061	0.4183	

(Source: Computed from RBI data using E-Views 8th version)

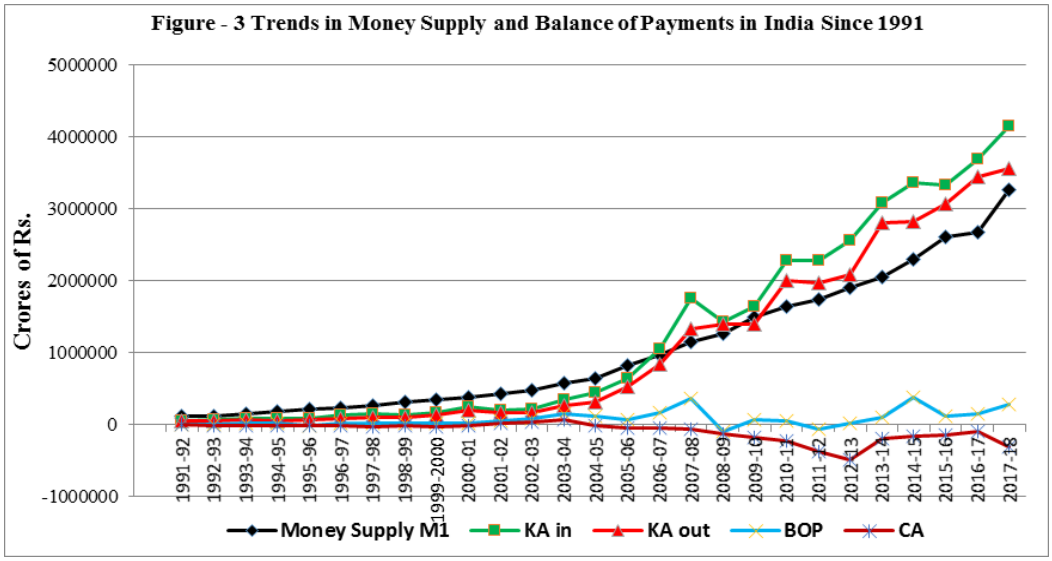
This study also uses the Granger Causality test for directional relationship between two variables separately, instead overall results. The main purpose is to use forward and backward relationship between money supply and balance of payments variables.

Pairwise Granger Causality test results from table 8 clearly support the inferences drawn from ARDL-ECM model. Granger Causality test result observed no causality for equations 4, 6 and 7. Which means that there is no correlation between money supply,

current account deficit and exchange rate in India. As per the Johnsonian approach, an increase in money supply leads to increase current account deficit and exchange rate through price effect. This observation clearly validated/supports ARDL-ECM results of no correlation in the short run. Similarly, the Pairwise Granger Causality test results observed unidirectional causality for equations 5 and 8 meaning that there is a unidirectional causality between money supply, capital outflows and balance of payments. It can be inferred that the increase in money supply leads to increase capital outflows (by decreasing interest rate) which causes exchange rate to rise. The rise in exchange rate will create deficit in balance of payments. This observation clearly validated/supports ARDL-ECM results of correlation in the long run.

Interestingly, the Granger Causality test result clearly validated the test results of the ARDL-ECM approach used in this study.

Finally, the study also uses descriptive statistical data for supportive evidence/confirmations. Based on the raw data, the study has established trend lines for the money supply, capital inflows and outflows, current account flows and overall balance in India.



The study has observed several interesting results in figure 3. It is clear from the figure that there is a positive correlation that prevails between money supply and capital flows in India since 1991. The increasing money supply is also affecting current account inversely. These two results validate the relevance of Johnsonian approach to India's Balance of Payments. But simultaneous increase in capital inflows and failure in the restoration of current account flows strongly invalidates Johnson's perspectives. That's why the empirical results also yield mixed implications.

5. Conclusions

The central theme of the study is to test the effectiveness and relevance of Harry Johnson's monetary approach using India's Balance of Payments account from 1991, especially in the context of liberalized exchanged rate regime (Since LERMS 1992). The main findings of the study can be observed in three dimensions. **First**, the study answers to what extent India's BOP responds to changes in the money supply. The empirical findings from the ARDL approach revealed that there is a long-run causality in the model. It implies that the log BOP responds to overall explanatory variables. When the study correlates BOP with every independent variable alone, the majority of variables are statistically insignificant. Granger Causality test results from table 8 are the evidence. Findings from ARDL-ECM and Granger Causality observed no correlation in the short run. **Secondly**, the study observed the effect of changes in money supply on capital outflows are always higher than the current account deficit. Coefficient values from ARDL approach and Granger causality test are the evidence for the above inferences. The trends in Money supply and capital outflows are almost similar but it is not true when the study compares it with current account (Figure 3). **Thirdly**, the study answers the commanding question called the relevance of Johnsonian approach and automatic restoration process in the flexible exchange rate system. Based on ARDL-ECM approach, Granger Causality test and descriptive statistics, the study observed Johnsonian approach has less relevance in Indian context even though there is a long-run causality. Moreover, the study did not find any shreds of evidence that support automatic restoration process in India's Balance of Payments. Especially, during the LERMS regime since 1992, money supply and trade deficit is increasing endlessly. It can be inferred that India is basically an importing nation does not have market access globally led to the failure of the automatic restoration process. Finally, the study observed that the role of monetary policy is not effective in the context of India's BOP. In the present scenario, this may not be an issue for an emerging economy like India. But in the long run, in order to achieve external equilibrium based on Mundell-Flemings assignment rule, the study strongly recommended Friedman's monetary rule for the effectiveness of monetary policy in India.

References

1. Bhattacharyya, Indranil, and Ray, Partha, (2007), How Do We Assess Monetary Policy Stance? Characterisation of a Narrative Monetary Measure for India. *Economic and Political Weekly*, 42 (13), 1201-1210.
2. Bosson-Amedenu Senyefia, Theodore Oduro-Okyireh and Osei-Asibey Eunice, (2019), The Balance of Payments as a Monetary Phenomenon, An Econometric Study of Ghana's experience. *International Journal of Economics, Commerce and Management*, 7 (2), 42-52.
3. Bukonla G.O, Sheriffdeen A.T and Bolade A.A., (2019), The Empirical Analysis of Monetary Policy on Balance of Payments Adjustments in Nigeria: A Bound Testing Approach. *Iranian Economic Review*, 23(1), 129-147.
4. Dickey, D.A., and Fuller, W.A., (1979), Distribution of the Estimators for Autoregressive Time Series with a Unit Root. *Journal of the American Stat. Association*, 74 (1), 427–431.
5. Dornbusch, Rudiger, (1971), Notes on Growth and the Balance of Payments. *Canadian Journal of Economics*, 4 (3), 389-395.

6. Engle, Robert F., and C.W.J. Granger, (1987), Co-Integration and Error Correction: Representation, Estimation, and Testing. *Econometrica*, 55 (2), 251-276.
7. Frenkel, Jacob A, Gylfason, Thorvaldur and Helliwell, John F., (1980), A Synthesis of Monetary and Keynesian Approaches to Short-Run Balance of Payments Theory. *The Economic Journal*, 90 (359), 582-592.
8. Frenkel, Jacob A., (1971), A Theory of Money, Trade and the Balance of Payments in a Model of Accumulation. *Journal of International Economics*, 1 (2), 159-187.
9. Frenkel, Jacob A., and Harry G. Johnson., (eds), (1976), *The Monetary Approach to the Balance of Payments*, London: Allen & Unwin, and Toronto, University of Toronto Press.
10. Frenkel, Jacob A., and Michael L. Mussa, (1981), Monetary and Fiscal Policies in an Open Economy. *The American Economic Review*, 71 (2), 253-258.
11. Frenkel, Jacob A., and Rodriguez, Carlos A., (1975), Portfolio Equilibrium and the Balance of Payments: A Monetary Approach. *The American Economic Review*, 65 (4), 674-688.
12. Friedman, Milton, (1948), A Monetary and Fiscal Framework for Economic Stability, *The American Economic Review*, 38 (3), 245-264.
13. Friedman, Milton, (1970), A Theoretical Framework for Monetary Analysis. *Journal of Political Economy*, 78 (2), 193-238.
14. Hutchison, Michael M, Nirvikar S., and Sengupta, Rajeswari, (2010), Estimating a Monetary Policy Rule for India. *Economic and Political Weekly*, 45 (38), 67-69.
15. Imoisi, Anthony Ilegbinosa Olatunji, Lekan Moses., and Ekpenyong, Bosco Itoro, (2013), Monetary Policy and Its Implications for Balance of Payments Stability in Nigeria: 1980-2010. *International Journal of Economics and Finance*, 5 (3), 196-204.
16. Johnson, Harry G., (1968), Current Issues in Monetary Policy. *Financial Analysts Journal*. 24 (4), 87-91.
17. Johnson, Harry G., (1972), The Monetary Approach to Balance-of-Payments Theory. *The Journal of Financial and Quantitative Analysis.* 7 (2), 1555-1572.
18. Johnson, Harry G., (1974), The Monetary Theory of Balance-of-Payments Policies. *Nebraska Journal of Economics and Business*, 13 (4), 144-163.
19. Johnson, Harry G., (1977), The Monetary Approach to Balance of Payments Theory and Policy: Explanation and Policy Implications. *Economica*, 44 (175), 217-229.
20. Kannan, R., (1989), Monetary Approach to Balance of Payments: A Case Study of India, 1968-85. *Economic and Political Weekly*, 24 (12), 627-636.
21. Khatiwada, Yuba Raj, (1992), Monetary Approach to Balance of Payments: Its Applicability and Policy Implication for Nepal. *NRB Economic Review*, 6, 1-14.
22. Komiya, R., (1969), Economic Growth and the Balance of Payments. *Journal of Political Economy*, 77 (1), 35-48.
23. Laffer, A.B., (1969), The U.S. Balance of Payments: A Financial Center View. *Journal of Law Contemporary Problems*, 34 (1), 33-46.
24. Magee, Stephen P., (1976), The Empirical Evidence on the Monetary Approach to the Balance of Payments and Exchange Rates. *The American Economic Review*, 66 (2), 163-170.
25. Mankiw, Gregory N., and Ries, Ricardo, (2018), Friedman's Presidential Address in the Evolution of Macroeconomic Thought. *The Journal of Economic Perspectives*, 32 (1), 81-96.
26. Mayer, Thomas, (1980), David Hume and Monetarism. *The Quarterly Journal of Economics*, 95 (1), 89-101.

27. Mc Kinnon, Ronald, (1968), Portfolio Balance and International Payments Adjustment, in Mundell, Robert A. and Swoboda, Alexander K., (eds)., *Monetary Problems of the International Economy*, Chicago: University of Chicago Press.
28. Mukolu, M.O, Illugbemi, A.O & Otalu, J.A., (2017), Monetary Policy and its Implication for Balance of Payment Stability in Nigeria, *Asian Journal of Economic Modelling*, 5(4), 480-492.
29. Mundell, Robert A., (1971), *Monetary Theory: Inflation, Interest and Growth in the World Economy*, Pacific Palisades, California: Goodyear Publishing.
30. Mundell, Robert A., (1968), Balance of Payments, in Sills, David L., (eds.)., *International Encyclopedia of the Social Sciences*, 2 (8) 1-11, USA: Crowell Collier and Macmillan, Inc.
31. Mussa, Michael, (1974), A Monetary Approach to Balance-of-Payments Analysis. *Journal of Money, Credit and Banking*, 6 (3), 333-351.
32. Odili, Okwuchukwu, (2014), Exchange Rate and Balance of Payment: An Autoregressive Distributed Lag (ARDL) Econometric Investigation on Nigeria, *IOSR Journal of Economics and Finance*, 4 (6), 21-30.
33. Pesaran, M.H., Shin., and Y., Smith, R.J., (2001), Bounds Testing Approaches to the Analysis of Level Relationships. *Journal of Applied Econometrics*, 16 (3), 289-326.
34. Phillips, P.C.B., and Perron, P., (1988), Testing for a unit root in a time series regression. *Biometrika*, 75 (2), 335–346.
35. Raghavan, V.S. and Saggar, M.K., (1989), Applicability of Monetary approach to Balance of Payments. *Economic and Political Weekly*, 24 (32), 1855-1859.
36. Tijani, Julius O., (2014), Empirical Analysis of Balance of Payment Adjustment Mechanisms: Monetary Channel in Nigeria, 1970-2010. *Mediterranean Journal of Social Sciences*, 5 (14), 67-76.

Tax Revenue Effect of Sectoral Growth and Public Expenditure in Tanzania: An application of Autoregressive Distributed Lag Model

Manamba Epaphra[1]
Lucas E. Kaaya [2]

Abstract

This paper analyses the effects of the sectoral growth and public expenditure on Tanzania's tax revenue performance both in the short run and long run. The paramount importance is to provide policy mechanism that would help Tanzania raise tax revenue from different sectors of the economy as the requirements for financing service delivery increase and the demand for donors declines in the country. The autoregressive distributed lag (ARDL) bounds testing approach. For validity and reliability of the results, the assumptions of homoscedasticity, normality, serial correlations, and model stability were tested. Empirical results indicate that there is a strong positive relationship between tax revenue and main sectors of the economy namely, agriculture, industrial and services sectors in both short run and long run. Similarly, recurrent and development public expenditures, as well as trade openness tend to exert positive effects on tax revenue performance in the short run and long run. However, free trade is likely to lower tax revenue ratio. The uniqueness of this paper is that first, the paper develops a simple analytical model for tax revenue performance based on key sectors of the economy. Second, findings suggest policies to support the development of value added linkages between major sectors of the economy and government expenditures while emphasizing the need to open the potentially large contribution of sectors of the economy with the view to widen the tax base. Third, trade policies should be designed to factor in the ambiguous relationship between trade liberalization and international trade taxes. Further trade liberalization is likely to reduce total tax revenue because international trade taxes, which constitute large share of total tax revenue, decline in Tanzania.

Keywords: *Tax Revenue, Sectoral Growth, Government Expenditure, ARDL*

JEL Classifications: C20, H20, H50

[1] Associate Professor, Institute of Accountancy Arusha, email: emalugu_007@yahoo.com; and emanamba@iaa.ac.tz, Phone: +255754399775.

[2] MSc. (Finance & Investment) student, 2018/19, Institute of Accountancy Arusha, E-mail: lucas.kaaya@yahoo.com

1. Introduction

The increasing of revenues is an avowed objective of fiscal administrators in most underdeveloped countries (Weiss, 1969). To this extent, revenue policy must be formulated as part of an overall development policy. Indeed, the increased financing requirements for service delivery, the need for money to settle debts, and to lower down demand for donors, developing countries tend to structure their ability to mobilize more tax revenues. Conceptually, the tax revenue share may be taken as a function of the tax bases available, rates applied to these bases, and the probability of collecting any specific levy. However, what affects tax revenues, measured as the ratio of tax revenues to GDP, has been the subject of a long debate. Underlying this argument, are a multitude of factors including, *inter alia*, the sectoral composition of output, level of development, the degree of trade and financial openness, government expenditure, administrative and political constraints on the fiscal system, the ratio of foreign aid to GDP and institutional factors such as the degree of political stability and corruption (Gupta, 2007; Epaphra, 2014; Castro & Ramírez, 2014; Epaphra & Massawe, 2017).

Tax revenue efficiency of the tax system of collection is contended to be attributable to growth of sectors and the compliance both from a tax administration and tax rate (Mawejje & Munyambonera, 2016). It is worth noting that many developing countries have taken important measures to advance tax revenue collections including provision taxpayer's identification number, broadening tax bases and introduction of value added tax which replaced sales tax. Despite all these measures, however, tax revenue performance in many countries remains below the international standards of 30 percent of GDP. In Tanzania, for example, the tax revenue-to-GDP ratio slightly increased from 9.8 percent in 1990 to 11.6 percent in 2018, while the ratio of non-tax-to-GDP declined from 1.6 percent in 1990 to 1 percent in 2018 after several years of fluctuations. This suggests that tax revenues have not been responsive to overall GDP growth as expected. At the same time government expenditure has continuously exceeded revenue, leading to deleterious macroeconomics effects on the economy. Indeed, total government expenditure as percentage of GDP increased from 11.86 in 1990 to 17.3 in 2018 (BoT, 2019). As a result, the budget deficit, which occupies great attention to policy makers because of its size and ways of financing it, has worsened in many years during the 1990-2018 period, drawing attention to its long term sustainability. Over this period, budget deficit rose from 2 percent of GDP in 1990 to 5.7 percent in 2018, albeit, with fluctuation of 7.6 percent on average during the 2004-2013 period (BoT, 2019). Nevertheless, as Tanzania and other low income countries consistently operate budget deficit, government debts tend to accumulate mainly due to ever expanding government expenditure, inadequate revenue generation capacity of government and increasing debt levels (Pomeyie 2001, Epaphra, 2017). Indeed, narrow tax base, structural characteristics of the economies and unsophisticated nature of tax administration, Tanzania lack the capacity to raise sufficient revenue from domestic sources (Epaphra 2017).

While the tax revenue performance has not been responsive to overall GDP growth, it is not clear which particular sectors of the economy are responsive or not. A clearer understanding of sector specific tax elasticities can provide better policy options for improving tax revenue performance (Mawejje & Munyambonera, 2016). The sectoral composition of output matters because certain sectors of the economy are easier to tax than others. For example, the agriculture sector may be difficult to tax, especially if it is dominated by a large number of subsistence farmers, while industry sector, a vibrant manufacturing and mining sub-sectors dominated by large firms can generate large taxable surpluses. Arguably, tax revenues in developing countries can only be paid from the surplus of income over the minimum subsistence' needs of the population. Moreover, despite, a vast empirical literature investigating the relationship between government size and tax revenue, the empirical evidence is still inconclusive. The spend-tax hypothesis, however, maintains that the government expenditure can be a root cause of change in tax revenue (Friedman, 1978; Darrat, 1998; Blackley, 1986), suggesting that governments should make decisions on expenditure first before adjusting tax policies and revenues to match expenditures. In the presence of crisis or natural disaster such as drought, the demand for some services in that period would increase leading to an increase in expenditure, which in turn shifts tax revenue permanently. Similarly, if a political majority increases expenditure, then revenues will also be increased (Kiminyei, 2018).

Admittedly, there are a number of studies examining the effects of sectoral and expenditure on tax revenue but it has not been exhaustive, there are issues unresolved. Against this background this paper examines the main determinants of tax revenue performance in Tanzania. The paper examines the responsiveness of tax revenue to growth in the broad sectors of the economy namely, agriculture, industry and services and how public expenditure can be better prioritized to stimulate tax revenue growth in the country. The paper employs autoregressive distributed lag (ARDL) bounds testing techniques over the 1990-2018 period. The rest of the paper is organized as follows: section two provides an over view of Tanzania's tax revenue, public expenditure and economic performance. Section three reviews the literature. Section four presents analytical framework, the methods and data used in the paper. The results and discussions thereof are presented in section five. Finally, conclusions and policy implications are presented in section six.

2. Revenue, Expenditure and Economic Performance in Tanzania

2.1. Tax Revenue and Expenditure

Government resources in Tanzania consist of tax revenue, non-tax revenues and domestic borrowings. Government revenue from domestic sources that is composed of tax and non-tax revenues was, on average, 72.3 percent of total government revenue in the 2007-2018 period, increasing from 63.4 percent in 2007 to 81.5 percent in 2018 (NBS, 2019). Government revenue from external sources, which consists of grants and loans, was on average, 27.2 percent of total government revenue over the same period; declining from 36.6 percent in 2007 to 18.5 percent in 2018 (NBS, 2019). The purpose of these loans and grants is to complement government-financing efforts in the implementation of the Second Five Year Development Plan. Notably, the current

trajectory suggests a declining external funding gap and an increasing domestic revenue mobilization. In reality, however, the funding gap is still wide because domestic saving is low while the country at this stage of economic development need investment rates close to 30 percent of GDP or higher over a sustained period to achieve economic transformation. With the outlook for external financing looking increasingly more difficult and with debt levels on the rise in the country, the mobilization of domestic resources is imperative.

Direct and indirect taxes form a general taxation system in Tanzania. Direct taxes include taxes on payroll and workforce pay as you earn (PAYE), basic skills and development levy, taxes on profits (corporate tax), taxes on income (individual or personal income tax), withholding taxes, rental tax, gaming tax and other income taxes. Broadly, indirect taxes in Tanzania consist of consumption taxes, international trade taxes and other domestic taxes and charges. Overall, the amount of indirect taxes, which is almost twice the amount of direct taxes, declined from 67.4 percent of total tax revenue in 2007 to 64.3 percent in 2018 whereas direct taxes rose from 32.6 percent to 35.7 percent during the same period (NBS, 2019). This is an indication of improved collection of direct taxes in the recent years. PAYE tax dominates the share of all direct taxes, averaging 45.9 percent of total direct taxes, though it declined from 47.9 in 2007 to 43.1 percent in 2018 mainly due to likely significant underreporting of non-wage income including capital income and gains and hence, there is room to increase withholding rates on interest and dividend payments to individuals (IMF, 2016). International trade taxes made the largest contribution to total indirect taxes during the 2007 to 2018 period, with 62.9 percent, though like PAYE, it slightly declined from 64.2 percent to 62.7 percent. The decrease in international trade taxes is a matter of empirical study. The main argument is that, most developing countries tend to shift away from trade taxes since in the 1990s, largely due to the widespread liberalization of trade undertaken under the Uruguay Round. The effect of trade liberalization on revenue mobilization, however, may be ambiguous. If this liberalization occurs primarily through reduction in tariffs then one expects losses in tariff revenue but according to Keen & Simone (2004) and Epaphra (2014), if trade liberalization occurs through tariffication of quotas, eliminations of exemptions, reduction in tariff peaks and improvement in customs procedure tax revenue may increase.

The tax systems in Tanzania have experienced important tax administration and policy reforms aiming at increasing the tax base and making tax collection more efficient in response to fiscal crisis and the demand for economic and social development. First, focusing on modernisation of the tax system and expanding the managerial and technical capacity within the Tanzania Revenue Authority (TRA) for more efficient and effective tax administration (IMF 2003 and Kim & Kim, 2019). Second, establishment of a taxpayer identification number (TIN), installment of the Large Taxpayers Department and unified the tax appeals system (BMZ 2003). Third, lowering both the personal income tax and the top marginal corporate tax rate to 30 per cent in 1990; simplifying the customs tariff structure in 1992; and launching VAT in 1998 (Osoro 1993). Further, in 2004, a new Income Tax Act was enacted to broaden the tax base and lower the tax burden.

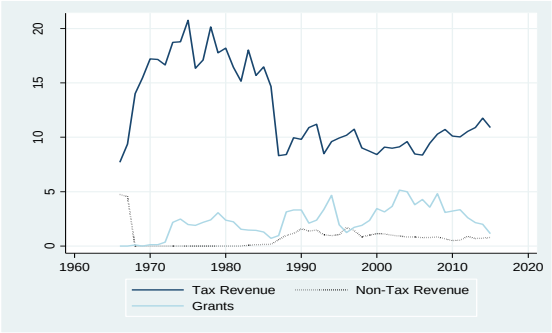
In general, Tanzania can be evaluated as a success case in pursuit of tax administration and policy reforms (Kim & Kim, 2019). Indeed, tax effort increased from

9.5 percent in 2007 to 11.6 in 2018, suggesting that there was an improvement in tax revenue collections. Similarly, total revenue, excluding grants, rose from 10.6 percent of GDP in 2010 to 12.9 percent in 2018. Income tax, excise, and other tax revenue increased significantly in the 2000s (IMF, 2016) as a consequence of structural reforms supported by a simplification of tax laws and regulations, notably with the 2004 Income Tax Act (Nord *et al*., 2009). However, VAT revenue stagnated at a low level, mainly due to numerous exemptions including the elimination of VAT on petroleum products in 2006, the reduction of the main rate from 20 to 18 percent in 2010, and compliance issues (Nord *et al*., 2009). Figure 1 reports the tax revenue, non-tax revenue and grants as percent of GDP in Tanzania over the 1967- 2016 period. It is observed that tax revenue contributes the largest share of total revenue in Tanzania. Between 1967 and 1986 tax revenue performance was impressive. Understandably, the drastic decline of tax revenue as percent of GDP in the second half of 1980s, 1990s and early 2000 was mainly due to substantial increase in GDP (Epaphra 2018). Nonetheless, this suggests weak revenue collections from somewhat wide tax base. Non-tax revenue and grants have been very low and fluctuating. In light of the country's large development needs, successive Governments have placed revenue mobilization at the center of economic policies with the objective to support investment in education, health, and critical infrastructure while safeguarding fiscal sustainability (IMF, 2016). Reliance on domestic revenue mobilization has emerged as a top priority because of the significant decline in donor support. Over the last 10 years, external grants dropped from 5.1 percent of GDP in 2003 to 1.1 percent of GDP in 2015 (Figure 1).

Notwithstanding the increase in tax effort and the improvements in the efficiency of tax revenue collection of over the past two decades, the average tax effort in Tanzania remains one of the lowest in Africa (Figure 2). Other countries under the same geographical representation such as Botswana, Angola, Mauritius, Mozambique, Kenya, and Malawi have relatively high tax revenue-to-GDP ratio. The tax revenue-to-GDP ratio of 10.9 percent in Tanzania over the 1990-2028 is lower than 16.1 percent of sub-Saharan Africa. Indeed, the tax revenue-to-GDP ratio of Tanzania is well below the average of East African Community countries and low-income countries, respectively at 13.1 percent of GDP and 14.7 percent of GDP (IMF, 2016). However, tax revenue performance in Tanzania is higher than some African countries such as Equatorial Guinea, Ethiopia, Sierra Leone, Democratic Republic of Congo, Congo Republic, and Nigeria. Lower tax capacity in many African countries, is due primarily to the low level of economic development; the large share of agriculture in economic activity, and the large size of the shadow economy. There is scope to increase it further. According to IMF (2016) Tanzania's low tax revenue performance is not due to low tax rates, but instead results from a low tax productivity of indirect taxes, notably VAT suffers from creeping exemptions, compliance issues and a weak refund mechanism. However, as Coulibaly & Gandhi (2018) suggest the objective of improving tax revenue collections will likely be a medium to long-term one as tax capacity is largely determined by structural factors, which take time to address. Improving governance, on the other hand, can yield near-term results. In the same vein, strengthening governance, including combating corruption and bolstering accountability, can significantly reduce inefficiencies, which in turn, lead to an increase in tax revenue collections (Coulibaly & Gandhi, 2018).

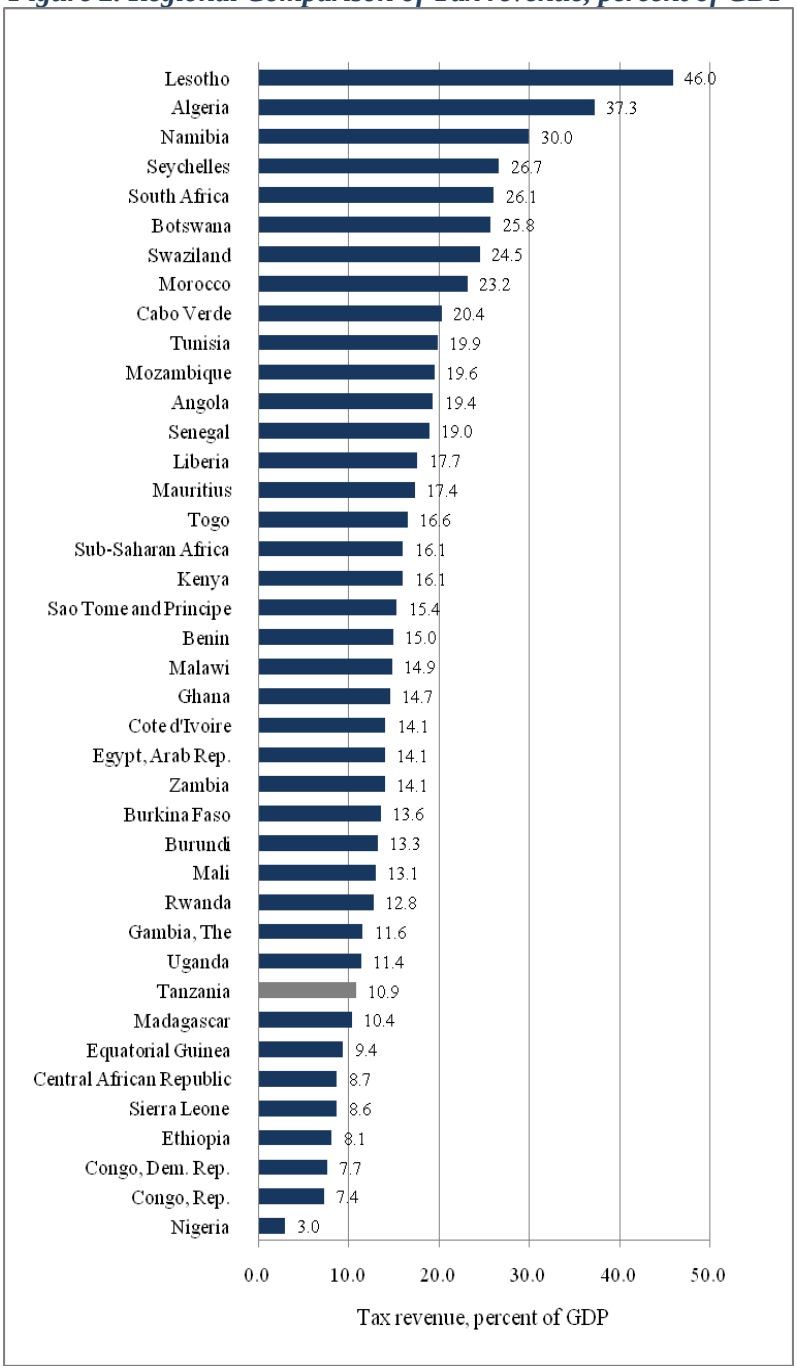
For most years, over the 1966-2018 period, as has been mentioned, government expenditure in Tanzania has exceeded government revenue leading to budget deficits. Expenditure has been rising steadily due to many reasons including an increase in demand for infrastructure and payment of interest on debt (Epaphra, 2018). Tanzania has large development needs. In line with the objectives of the Development Vision 2025, the Second National Strategy for Growth and Reduction of Poverty aimed at accelerating growth, alleviating poverty, improving living standards, and fostering good governance and accountability. The strategy required raising investment spending from 6.4 percent of GDP in 2010 to 9.6 percent of GDP by 2015 (IMF, 2016). After a steady increase in the 2000s, public expenditure has broadly stabilized as a share of GDP (Figure 3). Government spending increased significantly from 8.4 percent of GDP in 2000 to 19 percent of GDP in 2014 as the authorities ramped up priority spending to meet the Millennium Development Goals. Expenditure broadly stabilized as a share of GDP from recent years. In 2017 and 2018, for example, the ratio of Government expenditure to GDP was 17.7 percent and 17.3 percent respectively. Government spending priorities in the 2000s shifted towards development expenditure. Subsequently, the ratio of development expenditure to GDP increased from 2.7 percent in 2001 to 9.3 percent in 2012 (Figure 3), also the proportion of development expenditures in total expenditures increased from 21.9 percent in 2001 to 35.1 percent in 2012 (BoT, 2011). Likewise, the proportion of recurrent expenditure to total Government expenditure decreased from 78.1 percent to 64.9 percent in 2012. It should be noted that expenditure composition has deteriorated lately. The share of development expenditure declined from 35.1 percent of total expenditure and 9.3 percent of GDP in 2012 to 25.4 percent of total expenditure and 4.6 percent of GDP in 2015. This may be due to unrealistic budgeting, which requires adjusting expenditure in the course of the fiscal years and lower concessional project financing, partly offset by external nonconcessional loans (IMF, 2016). The fact that improving spending efficiency helps ensure value of money, reduce waste of resources, and maintain fiscal discipline, undoubtedly reducing inefficiency in spending implies that Tanzania can achieve the same output with fewer resources or achieve higher output with the same resources. However, according to IMF (2016), the process of improving the efficiency of public spending takes time and requires deep reforms to secure long-term gains.

Figure 1. Tax revenue, Non Tax Revenue and Grants, percent of GDP



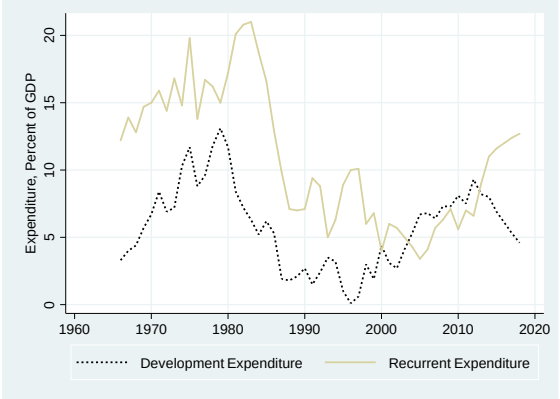
Data Source: Tanzania Revenue Authority (2019)

Figure 2. Regional Comparison of Tax revenue, percent of GDP



Data source: World Bank's WDI Dataset (2020)

Figure 3. Recurrent and Development Expenditure, Percent of GDP



Data Source: Bank of Tanzania (2019)

2.2. Economic Performance and the Structure of the Economy

Tanzania has emerged from periods of significant economic transitions, namely colonialism, independence, socialism, and market oriented developing economy as one of the most rapidly growing economies in sub-Saharan Africa. The economy of Tanzania can be divided into two phases: Before Structural Adjustment, ranging from 1961 to 86 and After Structural Adjustment Programme reform, ranging from 1987 to present. The period before Structural Adjustment can also be subdivided into post-independence period (1961-1966) that was characterized by a market economy with economic policy favouring the development of the private sector, and socialism period (1967-1985) when the country adopted socialism under the Arusha declaration in 1967. Throughout the period of post-independence, the economy remained open and markets were free from government intervention, whereas the agricultural sector constituted the largest share of the economy, over 50 percent of GDP. About 60 percent of export earnings came from primary agricultural crops (Amani *et al.*, 2003). During that period, the share of manufacturing sector was, on average, limited to 5 percent of GDP (Ruturagara, 2013). During socialism, most private enterprises including financial institutions were nationalized, and managed as state companies. Real GDP growth averaged 4.7 percent per year while annual inflation and balance payment, respectively, averaged 10 percent, and –4.3 percent of GDP (Ruturagara, 2013). Despite the decline of prices of export cash crops, export was impressive, accounting for 11.4 percent of GDP, dominated by traditional agricultural exports by 60 percent. Nonetheless, the economy experienced negative balance of trade, deterioration of balance of payment, high inflation rate of about 36 percent per annum between 1980 and 1986, and overall performance of the economy worsened. As a result, the Government instituted crisis policies and strategies including the National Economic Survival Programmes (NESP) of 1981 and 1982, aimed at reducing inflation, improvement of export production and marketing to overcome shortage of foreign exchange. The country also adopted Structural Adjustment Programmes (SAP) of 1983 prescribed by the IMF and the World Bank, aiming at increasing export revenue and eliminating food shortages through tighter control of public expenditure and increased production, prudent use of foreign currency, self-sufficiency in

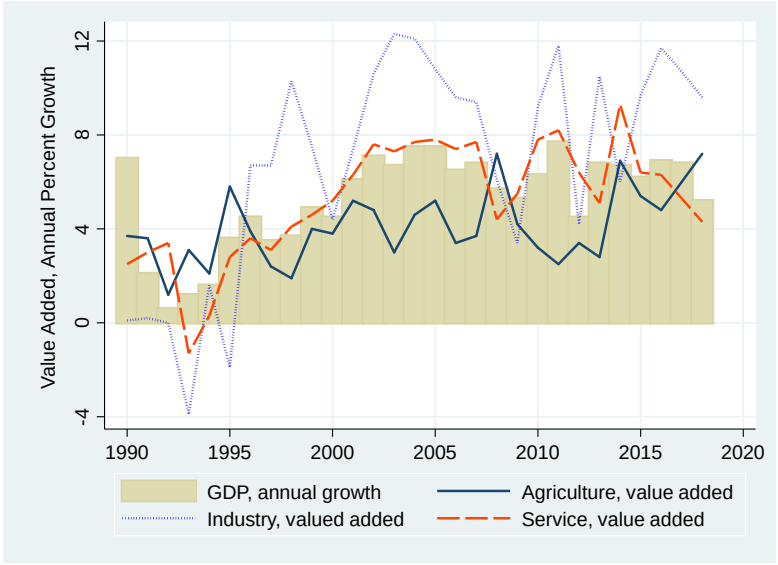
food, as well as interest rate liberalization. However, these policies failed to bring the expected result, over the 1980-1985 period, both per capita income and the real GDP growth declined. GDP growth rate fell from 4.2 percent in early 1970s to -2.4 percent in 1983 because production in almost all sectors declined steadily. Manufacturing sector deteriorated and agricultural growth declined though its contribution to the economy remained high at 50 percent of GDP.

It should be noted that the oil crises of 1970s, ignited a serious economic downturn, and thereby a wide range of policy restructuring including economic liberalisation to overcome the recession. Similarly, severe droughts of 1973 and 1974 caused shortage of food and raw materials countrywide, while the collapse of East Africa in 1977 worsened the economic situation in Tanzania because most of the common infrastructures ceased to operate in joint basis. In addition, Kagera war of 1978-79 cost the country about TZS 4.1 billion, equivalent to annual export earnings of 1979. From 1986, Tanzania adopted different policies and economic reforms in order to solve the economic problems occurred under SAP. The Economic Recovery Programme, which was adopted in 1986 in response to weak growth, high inflation, and a balance of payments crisis led to gradual liberalisation of exchange rate through introduction of a crawling peg in 1986 and subsequent full exchange rate unification, as well removal of restrictions on current account transactions. In parallel, export and import procedures were simplified, and tariff and non-tariff trade barriers reduced. Marketing and distribution of agricultural crops was opened up to encourage private participation in the agriculture sector (IMF, 2016). During the second half of 1990s the country launched comprehensive privatization programme in which underperforming manufacturing and commercial parastatals including state owned banks were restructured, liquidated, or privatized. Financial sector interest rates were liberalized and banking supervision and regulation strengthened. Cash budget system was introduced to constrain government spending and improve fiscal management, while VAT was introduced and tax administration was improved in order to mobilize more revenue. Moreover, public investment in infrastructure was increased, with the aim of improving productivity and exports.

Although the economy remains agrarian which in turn generates fiscal problems, over the last 4 decades, the country has transformed from a largely agricultural, state-controlled economy to a more diversified, dynamic, and market-based one. The expansion of industry sector such construction, mining, manufacturing and overall services sector enhanced economic growth and led to an increase in employment in the modern sectors. Annual GDP growth rate has increased from 0.6 percent in 1992 to 6.9 percent in 2017, with an average growth of 5.2 percent over the 1990-2018 period (Figure 4). During the same period, agriculture sector grew, on average, at 4.1 percent, whereas industry and service sectors grew at 6.7 percent and 5.2 percent respectively (Figure 4). The share of agriculture value added in total output declined from 44.7 percent in 1992 to 28.7 percent in 2017, in favor of higher value-added industry and services (Figure 5). Indeed, industry value added as percent of GDP increased from 15.1 percent in 1992 to 25 percent in 2017, whereas service value added rose from 33.3 percent of GDP to 37.9 percent of GDP suggesting that economic growth in Tanzania has become more broad-based and driven by services, construction, and manufacturing. According to IMF (2016),

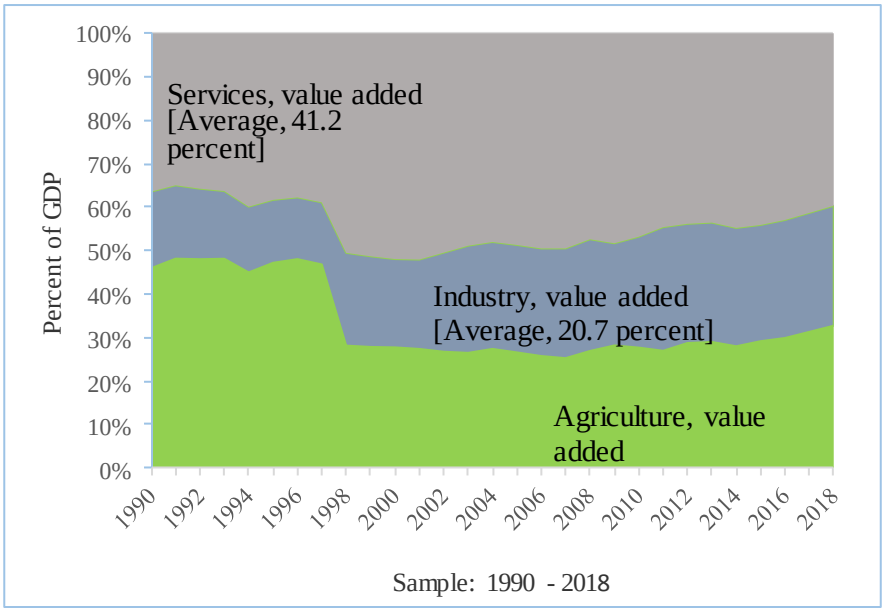
this economic success has been primarily fostered by sound macroeconomic policies and waves of structural reforms that started in 1986, and in the 1990-2000 period that were aimed at offering fertile ground for private sector development and inflow of foreign direct investment.

Figure 4. Performance of Economic Sectors



Data source: World Bank's WDI Dataset (2020)

Figure 5. Sectoral Composition of the Economy, Percent of GDP



Data source: World Bank's WDI Dataset (2020)

Economic growth in Tanzania has remained strong in recent years and become more capital intensive (IMF, 2016). Macroeconomic stability has remarkably been achieved, with inflation falling to a single digit. As the economy grew, the scope of taxation has considerably and steadily improved over the last 10 years. However, it should be noted that the economy is still dominated by agricultural sector. Many cross-country studies find a negative relationship between agriculture share in GDP and tax revenue performance (Pession & Fenochietto 2010; Gupta 2007). A huge share of agricultural activities are politically exempted from taxes (Bird & Martinez-Vazquez 2008) and this affects the tax revenue performance. In Tanzania, agriculture sector, which comprises crops, livestock, forestry, fishing and agricultural support services, employs about 65 percent of labour force but has 30 percent contribution to GDP suggesting to limited productivity in that sector. As such, the declining contribution of the agricultural sector to total GDP could be attributed to structural and/or institutional constraints other than systematic structural transformation (Mawejje & Munyambonera, 2016). The expansion of the services sector has been largely driven by innovation and technology, mainly due to reforms and expansion in the financial and insurance activities, transport and storage, as well as information and communication. In 2018, for example, transport and storage sub-activity grew by 11.8 percent, attributed to increase in volume of transit cargo following improved efficiency at Dar es Salaam and Tanga ports, as well as increase in the number of air passengers (BoT, 2019).

Industry and construction activity which includes mining, quarrying, manufacturing, construction, electricity and gas supply, and water supply and sewage, grew by 9.3 percent in 2017 (BoT, 2019). The growth of construction was 12.9 percent in 2018, reflecting growing public investments notably construction of standard gauge railways, bridges, airports and roads, as well as expansion of ports. The contribution of manufacturing, and mining and quarrying to GDP in 2018 was 8.2 percent and 5.1 percent respectively (BoT, 2019). Industry has been an integral part of Tanzania's development strategies, and therefore the sector is expected to lead the process of transforming the economy from low productivity to high productivity and high revenue mobilization.

3. Literature Review

Tax revenue mobilization is a central concern of economic policymaking in many countries. In developing countries, enhancing the mobilization of tax revenue is integral for governments to create fiscal space to fund public investment and deliver public services. However, experience shows that while some countries exhibit marked increases in their tax-to-GDP ratios, others show little or no increase over extended periods, as a result this difference in tax revenues across countries have been a topic of widespread debate in the relevant literature. In the literature, there are two main schools of thought explaining the factors that determine tax revenue mobilization namely, structural factors that include the composition of the economic activities, and institutional factors which include the government policies and political economy constraints (Mawejje & Munyambonera, 2016, Epaphra & Massawe, 2017). Structural factors that determine tax effort of the economy include the level of development, which is usually represented by the gross domestic product (GDP) per capita, share of trade in GDP, which also indicates

the degree of trade liberalization, ratio of debt and aid to GDP, the productive specialization, or the structure of the economy, that can be explored through the sectoral composition of the GDP namely, share of agriculture in GDP, share of industry in GDP (Gupta 2007; Epaphra & Massawe, 2017; Pessino & Fenochietto, 2010; Piancastelli, 2001; Karagöz, 2013), external factors such as the level of foreign direct investment and trade (Cassou, 1997; Gupta, 2007; *Bird et al*., 2008), whereas the institutional factors that affect the ability and efficiency of tax revenue collection include political stability, voice and accountability, governance, tax policies and corruption (Bird & Martinez-Vazquez 2008; Ghura, 1998; Epaphra & Massawe, 2017; Bird *et al.,* 2008; Martin-Mayoral & Uribe, 2010). Some studies have explored the effect of social variables such as the educational level, measured by public expenditure on education or illiteracy rate (Pessino & Fenochietto, 2010; Piancastelli, 2001) and population growth (Bahl & Wallace, 2005).

Despite the fact that there is a vast empirical literature investigating the determinants of tax revenue, the empirical evidence of the revenue effects of the share of agriculture, industry, services, public expenditure as well as the share of both development and recurrent expenditure in GDP using cross-country regressions is still inconclusive. Similarly, the relations among tax revenue, trade liberalization and foreign aid are too ambiguous. The empirical findings have been mixed mainly because of their sensitivity to the set of countries and the period of analysis. Also, the majority of these studies employ cross section empirical methods and hence ignore on the variation over time. Some studies have applied dynamic general equilibrium models (Feltenstein & Cyan, 2013), while others have conducted diverse econometric techniques, employing cross-section methods (Lotz & Morss, 1970), panel version of a stochastic tax frontier model (Pessino & Fenochietto, 2010), fixed and random effect models and dynamic panel data techniques that use the generalized methods of moments (GMM)(Gupta, 2007; Martin-Mayoral & Uribe, 2010, Epaphra & Massawe, 2017). It is worth noting that a very few previous studies reflect about the effect of lagged values of the tax revenue variable (Castro & Camarillo, 2014) or apply autoregressive distributed lag techniques (Mawejje & Munyambonera, 2016).

In the literature however, it is common to find that GDP per capita is positively correlated with tax share, as it is a good indicator of the overall level of economic development and sophistication of the economic structure (Gupta, 2007). A higher economic development suggests a lower average citizens' resistance to pay their taxes, because of their lower money's marginal utility and a greater proportion of them who surpass an exempt income level. In addition, a high rate of economic growth and a sizeable GDP per capita favour state capacity to collect taxes (Besley & Persson, 2009) and are related to greater tax bases namely, consumption and income (Muibi & Sinbo, 2013). Moreover, according to Wagner's law, since the demand for government services is income elastic, the share of goods and services provided by the government tend to rise with the level of development, which in turn, increases the ratio of tax revenue-to-GDP. Other studies including Chelliah (1971), Bahl (1971), Tanzi (1987), Pessino & Fenochietto (2010), and Mahdavi (2008) also find a positive correlation between tax revenue and GDP per capita. The most notable contradictory findings are reported in Profeta & Scabrosetti (2010) analysis of determinants of tax revenue of 39 developing countries over the period 1990-2004, including 11 Asian, 19 Latin American and 9 recent

members of the European Union. They show that GDP per capita does not affect tax revenues in the Asian economies included in the sample, but it has a positive effect for Latin American countries.

The sectoral composition of the economy is considered to be one the main determinants of tax effort because certain sectors of the economy are easier to tax than others (Gupta, 2007). Agriculture valued added as a percent of the economy may have a negative effect on tax revenue, because the economic activities in this sector are more difficult to tax, especially in developing countries, where production tends to be dominated by a large number of subsistence farmers, or organized on a small-scale basis. Moreover, studies show that higher agriculture share to GDP is expected to be associated with lower revenue because it is less monetized and largely informal, underreporting, and special or preferential tax treatment including exemptions and deductions, hence it has a negative impact on tax revenue (Ghura, 1998). It is possible that for political rather than economic reasons some countries exempt a large share of agricultural activities from taxes (Bird & Martinez-Vazquez 2008) and this affects the tax revenue performance. A number of empirical studies including Chelliah (1971), Bahl (1971), Tanzi (1987), Gupta (2007), Pessino & Fenochietto (2010), Agbeyegbe *et al*. (2004) and Bhushan & Samy (2010) confirm that the negative relationship between the ratio of agriculture-to- GDP and tax effort is indeed, statistically significant. By contrast, specialization in industry can have positive effects on taxation as industrial enterprises are typically easier to tax. Manufacturing can generate larger taxable than agriculture (Eltony, 2002). Similarly, a vibrant mining sector dominated by a few large firms can generate large taxable surpluses (Gupta, 2007). Studies such as Piancastelli (2001) and Stotsky & WoldeMariam (1997) also reveal a positive effect of manufacturing on tax ratio. Similarly, Chelliah (1971), Chelliah et al. (1975), Tait, *et al*. (1979), and Tanzi (1981) find that mining share has a positive effect on tax ratio. However, Stotsky & WoldeMariam (1997) find that both agriculture and mining share are negatively related to the tax ratio, whereas Eltony (2002) observes that mining share has a negative impact on the tax ratio for oil exporting countries, but a positive impact for non-oil exporting countries. This suggests that the effect of mining share, and indeed the ratio of industry-to-GDP on revenue performance is ambiguous. Nevertheless, the paramount importance here is vested in the argument that every sector, whether agricultural sector or non-agricultural sector, as well as industrialization have a vital role to the tax revenue mobilization. Industrialization concomitant with economic growth create new demands and requirements for government services (Weiss, 1969), which in turn lead to an increase in public spending and tax revenue mobilization.

Pessino & Fenochietto (2010) estimate tax effort and taxable capacity for 96 countries using the stochastic frontier analyses. The results show that, apart from the level of development as proxied by the per capita GDP, tax effort is determined positively by the level of trade openness, and public expenditure on education. According to Pessino & Fenochietto (2010) these positive effects can, however, be undermined by macroeconomic instability, for example through extended periods of high inflation, and disparities in income distribution. In a similar study, Ghura (1998) shows for 39 Sub-Saharan African Countries, that the tax revenue-to-GDP ratios rise with declining inflation and level of corruption, emerging human capital a delegation for the provision of public services by the

government, and the degree of openness. Ghura's findings on public service provision are consistent with Pessino & Fenochietto (2010) who show that public expenditure on education improves tax effort. Productive public expenditure can stimulate private sectors productivity and profitability (Aschauer, 1989), while a well-organized public expenditure is important in stimulating growth and poverty reduction (Sennoga & Matovu, 2013) that in turn may increase tax revenue mobilization. The main argument however, is the degree to which tax revenue correlates with government expenditure, because previous studies show mixed results depending on the economic groups (Lien & Thanh, 2017). While developed countries are likely to collect more taxes, spend less and maintain the slow speed of growing outcome, developing countries keep spending more and collect less revenue for rapid growth in their economies (Lien & Thanh, 2017). To shed more light on Pessino & Fenochietto (2010) and Ghura (1998), studies such as Lotz & Morss (1967), Tait, *et al*. (1979), Leuthold (1991), Ghura (1998), Piancastelli (2001), WoldeMariam (1997), and Immurana *et al.* (2013) also find that either trade openness or the ratio of export-to-GDP has a positive effect on tax revenue ratio. The effect of trade liberalization on revenue mobilization may be ambiguous both in theory and empirical evidence. Trade liberalisation in the form of converting quantitative restrictions to tariffs can initially lead to an increase in trade tax revenue (Gupta, 2009, Epaphra, 2014. Further liberalisation in the form of tariffs cut can cause trade tax revenue loss on one hand, but can also cause an increase in the volume of imports, and hence the tax base and revenue. Indeed, Baunsgaard & Keen (2010) show that developing countries have not succeeded in offsetting reductions in trade tax revenues due to trade liberalization by increasing revenues from other sources. The net effect of trade liberalisation depends on many factors, including the structure of liberalisation and the elasticity of demand for imports (Brafo-Insaidoo & Obeng, 2008). Real exchange rate depreciation associated with trade liberalisation also affects the profitability of corporate firms through changes in the relative prices of imported inputs as well as exports (Pupongsak, 2009).

Taxes are levied on a nominal basis with no distinction drawn between real and purely inflationary components of the item that make up taxable income (Jenkins & Lahouel, 1981). Inflation leads to miscalculation of taxable liabilities both at the level of personal income and at the level of business income (Jenkins & Lahouel, 1981). Bilquees (2004) states that substantially a huge amount of taxes are persistently collected through indirect methods which are assumed to be affected to a greater extent by the inflation, whereas the direct method of taxation is subject to an increase in the income and profitability resulting from such inflationary trend. Victor (1996) and Gerald & Carroll (1999) state three effects that inflation may have on real tax liability namely, erosion of amounts expressed in national currency, erosion of the value of tax obligations, effects on the measurement of the tax base.

Along with the above variables, in the literature, there is an ongoing debate on the effect of foreign aid on fiscal tax revenues. Some studies argue that loans have a positive effect on tax revenue because of the obligation to repay them, whereas grants have a negative effect because the recipient treats them as free money and as a substitute for taxation. Clist & Morrissey (2011) build on Gupta *et al.* (2004) model to examine the impact of foreign aid (loans and grants) on tax efforts for 82 developing countries,

classified as lower-middle income and low-income, over the 1970-1984 and 1985-2005 period. The findings for the first set of data show that loans are positively related to tax revenue while grants have a negative relationship with tax revenue. The second set, indicates that grants are positively related to tax revenue in the middle-income countries, primarily because they have better fiscal systems than the low-income countries. Similarly, the study by Hisali & Ddumba-Ssentamu (2013) shows that the long run equilibrium tax is positively influenced by loans but bears a negative relationship with grants. These results are similar to findings by *Crivelli et al.* (2012) and Gupta *et al.* (2003). However, other empirical studies, for example Mbatia & Ellyne (2017) show that both concessional loans and grants have a negative effect on taxation revenue, while some authors reveal insignificant relationship between the variables (Chaudhry & Munir, 2010). Indeed, according to Ouattara (2006) and Clist & Morrissey (2011) foreign aids need not suppress tax effort. This postulates that the causal relationship between the two variables is ambiguous.

The foregoing review of literature shows that while there is substantial evidence that tax performance depends on many factors, some are structural while others are institutional. The strength and direction of the relationship, however, is likely to depend on the level of development and effectiveness of the tax system of the respective economy. Method of estimation, also is like to affect the analysis. As a result, taxation has been a topic of discussion for decades in the global arena as countries strive to maximise tax revenue collection in order to raise the revenue needed for economic development. In view of this and the fact that results have been contradictory, and that less attention has been paid to analyse the tax revenue effect of sectoral growth and expenditure using ARDL, this paper contributes to literature in this respect. The analyses further build on Mawejje & Munyambonera (2016) to investigate the effect of growth of economic sectors and expansion of government expenditure on tax revenue in Tanzania.

4. Methodology

4.1. Analytical Framework

This paper adopts the framework developed by Mawejje & Munyambonera (2016) for Uganda. According to Mawejje & Munyambonera (2016), firms are the major micro production units that engage in the production of a final good but must rely on government expenditures for the provision of quality public infrastructures (G). Similarly, the firms hire labour units, N_i and invest in private capital, K_i. Government investment in public infrastructures acts as a catalyst for the productivity of labour and capital and as such, government expenditure is complimentary to firm performance. Assuming that government expenditures are financed by levying a constant tax rate, τ on firm profits, π, then the firms' production technology that follow a Cobb Douglas constant returns to scale function can be expressed as

$$q_i = \alpha K_i^{\beta} N_i^{1-\beta} G \tag{1}$$

where

q_i	=	Output (GDP)
K_i	=	The private capital investment
N_i	=	Amount of labour employed by the i^{th} firm
G	=	Government spending
α	=	A measure of a firm's productivity from other sources.
$1-\beta$ and β	=	Coefficients

This production function has the property that the exponents of the inputs add up to one, which gives constant returns to scale. If capital and labour inputs are doubled, output will also double. Function is assumed to be twice differentiable with positive marginal products and diminishing marginal rate of substitution, such that $f' > 0$ and $f'' < 0$. Public spending, G is a catalyst to firm productivity financed through Government expenditure on public capital, such as in energy, water, communication, transport, education and health infrastructures (Mawejje & Munyambonera, 2016).

Given the the return to labour, wage ω_i, and the return on private capital investments, the rate of return, ν_i, then the cost function can be presented as

$$c_i = \omega_i N_i + \nu_i K_i \tag{2}$$

So that the constrained output maximization problem will be as follows:

Maximise $q_i = \alpha K_i^{\beta} N_i^{1-\beta} G$ (3)

subject to $c_i = \omega_i N_i + \nu_i K_i$ (cost constraint)

The firms' profit function is given as

$$\pi_i = \alpha K_i^{\beta} N_i^{1-\beta} G - \omega_i N_i - \nu_i K_i \tag{4}$$

The first condition for profit maximization is that the first derivative of the function with respect to factor inputs be equal to zero. That is

$$\frac{\partial \pi_i}{\partial N_i} = (1-\beta)\alpha K_i^{\beta} N_i^{-\beta} G - \omega_i = 0 \tag{5}$$

$$\frac{\partial \pi_i}{\partial K_i} = \beta \alpha K_i^{\beta-1} N_i^{1-\beta} G - \nu_i = 0 \tag{6}$$

Profit maximization, therefore implies that

$$\omega_i = (1-\beta)\alpha K_i^{\beta} N_i^{-\beta} G \tag{7}$$

$$\nu_i = \beta \alpha K_i^{\beta-1} N_i^{1-\beta} G \tag{8}$$

Firms in the economy can be in agriculture (agr), industry (ind), and service (ser) sectors. The weighted geometric and natural logarithms functions of the aggregate activities in the economy can be expressed, respectively, as follows:

$$q = \left(agr^{\varphi_1}\right)\left(ser^{\varphi_2}\right)\left(ind^{\varphi_3}\right) \tag{9}$$

$$Log\, q = \varphi_1 \log agr + \varphi_2 \log ser + \varphi_3 \log ind \tag{10}$$

where φ_1, φ_2 and φ_3 are the shares of agriculture as percent of GDP, service as a percent of GDP, and industry as a percent of GDP.

In the formal sector[3], firms tend to report all their profit, π_i, for tax purposes. Since firms pay taxes on profits, then the tax revenue-to-GDP ratio is expressed as

$$\frac{\tau\pi_i}{q_i} = \frac{\tau}{q_i}\left(\alpha K_i^{\beta} N_i^{1-\beta} G - \omega_i N_i - \nu_i K_i\right) \tag{11}$$

Differentiating the tax revenue-to-GDP ratio with respect to profit gives the response of an increase in profitability to the tax revenue-to-GDP ratio at the margin, such that

$$\frac{d}{d\pi_i}\left(\frac{\tau\pi_i}{q_i}\right) = \frac{\tau}{q_i} > 0 \tag{12}$$

Expression (12) suggests that as firms expand their profitability the tax revenue-to-GDP ratio should increase, that is, there is a positive relationship between an increase in output or profit and tax revenue-to-GDP ratio.

4.2. Measurements of Variables and Sources of Data

As has been mentioned, the empirical analysis in this paper uses time series dataset for Tanzania covering the 1990-2018 period. The choice of years is primarily motivated by availability of data for the variables in questions. Table 1 gives a summary of variables' definitions and sources of data of the key variables. The variable of interest is tax revenue as a percentage of GDP, obtained from Bank of Tanzania's Annual Reports (*various issues*). Among the explanatory variables, we include GDP per capita, share of agriculture valued added in GDP, share of industry value added in GDP, share of service value added in GDP, and share of imports plus exports in GDP. Their sources are primarily the *World Development Indicators* (WDI). The other key explanatory variable is the public expenditure (recurrent and development) as a percentage of GDP, which is obtained from Bank of Tanzania's Annual Reports (*various issues*). Moreover, we include inflation and official development assistance. The source of these variables is WDI.

[3] Informal sector is beyond the scope of this paper.

Table 1. Definition of Variables and Sources of Data

Sn	Variable	Abbr.	Definition	Expected sign
1	Tax revenue	tax	Tax revenue, percent of GDP	
2	Output	q	Gross Domestic Product (TZS Million)	Positive
3	GDP per capita	qp	GDP/population	Positive
4	Public expenditure	g	Development g_1, and recurrent g_2, expenditure, percent of GDP	Positive
5	Agriculture	agr	Agriculture value added, percent of GDP	Negative
6	Service	ser	Service value added, percent of GDP	Positive
7	Industry	ind	Industry value added, percent of GDP	Positive
8	Trade	Γ	Export plus import of goods and services, percent of GDP	Positive/Negative
9	Inflation	η	Inflation, consumer prices, percent	Negative
10	ODA	da	Official development assistance, percent of GDP	Positive/ Negative

Source: Authors' construction from literature review, 2020

All variables, except GDP capita and inflation, are expressed as a percent of GDP to capture their relative sizes. GDP per capita, which captures income per person in the economy, is used as a proxy for the level of economic development. The level of development and the level of inflation are expected to have positive and negative signs, respectively. The main augment is that the degree of economic activities and macroeconomic instability are the main drivers of tax buoyancy and tax effort in the economy. Developed countries tend to have higher tax revenue-to-GDP ratio. Agriculture valued added represent the net output of the sector after adding up all the outputs and subtracting intermediate inputs and it is expected to have a negative sign because the economic activities in this sector are difficult to tax. Industry and services value added, just like agriculture capture the net output after subtracting intermediate inputs from the total output of the sector. Both industry and service sectors are expected to have a positive effect on tax revenue ratio because these sectors can generate large taxable surpluses. The impact of trade liberalization and official development assistance as has been stated already is not certain thus it can be positive or negative.

4.3. Model Specification

4.3.1. Autoregressive Distributed Lag Approach

Similar to Mawejje & Munyambonera (2016) for Uganda, we adopt the auto regressive distributed lag (ARDL) approach to cointegration analysis to assess the responsiveness of tax revenue to sectoral GDP performance and public expenditure in Tanzania. ARDL, which is also known as bound testing approach was proposed by Pesaran & Shin (1999) and further expounded by Pesaran *et al.* (2001). It is used to investigate the existence of cointegration relationships among variables (Matlasedi, 2017). It is worth noting that, in applied econometrics, the Granger (1981) and, Engle & Granger (1987), ARDL cointegration technique or bound test of cointegration (Pesaran & Shin,1999 and Pesaran *et al.*, 2001), as well as Johansen & Juselius (1990) cointegration techniques have become the solution to determining the long run relationship between

series that are non-stationary, as well as reparameterizing them to the Error Correction Model (ECM). However, when compared to other cointegration procedures like maximum likelihood based Johanssen (1988) procedure and the residual based Engle-Granger (1987) two-step estimation procedures, ARDL is favoured based on the fact that both the long-and short-run parameters of the model specified can be estimated simultaneously (Matlasedi, 2017).

If the variables in the model do not cointegrate, then we have the problems of spurious regression and the results therein become almost meaningless. To overcome the problem of non-stationarity and prior restrictions on the lag structure of a model, econometric analysis of time series data has increasingly moved towards the issue of cointegration (Nkoro & Uko, 2016). The reason being that, cointegration is a powerful way of detecting the presence of steady state equilibrium between variables. One of the reasons for preferring the ARDL is its applicability irrespective of whether the underlying regressors are purely or mutually cointegrated. We then avoid the potential bias associated with unit roots and cointegration tests. Indeed, unlike maximum likelihood based Johanssen (1988) procedure which, requires all variables to follow *I(1)* processes, ARDL approach is applicable irrespective of the order of integration whether the variables under consideration are purely *I*(0) (i.e. the variables are stationary at level form) or purely *I*(1) (i.e. the variables become stationary at first difference) or a combination of both. This means that the bound cointegration testing procedure may not require the pre-testing of the variables included in the model for unit roots and is robust when there is a single long run relationship between the underlying variables. ARDL approach to cointegration helps in identifying the cointegrating vector(s). That is, each of the underlying variables stands as a single long run relationship equation. If one cointegrating vector (i.e the underlying equation) is identified, the ARDL model of the cointegrating vector is reparameterized into error correction model (ECM). The reparameterized result gives the short-run dynamics and long run relationship of the underlying variables. Distributed lag Model simply means the inclusion of unrestricted lag of the regressors in a regression function. ARDL however, does not work with non-stationary variables integrated of order two I(2).

The ARDL approach involves two steps for estimating the long-run relationship (Pesaran et al., 2001). The first step is to examine the existence of long–run relationship among all variables in the equations under estimation. The second step is to estimate the long-run and the short-run coefficients of the same equation and the associated ARDL error coercion model. We run the second step only if we find a long-run relationship in the first step (Narayan et al., 2005). The ARDL model requires a priori knowledge or estimation of the orders of the extended ARDL. This appropriate modification of the orders of the ARDL model is sufficient to simultaneously correct for residual serial correlation and the problem of endogenous regressors (Pesaran & Shin, 1998). The order of the distributed lag on the dependent variable and the regressors is selected using either the Akaike Information Criterion (AIC) or the Schwartz Bayesian Criterion (SBC). This paper uses AIC as a lag selection criterion. Based on the previous discussion, a significant F-statistic for testing the joint level significance of the lagged level indicates the existence of long-run relationship.

In summary, requirement for the Application of ARDL approach to cointegration testing is that irrespective of whether the underlying variables are *I(0)* or *I(1)* or a combination of both, ARDL technique can be applied. If the F-statistics (Wald test) establishes that there is a single long run relationship and the sample data size is small or finite, the ARDL error correction representation becomes relatively more efficient. However, if the F-statistics (Wald test) establishes that there are multiple long-run relations, ARDL approach cannot be applied. Hence, an alternative approach like Johansen & Juselius (1990) can be employed.

4.3.2. ARDL Model Specifications

As has been presented, the formal sector can be disaggregated into agriculture, industry and services. Tax revenue-to-GDP ratio is expected to be positively associated with GDP or output. Similarly, productive Government expenditures are expected to be positively associated with profitability and output. Hence, the basic reduced form model arising from the analytical framework takes the form:

$$tax_t = f\left(q_t, g_t, qp_t, \Gamma_t, \eta_t, da_t\right) \tag{13}$$

since

$$q = f\left(agr_t, ser_t, ind_t\right) \tag{14}$$

it follows that the basic model that we estimate takes the form:

$$tax_t = f\left(agr_t, ser_t, ind_t, g_t, qp_t, \Gamma_t, \eta_t, da_t\right) \tag{15}$$

where

tax_t	=	Tax revenue-to-GDP ratio
q_t	=	Output (GDP)
g_t	=	Government expenditure-to-GDP ratio
agr_t	=	Agriculture value added-to-GDP ratio
ser_t	=	Service value added-to-GDP ratio
ind_t	=	Industry value added-to-GDP ratio
qp_t	=	GDP per capita
Γ_t	=	Trade-to-GDP ratio
η_t	=	Inflation, consumer prices, annual percent
da_t	=	Official development assistance-to-GDP ratio

Using equation (15), the general ARDL representation is specified as:

$$\begin{aligned}\Delta tax_t = \theta_0 &+ \sum_{i=1}^{p_1} \theta_1 i\,\Delta \ln tax_{t-1} + \sum_{i=0}^{p_2} \theta_2 i \Delta \ln q_{t-i} + \sum_{i=0}^{p_3} \theta_3 i \Delta \ln g_{t-i} \\ &+ \sum_{i=0}^{p_4} \theta_4 i \Delta \ln qp_{t-i} + \sum_{i=0}^{p_5} \theta_5 i \Delta \ln \Gamma_{t-i} + \sum_{i=0}^{p_6} \theta_6 i \Delta \ln \Gamma_{t-i}^2 \\ &+ \sum_{i=0}^{p_7} \theta_7 i \Delta \ln \eta_{t-i} + \sum_{i=0}^{p_8} \theta_8 i \Delta \ln da_{t-i} + \varphi_1 \ln tax_{t-1} + \varphi_2 \ln q_{t-1} \\ &+ \varphi_3 \ln g_{t-1} + \varphi_4 \ln qp_{t-1} + \varphi_5 \ln \Gamma_{t-1} + \varphi_6 \ln \Gamma_{t-1}^2 + \varphi_7 \ln \eta_{t-1} \\ &+ \varphi_8 \ln da_{t-1} + u_t\end{aligned} \tag{16}$$

where all variables are as previously defined, Δ is the difference operator, θ_0 is the drift component, u_t is a white noise error term, and it is assumed to be serially uncorrelated. Lastly, $p_1, p_2, \cdots, p_8$ are the lag length. Note that q_t is disaggregated into agriculture (agr_t), industry (ind_t) and services (ser_t) and g_t is divided into development expenditure (g_1) and recurrent expenditure (g_2). Γ_t^2 is included to capture the Laffer curve effect of trade liberalization. To trace the existence of cointegration, F-statistic is computed from OLS regression equation (16). The null hypothesis of no cointegration (H_0) is tested by restricting the lagged level variable equal to zero, against the alternative hypothesis (H_a) i.e.

$$H_0: \quad \varphi_1 = \varphi_2 = \cdots = \varphi_8 = 0 \tag{17}$$

$$H_a: \quad \varphi_1 \neq \varphi_2 \neq \cdots \neq \varphi_8 \neq 0 \tag{18}$$

The bounds tests provide two asymptotic critical value bound. The lower bound assumes variable are $I(0)$ whilst the upper bound assumes $I(0)$ variables. The null hypothesis of no cointegration is rejected if the computed F-statistic is greater than the upper critical value bound, and conclude that there exists steady state equilibrium between the variables. If the computed F-statistics is less than the lower bound critical value, then we cannot reject the null hypothesis of no cointegration. However, it should be noted that if the computed F-statistic falls within the lower and upper bound critical values, then the result is inconclusive; in this case, following Kremers *et al.* (1992), the error correction term will be a useful way to establish cointegration.

The error correction model (ECM) is developed in order to test for the speed of adjustment and how the variables in the dataset converge towards equilibrium in the long run. Therefore, the ARDL version of the ECM for the tax revenue model can be expressed, in conformity with model (16) as

$$\Delta tax_t = \theta_0 + \sum_{i=1}^{p_1} \theta_1 i\, \Delta \ln tax_{t-1} + \sum_{i=0}^{p_2} \theta_2 i \Delta \ln q_{t-i} + \sum_{i=0}^{p_3} \theta_3 i \Delta \ln g_{t-i} \quad (19)$$
$$+ \sum_{i=0}^{p_4} \theta_4 i \Delta \ln pq_{t-i} + \sum_{i=0}^{p_5} \theta_5 i \Delta \ln \Gamma_{t-i} + \sum_{i=0}^{p_6} \theta_6 i \Delta \ln \Gamma_{t-i}^2$$
$$+ \sum_{i=0}^{p_7} \theta_7 i \Delta \ln \eta_{t-i} + \sum_{i=0}^{p_8} \theta_8 i \Delta \ln oda_{t-i} + \delta \Re_{t-1} + u_t$$

where $\theta_1, \theta_2, \cdots, \theta_8$ = Short run coefficients

δ = The extent of disequilibrium correction

$\Re_{t-1}$ = The error correction term (ECT)

δ explains the speed of adjustment and the error correction term, $\Re_{t-1}$, is derived from the residuals obtained in model (16). The coefficient of the lagged error correction term (δ) is expected to be negative and statistically significant to further confirm the existence of a cointegrating relationship.

4.2.3. Unit Root Tests

One of the first steps in econometric analysis is to test for the unit roots of the series, for which different tests such as Dickey-Fuller (1979) (DF), Augmented Dickey-Fuller (1981) (ADF) test, Philip-Perron (1988) (PP) and Kwiatkowski-Phillips-Schmidt-Shin (1992) (KPSS) tests are described in the literature. The presence of a unit root implies that a time series under consideration is non-stationary while the absence of it entails that a time series is stationary. When non-stationary time series are used in estimation of an econometric model, the Ordinary Least Square traditional diagnostic statistics for evaluation of the validity of the model estimates such as, coefficient of determination *(R^2)*, Fisher's Ratio (F-Statistic), Durbin-Watson, t-statistic etc. become highly misleading and unreliable in terms of forecast and policy. In such series, the mean, variance, covariance and autocorrelation functions change overtime and affect the long run development of the series (Nkoro & Uko, 2016).

For the purposes of this paper, the standard version of the Augmented Dickey–Fuller (ADF) (Dickey, 1976; Dickey & Fuller, 1979) unit root test is employed to check the non-stationary assumption. The ADF test is considered superior because of its popularity and wide application. Indeed, the ADF test adjusts the DF test to take care of possible autocorrelation in the error terms by adding the lagged difference term of the dependent variable. If tax_t that is random walk process, that is, $tax_t = tax_{t-1} + u_t$, then the regression model becomes $tax_t = \rho tax_{t-1} + u_t$. Subtracting tax_{t-1} from both sides of the model, we present the restrictive and general ADF model as follow

Restrictive ADF model: $$\Delta tax_t = \rho_1 tax_{t-1} + \sum_{i=1}^{k} \psi_i \Delta tax_{t-i} + u_t \quad (20)$$

General ADF model: $$\Delta tax_t = \psi_0 + \rho_1 tax_{t-1} + \sum_{i=1}^{k} \psi_i \Delta tax_{t-i} + u_t \qquad (21)$$

where u_t is a pure white noise error term and $\Delta tax_t = (tax_t - tax_{t-1})$, $\Delta tax_{t-1} = (tax_{t-1} - tax_{t-2})$. k is the lagged values of Δtax_t, to control for higher-order correlation assuming that the series follow an autoregressive process, $AR(\rho)$. The number of lagged difference term to be included is often determined empirically, the reason being to include enough terms so that the error terms are serially uncorrelated. The Schwartz-Bayesian Criterion (SBC) and Akaike Information Criterion (AIC) are widely used to determine the optimal number of lags included in the test. In practice, we test the hypothesis that the series has a unit root, $\rho = 0$. That is

$$H_0: \quad \rho_1 = 0 \quad \rho_1 \sim I(1) \qquad (30)$$

$$H_a: \quad \rho_1 < 0 \quad \rho_1 \sim I(0) \qquad (31)$$

An ADF value with less than its critical value shows that the underlying series has a unit root, in that case it is non-stationary. Contrarily, when an ADF value is greater than its critical value, then the underlying series has a unit root or it is stationary.

5. Empirical Results

5.1. Descriptive Data Analysis and Statistical Tests

Descriptive analysis and correlation matrix are conducted to ascertain the statistical properties of the variables. Table 2 and Table 3, respectively, report the descriptive statistics and correlation matrix of the variables. All variables are measured in logarithm forms. The descriptive statistics suggest that all variables except agriculture value added (agr) and development expenditure (g_1) are approximately normally distributed because their respective skewness is either not above than 0.5 in absolute values or the probabilities of these variables fail to reject the null hypothesis of normal distribution. However, both skewness and probabilities of agriculture value added and development expenditure reject the null hypothesis of normal distribution.

The correlation matrix of the variables of the regression model as reported in Table 3 suggests that tax revenue ratio is positively correlated GDP per capita, trade-to-GDP ratio, government expenditure, but negatively correlated with official development assistance-to-GDP ratio, agriculture value added, and services value added. Indeed, the tax revenue ratio seems to be strongly positively correlated with the ratio of recurrent expenditure-to-GDP. The correlation between tax revenue ratio and inflation appears to have been positive but very weak. The correlation matrix also shows that the pair-wise correlations between explanatory variables, except GDP per capita and industry valued added on one hand, and agriculture valued added and industry value added on the other, are not quite high (i.e. less than 0.8) indicating that multicollinearity is not a serious problem. A strong negative correlation between industry and agriculture value added, and

a strong positive correlation between GDP per capita and industry value added are expected in Tanzania, as the economy tend to move from agrarian to industrial economy. This multicollinearity case was taken into consideration in the regression analysis.

Table 2. Descriptive Statistics and Correlation of Variables

	tax	*qp*	*agr*	*ind*	*ser*	g_1	g_2	Γ	η	*da*
Mean	1.00	5.62	1.48	1.31	1.61	0.56	0.85	1.61	1.00	1.01
Median	1.00	5.70	1.42	1.36	1.62	0.66	0.83	1.64	0.90	0.97
Maximum	1.07	6.38	1.65	1.42	1.69	0.97	1.10	1.82	1.55	1.48
Minimum	0.92	4.53	1.37	1.11	1.50	-1.00	0.53	1.38	0.54	0.64
Std. Dev.	0.05	0.56	0.10	0.10	0.06	0.42	0.16	0.13	0.30	0.23
Skewness	-0.08	-0.45	0.88	-0.75	-0.28	-2.07	-0.06	-0.24	0.49	0.50
Kurtosis	1.85	2.08	1.97	2.05	1.80	7.95	2.11	2.00	1.87	2.51
Jarque-Bera	1.63	2.01	5.04	3.78	2.11	50.4	0.98	1.50	2.68	1.48
Probability	0.44	0.37	0.08	0.15	0.35	0.00	0.61	0.47	0.26	0.48
Sum	28.9	163.1	42.8	37.9	46.7	16.3	24.6	46.8	28.9	29.3
Sum Sq. Dev	0.06	8.69	0.30	0.29	0.09	4.89	0.71	0.47	2.55	1.46
Observations	29	29	29	29	29	29	29	29	29	29

Source: Authors' computations

Table 3. Correlation coefficient Matrix

	tax	*qp*	*agr*	*ind*	*ser*	g_1	g_2	Γ	η	*da*
Tax revenue	1									
GDP per capita	0.34	1								
Agriculture	0.18	-0.79	1							
Industry	0.17	0.90	-0.89	1						
Services	0.51	0.47	-0.80	0.57	1					
Dev. Expenditure	0.04	0.62	-0.69	0.80	0.43	1				
Rec. Expenditure	0.87	0.18	0.34	-0.05	-0.57	-0.25	1			
Trade	0.23	-0.28	0.50	-0.34	-0.62	-0.08	0.14	1		
Inflation	0.01	-0.78	0.81	-0.77	-0.67	-0.48	0.10	0.68	1	
ODA	-0.25	-0.92	0.72	-0.78	-0.49	-0.43	-0.23	0.50	0.79	1

Source: Authors' computations

5.2. Tests for Stationarity

It was important to verify the stationarity properties of the variables used for the study in order to avoid the risk of spurious regression since literature has shown that most time series variables have stochastic trends, thus their variances and unconditional means are non-stationary. The Augmented Dickey-Fuller (ADF) method is conducted to check for a unit root for all variables in both levels and first differences. In carrying out the

stationarity tests we considered constant and trend in the series. The results of this test are presented in Table 4, which indicates that the hypothesis of a unit root cannot be rejected in all variables in levels. It is therefore concluded that all variables are non-stationary at their levels. However, the hypothesis of a unit root is rejected in first differences which indicates that all variables are integrated of degree one (Table 5). This also suggests that, further estimations could be carried while in first difference in order to avoid spurious correlation.

Table 4. ADF Unit Root Tests for Stationarity: Level Variables

No	Variable	ADF test statistic			Decision
		Intercept	Intercept & trend	None	
1	Tax revenue	-2.041	-2.538	0.274	Accept H_0
2	GDP per capita	-3.714	-1.398	2.420	Accept H_0
3	Agriculture	-1.563	-0.959	-0.759	Accept H_0
4	Industry	-1.038	-2.253	0.823	Accept H_0
5	Service	-1.638	-1.048	0.201	Accept H_0
6	Development expenditure	-2.080	-2.812	-1.091	Accept H_0
7	Rec. Exp.	-1.575	-1.792	0.144	Accept H_0
8	Trade	-1.996	-2.037	-0.443	Accept H_0
9	Trade Squared	-2.030	-2.092	-0.563	Accept H_0
10	Inflation	-2.449	-2.256	-2.708	Accept H_0
11	ODA	-1.424	-2.431	-2.207	Accept H_0
	Critical values: 5% level	-2.972	-3.581	-1.953	

Hypothesis: H_0: Series is non-stationary/has unit root.
H_1: Series has no unit root.
Source: Authors' computations

Table 5. ADF and PP Unit Root Tests for Stationarity: First Difference

No	Variable	ADF test statistic			Decision
		Intercept	Intercept & trend	None	
1	Tax revenue	-6.152	-5.635	-6.271	Reject H_0
2	GDP per capita	-3.571	-4.675	-1.863	Reject H_0
3	Agriculture	-4.745	-5.029	-4.745	Reject H_0
4	Industry	-5.120	-5.021	-5.029	Reject H_0
5	Service	-4.369	-4.961	-4.433	Reject H_0
6	Development expenditure	-5.108	-4.996	-5.206	Reject H_0
7	Recurrent expenditure	-5.957	-6.176	-6.061	Reject H_0
8	Trade	-3.196	-3.666	-3.239	Reject H_0
9	Trade Sqaured	-3.194	-3.168	-3.241	Reject H_0
10	Inflation	-5.380	-5.318	-5.135	Reject H_0
11	ODA	-7.237	-7.087	-6.570	Reject H_0
	Critical values: 5% level	-2.976	-3.588	-1.954	

Hypothesis: H_0: Series is non-stationary/has unit root.
H_1: Series has no unit root.
Source: Authors' computations

5.3. Autoregressive Distributed Lag Cointegration Test

Results of the ARDL bound test for cointegration, which is based on the Wald-test (*F*-statistic) are reported in Table 6. In this test, as has been discussed, the lower critical bound assumes all the variables are *I*(0) meaning that there is no cointegration relationship between the examined variables, whereas the upper bound assumes that all the variables are *I*(1), meaning that there is cointegration among the variables. The Table also reports the null hypothesis of no cointegration $(H_0)$and the alternative hypothesis (H_a) of cointegration amongst the variables. The fact that the computed *F*-statistic $(F = 8.21)$ is greater than the upper bound critical value, at all levels of significance, i.e. 10 percent, 5 percent, and 1 percent; then the H_0 is rejected, meaning that the variables in the model are cointegrated. Similarly, the computed *t*-statistic $(t = -7.61)$ is greater than the upper bound critical value, at all levels of significance, also rejecting the H_0 of no cointegration among the variables in the model. The implication is that the bounds testing approach provides a proof that there is indeed a long run relationship between the variables in the model and therefore the long run cointegration model and coefficients can be estimated and specified.

Table 6. ADL Bounds and Critical Value Bounds Test for Cointegration

F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Signif.	Lower bound I(0)	Upper bound I(1)
		Asymptotic: *n* = 1000		
Wald F-statistic	8.207356	10%	2.03	3.13
k	7	5%	2.32	3.5
		1%	2.96	4.26
t-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Signif.	Lower bound I(0)	Upper bound I(1)
t-statistic	-7.606863	10%	-2.57	-4.23
		5%	-2.86	-4.57
		1%	-3.43	-5.19

H_0: $\varphi_1 = \varphi_2 = \cdots = \varphi_8 = 0$ A Long-run relationship does not exist

H_a: $\varphi_1 \neq \varphi_2 \neq \cdots \neq \varphi_8 \neq 0$ A Long-run relationship exists

Source: Authors' computations

5.4. Autoregressive Distributed Lag Long-run Regression Results

It should be understood that if cointegration exists among the variables, ARDL approach can be used to determine long term relationships. Table 7 presents long-run results of the *ARDL* model, which can be summarized as follows:

$$Co\text{int}\, eq = \ln tax - \begin{pmatrix} 0.786\ln agr + 0.482\ln ind + 0.753\ln ser \\ +0.046\ln g_1 + 0.232\ln g_2 + 3.273\ln \Gamma - 0.998\Gamma^2 \end{pmatrix} \quad (22)$$

All the variables in the model are statistically significant at 1 percent and 5 percent. The elasticity of agriculture valued added (agr) is 0.786, suggesting that a 1 percent increase in the ratio of agriculture value added-to-GDP, will lead to an increase of about 0.78 percent in the tax revenue ratio in the long run. A large share of agriculture in crops such as tobacco, coffee, tea, coconuts, vegetables, fruits, cotton, as well as fish reflect an export industry amenable to taxation. Results also reflect an increase in VAT stimulated by the increase of consumption on importation boosted by the increase of imported capital and intermediate consumption goods used by farmers. Indeed, a positive correlation between agriculture and tax revenue is not uncommon. Terefe & Teera (2018) and Boukbech *et al*. (2019) reveal a positive and significant effect of agriculture on tax revenue ratio for Eastern African Countries and lower middle income countries respectively.

The other most important determinants of tax revenue performance in Tanzania seem to be growth in industry and trade. The elasticity of industrial valued added (ind) is 0.48, while that of trade-to-GDP ratio (Γ) is 3.27 and are highly significant at 1 percent, thus confirming a positive effect on tax revenue ratio. Specifically, a 1 percent growth in industrial valued added will lead to a 0.48 percent increase in the tax revenue ratio, while a 1 percent growth in the ratio of trade-to-GDP will lead to a 3.27 percent growth in the tax revenue ratio in the long run. Notably, productivity in industrial sector in Tanzania, which comprises among others, manufacturing, processing, and assembling industries has been impressive. This in turn, widens the tax base for domestic taxes such as corporate and profit taxes. Similarly, positive effects of trade openness on tax revenue suggest that an increase in the volume of imports resulting from openness exceed the magnitude of tariff reduction. Further, an increase in imports may lead to an increase in VAT and corporate tax, which more than recoup declining international trade. This is consistent with the theory that higher import lead to rising shares of both import duties and VAT. However, as expected, and consistent with Epaphra (2014), Khattry & Rao (2002) and Agbeyegbe *et al.* (2004), the results confirm the hypothesis that there is a diminishing tax revenue return to trade liberalization. The negative magnitude of the ratio of trade-to-GDP squared (Γ^2) suggests that a potential Laffer effect exists for tax revenue. Measures such reduction in tariffs tend to reduce trade taxes in the long run, which in turn lead to a decline in total tax revenue because international trade constitutes large share of total tax revenue.

Like industrial sector, growth of services sector (ser) is important for tax revenue performance. Services in Tanzania, which cover transportation and storage, information

and communications, financial, banking, and insurance activities and all other private economic activities that do not produce material good, account for more than 40 percent of GDP, and about 25 percent share of total employment. Overall services sector displays high productivity, and unsurprisingly, a 1 percent growth in the sector is likely to lead to a 0.75 percent increase in the tax revenue ratio. Unsurprisingly, the coefficients on development expenditure (g_1) and recurrent expenditure (g_2) are positive and significant at 5 percent and l percent respectively. A 1 percent increase in the share of development expenditure in GDP results in a 0.05 percent increase in the ratio of tax-to-GDP, while a 1 percent increase in the share of recurrent expenditure leads to a 0.23 percent increase in the tax revenue ratio. This result highlights the prominent role of recurrent expenditure in increasing the domestic liquidity and the economic activity, as well as productivity effects of development expenditure such as in building real businesses that tend to increase production and employment. The coefficients of inflation (π) and official development assistance (oda) turned out to be statistically insignificant, and therefore were dropped out in the regression. GDP per capita was also excluded in the analysis because it was highly correlated with both agricultural and industrial sectors.

Table 7. ARDL Long-Run Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
$\ln agr$	0.7862***	0.2818	2.7898	0.0121
$\ln ind$	0.4818***	0.1691	2.8494	0.0106
$\ln serv$	0.7527**	0.3149	2.3903	0.0280
$\ln g_1$	0.0462**	0.0174	2.6530	0.0189
$\ln g_2$	0.2321***	0.0234	9.9235	0.0000
$\ln \Gamma$	3.2733***	0.6852	4.7775	0.0002
$\ln \Gamma^2$	-0.9978***	0.2115	-4.7184	0.0002
Normality	$JB = 2.4703$	$F(2, 21) = 0.2819$	$\Pr = 0.2908$	$F(2, 21) = 0.2819$
Breusch-Godfrey Serial Correlation LM Test		$F = 1.3457$		$F(2, 21) = 0.2819$
ARCH		$F = 0.0086$		$F(1, 25) = 0.9265$
RESET Test		$F = 0.9562$		$F(1,17) = 0.3524$

Dependent Variable: *D(lntax)*
***Denotes a 1 percent level of significance
**Denotes a 5 percent level of significance
Source: Authors' computations

5.5. Autoregressive Distributed Lag Error Correction Model

Since variables in the model are cointegrated, then the ARDL-ECM is estimated in order to test for the speed of adjustment and how the variables in the dataset converge towards equilibrium in the long-run. Figure 6a shows the top 20 of different ARDL

models evaluated by Eviews and the final selected model as chosen by the Akaike Information criterion. The Figure shows that the final model used in the paper is an ARDL(1, 0, 0, 0, 0, 1, 0, 0) model. That is, 1 lag of the dependent variable, tax revenue ratio (tax), zero lag of agriculture value added (agr), industry value added (ind), service value added (ser), and development expenditure (g_1), one lag of the recurrent expenditure (g_2), and zero lag of both trade-to-GDP ratio (Γ) and square of the ratio of trade-to-GDP (Γ^2). It should be noted that both Schwarz Criteria and Hannan-Quinn Criteria, too, choose ARDL(1, 0, 0, 0, 0, 1, 0, 0) as the preferred model (Figure 6b and Figure 6c). Results of the short run ARDL version of the ECM for the tax revenue model associated with the ARDL(1, 0, 0, 0, 0, 1, 0, 0) are reported in Table 8. Table 9 reports associated diagnostic tests of the model, which are discussed in subsection 5.6. An ARDL-ECM has two important parts. First, estimated short-run coefficients and second, error correction term, $\Re_{-1}$, that provides the feedback or the speed of adjustment whereby short-run dynamics converge to the long-run equilibrium path in model.

Figure 6a. Top 20 Model: Akaike Information Criteria

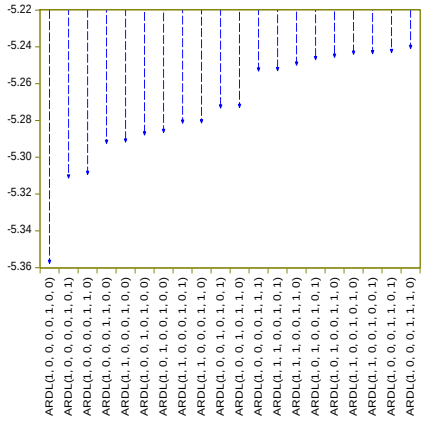
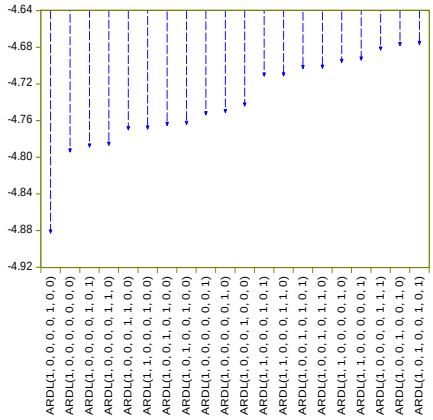


Figure 6b. Top 20 Model: Schwarz Criteria



Source: Authors' Computations

Figure 6c. Top 20 Model: Hannan-Quinn Criteria

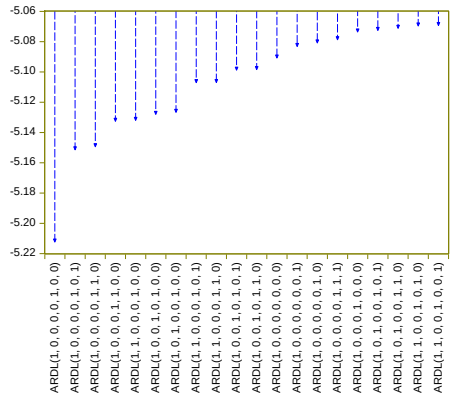


Table 8. Autoregressive Distributed Lag Error Correction Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
$\Delta \ln tax\_1$	-0.2875**	0.1294	-2.2222	0.0410
$\Delta \ln agr$	1.2102***	0.3454	3.5038	0.0029
$\Delta \ln ind$	0.7092***	0.2089	3.3956	0.0037
$\Delta \ln ser$	1.1961***	0.3645	3.2813	0.0047
$\Delta \ln g_1$	0.0236*	0.0116	2.0244	0.0600
$\Delta \ln g_2$	0.2086***	0.0329	6.3330	0.0000
$\Delta \ln g_2\_1$	0.1247***	0.0429	2.9100	0.0102
$\Delta \ln \Gamma$	4.9431***	0.9263	5.3361	0.0001
$\Delta \ln \Gamma^2$	-1.5098***	0.2811	-5.3705	0.0001
$\Re_{-1}$	-1.0015***	0.2891	-3.6367	0.0022
Constant	-0.0004	0.0028	-0.1482	0.8841

R-squared	0.9160	Mean dependent var	0.0010
Adjusted R-squared	0.8635	Akaike info criterion	0.0380
S.E. of regression	0.0140	Schwarz criterion	-5.4013
Sum squared resid	0.0032	Hannan-Quinn criter.	-4.8734
F-statistic	17.4544	Durbin-Watson stat	1.6471
Prob(F-statistic)	0.0000		

ARDL(1, 0, 0, 0, 0, 1, 0, 0): Dependent Variable: $\Delta \ln tax$

***Denotes a 1 percent level of significance
**Denotes a 5 percent level of significance
*Denotes a 10 percent level of significance

Table 9. Model Diagnostic Tests

Diagnostic test	Computed test statistic	p-value
Normality	$JB = 2.1401$	0.3430
Breusch-Godfrey Serial Correlation LM Test	$F = 2.3102$	$F(1,15) = 0.1493$
Breusch-Pagan-Godfrey test for heteroskedasticity	$F = 0.4991$	$F(10,16) = 0.8666$
Glejser test for heteroskedasticity	$F = 1.0099$	$F(10,16) = 0.4756$
ARCH LM test	$F = 0.0052$	$F(1,24) = 0.9430$
Ramsey RESET test	$F = 2.3265$	$F(1,24) = 0.2635$

Source: Authors' computations

Estimations show that the coefficients of all the regressors are statistically significant at either 1 percent of 5 per cent level. Only, the coefficient on the development expenditure that is statistically significant at 10 percent level. The coefficient of the error correction term, $\Re_{-1}$, which measures the speed of adjustment is as expected, significantly negative at 1 percent, suggesting that the series is not explosive and that equilibrium in the long run will be attained. The coefficient of −1.00 reveals that 100 percent of the disequilibrium in the tax revenue function for the current period will be corrected in the following year.

The ARDL-ECM results suggest that in the short run growth in agriculture sector, services sector, industrial sector, trade openness, as well as development and recurrent expenditure have positive and significant effects on tax revenues performance in Tanzania. On the contrary, trade openness squared, a proxy for unrestrictive trade practices, is negatively associated with tax revenue performance. Trade openness, services sector, as well as agricultural sector seem to have greater effects on tax revenue performance in the short-run. The coefficient on trade openness is 4.94, suggesting that a 1 percent growth in trade will lead to a 4.94 percent increase in the tax revenue ratio. However, free trade or unrestrictive trade practice is likely to halt tax revenue performance, as explained by a negative coefficient on trade openness squared. In the short run, agricultural sector and services sector have almost identical effects on tax revenue performance. Tax revenue ratio will increase by 1.2 percent if either agricultural sector or services sector increases by 1 percent. Industrial sector and recurrent expenditure, too, have a significant effect on tax revenue in the short run. A 1 percent growth in industrial sector will lead to a 0.71 percent increase in the tax revenue ratio. Likewise, the ratio of tax revenue will increase by 0.21 percent if recurrent revenue increases by 1 percent in the short run.

The lag of the current government expenditure (g_2_1) is positively related to tax revenue in the short run and with a coefficient of 0.13. This reveals that a 1 percent increase in last period's current expenditure will lead to a 0.3 percent increase in the current period tax revenue performance in the short run. The lagged tax revenue variable (tax_1) is also significant at 5 percent and suggests that the current tax revenue is directly influenced by the previous tax revenue value. Overall, these results suggest that efforts to improve tax revenue performance in the short run should focus on the growth effects of industry and services sectors, trade openness and both recurrent and development expenditures while unlocking the constraints in the agricultural sectors to increase productivity and income.

In general, the high adjust R-squared shows that the independent variables are highly correlated with the dependent variable.

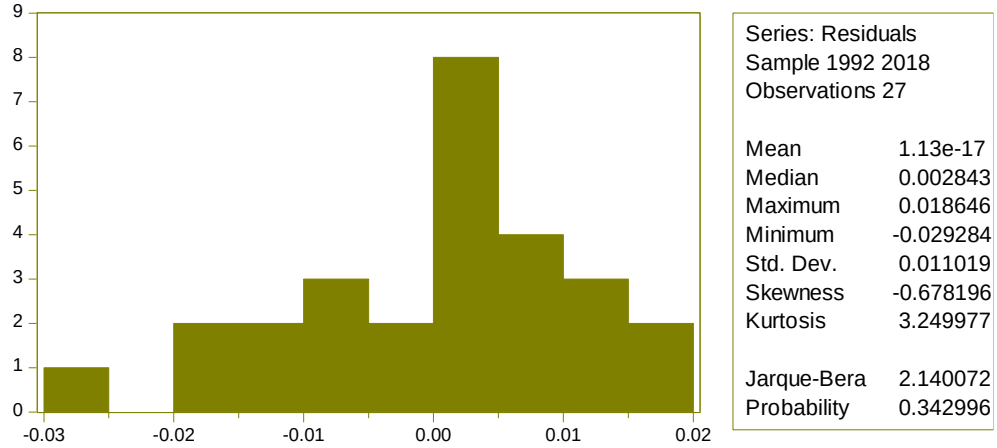
5.6. Diagnostic and Stability Tests on the Error Correction Model

The validity of the results is dependent on the fit and stability of the model. Table 9 summarises the results of the various residual diagnostic and stability tests on the ARDL-ECM model. The Table reports that the residuals are normally distributed in the model as evidenced by the non-rejection of the null hypothesis using the Jarque–Bera test (Also see Figure 7). The Ljung–Box Q statistic also reports that there is no auto correlation in the

model (Table 10). Breusch-Godfrey Lagrange Multplier test for serial correlation test also confirms that there is no serial correlation in the model. The model also appears to be free from heteroskedasticity as it passes all the heteroskedasticity tests including Breusch-Pagan-Godfrey test, Glejser test, and ARCH LM test.

Further, the Ramsey RESET test results suggest that the model is correctly specified as evidenced by a probability value of 26 percent, which is greater than the 5 percent level of significance. Therefore, we do not reject the null hypotheses that the model is correctly specified. The stability of the model is evidenced from Cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ), proposed by Brown *et al.* (1975), as indicated in Figure 8 and Figure 9 respectively. Since the residuals plot do not fall outside the 5 percent significant boundaries, we fail to reject the null hypothesis of perfect parameter stability, and hence conclude that the estimates are stable over the period. In addition, the coefficients of the model are estimated. The results of the estimated coefficients are reported in Figure 10. Despite a slight instability in some parameters, overall results suggest no statistically significant changes in parameters. Since our model exhibits all the desirable properties of OLS, we conclude that the model is reliable for economic analysis and forecasting.

Figure 7. Normality test, Skewness and Kurtosis of the Residuals



H0: Residuals are normally distributed

Ha: Residuals are not normally distributed

Dependent Variable: $\Delta \ln tax$

Notes: The Normality test indicates that residuals are normally distributed as we unable to reject the null hypothesis of normality using Jacque-Bera at 5 percent.

Source: Authors Estimates

Table 10. Autocorrelation and Partial Autocorrelation

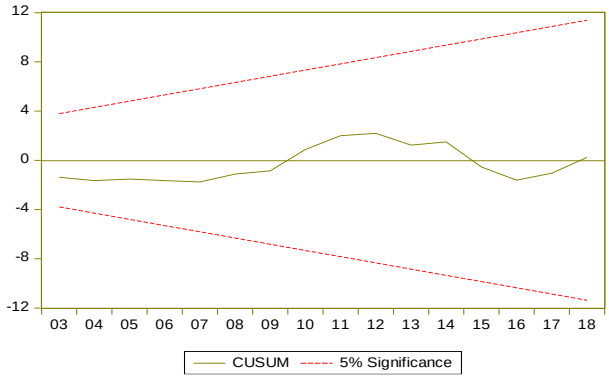
Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
. | . |	. | . |	1	0.019	0.019	0.0107	0.918
.**| . |	.**| . |	2	-0.252	-0.253	1.9433	0.378
. *| . |	. *| . |	3	-0.082	-0.076	2.1586	0.540
.**| . |	***| . |	4	-0.269	-0.355	4.5471	0.337
. |* . |	. | . |	5	0.086	0.049	4.8053	0.440
. | . |	.**| . |	6	0.007	-0.219	4.8073	0.569
. | . |	. |* . |	7	0.065	0.082	4.9706	0.664
. *| . |	.**| . |	8	-0.086	-0.320	5.2724	0.728
.**| . |	. *| . |	9	-0.206	-0.150	7.0896	0.628
. |**. |	. |* . |	10	0.318	0.173	11.680	0.307
. |* . |	. | . |	11	0.134	0.052	12.553	0.324
. *| . |	. *| . |	12	-0.108	-0.098	13.157	0.358
. | . |	. | . |	13	-0.009	-0.006	13.161	0.435
. | . |	. |* . |	14	-0.060	0.109	13.376	0.497
. *| . |	. *| . |	15	-0.071	-0.090	13.707	0.548
. | . |	. | . |	16	0.015	0.031	13.723	0.619
. | . |	. *| . |	17	0.004	-0.153	13.724	0.687
. | . |	. | . |	18	-0.046	-0.018	13.916	0.735
. | . |	. | . |	19	-0.028	-0.002	13.996	0.784
. | . |	. *| . |	20	-0.002	-0.140	13.996	0.831
. | . |	. *| . |	21	0.073	-0.104	14.767	0.834
. | . |	. | . |	22	0.018	-0.019	14.826	0.870
. | . |	. *| . |	23	-0.064	-0.106	15.834	0.862
. | . |	. | . |	24	0.043	-0.064	16.517	0.869

H_0: There is no serial correlation in the residuals;
Ha: There is serial correlation in the residuals

Note: No serial correlation in the model because none of the lag is found to be significant at 1 percent level.

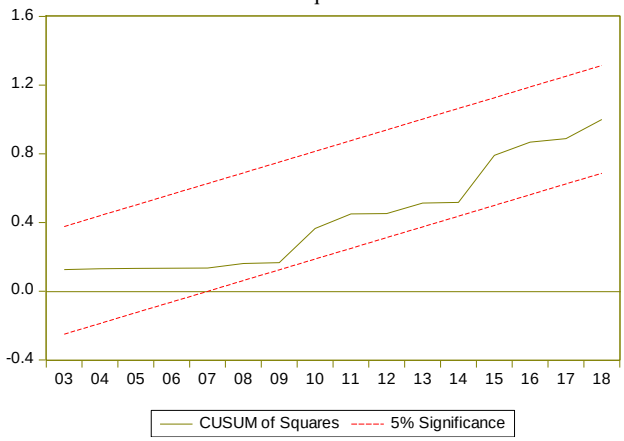
Source: Authors Computations

Figure 8. Stability Test:
Plot of Cumulative Sum of Recursive Residuals



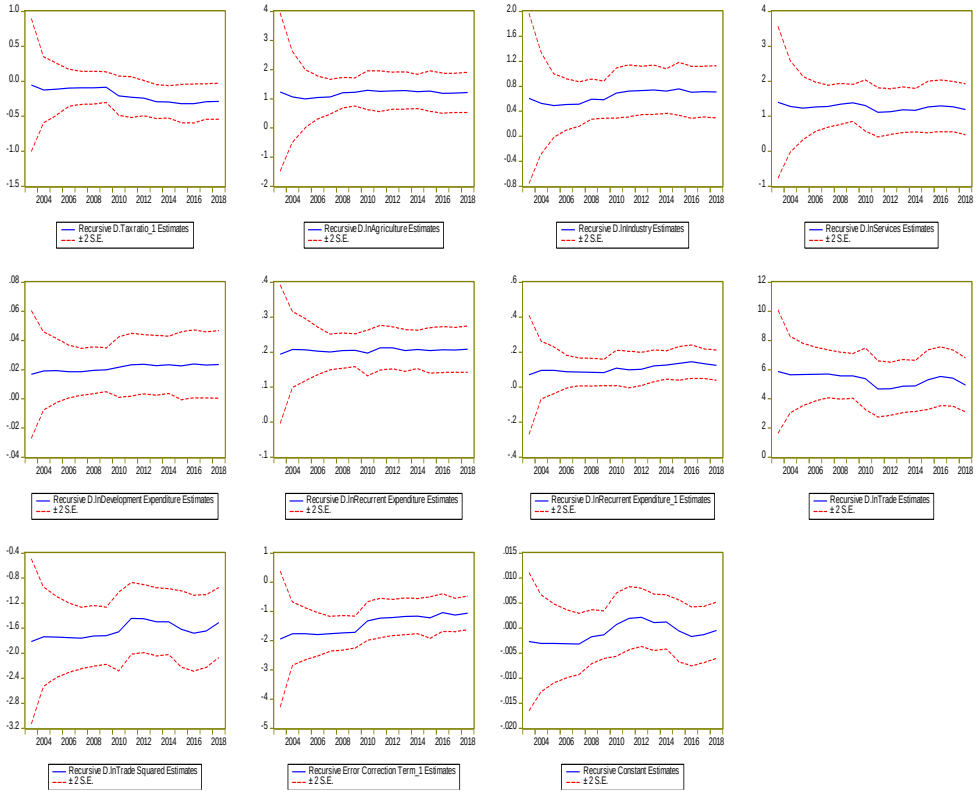
Source: Authors' Estimates

Figure 9. Stability Test:
Plot of Cumulative Sum of Squares of Recursive Residuals



Source: Authors' Estimates

Figure 10. Recursive Estimates of the Estimated Coefficients



Authors' estimates

6. Conclusions and Policy Implications

Tax revenue performance in Tanzania has improved in recent years, but the progress has been slow and in fact, it falls behind when compared to some other sub-Saharan countries, despite the fact that reliance on domestic revenue mobilization has been emerged as a key priority because of the significant decline in donor support. This paper examines the effect of growth of main sectors of the economy and public expenditure on tax revenue performance using the auto regressive distributed lag (ARDL) methods. The results from the analysis show that in both short run and long run, the ratio of tax revenue-to-GDP is influenced by industrial and services sectors, recurrent and development public expenditures, and trade openness. The agricultural sector exhibits a negative short run and long run relationship with growth of tax-to-GDP ratio. Moreover, the empirical results demonstrate the significant negative effects of further trade openness or liberalization on tax revenue performance.

The positive effects of all main sectors of the economy namely, agricultural, industrial and services sectors on the tax revenue performance is interesting. First, agriculture accounts for about two-thirds of total labour force but contributes less than one-third share in GDP. Moreover, agriculture is rated the hardest to tax of all hard to tax sectors mainly because of the small and spatial spread of the activity, absence of standard account keeping and the practice of payments not routed through bank. However, despite all these impediments, the tax revenue effect of agriculture is substantial in both short run and long run. The policy implication here is that an improvement of agricultural productivity, formalization and linking agricultural production to value added agro-processing in the industrial sector will widen tax base, leading to even more tax revenue performance. However, it should be noted that, although taxing agriculture is a central to development and efficiency improvement of the tax system, there is a need for within-sector retention of resources raised from the sector for infrastructure, productivity improvement, and economic efficiency, which in turn, might raise tax revenue performance. Second, the share of services sector in GDP is more than agriculture, and indeed is increasing despite the fact that the overall economy is still considered agrarian. Third, the country tend to transform from a largely agricultural economy to a more diversified, dynamic, and market-based economy. Further improvement of factor productivity in these sectors would broaden tax base, which in turn increases tax revenue collections albeit with increasing an efficient system of tax collection. The fact that the industrial sector is usually assumed to be easier to tax, Tanzania is capable of generating substantially more tax revenue.

The other potential variables that are involved in this paper are development and recurrent public expenditures. The positive effects of both recurrent and development expenditures could be reinforced through prudent use of funds. Similarly, international trade tends to be an important source of tax revenues in Tanzania. Trade facilitation and removing trade barriers are inclined to strengthen the international trade taxes, import VAT, corporate taxes, and total tax revenue. However, trade policies should be designed and implemented with care because the relationship between trade liberalisation and total tax revenue is ambiguous. Further trade liberalization is likely to reduce international trade taxes, and subsequently total tax revenue, because international trade taxes constitute large share of total tax revenue.

References

1. Agbeyegbe, T.D., Stotsky, J. & WoldeMariam, A., (2004), *Trade liberalization, exchange rate changes, and tax revenue in Sub-Saharan Africa*, IMF Working Paper, WP/04/178, International Monetary Fund. doi.org/10.5089/9781451858983.001.
2. Amani, Haidari et al., (2003), *Trade Policies and Agricultural Trade in the SADC Region: Challenges and Implications.* Preliminary Report for Tanzania. ESRF, Dar es Salaam.
3. Amani, K, Nyange, D.A., Kweka, J.P. & Leyaro, V., (2003), *Trade policies and agricultural trade in the SADC region: Challenges and implications*. Report for Food, Agriculture and Natural Resources Policy Network (January).
4. Aschauer, D. Alan, (1989), Is public expenditure productive? *Journal of Monetary Economics*, *23*(2), 177-200. doi.org/10.1016/0304-3932(89)90047-0.
5. Bahl, Roy & Wallace, Sally, (2005), Public Finance in developing and transition countries. *Public Budgeting and Finance*, 25(4), 83-98, doi.org/10.1111/j.1540-5850.2005.00005.x.
6. Bahl, Roy, (1971), A regression approach to tax effort and tax ratio analysis. *IMF Staff Papers, 18*(3), 570–612. doi.10.2307/3866315.
7. Bank of Tanzania, (2011), 50th anniversary of the Bank of Tanzania: Evolution of the role and functions of the Bank of Tanzania. *Director of Economic Research and Policy*, Bank of Tanzania.
8. Bank of Tanzania, (2019), Annual Report, 2018/19. Director of Economic Research and Policy, Bank of Tanzania.
9. Baunsgaard, T. & Keen, M., (2010), Tax revenue and (or?) trade liberalization. *Journal of Public Economics*, 94(9-10), 563 – 577. doi.org/10.1016/j.jpubeco.2009.11.007.
10. Besley, Timothy & Persson, Torsten, (2009), The origins of state capacity: Property rights, taxation, and politics. *American Economic Review*, 99 (4), 1218-44. doi.10.1257/aer.99.4.1218.
11. Bhushan, A., & Samy, Y., (2010), *Enhancing domestic resource mobilization for effective development: The role of donors*. North-South Institute, Ottawa, Canada.
12. Bilquees, F., (2004), Elasticity and buoyancy of the tax system in Pakistan. *Pakistan Development Review, 43*(1), 73-93.
13. Bird, Richard, Martinez-Vazquez, Jorge & Torgler, Benno, (2008), *Tax effort in developing countries and high income countries: The impact of corruption*, voice and accountability. Economic Analysis and Policy, 38(1 (1), 55-71. doi.org/10.1016/S0313-5926(08)50006-3.
14. Blackley, P.R., (1986), Causality between revenues and expenditures and the size of the Federal budget. *Public Finance Review*, *14*(2), 139-156. doi.org/10.1177/109114218601400202.
15. BMZ, (2003), *Evaluierung des Vorhabens, Beratung der tansanischen Steuerverwaltung*, Endbericht, Bonn: BMZ.
16. Boukbech, R., Bousselhami, A. & Ezzahid, E., (2019), Determinants of tax revenues: Evidence from a sample of lower middle-income countries. *Applied Economics and Finance, 6*(1) 11-20. doi.10.11114/aef.v6i1.3280.
17. Brafo-Insaidoo, W.G. & Obeng, C.K., (2008), *Effect of trade liberalisation on tariff revenue in Ghana*. AERC Research Paper 180, African Economic Research Consortium, Nairobi.

18. Brown, R.L, Durbin, J., & Evans, J.M., (1975), Techniques for testing the constancy of regression relations over time. *Journal of the Royal Statistical Society: Series B (Methodological)*, 37(2), 149-163. doi.org/10.1111/j.2517-6161.1975.tb01532.x
19. Cassou , P. Steven, (1997), The link between tax rates and foreign direct investment. *Applied Economics, 29*(10), 1295-1301. doi.org/10.1080/00036849700000019.
20. Castro, G. Ángeles & Camarillo, D.B. Ramírez, (2014), *Determinants of tax revenue in OECD countries over the period 2001–2011*. Contaduría y Administración, *59*(3), 35-59. doi.org/10.1016/S0186-1042(14)71265-3.
21. Chaudhry, I.S., & Munir, F., (2010), Determinants of low tax revenue in Pakistan. *Pakistan Journal of Social Sciences*, 30(2), 439-452.
22. Chelliah, R.J., Baas, H.J. and Kelly, M.R., (1975), *Tax ratios and tax effort in developing countries*. IMF Staff Papers, 2(1), 187-205.
23. Chelliah, Raja J., (1971), Trends in taxation in developing countries. *International Monetary Fund, Staff Papers,* 18(2), 254–331. doi.org/10.2307/3866272.
24. Clist, P. & Morrissey, O., (2011), Aid and tax revenue: Signs of a positive effect since the 1980s. *Journal of International Development*, 23(2), 165-180. doi.org/10.1002/jid.1656.
25. Coulibaly B.S. & Gandhi, D., (2018), Mobilization of tax revenues in Africa: State of play and policy options. *Brookings Policy Brief*, October.
26. Crivelli, E., Gupta, S., Muthoora, S., & Benedek, .D., (2012), *Foreign aid and revenue: Still a crowding out effect?*, International Monetary Fund, Working Paper WP/12/186. doi.org/10.5089/9781475505344.001.
27. Darrat, A.F., (1998), Tax and spend, or spend and tax? An inquiry into the Turkish budgetary process. *Southern Economic Journal*, 64(4), 940-956. doi.10.2307/1061212.
28. Dickey, D.A., (1976), *Estimation and hypothesis testing in nonstationary time series.* Ph.D. Thesis, Iowa State University.
29. Dickey, D.A. & Fuller, W.A., (1979), Distribution of the estimators for autoregressive time Series with a unit root. *Journal of the American Statistical Association*, 74(366), 427-431, doi.10.2307/2286348.
30. Dickey, D.A. & Fuller, W.A., (1981), Likelihood ratio statistics for autoregressive time series with a unit root. *Econometrica*, 49(4), 1057-1072. doi.10.2307/1912517.
31. Eltony, M. Nagy, (2002), *Measuring tax effort in Arab countries*. Working Paper 200229. Economic Research Forum, Cairo.
32. Engle, R.F. & Grange, C.W.J., (1987), Co-integration and error correction: Representation, estimation, and testing. *Econometrica*, 55(2), 251-276, doi.10.2307/1913236.
33. Epaphra, M, & John Massawe, J., (2017), Corruption, governance and tax revenues in Africa. *BEH -Business and Economic Horizons, 13*(4), 439-467. doi.org/10.15208/beh.2017.31.
34. Epaphra, M, (2014), The revenue implications of trade liberalization in Tanzania. *Journal of World Economic Research, 3*(3), 25-36. doi.10.11648/j.jwer.20140303.12.
35. Epaphra, M., (2017), The twin deficits hypothesis: An empirical analysis for Tanzania. *The Romanian Economic Journal, 20*(65), 2-34
36. Epaphra, M., (2017), Analysis of budget deficits and macroeconomic fundamentals: A VAR-VECM approach. *Journal of Economics and Management*, *30* (4), doi.10.22367/jem.2017.30.02.
37. Feltenstein, Andrew & Cyan, Musharraf R., (2013), A computational general equilibrium approach to sectoral analysis for tax potential: An application to Pakistan. *Journal of Asian Economics, 27,* 57-70, doi.org/10.1016/j.asieco.2013.05.004.

38. Friedman, M., (1978), The limitations of tax limitations. *Quadrant*, 22(8), 22-24.
39. Gerald, A. & Carroll, R., (1999), Effect of income taxes on household incomes. *The Review of Economics and Statistics*, 81(4), 681-693. jstor.org/stable/2646717.
40. Ghura, Dhaneshwar, (1998), *Tax revenue in sub-Saharan Africa: Effects of economic policies and corruption.* IMF Working Paper 98/135. Washington, DC: International Monetary Fund.
41. Granger, C.W.J., (1981), Some properties of time series data and their use in econometric model specification. *Journal of Econometrics, 16*(1), 121-130. doi.org/10.1016/0304-4076(81)90079-8.
42. Gupta, Abhijit Sen, (2007), *Determinants of tax revenue efforts in Developing Countries*. IMF Working Paper, No: WP/07/184 (July).
43. Gupta, S., Clements, B., Pivovarsky, A. & Tiongson, .R., (2003), *Foreign aid and revenue response: Does the composition of aid matter?*, IMF Working Paper, WP/03/176.
44. Hisali, Eria & Ddumba J. Ssentamu, (2013), Foreign aid and tax revenue in Uganda. *Economic Modeling*, 30, 356–365. doi.org/10.1016/j.econmod.2012.09.012.
45. IMF, (2013), *Tanzania Selected Issues and Statistical Appendix*, MF Country Report No.03/2, International Monetary Fund, Washington, D.C.
46. IMF, (2016), *United Republic of Tanzania Selected Issues*, MF Country Report No.16/254, International Monetary Fund, Washington, D.C.
47. Immurana, M., Rahman, A.M.A., & Iddrisu, A-A., (2013), The impact of trade liberalisation on tax revenue in Ghana: A co-integration analysis. *Africa Development and Resources Research Institute (ADRRI) Journal*, 3(3), 1-19.
48. Jenkins, G.P & Lahouel, H.M, (1981), *Inflation and Taxation. Conference on Aspects of Fiscal Policy*, Legistration and Administration, Caracas, Venezuela.
49. Johansen, S., (1988), Statistical analysis of cointegration vectors. *Journal of Economic Dynamics and Control*, 12(2–3), 231–254. doi.org/10.1016/0165-1889(88)90041-3.
50. Johansen, Søren & Juselius, Katarina, (1990), Maximum likelihood estimation and inference on cointegration–with applications to the demand for money. *Oxford Bulletin of Economics and Statistics, 52(*2), 169–210. doi.org/10.1111/j.1468-0084.1990.mp52002003.x.
51. Karagöz, K., (2013), Determinants of tax revenue: Does sectorial composition matter? *Journal of Finance, Accounting and Management*, 4(2), 50-63.
52. Khattry, B., & Rao, M.J., (2002), Fiscal Faux Pas?: An analysis of the revenue implications of trade liberalization. *World Development*, 30(8), 1431–1444. doi.org/10.1016/S0305-750X(02)00043-8.
53. Keen, M., & Simone, A., (2004), Tax policy in developing countries: Some lessons from the 1990s, and some challenges ahead, in Sanjeev Gupta, Benedict Clements, & Gabriela Inchauste (eds.): *Helping countries develop: the role of the fiscal policy* (Washington: International Monetary Fund).
54. Kim, Sohee & Kim, Taekyoon, (2018), Tax Reform, Tax Compliance and State-building in Tanzania and Uganda. *Africa Development*, 43(2), 35-64. jstor.org/stable/26640998.
55. Kiminyei, F.K., (2018), The nexus between tax revenue and government expenditure in Kenya. *International Journal of Economics and Management Science*, 7(5), 1-6. doi.10.4172/2162-6359.1000546.

56. Kremers, J.J.M., Ericsson, N.R. & Dolado, J.J., (1992), The power of cointegration tests. *Oxford Bulletin of Economics, 54(*3), 325-348. doi.org/10.1111/j.1468-0084.1992.tb00005.x.
57. Kwiatkowski, D., Phillips, P. C. B., Schmidt, P., & Shin, Y., (1992), Testing the null hypothesis of stationarity against the alternative of a unit root: How sure are we that economic time series have a unit root? *Journal of Econometrics, 54*(1-3), 159-178 doi.org/10.1016/0304-4076(92)90104-Y.
58. Leuthold, Jane H., (1991), Tax shares in developing countries: A panel study. *Journal of Development Economics, 35*(1), 173–185. doi.org/10.1016/0304-3878(91)90072-4.
59. Lien, N. Phuong & Thanh, H. Sen, (2017), Tax revenue, expenditure, and economic growth: An analysis of long-run relationships. *Journal of Economic Development, 24*(3), 04-26.
60. Lotz, R. Joergen & Morss, R. Elliott, (1970), A theory of tax level determinants for developing countries. *Economic Development and Cultural Change*, 18(3), 328-341. jstor.org/stable/1152062.
61. Mahdavi, S., (2008), The level and composition o f tax revenue in developing countries: Evidence from unbalanced panel data. *International Review of Economics & Finance*, 17(4), 607-617 doi.org/10.1016/j.iref.2008.01.001.
62. Martín-Mayoral, F. & Uribe, C.A., (2010), Determinantes económicos e institucionales del esfuerzo fiscal en Amèrica Latina. *Investigación Económica*, LXIX (273), 85-113.
63. Matlasedi, T. Nchokoe, (2017), The influence of the real effective exchange rate and relative prices on South Africa's import demand function: An ARDL approach. *Cogent Economics & Finance*, *5*(1), 1419778. doi.org/10.1080/23322039.2017.1419778.
64. Mawejje, Joseph & Munyambonera, Ezra Francis, (2016), Tax revenue effects of sectoral growth and public expenditure in Uganda. *South Africa Journal of Economics*, 84(4), 538-554. doi.org/10.1111/saje.12127.
65. Mbatia, Carolyne & Ellyne, Mark, (2017), *Effect of foreign aid dependency on taxation revenue in sub-Saharan Africa.* Conference of the Economic Society of South Africa 30 August – 1 September 2017, Rhodes University, Grahamstown.
66. Muibi, S., & Sinbo, O., (2013), Macroeconomic determinants of tax revenue in Nigeria (1970–2011). *World Applied Sciences Journal*, 28(1), 27–35. doi.10.5829/idosi.wasj.2013.28.01.1189.
67. Narayan, Paresh Kumar & Smyth, Russell, (2005), Trade liberalisation and economic growth in Fiji: An empirical assessment using the ARDL approach, *Journal of Asian pacific economy, 10*(1), 96-115, doi.10.1080/1354786042000309099.
68. NBS, (2019), *Tax Statistics Report 2017/18: Tanzania Mainland*. National Bureau of Statistics, the United Republic of Tanzania.
69. Nkoro, E. & Uko, A.K., (2016), Autoregressive distributed lag (ARDL) cointegration technique: Application and interpretation. *Journal of Statistical and Econometric Methods*, 5(4), 63-91.
70. Nord, R., Sobolev, Y., Dunn, D., Hajdenberg, A., Hobdari, N., Maziad, S. and Roudet, S., (2009), Tanzania: the story of African transition, International Monetary Fund, Washington D.C.
71. Osoro, N.E., (1993), Revenue productivity implications of tax reform in Tanzania, *African Economic Research Consortium* (AERC) Paper 20.

72. Ouattara, B., (2006), Aid, debt and fiscal policies in Senegal. *Journal of International Development, 18*(8): 1005–1122. doi.org/10.1002/jid.1282.
73. Pesaran, M.H., Shin, Y., & Smith, R.J., (2001), Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics, 16*(3), 289–326. doi.org/10.1002/jae.616.
74. Pesaran, M., & Shin, Y., (1999), An autoregressive distributed-lag modelling approach to cointegration analysis. In S. Strøm (Ed.), *Econometrics and economic theory in the 20th century: The Ragnar Frisch Centennial Symposium* (Econometric Society Monographs, 371-413). Cambridge: Cambridge University Press. Doi.10.1017/CCOL521633230.011.
75. Pessino, C., & Fenochietto, R., (2010), *Determining countries' tax effort*. Hacienda Pública Española/Revista de Economía Pública, 195(4), 65-87.
76. Phillips, P.C.B. & Perron, P., (1988), Testing for a unit root in time series regression. *Biometrika, 75(2),* 335-346. doi.10.2307/2336182.
77. Piancastelli, Marcelo, (2001), *Measuring the tax effort of developed and developing countries: Cross country panel data analysis*, 1985/95. IPEA Working Paper No. 818.
78. Pomeyie, Paragon, (2001), *Macroeconomics: an introductory* textbook. Accra, Wade Laurel Corel Co.
79. Profeta, P. & Scabrosetti, S., (2010), *The political economy o f taxation: Lessons for developing countries.* Edward Elgar Publishing Limited.
80. Pupongsak, S., (2009), *The effect of trade liberalisation on taxation and government revenue*. PhD. Dissertation, Department of Economics, the University of Birmingham.
81. Ruturagara, Nelson J., (2013), *Government spending and economic growth in Tanzania 1970-2010*. MSc in Economics Dissertation, Open University of Tanzania.
82. Sennoga, E. Batte & Matovu, M. John, (2013), Public spending composition in Uganda and its implications for growth and poverty reduction. *Public Finance Review,* 41(2), 227-247. doi.org/10.1177/1091142112448412.
83. Stotsky J.G. & WoldeMariam A., (1997), *Tax effort in sub-Saharan Africa*. IMF Working Paper, 97/107.
84. Tait A.A., Gratz W.L.M. & Eichengreen, B.J., (1979), *International comparisons of taxation for selected developing countries*, 1972-76. IMF Staff Paper, *26*(1), 123-156. doi.10.2307/3866567.
85. Tanzi, V., (1981), A statistical evaluation of taxation in sub-Saharan Africa, in *Taxation in sub-Saharan Africa,* Washington: International Monetary Fund, 45-50.
86. Tanzi, V., (1987), Quantitative characteristics of the tax systems of developing countries, in: D.M.G. Newbery and N.H. Stern, eds., *The theory of taxation for developing countries*. New York: Oxford University Press and World Bank.
87. Terefe, K.D. & Teera, J., (2018), Determinants of tax revenue in East African countries: An application of multivariate panel data cointegration analysis. *Journal of Economics and International Finance*, 10(11), 134-155, doi.10.5897/JEIF2018.0924.
88. Victor, T., (1996), Adjusting taxes for inflation, in *Tax law design and drafting*. International Monetary Fund.
89. Weiss, S.J., (1969), Factors affecting the Government revenue share in Less Developed Countries. *Social and Economic Studies*, 18(4), 348-364. jstor.org/stable/27856402.