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Mécanismes de contrôle par la proximité et performance: Cas Spécifique des PME camerounaises financées par capital investissement

By Nselapi Nocheh Dieudonné & Mba Fokwa Arsène

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Abstract- SMEs financed by Private equity have this particularity of strong involvement and active partnership of the capital-investor in the different development phases. The purpose aims to measure the effect of the specific control mechanisms as identified in the Cameroonian context on the performance of the financed enterprise. Surveys of SMEs financed, it appears from the multiple regression that the specific disciplinary control mechanisms such as the visits of the agents within the companies, the duration of stay and the activism of the capital-investor to the board of directors have a positive influence on the performance of the financed SME.

Keywords: *private equity, control by proximity, performance, cameroonian SME.*

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Mécanismes de contrôle par la proximité et performance: Cas Spécifique des PME camerounaises financées par capital-investissement

Nselapi Nocheh Dieudonné ^α & Mba Fokwa Arsène ^σ

Résumé- Les PME financées par Capital-investissement présentent cette particularité d'une implication forte et d'un partenariat actif du capital-investisseur dans les différentes phases de développement. L'objectif de cette communication est de mesurer l'effet des mécanismes de contrôle spécifique tels que identifiés dans le contexte camerounais sur la performance de l'entreprise financée. Des enquêtes auprès des PME financées, il ressort à partir de la régression multiple que les mécanismes de contrôle disciplinaire spécifiques tels que les visites des agents au sein des entreprises, la durée de séjour et l'activisme du capital-investisseur au conseil d'administration ont une influence positive sur la performance de la PME financée.

Mots clés: capital-investissement, contrôle par la proximité, performance, PME camerounaise.

Abstract- SMEs financed by Private equity have this particularity of strong involvement and active partnership of the capital-investor in the different development phases. The purpose aims to measure the effect of the specific control mechanisms as identified in the Cameroonian context on the performance of the financed enterprise. Surveys of SMEs financed, it appears from the multiple regression that the specific disciplinary control mechanisms such as the visits of the agents within the companies, the duration of stay and the activism of the capital-investor to the board of directors have a positive influence on the performance of the financed SME.

Keywords: private equity, control by proximity, performance, cameroonian SME.

I. INTRODUCTION

Le développement des économies africaines dépend de la prolifération et de la pérennité de leurs PME qui constituent l'essentiel du potentiel d'emplois. Malheureusement, le financement des actifs longs constitue l'un des obstacles liés à leur éclosion et poussent certaines PME à la cessation de paiement et d'autres à la faillite. Aux difficultés d'accès au financement, s'ajoutent le manque des garanties et des compétences managériales requises limitées pour mieux piloter ces entreprises (RGE, INS, 2017). Le capital-investissement (désormais CI) apte à répondre à ce type de besoin apparaît comme une alternative à ce manque. Il apporte des fonds propres et quasi-fonds

propres aux PME et leurs permet de bénéficier de leurs expériences en matière gestion. Selon Glachant (2008), le CI est l'ensemble des instruments financiers et procédures visant à augmenter les fonds propres des PME non coté à fort potentiel de croissance. Ce mode de financement est intéressant et adapté aux PME qui trouvent le recours au financement traditionnel moins facile et plus coûteux (Belletante et al. 2001; Julien, 1997).

Le CI est un mode de financement adapté aux PME en phase de démarrage en vue d'assurer leur croissance, leur développement et organiser leur transmission. Contrairement aux autres établissements financiers, les CI peuvent offrir un financement en fonds propres, débloquer en faveur des PME des montants importants sans demande de garanties, apportant ainsi des solutions concrètes au manque des moyens financiers. Ces professionnels de l'industrie du capital-investissement ont contribué cette dernière décennie au soutien de nombreuses entreprises en Afrique en général et au Cameroun en particulier (AVCA¹, 2019). La littérature montre l'apport de cette technique financière à la performance des PME financées. A partir des méthodes d'évaluation, des techniques de contrôle adaptées et une implication active dans la PME, le Capital-Investisseur, en qualité d'actionnaire offre une solution adaptée aux besoins de ces entreprises. Il s'établit entre le Capital-Investisseur et le dirigeant/propriétaire de la PME une relation relativement étroite dont l'investisseur a un droit de regard et de contrôle sur les décisions et les actions du dirigeant. Cette relation spécifique est marquée par l'asymétrie d'information élevée et des comportements opportunistes liés à l'absence des garanties (Diamond, 1984). Dans le cas spécifique du Cameroun, les capital-investisseurs participent et s'impliquent dans la gestion de la PME financée. Les aspects tels la fréquence de contacts, les missions au sein de l'entreprise financée qualifiés de «contrôle par la proximité» sont mis en évidence.

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¹ AVCA: Africa Venture Capital Association

Cette recherche vise à montrer si les mécanismes de contrôle de proximité développés par le capital-investisseur favorisent nécessairement la performance de l'entreprise financée. Il s'articule autour d'une revue de la littérature sur le lien CI/dirigeant et performance, de la méthodologie, de la présentation et l'analyse des résultats.

II. RELATION DE PARTENARIAT CI/DIRIGEANT ET PERFORMANCE : UN ÉTAT DE L'ART

La contribution du CI à la performance de la PME a été mise en évidence dans plusieurs travaux en finance organisationnelle. Toutefois la question du rôle du Capital-investisseur dans le processus de création de valeur est partiellement traitée. Elle renvoie à la problématique plus générale de la place que tient l'actionnaire dans ce processus de création et de répartition de la valeur. Elle est traitée au travers des différentes approches de la gouvernance d'entreprise (Charreaux, 2000). Il distingue deux modèles théoriques de création et de répartition de la valeur qui sous-tendent les principales théories de la gouvernance à savoir les théories normatives de la gouvernance qui s'intéressent sur la manière dont la valeur est répartie. Le second modèle relevé par Charreaux (1998) repose sur une conception plus positive de la relation actionnaire-dirigeant.

a) *Influence des mécanismes de contrôles exercés par le capital-investisseur sur la performance*

Les travaux de Sahlman et Gordman, (1989) dans l'article «*What does Venture Capitalist do ?*» sont les premiers à analyser l'influence du CI sur la création de valeur. Ils sont complétés par ceux de Sapienza, Gupta, 1994; Sapienza, Manigart, Verneir, 1996. Selon ces chercheurs, l'apport majeur des CI est d'ordre financier et leur présence constitue un signal pour lever des fonds supplémentaires auprès des autres prêteurs potentiels. Ils contribuent à l'amélioration de la performance financière (Stéphany, 1998). Aussi, la performance de l'entreprise s'explique par le rôle de conseil de l'investisseur dans le domaine financier (Murray, 1995).

Selon l'étude réalisée par Murray (1995), des entrepreneurs interrogés jugent les CI plus compétents que les autres membres du conseil d'administration. Par contre, d'après Sapienza, Gupta, 1994, les entrepreneurs interrogés considèrent que la valeur apportée par les CI est plus importante lorsque ceux-ci ont une expérience opérationnelle que lorsqu'ils ne disposent que d'une expertise financière. Certains auteurs considèrent que l'apport principal des CI se trouve dans leur implication dans l'élaboration de la stratégie d'entreprise. Cette implication peut être à l'origine de la performance des firmes financées

(Sapienza, Allen, Manigart, 1994; Sapienza, Manigart, Verneir, 1996). Les travaux de Stéphany (1998) montrent que l'appel à des entreprises de conseils fait partie des modifications organisationnelles apportées par l'arrivée du CI dans les entreprises de l'échantillon. Ces changements induisent les compétences nouvelles qui agissent positivement sur la performance.

Tréhan (2004) montre sur un échantillon d'entreprises familiales et personnelles de moyenne dimension que les CI encouragent la mise en place d'une stratégie de croissance externe et accroît ainsi le taux de survie. Desbrières et al., (2005) démontre que les investisseurs en fonds ont également une influence sur la politique d'investissement. Les entreprises ayant ouvert leur capital à un investisseur en fonds trouve le volume d'investissement accru et le nombre de personnel revu à la hausse.

Stévénot (2005) propose que le système de gouvernance des entreprises financées par CI a non seulement une vocation disciplinaire (l'intervention sur la répartition de la valeur créée), mais aussi productive et contribue à la création de la valeur. Pour améliorer la performance des entreprises financées, l'auteur relève que l'apport en fonds propres et les effets de levier mécaniques de montages financiers constituent une valeur ajoutée pour les entreprises bénéficiaires. Les résultats concernant les aspects et l'importance de l'intervention des CI ne font pas l'unanimité. Ceci s'explique par l'importance de nombreux facteurs de contingence tels que le stade de développement de l'entreprise, le profil de l'entrepreneur, l'expérience CI, le type du CI, le niveau de risque et le degré d'innovation du projet.

Au cours de cette dernière décennie, le lien CI et la performance est évoqué par certains auteurs. Mougénot (2003) insiste sur les leviers sur lesquels les CI se basent pour créer la valeur. Dans une étude commanditée par l'AFIC et réalisée par le cabinet Ly brand Corporate France en 2004 et actualisée en 2008, la performance des entreprises financées par CI est contrastée. Pour Barroso R., (2011), « un investisseur professionnel en fonds propres limiterait les coûts d'agence et améliorerait la performance de l'entreprise en s'impliquant de nouveaux acteurs dans la gouvernance de l'entreprise financée (présence au conseil d'administration, nomination directe des dirigeants) en fonction du degré de pouvoir exécutif négocié en contrepartie de l'apport en capitaux. En dépit des considérations et précautions dans l'interprétation, on reconnaît un effet positif entre la présence de CI et la bonne performance de l'entreprise ». Selon Pommet et al. (2013), les PME innovantes financées par CI dans quatre pays européens ont réalisées des performances contrastées. Ils arrivent à la conclusion que les stratégies de spécialisation et de syndication déployés par les CI n'ont pas d'effet positif sur la performance (taux de survie) de ces entreprises.

Pougué Y-A., Bernasconi M. (2013) pensent les investisseurs en fonds installés en Afrique subsaharienne au regard de la forte asymétrie informationnelle et du risque de défaillance s'impliquent de bout en bout dans la sélection du projet et l'accompagnement de la PME financée. Cette relation de proximité réduit le risque de sélection adverse et d'aléas moral et en conséquence les coûts d'agence.

Si les capital-investisseurs en occident utilisent des mécanismes classiques de gouvernance (conseil d'administration, marché financier, marché des biens, etc) pour réduire les risques et contribuent à l'amélioration de la performance. Ceux qui sont installés en Afrique centrale développent d'autres techniques de contrôle pour se rapprocher des entreprises et contribuer à la réduction de risque et à la valorisation des entreprises financées. L'analyse de ces mécanismes spécifiques qualifiés de «contrôle par la proximité» et leur impact sur la performance s'avère indispensable pour comprendre la dynamique de la relation capital-investisseur et PME dans le contexte camerounais.

b) Hypothèses de la recherche

Les mécanismes de contrôle effectués par les capital-investisseurs installés au Cameroun se font à travers des descentes organisées et les missions inopinées au sein des entreprises financées. Ils s'apparentent à des mécanismes de gouvernance. S'interroger sur leurs manifestations et leur impact sur la performance des entreprises financées devient pertinent.

c) Les missions de descentes comme source de réduction de risque

Sapienza et Timmons (1989) démontrent que plus le risque d'agence associé à une entreprise est élevé, plus le suivi et le contrôle des actions des dirigeants ainsi que la relation entre la SCI et l'entreprise seront intensifs. Les options d'implication varient d'une entreprise à une autre, en fonction des difficultés rencontrées et du montant investi dans la société et du stade de financement. A cet égard, on note que les missions varient de quelques jours à plus un mois. Durant cette période, le CI peut faire des déplacements sur place si les deux sont dans la même ville, ou est complètement détaché au sein de l'entreprise. Cette mission permet de faire un diagnostic général de la situation, déceler les anomalies (éventuels risques) et proposer de commun accord avec le dirigeant les actions correctrices. Ceci pourrait réduire les risques inducteurs de coûts et par conséquent influencer positivement sur la performance de l'entreprise. On en déduit l'hypothèse suivante;

H1 La durée de missions effectuées par des Sociétés de Capital-Investisseurs au sein de la PME financée influence positivement la performance de l'entreprise.

d) La fréquence des rencontres comme vecteur de réduction de risque

Certains auteurs se sont intéressés à la fréquence des contacts entre Capital-investisseur et Dirigeant. Sapienza et Gupta (1994) ont montré que la fréquence des contacts entre CI et dirigeant est régulière quand le risque d'agence et d'affaires se révèlent accrus. Sapienza et al., (1996) trouvent que l'interaction entre dirigeants et CI est réduite quand les deux partenaires ont connu des difficultés précédemment. Selon Stéphanie E. (2001), le risque d'affaires est très élevé dans le financement par Capital-risque car la majorité des projets financés sont en phase de lancement d'où il est nécessaire de renforcer les contacts. Desbrières (2001) confirme cette assertion en insistant sur le fait que les entreprises qui sollicitent le CI n'ont aucune contrainte de publications des informations. Bonnet C., (2004) propose que les contacts fréquents renforcent des liens de confiance entre le CI et le dirigeant et orientent les visions dans le même sens. Mawamba (2011) pense dans le cas de l'Afrique centrale, les entreprises sont caractérisées par une forte opacité, la rareté des informations sur les PME, tant bien qu'elles existent, elles sont manipulées. Cette idée est confirmée par Wamba H. (2013) pour qui, lors du financement, le recours au capital social permet de mieux connaître le demandeur et réduire le risque. La meilleure stratégie de gestion de ce risque est l'intensification des contacts. Face à l'ampleur de la difficulté et de l'objectif fixé par le CI pour redresser l'entreprise financée, la fréquence des contacts peut être régulière, routinière et planifiée. Un tel mécanisme contribue à la réduction du risque d'asymétrie et peut impacter sur la performance. Fort de ce constat, on peut énoncer l'hypothèse secondaire suivante:

H2 La performance de la PME financée est positivement liée à la fréquence des contacts effectués par le capital-investisseur

e) La nature des contacts et réduction de risque d'asymétrie

Le contrôle de la PME par l'investisseur peut s'effectuer à partir des contacts directs. Ils se présentent sous plusieurs formes à savoir: La mise au point sur l'activité à travers des contacts téléphoniques lors que le besoin ou la nécessité est moins important, le face à face pour la confirmation visuelle des reporting, les notes écrites (Il s'agit de notes d'observation ou de rappel à l'ordre suite à la descente sur le terrain) et les échanges réguliers de mail pour suivre l'évolution de l'activité. Chaque forme joue un rôle primordial dans la relation et contribue à la réduction du risque. Durant la phase empirique, il ressort des chargés d'affaires ce qu'il suit: «Il est toujours nécessaire de faire des descentes sur le terrain car le téléphone est un outil de mensonge et on peut produire n'importe quoi dans le rapport. Lors de la

descente, on peut observer l'insalubrité sur un site et exiger le respect des clauses environnementales». On peut croire que ces contacts permettent de s'accorder sur les éventuelles anomalies, procéder à la vérification, rappel à l'ordre le dirigeant et par ricochet orienter la firme financée vers les objectifs assignés (Sapienza et Gupta, 1994; Torrès O., 2000). Partant de ces observations, nous pouvons formuler l'hypothèse secondaire suivante:

H3 La performance de l'entreprise financée est liée à la nature des contacts déployés par le capital-investisseur

f) Le capital-investisseur, véritable moniteur de l'entreprise financée

Dans le cas des opérations liées au financement par CI, nous nous sommes inspirés sur la littérature antérieure et sur l'enquête exploratoire préalablement réalisée auprès des CI et de quelques chefs d'entreprises. Le rapport RGE/INS (2011, 2017) montre que plus de 90% des entreprises sont les PME familiales. Ce caractère familial des entreprises financées par les CI au Cameroun constitue le premier facteur explicatif de l'intensité d'un contrôle par la proximité. Le CI essaye de mettre de l'ordre dans la gestion financière de la PME et rend la structure de l'entreprise plus formelle. Cette situation est génératrice de conflits entre le dirigeant et le CI. Bien que les «*dues diligences*» soient mises en œuvre afin de confronter les éléments du curriculum vitae des dirigeants et en dépit du fait que les nombreux entretiens réalisés entre ces derniers et les CI permettent d'apprécier leur personnalité, les risques d'agence peuvent subsister. Et ils sont d'autant plus importants quand le dirigeant possède une faible expérience dans la création d'entreprise. Au Cameroun, le manque de compétences (techniques, commerciales...), conjugués aux mentalités des entrepreneurs conduit les CI à multiplier les contacts et à s'impliquer davantage dans les décisions importantes (Mawamba, 2012). L'incertitude et le risque augmentent considérablement pour les entreprises en phase de démarrage que pour celles en développement (Sapienza et Gupta, 1994). Les risques s'en trouvent accrus par le caractère incertain de la technologie, des méthodes de production, de la chaîne de distribution, de la jeunesse de l'équipe dirigeante et de l'horizon de sortie (Manigart et Sapienza, 1996). Le CI devrait donc être davantage impliqué lorsque l'investissement a été effectué au sein d'une entreprise en phase de démarrage. Il contribue à la création de valeur en assistant le dirigeant dans l'organisation de l'entreprise et l'élaboration des stratégies (Stéphany, 2001; Stévenot, 2005). Toutes ces mesures visent à suivre l'entreprise financée afin de s'assurer que le dirigeant œuvre conformément aux objectifs fixés et accroît la performance.

H4 La performance de la firme financée est liée positivement à la surveillance permanente exercée par le Capital-investisseur

g) L'activisme très marqué du capital-investisseur au Conseil d'Administration

Le conseil d'administration a fait l'objet de nombreuses recherches et constitue l'un des mécanismes de gouvernance le plus efficace pour le contrôle des firmes managériales. La littérature montre que dans les entreprises financées par CI, ce mécanisme concourt à réduire le risque des conflits d'agence et permet aux CI d'exercer un «*monitoring*» sur des décisions prises par le dirigeant de la firme. Il présente une composition particulière dans le sens où les CI y sont fortement représentés. En effet, la présence des CI dans le capital réduit la part détenue par le dirigeant et de ce fait peut l'inciter à agir dans l'intérêt de ces investisseurs (Landström, 1992). Grâce à leur implication dans le conseil d'administration, les CI parviennent à contrôler de manière efficace les décisions du dirigeant. La participation des investisseurs au conseil semble être liée au taux de participation dans le capital et dont l'objectif est de surveiller le dirigeant. Les études portant sur le Conseil d'Administration ont montré que son efficacité dépend de sa composition, de sa taille, la structure de propriété et l'allocation des droits de vote. Sahlman (1989) et Nathusius (2002) soulignent l'importance du conseil d'administration dans le contrôle du dirigeant. Ils trouvent que les CI sont fortement représentés dans cet organe de surveillance. Des études plus approfondies comme celle de Lerner (1995) réalisée à partir d'un échantillon de 271 sociétés de biotechnologies observées entre 1978 et 1989, montrent que la représentation des CI au conseil d'administration des sociétés accroît significativement la performance au cours des périodes dans lesquelles le besoin de contrôle est le plus important, notamment lors du remplacement du management d'une société. On peut au regard de ces constats émettre cette hypothèse:

H5: Le comportement actif des Capital-investisseurs au conseil d'administration influence positivement la performance de l'entreprise financée.

III. DESCRIPTION DE LA DÉMARCHÉ MÉTHODOLOGIQUE

Elle s'articule autour de la technique de collecte des données ainsi que le modèle statistique de la recherche.

a) Démarche suivie et échantillonnage

L'étude de la relation CI/Dirigeant et performance porte sur les PME installées au Cameroun. Ces PME sont identifiées à partir des entretiens menés auprès des investisseurs en fonds. Les données de

l'étude ont été collectées à base de l'administration en face en face d'un questionnaire auprès de la direction de l'entreprise financée et complétée par les données secondaires. L'enquête s'est effectuée entre Août et septembre 2018 et la période concernée par l'étude s'étale entre 2015 et 2017 en prenant en compte les rapports d'activité et les bilans certifiés des entreprises financées. Sur 100 questionnaires envoyés dans les PME (dont 50 ont au moins un investisseur en fonds dans son actionariat), 68 sont retournés exploitables soit un taux de réponse de 68 %. Notre échantillon est constitué de deux groupes à savoir les PME financées par CI et les PME du même secteur que le premier groupe ayant recours aux autres modes de financement. Le test de la différence de moyenne (t de *Student*) entre les deux sous échantillons nous a permis d'apprécier la contribution du CI à la performance. Le dépouillement des données issues des Bilans donne une valeur de $t = -2,160$ ($\text{sig} = 0,033$). Le test est

significatif au seuil de 5% avec un signe négatif. On conclut qu'il existe une différence de performance entre les PME financée par CI et les PME non financées par CI. La meilleure performance des premières n'est pas due à l'effet secteur. Par la suite, la régression s'est faite uniquement sur l'échantillon constitué des PME financées par CI.

b) *Description des variables et modèle empirique*

1- Les variables de l'étude

Les variables retenues pour cette recherche sont les variables expliquées (la performance) et les variables explicatives (mécanismes de contrôle exercés par le CI). Pour le CI, le seul intérêt réside dans la rentabilité des capitaux mis à la disposition de l'entreprise. Le Return of Equity ou rentabilité financière ($RF = RN / CP$) semble intéressant pour mesurer la performance.

Tableau 1: Description des variables

Variables	Intitulé	Interprétation
Expliquée	PERF = ROE	Le <i>Return of Equity</i> ou rentabilité financière ($RF = RN / CP$)
Variable contrôle de proximité	PER_VIST CAD_VIST NAT_CONT SURV_CI CA_IMP	Période des contrôles effectués par le CI en termes de durée de mission. Traduit la forme d'intervention effectuée durant la descente Traduit la forme de rencontres entre le CI et l'entreprise financée Traduit par le suivi permanent des outils de contrôle mis en place par le CI. Mesure l'implication du Capital-investisseur au Conseil d'Administration

Source: Auteur

2- Modèle mathématique

La formulation mathématique du modèle de base se présente ainsi qu'il suit:

a: le terme de la constante

L'équation du modèle peut s'écrire sous la forme:

$$PERF = a_0 + b_1(PER_CONT) + b_2(CAD_CONT) + b_3(NAT_CONT) + b_4(SUR_PER) + b_5(CA_IMP) + e_i$$

Cette équation permet de vérifier empiriquement les facteurs susceptibles d'influencer la variable de performance via le système de gouvernance disciplinaire. Au terme de l'analyse des tests statistiques découlant de la régression multiple à partir du logiciel SPSS version Windows 16, nous aboutirons aux résultats et implications.

IV. RÉSULTATS ET DISCUSSIONS

Nous partons du constat que la relation CI et dirigeant induit des conflits d'agence. Ceci est possible

bi: Paramètres liés aux variables explicatives ou indépendantes

ei: terme de l'erreur ou résidus.

au regard de l'ampleur du niveau des conflits entre les deux parties et l'existence de l'asymétrie d'informations. Nous procédons au test des effets de chaque mécanisme de contrôle (variable) susceptible d'influencer la performance de l'entreprise financée à travers la régression linéaire multiple. Nous avons d'abord considéré les problèmes éventuels de multicollinéarité entre les variables indépendantes. Les tableaux de résultat du modèle se présentent comme suit:

Tableau 2: Résultat du modèle

Modèle	R	R2	F	DDL	Sig var. F	DW
1	0,569	0,232	4,622	3	0,009 (*)	1,709

Source: Enquête 2018

(*) Seuil de signification au seuil de 5%

On constate que les données sont moyennement ajustées au modèle (avec un R= 0,569). Le modèle au regard de la valeur de Fisher (F=4,622, sig =0,009) est globalement significatif. Il suggère que 4,622% de la variation de la variable dépendante est expliquée par les variables indépendantes.

Tableau 3: Coefficients(a) du modèle

Modèle Variables indépendantes	Coef stand	T	Significativité	Statut de colinéarité	
				Tolérance	VIF
Constante	2,673	4,145	0,000 *	/	/
VAR IND (X1= visite des agents)	0,431	2,867	0,008*	0,709	1,41
VAR IND (X2= la durée du séjour)	0,239	1,666	0,100**	0,771	1,297
VAR IND (X3 = participation au conseil d'administration)	-0,318	-1,823	0,079**	0,678	1,476

Source: enquête 2018

(a): variable dépendante : votre société distribue-t-elle régulièrement les dividendes ?

(*) Significativité au seuil de 5% ; (**) Significativité au seuil de 10 %

Il se dégage du tableau et en fonction des valeurs de la statistique de Student que trois variables associées à l'axe disciplinaire sont significatifs (seuil de 5% et seuil de 10%). Au regard des valeurs de la Tolérance et le VIF de chaque variable indépendante, il existe une forte colinéarité entre elles. Il apparaît que l'intensité du contrôle exercé par les capital-investisseurs à travers le système de gouvernance est une fonction positive du niveau de conflits d'intérêt potentiels et d'asymétrie informationnelle entre les investisseurs en capital et les entrepreneurs. La performance des entreprises financée est liée aux missions de descente au sein de l'entreprise financée, à la durée de séjour au sein de l'entreprise et à l'activisme du CI au conseil d'administration.

Ces résultats montrent que le mécanisme de contrôle classique (le conseil d'administration) et les mécanismes spécifiques dits « contrôle par la proximité » tels que les missions effectuées, la durée de séjour au sein de l'entreprise financée réduisent les coûts d'agence entre le capital-investisseur et la PME et impactent positivement la performance de l'entreprise. Ce contrôle dit de proximité permet de réorienter les actions du dirigeant vers l'intérêt des actionnaires (Capital-investisseurs). Ces résultats corroborent avec ceux de Sapienza et Gupta (1994), Sapienza et al (1996), N'dri (2010), Mawamba (2011).

Durant les missions et les rencontres, le CI essaie de mettre de l'ordre dans la gestion financière du Dirigeant, contribue à la formalisation du système de gestion. Selon Vilgrain (2011): « lors des dues diligences, le Capital-investisseur «deshabille» la société, la questionne, effectue les visites sur les sites industriels avec le dirigeant. Cette phase constitue une période de remise en cause de la stratégie et de l'organisation de la société, en d'autres termes l'entrée dans la modernité et la résistance au changement ».

De plus, la prise de participation dans le capital de la PME entraîne des conflits entre le CI et le Dirigeant. L'investisseur a intérêt à s'impliquer dans la gouvernance de l'entreprise en multipliant des contacts, des missions de descente sur le terrain. Le processus de surveillance déclenche par une étape de type financier dont l'objectif est de comparer le budget aux réalisations, en cas d'écart, le chargé d'affaires cherchera les causes, comprendre les raisons et mener les actions correctives. Les instruments utilisés sont les outils d'analyse financière combinée à l'analyse de l'information sur le marché ou sur le secteur concerné. Ces résultats vont dans le même sens que ceux de Nomo et al (2011) qui montrent à partir des PME financées par capital-risque au Canada que les CI surveillent l'entreprise de façon permanente. Les écarts sont recherchés à partir des informations externes et internes à l'entreprise. La surveillance est renforcée lorsque les écarts de report sont importants et les réalisations s'éloignent des objectifs.

S'agissant du conseil d'administration, les missions sont multiples, il est destiné d'une part à nommer, surveiller, récompenser les dirigeants et éventuellement les révoquer. D'autre part, il ratifie, contrôle les décisions importantes prises par l'équipe dirigeante. Baker et Gompers(2001) montrent que le capital-risqueur est très actif au conseil d'administration et l'efficacité des décisions prises dépend de son expérience. Dans les PME ou la gestion est peu formalisée et repose sur le propriétaire dirigeant, l'implication des administrateurs est renforcée car les conflits d'intérêts sont caractérisés. Cette divergence peut expliquer le signe du coefficient et une autre recherche peut analyser les effets de la taille dans le cadre d'un financement par CI sur la performance. S'agissant de la fréquence des contacts et la surveillance, les tests montrent qu'elles n'ont aucune

influence sur la performance. Ceci est démontré par les travaux de Stéphanie (1998), Pommet S. (2013) pour qui le contrôle intensif de l'investisseur engendre plutôt des coûts supplémentaires qui réduisent la performance de l'entreprise.

V. CONCLUSION

L'étude de la relation CI et dirigeant de la PME financée montre l'existence des conflits. En effet, le montant investi par le CI, les capacités managériales limitées du dirigeant/promoteur, le caractère familial et la performance passée de l'entreprise qui recourt à un financement par CI sont autant de facteurs qui expliquent l'implication du CI lors de la prise de participation dans le capital. Cette étude vise à montrer si les mécanismes de contrôle de proximité développés par le capital-investisseur favorisent nécessairement la performance de l'entreprise financée.

A partir de l'enquête menées auprès des PME financées au Cameroun, il ressort à travers des tests de régression multiple que la performance de l'entreprise est liée à l'activisme de l'investisseur au conseil d'administration et aux mécanismes de contrôle spécifique (contrôle par la proximité) tels que les missions effectuées au sein de l'entreprise financée et le temps passé durant le séjour. Dans les PME ou la gestion est peu formalisée et repose sur le propriétaire dirigeant, l'implication des administrateurs est renforcée car les conflits d'intérêts sont caractérisés. Par contre, les missions de rencontre permettent à l'investisseur de dissuader les comportements opportunistes et réduire le risque de défaut. Toutefois, les tests montrent que la fréquence régulière de rencontre et la surveillance permanente de la PME par l'investisseur n'ont aucun effet.

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Tax Revenue and Nigerian Economy: Examining the Position of Taxation in the Fourth Republic Economy (1999-2018)

By Aliyu, Ahmed Alhaji & Moshood Abdulrasheed Abiola

Abstract- Taxation being the primary source of revenues to government is an important economic tool in attaining economic growth and sustainability. Thus, this research examines the position of taxation in Nigeria fourth republic economy. The study adopted a descriptive and historical research design; secondary data for nineteen years (1999 - 2018) were collected from various issues of the Central Bank of Nigeria (CBN) statistical bulletin and annual reports. Tax revenue as an independent variable was measured with Direct taxes and indirect taxes and Nigerian economy measured using Real Gross Domestic Product. The data was analyzed using multiple regression analysis to establish the relationship between the dependent and independent variables. Durbin Watson test carried out and multicollinearity test using the VIF factor. From the study, we examined that, tax revenues are significant to economic growth in Nigeria. The study concluded that, direct taxes have positive relationship with economic growth and indirect taxes have negative relationship with Nigerian economy.

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TAXREVENUEANDNIGERIANECONOMYEXAMININGTHEPOSITIONOFTAXATIONINTHEFOURTHREPUBLICANECONOMY19992018

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Aliyu, Ahmed Alhaji ^α & Moshood Abdurashede Abiola ^ο

Abstract- Taxation being the primary source of revenues to government is an important economic tool in attaining economic growth and sustainability. Thus, this research examines the position of taxation in Nigeria fourth republic economy. The study adopted a descriptive and historical research design; secondary data for nineteen years (1999 - 2018) were collected from various issues of the Central Bank of Nigeria (CBN) statistical bulletin and annual reports. Tax revenue as an independent variable was measured with Direct taxes and indirect taxes and Nigerian economy measured using Real Gross Domestic Product. The data was analyzed using multiple regression analysis to establish the relationship between the dependent and independent variables. Durbin Watson test carried out and multicollinearity test using the VIF factor. From the study, we examined that, tax revenues are significant to economic growth in Nigeria. The study concluded that, direct taxes have positive relationship with economic growth and indirect taxes have negative relationship with Nigerian economy. It therefore, recommended that, the Nigeria government should embrace and improves collection of Direct taxes revenue to boost economic growth in the country. Appropriate economic infrastructures should be put in place to enhance employment opportunities which in turn, boost tax revenue generation. Moreover, the issues of tax evasion and tax avoidance should be adequately administered for improve tax collection performance.

I. INTRODUCTION

Tax revenue is undoubtedly the most recognized primary source of government revenue in the world. The Nigerian government have been working immensely in diversification of economy, because, revenue accrued from crude oil is topping the revenue accrued chart since its discovery in the 1970s. Therefore, tax is a major player in every society of the world (Azubike, 2009). Taxation is an important fiscal policy instrument at the disposal of governments to mobilize revenue and promote economic growth and development. The tax system is an avenue for government to use in collecting additional revenue needed in discharging its pressing obligations. A tax system is one of the most effective means of mobilizing a nation's internal resources and it lends itself to creating an enabling environment to promote economic growth. Towing this line of argument, Nzotta (2007), also argued that taxes constitute key sources of revenue to

the federation account shared by the federal, state and local governments. Hence, a tax policy represents key resource allocator between the public and private sectors in a country.

The role of government to provide for public (utilities) goods like roads, communication, power, education and health and so on, continue to rise over the years, due to progressive increases in the population of the people in Nigeria in the fourth republic. This has put the Nigerian government on its feet to deliver well and sound growth and development of the economy, by achieving various macroeconomic objectives: favorable inflationary rate, high employment, sustainable economic growth, price stability, long viability of the balance of payments and external equilibrium. To achieve these, the government requires funds to carry out these duties and responsibilities, and the funds can be generated from tax revenue from the citizens and organizations either on the base on residence or income sources. Effective tax revenue mobilization reduces an economy's dependence on external flows which is highly volatile. Taxation also allow governments' greater flexibility in designing and controlling their development agenda; conditions states to improve their domestic economic policy environment, thus creating a favorable environment for the much-needed foreign direct investments; and strengthen the bonds of accountability between governments and the citizens. The 2008/2009 global financial and economic crisis provided useful lessons for countries on the need to direct more attention to domestic resources mobilization efforts, including through increasing tax revenues. In recent time, the minister of finance Ahmed Zainab (2019) said "the problem of the Nigerian economy is not the increasing rise in the public expenditure procurement and public debts profile, but ability to generate sufficient revenues from different channels of the economy". Thus, government use tax proceeds to render their traditional functions, such as the provision of public goods, maintenance of law and order, defence against external aggression, regulation of trade and business to ensure social and economic maintenance.

However, the use of tax as a source of revenue generation in financing development activities in Nigeria has been a difficult issue. It is evidence that the role of

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taxation in promoting economic growth and development in Nigeria is far fetch, primarily because of its poor administration. The major challenges facing tax administration in Nigeria include frontiers of professionalism, poor accountability, lack of awareness of the public on the imperatives and benefits of taxation, corruption of tax officials, tax avoidance and evasion by taxing units, connivance of taxing officials with taxing population, high rate of tax, poor method of tax collection, and so on. Tax administration and individual agencies suffer from limitations in labour, money, tools and machinery to meet the ever-increasing challenges and difficulties. In fact, the negative attitude of most tax collectors toward taxpayers can be link to poor remuneration and motivation. There is also the problem of accuracy of tax statistics. Apart from some few states such as Delta, Lagos, Kaduna and Katsina and the Nigerian Customs Services, where tax are known to be well kept, other agencies of the states and relevant federal tax offices have serious failures in data management. On tax compliance, Statistically, Nigeria has 6% tax to GDP, which considered one of the lowest tax compliance rates in the world; Ghana has 15% and South Africa tax compliance rate stood at 24%. Nigeria's tax compliance is 6% suggesting that there is huge tax evasion and tax avoidance. Over 200,000 companies registered in Nigeria and never paid any tax, which creates setbacks to what is been generated from tax. Several other effects of taxation can also be identified. First, taxes can inhibit investment rate through high tax rates such as corporate and personal income, capital gain taxes. Second, taxes can slow down growth in labour supply by disposing labour leisure choice in favour of leisure. Third, tax policy can affect productivity growth through its discouraging effect on research and development expenditures. Fourth, taxes can lead to a flow of resources to other sectors that may have lower productivity. Finally, high taxes on labour supply can distort the efficient use of human capital high tax burdens even though they have high social productivity.

In Nigeria, however, tax revenue accrued is a major concern, which has lead to many studies on impact of tax revenue on economic growth in Nigeria. Odusola (2004) in his study asserted that, the tax system is lopsided and dominated by oil revenue which accounted for at least 70% of the revenue; this indicates that traditional tax revenue has never assumed a strong role in the country's management of fiscal policy. In the same vein, (Festus & Samuel 2007) observed that, Revenue generated through tax has not meet the expectation of government. Government has equally expressed this disappointment and is working towards expanding the non oil tax revenue. Despite the lofty position of crude oil revenue accrued in the economy, it is practically impossible to achieved development along the economic growth in Nigeria if much revenue is not generated from other channels of revenue generation,

most especially tax revenue. Thus, no economy, anywhere in the world can deliver sustainable long-term growth, without volatility if tax revenue is at 6% of GDP, (Kemi Adeosun 2017). Therefore, many questions posit themselves, has tax revenue generated triggered economic growth in Nigeria? How much have been accrued from tax revenue in the fourth republic to finance teeming government expenditures? Has tax revenue accrued positively or negatively impacted on the Nigerian economy? All this constitute part of the objective of the study.

Specifically, in the light of the forgoing, this study is directed toward examining the position of taxation in Nigerian fourth republic economy (1999-2018).

II. LITERATURE REVIEW

a) *Concept of Taxation*

Taxation is the process of imposition of compulsory levies on individuals or entities by government. Taxes are levied in almost every country of the world, primarily to raise revenue for government expenditures. Taxation refers to the practice of government collecting money from its citizens to pay for public services. According to Anyanwu (1997), a tax is a compulsory levy imposed by the government on individuals, companies, goods and services to raise revenue for its operations and to promote social equity through the redistribution of income effect of taxation. In line with this frame of thought, taxation is a source of government revenue by which individuals and corporate bodies are mandatorily required to pay certain proportion of their earnings to the government for the course of development. In addition, Bhatia (2003) defined tax as a compulsory levy payable by an economic unit to the government without any corresponding entitlement to receive a definite and direct benefit from the government. Note, the word direct here does not mean a price paid by the tax payer for any definite service rendered or a commodity supplied by the government. Rather it means that the benefits received by tax payers from the government are not related to or based upon the tax paid by the tax payers. This in effect implies that tax is a generalized exaction, which may be levied on one or more criteria upon individuals, groups, or the legal entities. Abomaye-Nimenibo (2017) is of the view that, tax is a compulsory contributions made by animate and inanimate beings to government being a higher authority either directly or indirectly to fund its various activities and any refusal is meted with appropriate punishment. Gyani (1990), went on to say that tax is a compulsory contribution imposed by the government on citizens in accordance with legislative provisions and paid by them through agents to defray the cost of administration. Taxation in summary is the transfer of income or resources from the private sector to the public sector in order to enable the

public sector to carry out some, if not all of the Nation's economic and social goals. The goals may be in the form of provision of Government basic services regularly and particularly in the educational, public health, transportation sectors, amenities and capital formation. Taxes may be levied upon wealth or income or in the form of surcharge on prices.

There are two types of taxes, and they are direct and indirect taxes which differs only in terms of the taxpayers' awareness or in awareness of the incidence of a particular tax. The burden of the tax is distributed among the taxpayer who bears the tax payment knowingly or unknowingly. The tax burden is incidentally collected from the tax payers proportionally, progressively and/or regressively and they differ from one another on the bases of the relationship between tax base and tax rate.

b) *Direct Tax*

This is a tax that is levied directly on a person or company and such a person or company is expected to pay the tax, as the taxpayer has been advised by notification, called assessment notice. Any tax authority personnel so empowered to collect tax and who did not comply with the above is a quack and an impostor. The taxpayer must be notified of the incidence of such tax (Abomaye-Nimenibo, 2017). Therefore, Direct tax is a tax levied directly on the income and property of individuals and Companies which includes the following: Personal income tax, Company income tax, Petroleum Profit tax, Capital gains tax etc.

c) *Indirect Tax*

These are taxes levied on persons or groups who are not intended to bear the burden or incidence but who will shift them to other people. They are normally levied on commodities or services which incidence does not fall directly on the producer or first payer but on the final payers and consumers. They include; Custom duty, excise duty, Stamp duties and Value added tax.

The Nigerian economy has undergone series of changes over time with different policy regimes up to 1990; the economy witnessed some gains which were associated with increased deregulation and liberalization in economic management. However, the scenario changed in 1999, with the return of democratic governance in the country. Democratic governments have introduced series of reforms that were aimed at redressing the distortions in the economy and to restore economic growth following the period of economic decline. In 2004, the government's economic agenda was formally launched and tagged the National Economic Empowerment and Development Strategy (NEEDS). Within the context of the Central Bank of Nigeria (CBN), a medium-term policy framework adopted since 2002 was to free monetary policy

implementation from the problem of time inconsistency and minimize over-reaction to temporary shocks.

However, periodic amendments are constantly made to the policy guidelines in the light of developments in the financial markets and performance of the economy. Thus, in 2005, some new reforms were introduced as "amendments and addendum" to the 2004/2005 monetary policy circular. Even though, emphasis on techniques and instruments to achieve these objectives continually changed over the years, the authority has continued to sanitize and restructure the financial sector. Thus, in 2004 the banking sector consolidation was initiated aimed at recapitalizing the banks and ensuring a sustainable and stable financial system that would support the real sector of the economy.

d) *Theories of Taxation*

i. *Benefit Theory*

According to this theory, the state should levy taxes on individuals according to the benefit conferred on them. The more benefits a person derives from the activities of the state, the more he should pay to the government. This principle has been subjected to severe criticism on the following grounds: Firstly, If the state maintains a certain connection between the benefits conferred and the benefits derived. It will be against the basic principle of the tax. A tax, as we know, is compulsory contribution made to the public authorities to meet the expenses of the government and the provisions of general benefit. There is no direct quid pro quo in the case of a tax. Secondly, most of the expenditure incurred by the slate is for the general benefit of its citizens, it is not possible to estimate the benefit enjoyed by a particular individual every year. Thirdly, if we apply this principle in practice, then the poor will have to pay the heaviest taxes, because they benefit more from the services of the state. If we get more from the poor by way of taxes, it is against the principle of justice?

ii. *The Cost of Service Theory*

Some economists were of the opinion that if the state charges actual cost of the service rend from the people, it will satisfy the idea of equity or justice in taxation. The cost of service principle can no doubt be applied to some extent in those cases where the services are rendered out of prices and are a bit easy to determine, e.g., postal, railway services, supply of electricity, etc. But most of the expenditure incurred by the state cannot be fixed for each individual because it cannot be exactly determined. For instance, how can we measure the cost of service of the police, armed forces, judiciary, etc., to different individuals? Dalton has also rejected this theory on the ground that there is no quid pro qua in a tax.

iii. *Ability to Pay Theory*

The most popular and commonly accepted principle of equity or justice in taxation is that citizens of a country should pay taxes to the government in accordance with their ability to pay. It appears very reasonable and just that taxes should be levied on the basis of the taxable capacity of an individual. For instance, if the taxable capacity of a person A is greater than the person B, the former should be asked to pay more taxes than the latter. It seems that if the taxes are levied on this principle as stated above, then justice can be achieved. But our difficulties do not end here. The fact is that when we put this theory in practice, our difficulties actually begin. The trouble arises with the definition of ability to pay. The economists are not unanimous as to what should be the exact measure of a person's ability or faculty to pay. The main viewpoints advanced in this connection are as follows:

- A. **Ownership of Property:** Some economists are of the opinion that ownership of the property is a very good basis of measuring one's ability to pay. This idea is out rightly rejected on the ground that if a person earns a large income but does not spend on buying any property, he will then escape taxation. On the other hand, another person earning income buys property, he will be subjected to taxation. Is this not absurd and unjustifiable that a person, earning large income is exempted from taxes and another person with small income is taxed?
- B. **Tax on the Basis of Expenditure:** It is also asserted by some economists that the ability or faculty to pay tax should be judged by the expenditure which a person incurs. The greater the expenditure, the higher should be the tax and vice versa. The viewpoint is unsound and unfair in every respect. A person having a large family to support has to spend more than a person having a small family. If we make expenditure as the test of one's ability to pay, the former person who is already burdened with many dependents will have to pay more taxes than the later who has a small family. So this is unjustifiable.
- C. **Income as the Basics:** Most of the economists are of the opinion that income should be the basis of measuring a man's ability to pay. It appears very just and fair that if the income of a person is greater than that of another, the former should be asked to pay more towards the support of the government than the latter. That is why in the modern tax system of the countries of the world, income has been accepted as the best test for measuring the ability of a person to pay tax.

e) *Empirical Literature*

Several empirical studies have been conducted on the impact of taxes on economic growth. Ogbonna and Appah (2012) investigating the impact of tax

reforms and economic growth of Nigeria using time series data from 1994 to 2009 (a period of 11 years) utilizing Petroleum profit tax, Companies income tax, Value added tax, Education tax, Personal income tax and Customs and Excise duties as proxy for tax reforms (independent variables) and Gross domestic product (GDP) as the dependent variable, claimed that there is a positive relationship between tax revenue and economic growth of Nigeria. They argued that 54% variation in the dependent variable (GDP) is as a result of change in tax revenue and that there exists long run equilibrium relationship between GDP and the independent variables. They used the Augmented Dickey Fuller test for the unit root test and the Johansen's Co-integration test and Error correction technique to run the regression analysis. However, there study did not consider capital gains tax, which is also part of direct taxes in Nigeria.

In another related study, Worlu and Nkoro (2012) on tax revenue and economic development in Nigeria 1980 to 2007, utilizing least square regression method of analysis, claimed that tax revenue stimulates economic growth through infrastructural development but that tax revenue has no independent effect on growth through infrastructural development and foreign direct investment. Thus, this study did not examine the impact of direct and indirect taxes on economic growth. Since, tax revenue are accrued from both direct and indirect sources, it is important to highlight which of the two have impacted more on the economy, and to recommend appropriate measures on improving either direct or indirect tax revenues.

Anichebe, (2013) conduct a study on the impact of tax on economic growth in Nigeria for periods 1986 to 2010. He found out that a significant relationship exist between tax composition and economic growth. Umoru and Anyiwe, (2013) examine the effect of tax structure on economic growth in Nigeria. They employed co integration and error correction methods of empirical estimation with an empirical strategy of disaggregation. They found out that direct taxation is significantly and positive correlated with economic growth while indirect taxation has insignificant negative impact on economic growth.

Emmanuel (2013) examined the effects of VAT on economic growth and total tax revenue in Nigeria using data ranging from 1994 to 2010. He formulated two hypotheses that VAT does not have significant effects on GDP and also on total tax revenue. He found out that VAT has significant effect on GDP and also on total tax revenue. This indicates that increase in value added tax would to increase in tax revenue and economic growth (GDP). However, this study is deficient in the sense that, it only covers VAT effect on economic growth without including other examples of indirect taxes as well as direct taxes. Also, the period under review is not one of defining moments in the Nigerian

economy which makes the study not a qualitative academic research.

Akhor et'al (2016) in their study, impact of indirect tax on economic growth in Nigeria 1993 to 2013, using regression analysis technique and Error correction model among others, they concluded that, VAT and custom and excise duties has no positive significant to economic growth of Nigeria. Thus, this study is deficient because, it did not cover direct taxes revenue; therefore, it cannot be used to conclude on impact of taxation in the economy.

Uzoka and Chiedu (2017), in their study on effect of tax revenue on economic growth in Nigeria, the study used Augmented Dickey Fuller test to check for the presence of a unit root i. e the stationary of the variables and to what degree. Johansen co - integration test was used to check for long run relationship that exists among the variables in the model. In the short-run, deviations from the long-run relationship established could occur due to shocks to any of the variables. The Error Correction Model (ECM) was therefore used to test the speed of adjustment from short run to long-run equilibrium and correct or eliminate the discrepancy that occurs in the short-run. That is to test if the past of the explanatory variables contains information that can be used to predict the future of the dependent variable. They concluded that, CGT and EDT with one year lag have no statistical significant effect on economic growth of Nigeria. PPT, CIT, VAT and CED with one year lag has statistical significant effect on the economic growth of Nigeria.

III. METHODOLOGY

The study adopted a descriptive research design. A descriptive approach in data collection is able to collect accurate data on and provide a clear picture of the phenomenon under study. In addition, the principal method common to this kind of research is empirical method. This method entails the use of quantitative, statistical or regression techniques in evaluating the research issues or problems. The time series data is used, and will be source from Nigerian Bureau of Statistics (NBS), Central Bank of Nigeria ((CBN) statistical bulletin and website, and World Bank publications. The macroeconomics variables use for this research is Tax Revenues which include Direct Taxes (DIT) and Indirect Taxes (IDT), and Nigerian Economy proxy by Real Gross Domestic Product (RGDP). The population of the study is Nigerian fourth republic; however, the population size used by the researcher was periods from 2000 to 2018. Year 2019 was not included because, this study was conducted in the fourth quarter of 2019, and full year data for the year was not available.

a) Model specification

The multiple econometric regression models for this study were specified as:

- Model: $RGDP = F(DIT + IDT)$
- Regression Equation: $RGDP = \beta_0 + \beta_1(DIT) + \beta_2(IDT) + \varepsilon$

Where:

RGDP= Real Gross Domestic Product

DIT= Direct Taxes

IDT= Indirect Taxes

B_0 = constant

B_{1-2} = co-efficient of independent variable

ε = Error Terms

Multiple regression analysis is an extension of simple regression analysis, because in multiple regression analysis, more than one independent variable is use to determine the dependent variable. Variables that are being determined predicted or explained by mathematical equation referred to as dependent variables, while the variable used in determining or predicting is called the independent variable. Therefore, multiple econometric regression models is one that seek to explain variation in the values of the dependent variable on the basis of changes in the independent variables (Akhor et al 2015).

b) Method of Analysis

The study used Durbin Watson test: Durbin-Watson statistic is a test statistic used to detect the presence of autocorrelation at lag 1 in the residuals (prediction errors) from a regression analysis. The Durbin Watson (DW) statistic is a test for autocorrelation in the residuals from a statistical regression analysis. The Durbin-Watson statistic will always have a value between 0 and 4. A value range of 2.0 means that, there is no autocorrelation detected in data. Values from 0 to less than 2 indicate positive autocorrelation and values from 2 to 4 indicate negative autocorrelation. Multicollinearity test will be conducted to establish if there is correlation between the independent variables in the model. Multicollinearity refers to when your predictor variables are highly correlated with each other. This is an issue, as regression model will not be able to accurately associate variance in outcome variable with the correct predictor variable, leading to muddled results and incorrect inferences. Thus, the test is required to examine variables in a multiple regression model whether it can be linearly predicted from the others with a substantial degree of accuracy.

IV. DATA ANALYSIS AND PRESENTATION OF RESULTS

Table 1.1: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Direct Tax	19	273	3316	1749.84	1079.587
Indirect Tax	19	43	2288	963.31	663.381
RealGDP	19	-1	15	6.33	3.687
Valid N (list wise)	19				

Source: SPSS Software Output 2020

From the table, we can observe that the dependent variable Real Gross Domestic Product has a mean of 6.33 and varies from -1 to 15, means that on average, Nigeria economy witnesses growth, because the mean of Real Gross Domestic Product is positive over the years of the research, suggesting that, the economic activities in the country for period under review translated into economic growth. Direct taxes has

a mean of 1749.84 and varied from 273 to 3,316 indicating that, Nigeria accrued more direct taxes over the years. Suggesting that, the higher the direct taxes collection, it impacted on the economy positively. The variable indirect taxes has a mean 963.31 and varied from 43 to 2288, indicating that, Nigeria raised slightly high indirect taxes from the economy during the period in study.

Table 1.2: Model Summary^b Table

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.667 ^a	.445	.375	2.915	1.178

a. Predictors: (Constant), IndirectTax, DirectTax

b. Dependent Variable: RealGDP

Source: SPSS Software Output 2020

a) Model Regression Summary

The coefficient of determination (R –Squared) measures the variability that is accounted for in the statistical model. It can be concluded that there is a relationship between the dependent variable (Economic Growth) and independent variables (Tax Revenues) when these components are considered together which explain 44.5% of changes in Real Gross domestic product. While the remaining 55.5% are due to other factors not identified in this research but impacts positively on the Real Gross domestic product.

Suggesting that, the combination of the independent variables above, are responsible for 44.5% of the Economic Growth in Nigeria. Thus, if these variables are well placed in the economic, they will contribute to economic growth by 44.5%, and if not well articulated, they will causes reduction in economic growth by 44.5%.

In addition, Durbin Watson analysis result which shows 1.178, it implies that, there is autocorrelation and positive relationship between the independent variables, thus, makes the independent variables used in study not sufficiently predicting the dependent variable.

Table 1.3: ANOVA^a Table

Model	Sum of Squares	df	Mean Square	F	Sig.
1					
Regression	108.799	2	54.400	6.40	.009 ^b
Residual	135.922	16	8.495	4	
Total	244.721	18			

a. Dependent Variable: Real GDP

b. Predictors: (Constant), Indirect Tax, Direct Tax

Source: SPSS Software Output 2020

From the above table, showing how predictable are the independent variables in predicting the dependent variable. The exact significance level is less than 0.05, in this case assumed to be .009, the model with variables Direct Taxes and Indirect Taxes significantly predicted (Real Gross Domestic Product).

Table 1.4: Coefficients^a Multicollinearity and Coefficient Relationship Table

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	St d. Error	Beta			Tolerance	VIF
(Constant)	9.989	1.299		7.690	.000		
1 DirectTax	.002	.001	.081	-.186		.182	5.491
IndirectTax	-.003	.002	.592	-1.357	.194	.182	5.491

a. Dependent Variable: RealGDP

Source: SPSS Software Output 2020

The researcher conducted a multiple regression analysis to determine the relationship between Real Gross domestic product and Direct taxes and Indirect Taxes in Nigeria. From the findings, it indicated that, all of the coefficients were insignificant, but portrays existence of a relationship between real gross domestic products and the variables. Based on the results Direct taxes, was insignificant in at 95% confidence level (p-value=0.855). The value of the coefficient was 0.002. This implies that, the higher the Direct taxes, the better the economy growth rate. In addition, Indirect taxes resulted into statistically insignificant coefficients at 95% confidence level (p-value=0.194). Even it is not significant; it has negative impact on real gross domestic product. The coefficient of - 0.003 indicates that if government Indirect taxes increase by one value, would lead to decrease in the real gross domestic product by 0.003 values. This implies that indirect tax revenue has negative relationship with the rate of economic growth.

Moreover, the above table shows the multicollinearity between the variables. From the above, the VIF value (5.491) which is great than 1 and less than 10 and tolerance scores, which is 0.182 show there is no multicollinearity in the data.

V. CONCLUSIONS AND RECOMMENDATIONS

From the research, using Direct taxes and Indirect taxes as variables representing Tax revenues in Nigeria. And Real Gross Domestic Product in proxy of economic growth in the country, thus we concluded that, Tax revenues have positive relationship with economic growth in Nigeria. This was in line with the study of Ogbonna and Appah (2012), Umoru and Anywe (2013) respectively. In addition, we also concluded that, direct taxes has positive impact on the economy in Nigeria, thus, direct taxes improves the economy growth. This was in line with study of Umoru and Anywe (2013). Furthermore, we concluded that, indirect taxes in statistically insignificant and negatively impact on the Nigeria economy growth. This was in line with the study of Akhor et al (2016) and Umoro and Anywe (2013) respectively.

From the forging, recommended that, the Nigeria government should embrace and improves

collection of Direct taxes revenue to boost economic growth in the country. Appropriate economic infrastructures should be put in place to enhance employment opportunities which in turn, boost tax revenue generation. Moreover, the issues of tax evasion and tax avoidance should be adequately administered as well. Also, the government need to be steadfast in aspect of indirect taxes, from policies, relevant regulations and strategies that will catapult indirect taxes revenue to be significant, thereby, positively impacted on the growth of the country's economy in this 21st century.

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Effectiveness of the Exogenous and Endogenous Variables as Determinants of Money Supply in Nigeria: 1980-2019

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Abstract- This work dealt on the effectiveness of the exogenous and endogenous variables as determinants of money supply in Nigeria. It is a contribution to the existing debate on money supply exogeneity/endogeneity concepts. To examine these issues, this work adopted two models and used annual time-series data for the period 1980 to 2019. It employed the ordinary least square (OLS) technique, the unit root test, the Johansson co-integration procedure and the error correction mechanism (ECM) to analyse the data. Most variables in the models were significant and rightly signed. From the exogenous model, Treasury Bill Rate (TBR), Monetary Policy rate (MPR) and Liquidity ratio (LQ) significantly impacted to changes in money supply in the short run. But in the long run analysis only TBR was found to be significant and impacted positively to changes in money supply. The result indicated a low coefficient of determination (R²) and weak disequilibrium adjustment value (in the long run) depicting weak exogeneity and less effective.

GJMBR-C Classification: JEL Code: F65



Strictly as per the compliance and regulations of:



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Abstract- This work dealt on the effectiveness of the exogenous and endogenous variables as determinants of money supply in Nigeria. It is a contribution to the existing debate on money supply exogeneity/endogeneity concepts. To examine these issues, this work adopted two models and used annual time-series data for the period 1980 to 2019. It employed the ordinary least square (OLS) technique, the unit root test, the Johansson co-integration procedure and the error correction mechanism (ECM) to analyse the data. Most variables in the models were significant and rightly signed. From the exogenous model, Treasury Bill Rate (TBR), Monetary Policy rate (MPR) and Liquidity ratio (LQ) significantly impacted to changes in money supply in the short run. But in the long run analysis only TBR was found to be significant and impacted positively to changes in money supply. The result indicated a low coefficient of determination (R^2) and weak disequilibrium adjustment value (in the long run) depicting weak exogeneity and less effective. Furthermore, the result of the endogenous model showed that in the short run National Income (RIC), Price Level (PRL), Currency outside Banks (COB) and Reserves of the Banking System (RBS) were significant and rightly signed. In the long run analysis of the endogenous model, RIC, COB and RBS maintained their significant status. The coefficient of determination which measures the collective effort of the explanatory variables proved to be of good fit. The Error Correction mechanism (ECM) was significant and rightly signed with a moderate disequilibrium adjustment value, depicting strong endogeneity. From the Overall empirical evidence, the conclusion drawn was that, money supply in Nigeria is weakly exogenous and strongly endogenous. Relating this to our main objective, it means that the endogeneity function is more effective in determining money supply in Nigeria, supporting the post Keynesians. With regards to our results, the work recommended among others, that the Nigerian Monetary authority should reduce emphasis on money supply exogeneity concept and consider a policy mix as an option. This policy mix entails managing monetary aggregate with considerable attention given to market forces, production and the activities of the banking system.

1. INTRODUCTION

In a bid to control the monetary aggregates or to determine the quantity of money in the economy (for achieving macroeconomic objectives), Nigeria through its central bank (CBN) has adopted different approaches of monetary policy. From inception in 1959, the CBN has adopted two broad monetary policy

frameworks. These are exchange rate targeting (1959-1973) designed to provide a sound basis for the national currency introduced soon after independence and the other is monetary targeting adopted since 1974. Monetary targeting involves the use of direct control or market based (indirect) instruments. Consequently, the major focus of monetary policy was on controlling monetary aggregates, a policy based on the belief that inflation is essentially a monetary phenomenon. The ability to control money supply relative to the required level of output would all things being equal control inflation. The monetary targeting was used both under the direct monetary control and the indirect monetary control era, as well as in the short-term (annual) and medium-term policy framework. During the direct monetary control era the major objective of the monetary policy was to promote rapid and sustainable economic growth. To achieve this, the monetary authorities imposed differential quantitative ceilings on all sectors of the economy, given more of such ceiling to the preferred sectors of the economy. Agriculture, Manufacturing and Construction were the preferred sectors with respect to credit allocation below market lending rate. The post-1986 considered as the era of indirect control ushered in a new era of monetary policy implementation with market-friendly techniques in Nigeria. Using this technique the CBN indirectly influences economic parameters through its Open Market Operation (OMO), which is complimented with the use of reserve requirements; the Cash Reserve Ratio (CRR) and the Liquidity Ratio (LQ). These set of instruments are used to influence the quantity-based nominal anchor (monetary aggregate) used for monetary programming (Uchendu, 2009 and CBN 2016).

Monetary policy since 1986 (the Structural Adjustment Programme–SAP was adopted in July 1986 against the crash in the international oil market and the resultant deteriorating economic conditions in the country) was designed to achieve fiscal balance and balance of payments viability by altering and restructuring the production and consumption patterns of the economy, eliminating price distortions, reducing the heavy dependence on crude oil exports and consumer goods imports, enhancing the non-oil export base and achieving sustainable growth. Other aims were to rationalize the role of the public sector and

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accelerate the growth potentials of the private sector. The main strategies of the programme were the deregulation of external trade and payments arrangements, the adoption of a market-determined exchange rate for the Naira, substantial reduction in complex price and administrative controls and more reliance on market forces as a major determinant of economic activity.

The objectives of monetary policy since 1986 have remained the same as in the earlier period. In line with the general philosophy of economic management under SAP, monetary policy was aimed at inducing the emergence of a market – oriented financial system for effective mobilization of financial savings and efficient resource allocation. The main instrument of the market based operations was OMO. This is complemented by reserve requirements and discount window operations. The adoption of a market-based framework, such as OMO in an economy that had been under direct control for long, required substantial improvement in the macroeconomic, legal and regulatory environment. In order to improve macroeconomic stability, efforts were directed at the management of excess liquidity, thus a number of measures were introduced to reduce liquidity in the system. These included the reduction in the maximum ceiling on credit growth allowed for banks, the recall of the special deposits requirements against outstanding external payment arrears to CBN from banks, abolition of the use of foreign guarantees/currency deposits as collaterals for naira loans and the withdrawal of public sector deposits from banks to the CBN.

Money is considered exogenous or endogenous depending on its relationship to the economy. If its existence and quantity are determined by economic activities and production, money is considered endogenous. Conversely, if the existence and quantity of money are determined by forces outside economic activity – most often by the state (or monetary authority), money is considered exogenous. Since the inception of recorded monetary thinking, there has been an ongoing debate about whether money should be treated as endogenous or exogenous (Palley 2008).

As Nayan and Chik (2010) put it in many of the mainstream macroeconomic literature money supply is assumed to be exogenously determined by the Central Bank. This view is forward by a group of economists known as the monetarists based on the argument that money supply equals the money multiplier times the monetary base. Since the central bank can manipulate the base money, it can control the supply of money in the economy exogenously. On the other side of the debate, another group of economists known as the post Keynesian economists maintained that money supply is endogenous in nature. Whereas there are a number of different views of the concept of money supply endogeneity, the core argument of the post Keynesian

school of thought is that economic activities determine the level of money supply.

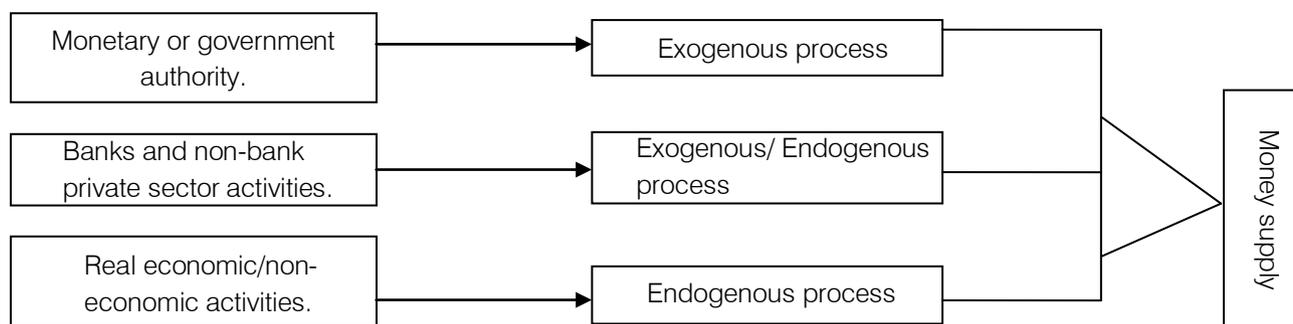
In Nigeria the CBN uses M_2 (Broad money supply) as monetary aggregate and policy decision are based on the same. The Broad money comprises narrow money (M_1) and Quasi money (QM); which the Nigerian monetary authority manipulates in order to control the money supply. The fact remains that the stability of the economy depends much on the ability of the CBN to control the components of 'M₁' and 'QM'. As a developing nation the control of these variables may become more problematic due to economic and structural changes in the economy, ranging from liberalization of the economy to recent banking reforms and also the advent of Automated Teller Machines (ATM), mobile banking, interest banking, debit and credit cards, and money market funds which exert pressures on money supply.

Our focus in this study therefore is to examine how effective the CBN instruments of monetary policy may be in controlling money supply in the face of economic and structural changes in the economy and also how effective economic activities may be in controlling the money supply.

II. REVIEW OF RELATED LITERATURE

a) *Conceptual Framework*

A conceptual framework as suggested by Kothari and Garg (2014) forms a simplified familiar structure which is meant to help gain insight into a phenomenon that one needs to explain. To Orodho (2009) Conceptual research is that which relates to some abstract ideas or theory. It is generally used by philosophers and thinkers to develop new concepts or to reinterpret existing ones. The conceptual literature concerns the concept and theories and explains how the variables relate.



Source: Researchers Analysis

Figure 1.1: Diagrammatic representation of conceptual framework

b) *Theoretical Literature Review*

One of the controversial issues in monetary economics is the debate over the concept of exogenous and endogenous money. The debate has been going on since the 17th century and has its theoretical roots as well as its policy implication. Exogenous money supply along with the stable money demand function is an important element in the monetarists' model that asserts the effectiveness of monetary policy. On the other hand post-Keynesian advocate the concept of endogeneity of money supply since the ultimate good of the economic activity is to create money. According to the post Keynesians the main function of commercial banks in the modern economy is to finance the business sector which would in turn determine the quantity of money. Therefore money supply has no impact on real variables such as investment, employment and national income (Minsky 1977).

c) *The neo-classical Approach To Money Supply Determination*

The idea of an exogenous money supply is a fundamental tenet of the neo-classical economics. The quantity theory of money, $MV = PY$, frames the approach clearly. The theory assumes, at least in the short-run, that the velocity of money (V) and real output (Y) will be constant, either in levels or growth rates. It then assumes that causation runs from the left to the right hand side of the equation; meaning that variation in money growth (M) determines fluctuations in the price level (P) – that is, the rate of inflation or deflation. The quantity theory finally assumes that the central bank, on its own has the capacity to determine 'M', through discount-window lending and dynamic open market operations (Friedman 1968).

Combining these elements, the conclusion emerges that the central bank exogenously determines the growth rate of the money supply and through this capacity, will also control an economy's inflation rate and business cycle fluctuations.

d) *THE Post-Keynesian Approach To Money Supply Determination*

Endogenous money supply theory is one of the main cornerstones of the post-Keynesian (PK) economics. In post-keynesian economics money is endogenously determined. Analytically, it provides a critical link connecting the financial and the real sectors of the economy (George and Pasche, 2010).

This approach is considered appealing because it provides a link not only to the impact of financial sector (the central bank and commercial banks) on the money supply but also brings to the fore the impact on money supply of the non-bank public and activities in the real sector, (Ali and Islam, 2010).

e) *Empirical Literature Review*

i. *Empirical evidence of Exogenous Money Supply*

A monetary sector model of India had been estimated by Khetan (1973). The model consisted of three sectors, namely, the commercial banking, the private non-bank and the government sectors and comprises eight (8) behavioral equations. The demand and supply of six principal financial assets in the Indian money market include bank credit, currency with the public, demand deposits, excess reserves, government securities and time deposits. The theory he found useful for his analysis was the orthodox money multiplier theory. He found that money supply is exogenous in Indian economy. This orthodox model is illuminating both for what it includes and what it omits. First the model emphasizes the supply of base as a constraint on the money supply. Fractional reserve banking means that base is needed to support deposit, so that the supply of base restricts the quantity of deposits that can be created. Second, bank lending creates inside balances and in equilibrium, these balances must be willingly held, or else agents will seek to spend them causing interest rate, output or price level adjustments. Thus, equilibrium outcomes must lie on the money demand schedule. Third, the money supply depends on the portfolio choices of agents through the demand for currency, time deposits, and excess reserves. Shifts in

any of these assets demands will change the money supply: thus, even the orthodox model exhibits some money supply endogeneity (Palley 1993). Other works that gave support to exogenous money supply are: Meltzer (1958), who investigated the France economy; Pollin (2008) and Cerqueira (2009), who examined the extent of the exogeneity of money supply in Brazil .

ii. *Empirical evidence of Endogenous Money Supply*

In what they termed a review work, Sabri et al (2015), embarked on the process of reviewing the post Keynesian theory and evidence of money supply endogeneity. They demonstrated and declared that money is endogenous through credit and production transmission mechanism. The method they used is historical and theoretical analyses. The lack of empirical evidence made the validity of their work questionable.

Nell (1999), using the ordinary least square (OLS) method found that irrespective of the monetary system at anytime, the money supply process in South Africa is endogenously determined. The empirical analysis that took 1966-1997 as investigation period further showed that the inability of the South Africa Reserve Bank (SARB) to control money growth rate within this investigation period confirms the presence of an endogenous money supply process in South Africa. Nell found the structuralist approach to money supply which is part of the post-Keynesian theory of money supply appropriate for carrying out his analysis. He supported the structuralist argument that commercial banks respond to an increase in credit demand with structural changes of their portfolio on the asset and liability side. This is because, for the structuralist, liquidity pressures matter and the supply price of finance to banks can increase endogenously. Other works for endogenous money supply are: Bakara (2011), Cling (2011), Nayan and Chik (2010), Elhendway (2015). Others are Arkadiusz (2019), Falah and Ahmed (2017), Elhendway (2016), Kaplan, F. and Gungor, S. (2015).

III. METHODOLOGY

This study sets up an econometric model to test the long run relationship between money supply and some exogenous and endogenous variables in Nigeria with a view to ascertain their effectiveness. In this study the exogenous variables are those variables that the central Bank can manipulate or set their values through its policies to control the growth of money supply. In this sense money is exogenous according to Brunner (1968) if it can be manipulated by the monetary authorities. And the endogenous variables are variables that their values are determined by economic activities; meaning that money supply is endogenously determined if its changes are caused by economic activities and production (Tobin, 1971). We used annual time series data from 1980-2019. The sources of the data are; Central Bank of Nigeria (CBN) Statistical Bulletin (2016-

2019), CBN Annual report and statements of account for various years, National Bureau for statistics (NBS)-2017- 2019. Most time series data are characterized by a unit root so that their first difference are stationary (Engel and Granger, 1987, Granger, 1969). According to Wadud (2000), if a statistical test like co integration establishes co-movements in the time series data, then the residual from the regression can be used as an error correction term in the dynamic first difference equation. Therefore after estimating the multiple regression models, the study shall conduct tests for stationarity, co-integration and error correction models, so as to know the long run reliability of the models. Granger causality test will also be carried out to determine the direction of causality between money supply and the exogenous/endogenous variables.

a) *Model specification*

Model 1

$$\text{MSP} = f(\text{TBR}, \text{OMO}, \text{MPR}, \text{CRR}, \text{LQR}). \quad (\text{Eq. I II.1})$$

Where;

MSP = Broad Money supply;

TBR = Treasury bill rate;

OMO = Open market operation;

MPR = Monetary policy rate;

CRR = Cash reserve ratio;

LQR = Liquidity ratio

Eq = Equation

The theoretical framework adopted in 'model 1' is the exogeneity approach of the monetarists to money supply determination. This approach suggests that the Central Bank has powers to control the growth of money supply through its instruments. Given that the Nigerian economy is similar to many other economies this research work adopted the model developed by Cerqueira (2009). In testing the exogeneity of money supply in Brazil, Cerqueira related money supply to other instruments of monetary policy.

Model 2

$$\text{MSP} = f(\text{RIC}, \text{RIR}, \text{PRL}, \text{COB}, \text{RBS}) \dots \dots \dots (\text{Eq. III .2})$$

Where;

MSP = as explained in model 1

RIC = National Income;

RIR = Interest Rate;

PRL = Price Level;

COB = Currency outside banks;

RBS = Reserves of the banking system;

Model 2 adopted the idea of endogeneity theory of money supply advocated by the post Keynesians (PK) economists. In line with this theory the study adopts the economic model developed by Fry (1985) in Turkish economy which was adopted by Bakara (2011) in the Nigerian economy. According to Bakara, a change in money supply is determined by the activities of the commercial banks and in real economic sectors of the economy.

From the above functional relationships, the general econometric model is specified as

$$Y_t = \alpha_0 + \sum_{i=1}^n \alpha_i x_{it} + U_t \dots\dots\dots (Eq.III.3).$$

- Where;
- $i= 1$
 - y = the dependent variable
 - α_0 = n the intercept (that is the value of y when all X^s are zero)
 - α_i = Parameters to be estimated
 - x_i = the explanatory variables
 - t = Subscript depicting time or period.
 - U = iid stochastic error term
 - n = number of explanatory variable.
 - i = numerical numbers ranging from 1 -n.

Specifically, each model with its peculiarities could be developed econometrically from equation 3.3.

Model 1:

$$MSP_t = \alpha_0 + \alpha_{11} TBR_t + \alpha_{12} OMO_t + \alpha_{13} MPR_t + \alpha_{14} CRR_t + \alpha_{15} LQR_t + U_t \dots\dots\dots (Eq. III. 4).$$

α_0 , = the intercept, $\alpha_{11} - \alpha_{15}$ = parameters to be estimated and U_t = error term.

Based on a priori reasoning, the expected signs for the parameters estimates are as depicted on table (III.1).

Table III.1: Expression of expected signs (Model 1)

Parameter estimates	α_{11}	α_{12}	α_{13}	α_{14}	α_{15}
Expected signs	<0	<0	<0	<0	<0
The implication					

Source: Author's analysis

Note:

- : \longrightarrow Implies that increase in the explanatory variable leads to an increase in the dependent variable.
- : \longleftarrow Implies that increase in the explanatory variable leads to a decrease in the dependent variable.

Model 2.

$$MSP_t = \varphi_0 + \varphi_{21} RIC_t + \varphi_{22} RIR_t + \varphi_{23} PRL_t + \varphi_{24} COB_t + \varphi_{25} RBS_t + U_t \dots\dots\dots (Eq III.5)$$

Where:

φ_0 = the intercept; $\varphi_{21} - \varphi_{25}$ = parameters to be estimated and U_t = error term.

Based on a priori reasoning the expected signs for the parameter estimates are as shown on table (III.2).

Table III.2: Expression for expected signs (Model 2)

Parameters estimates	φ_{21}	φ_{22}	φ_{23}	φ_{24}	φ_{25}
Expected signs	>0	<0	<0	>0	>0
The Implication					

Source: Authors' analysis

Note \longrightarrow and \longleftarrow are as explained under table (III.1)

IV. ESTIMATION PROCEDURE

a) Multiple Regression (Exogeneity Model – Model 1)

This empirical analysis shows the degree or association between treasury bill rate (TBR), open market operation (OMO), monetary policy rate (MPR), cash reserve ratio (CRR), liquidity ratio (LQR) and money supply (MSP).

Table IV.1: Multiple Regression Result (Model 1)

Dependent Variable LOG (MSP)

Variable	Coefficient	Std. Error	t. statistic	Prob.	R-squared (R ²) 0.971133 Adjusted R ² = 0.969802 F-statistic = 225.8020 Prob (f-statistic) 0.0000 Durbin – Watson statistic = 0.996157
C	2.707671	0.614233	4.408216	0.0001	
(TBR)	-0.772570	0.073061	-S10.57438	0.0000	
Log(OMO)	-0.177287	0.088912	-1.993937	0.0563	
MPR	-0.048524	0.020165	-2.406318	0.0232	
CRR	-0.017498	0.016869	-1.037273	0.3033	
LQR	0.023967	0.007503	3.194505	0.0033	

Source: Extraction from E-View (Computer) Result

The estimated model can be shown as

$$\text{LOG (MSP)}_t = 2.708 + 0.773 (\text{TBR})_t - 0.177 \text{Log (OMO)}_t - 0.049 \text{MPR}_t (0.614) \quad (0.073) \quad (0.089) \\ (0.020) - 0.017 \text{CRR}_t + 0.024 \text{LQR}_t \dots\dots\dots (\text{eq, IV.1}). (0.028) \quad (0.008)$$

From the regression result on Table IV.1, we observed that, Treasury bill rate (TBR), monetary policy Rate (MPR) and Liquidity Ratio (LQR) were statistically significant at 5 percent level. The coefficient of determination and F- statistic were also significant but the Durbin- Watson statistic is below 1.5 which suggests

the presence of serial autocorrelation. Given this result, it is necessary to test its reliability, that is, whether it is not a spurious regression. This is because most time series data are characterized by unit root. We therefore subject the variables to a unit root test.

Table IV.2: Unit Root Test Result (Model 1)

Variables	At Level			At 1 st Difference			Order of Integration
	ADF Statistic	5% Critical Value	Probability	ADF Statistic	5% Critical Value	Probability	
(Log)MSP	-2.913609	-2.957110	0.0548	-8.829645	-2.960411	0.0000	1(1)
TBR	2.526266	-2.957110	1.0000	-3.363907	-2.960411	0.0203	1(1)
(Log)OMO	-1.708340	-2.971853	0.4163	-9.311849	-2.971853	0.0000	1(1)
MPR	-2.777594	2.957110	0.0728	-5.850592	-2.963972	0.0000	1(1)
CRR	-1.942212	-2.957110	0.3097	-4.490656	-2.960411	0.0012	1(1)
LQR	-2.897793	-2.957110	0.0567	-5.374798	-2.96411	0.0000	1(1)

Source: Extraction from E-View (Computer) Result

The result of table IV.2 above shows that the variables are non-stationary at level form since their ADF values are less than their critical values at 5% level of significance, for this reason, the null hypothesis of a unit root was accepted for all the variables but was rejected at first difference. Thus, we conclude that the variables

under investigation are stationary at first difference or integrated of order one 1 (1).

Given the unit root properties of the variables, we proceed to implement the Johanson Co-Integration Test. This test is shown on table IV.3.

Table IV.3: Result of Co-integration Test (Model 1)

Hypothesized No. of CE(s)	Eigen Value	Trace Statistic	0.05 Critical Value	Probability **
None *	0.794944	125.7829	95.75366	0.0001
At most 1*	0.612104	76.66419	69.81889	0.0128
At most 2	0.540739	47.30662	47.85613	0.0563
At most 3	0.393970	23.18436	29.79707	0.2371
At most 4	0.134194	7.658777	15.49471	0.5026
At most 5	0.097839	3.191842	3.841471	0.0740

Trace test indicates 2 Co-Integrating equ(s) at the 0.05 level.

* denotes rejection of the hypothesis at 0.05 level

** Mackinnon – Hang – Michelis (1999) P.value.

Source: Extraction from E-view (Computer) Result.

The result of table IV.3 indicates that the trace statistic of 125.78 and 76.66 are greater than 5 percent critical value of 95.75 and 69.82 respectively, which means that at least there are two co-integrating equations, hence, the “At most 1*” hypothesis was rejected. This suggests the existence of a long-run

equilibrium relationship between explanatory variable and money supply. Consequently, we adopt the Error Correction Model (ECM) which was specified in case Co-integration is established among the variables. It tests for long run relationship between the dependent variable and the explanatory variables.

Table IV.4: Parsimonious ECM Result (Model 1)
Dependent variable $\Delta(\log(\text{MSP}))$

Variables	Coefficient	Std. Error	t-statistic	Prob.	R-squared = 0.502939 Adjusted R- Squared = 0.383645 f-stat=4.215945 Prob(f-stat)=0.004591 Durbin – Watson stat = 1.797899
C	0.183847	0.023251	7.906996	0.0000	
$\Delta(\text{TBR})$	-0.122704	0.051447	-2.384946	0.0250	
$\Delta(\text{LOG}(\text{OMO}))$	-0.058170	0.125961	-0.461812	0.6482	
$\Delta(\text{MPR})$	-0.010234	0.026922	-0.380134	0.7071	
$\Delta(\text{CRR})$	0.025801	0.043108	0.598522	0.5541	
$\Delta(\text{LQR})$	-0.007266	0.010215	-0.711336	0.4855	
ECM(-1)	-2.67E-06	6.73E-07	-3.371032	0.0005	

Source: Extraction from E-View (Computer) Result

The estimated model can be shown as:

$$\Delta(\text{LOG}(\text{MSP}))_t = 0.184 + 0.123\Delta(\text{TBR})_{t-1} - 0.058\Delta(\text{Log}(\text{OMO}))_t - 0.010\Delta(\text{MPR})_t + 0.026\Delta(\text{CRR})_t - 0.007\Delta(\text{LQR})_t - 2.67\text{E-}06\text{ECM}(-1) \dots \dots \dots (\text{Eqn.IV.2})$$

Furthermore, it is appropriate to know the direction of causality between money supply and the

explanatory variables. The Granger Causality Test result on table IV.5 sheds light on this.

Table IV.5: Pairwise Granger Causality Test (Model 1)

Null hypothesis	Obs	f-statistic	Prob.	Decision	Direction
TBR does not Granger Cause MSP	34	0.19050	0.8277	Accept	No causality
MSP does not Granger Cause TBR		0.66722	0.5217	Accept	No causality
OMO does not Granger Cause MSP	34	16.9056	2 E-05	Reject	Causality
MSP does not Granger Cause OMO		10.5159	0.0004	Reject	Causality
MPR does not Granger Cause MSP	34	1.04182	0.3671	Accept	No causality
MSP does not Granger Cause MRP		1.13659	0.3348	Accept	No causality
CRR does not Granger Cause MSP	34	0.41932	0.6619	Accept	No causality
MSP does not Granger Cause CRR		1.54731	0.2318	Accept	No causality
LQR does not Granger Cause MSP	34	1.24884	0.3035	Accept	No causality
MSP does not Granger Cause LQR		1.75721	0.1924	Accept	No causality

Source: Extraction from E-View (Computer) Result

The Granger Causality Test suggests that there is bidirectional causality between Money supply (MSP) and Open Market Operation (OMO) while independent causality exists between money supply and Treasury Bill Rate (TBR), Monetary Policy Rate (MPR), Cash Reserve Ratio (CRR) and Liquidity Ratio (LQR). This means that OMO Granger cause money supply though it was not significant at 5 percent level in the regression analysis. It also revealed the importance of OMO in the model.

b) *Multiple Regression (Endogeneity Model – Model 2)*
This empirical analysis shows the relationship between National Income (RIC), Interest Rate (RIR), Price Level (PRL), Currency outside Banks (COB), Reserves of the Banking System (RBS) and Money Supply (MSP).

Table IV.6: Multiple Regression Result (Model 2)
Dependent Variable LOG (MSP)

Variables	Coefficient	Std. Error	t-statistic	Prob.	R-squared = 0.993344 Adjusted R- Squared = 0.992196 f-stat=1062.687 Prob(f-stat)=0.00000 Durbin – Watson stat = 1.357493
C	-2.393622	0.970213	-2.596703	0.0151	
LOG (RIC)	0.687505	0.255303	3.668720	0.0018	
RIR	-0.003933	0.008274	-0.475373	0.6381	
PRL	-0.301713	0.148234	-2.565391	0.0271	
LOG(COB)	0.736431	0.200772	3.667993	0.0010	
LOG(RBS)	0.402688	0.063374	6.354134	0.0000	

Source: Extraction from E-View (Computer) Result

The estimated model can be shown as:

$$\text{LOG(MSP)}_t = -2.394 + 0.688\text{LOG(RIC)}_t - 0.004\text{RIR}_t + 0.302\text{PRL}_t + 0.736\text{LOG(COB)}_t + 0.403\text{LOG(RBS)}_t + \text{error}_t \quad (0.970) \quad (0.255) \quad (0.008) \quad (0.148) \quad (0.201) + 0.403\text{LOG(RBS)} \dots \dots \dots \text{equ. (IV.3)} \quad (0.063)$$

The short run result from model 2 indicates that National Income (RIC), Price level (PRL), Currency outside Banks (COB) and Reserves of the Banking System (RBS) are all significant at 5 percent level. The coefficient of determination (R²) and the F-statistic were also significant. But the Durbin- Watson statistic of 1.3 is

low and suggests the existence of serial autocorrelation in the Model. It is therefore necessary to test its reliability, that is, whether it is not a spurious regression. This was carried out through the unit root test using the Augmented Dickey – Fuller (ADF) stationarity test.

Table IV.7: Unit Root Test Result (Model 2)

Variables	At Level		At 1 st Difference		Order of Integration
	ADF Statistic	5% Critical Value	ADF Statistic	5% Critical Value	
(Log)MSP	-2.913609	-2.957110	-8.829645	-2.960411	1(1)
(Log)RIC	-5.020830	-2.957110	-	-	1(0)
RIR	-3.025803	-2.957110	-	-	1(0)
PRL	-0.726740	-2.957110	-5.012580	-2.951125	1(1)
(Log)COB	-4.178677	-2.986225	-	-	1(0)
(Log)RBS	-4.208076	-2.957110	-	-	1(0)

Source: Extraction from E-View (Computer) Result

The result on table IV.6 above shows that money supply (MSP) and price level (PRL) were non stationary at level form since their ADF values are less than their critical values at 5 percent; for this reason the null hypotheses of a unit root was accepted for these variables but was rejected at first difference (when ADF value > critical value). The other variables, National Income (RIC), Interest Rate (RIR), Currency Outside Banks (COB) and Reserves of the Banking System (RBS) were stationary at level form, hence, their ADF values are greater than their respective critical values at 5 percent under level form. We therefore maintain that the variables under investigation are integrated of order

1(0) and 1(1). This could be also confirmed using the probability of the ADF statistic as depicted on the computer result.

According to Akpan (2008), the presence of 1(1) and 1(0) variables does not constitute any hindrance as it is not necessary for all the variables in the multi-variables regression to have the same order of integratebility. As the dependent variable was stationary at first difference, 1(1); we envisage co-integration in the model. We therefore adopted the Johanson Co-Integration procedure to test for co-integration in the model.

Table IV.8: Result of Co-integration Test (Model 2)

Hypothesized No. of CE(s)	Eigen Value	Trace Statistic	0.05 Critical Value	Prob**
None *	0.999948	470.9720	95.75366	0.0001
At most 1*	0.944434	174.7796	69.81889	0.0000
At most 2*	0.818383	88.07382	47.85513	0.0000

At most 3*	0.558766	36.89816	29.79707	0.0064
At most 4	0.213028	12.35274	15.49471	0.1408
At most 5*	0.138480	4.471722	3.841466	0.0345

Trace test indicates 4 Co-Integrating equ(s) at the 0.05 level.

* denotes rejection of the hypothesis at 0.05 level

** Mackinnon – Hang – Michelis (1999) P.value.

Source: Extraction from E-view (Computer) Result.

From table IV.8, it is observed that the trace statistic of 470.9720 is greater than the 0.05 critical value of 95.75366, depicting that there is at least one co-integrating equation, we therefore reject the null hypothesis of none co-integrating equation. The test found about 4 co-integrating equations which is confirmed from the table as we reject the sixth hypothesis (At most 5*). This suggests a robust long run

equilibrium relationship between the endogenous variables and money supply in Nigeria. Consequently, we adopt the error correction model which was specified in case co-integration was established among the variables. This is achieved by adding the residual of the model as explanatory variable which is captioned Ecm (1) to test the long run relationship.

Table IV.9: Parsimonious ECM Result (Model 2)

Dependent variable Δ (LOG (MSP))

Variables	Coefficient	Std. Error	t-statistic	Prob.
C	0.344128	0.258164	1.000976	0.2992
LOG (RIC)	0.275047	0.110532	2.488403	0.0395
RIR	-0.005978	0.005627	-1.062530	0.5141
Δ (PRL)	-0.164473	0.208267	-0.789724	0.3429
LOG(COB)	0.300766	0.047073	2.318119	0.0293
LOG (RBS)	0.201037	0.042519	3.270767	0.0199
ECM(-1)	-0.561322	0.181422	-3.094019	0.0000

R-squared = 0.833977
 Adjusted R- Squared = 0.767471
 f-stat=208.5795
 Prob(f-stat)=0.0000
 Durbin – Watson stat = 1.91769

Source: Extraction from E-view (Computer) Result.

The estimated model can be shown as:

$$\Delta(\text{Log(MSP)})_t = 0.344 + 0.275\text{LOG(RIC)}_t - 0.006\text{RIR}_t - 0.164(\text{PRL})_t + (0.2582) \quad (0.1105) \quad (0.0056) \quad (0.2083) \\ 0.301\text{LOG (COB)}_t + 0.201\text{LOG(RBS)}_t - 0.561\text{ECM}(-1) \dots\dots (\text{eq.IV.4}).(0.0471) (0.0425) (0.1814)$$

Furthermore, it is appropriate to know the explanatory variables. The Granger Causality Test result direction of causality between money supply and the explanatory variables. The Granger Causality Test result on table IV.10 explains this.

Table IV.10: Pairwise Granger Causality Test (Model 2)

Null hypothesis	Obs	f-statistic	Prob.	Decision	Direction
RIC does not Granger Cause MSP	34	5.65147	0.0085	Reject	causality
MSP does not Granger Cause RIC		3.42904	0.0531	Reject	causality
RIR does not Granger Cause MSP	34	0.02551	0.9748	Accept	No causality
MSP does not Granger Cause RIR		0.14024	0.8698	Accept	No causality
PRL does not Granger Cause MSP	34	5.11215	0.0134	Reject	Causality
MSP does not Granger Cause PRL		3.43418	0.0475	Reject	Causality
COB does not Granger Cause MSP	34	0.95041	0.4012	Accept	No causality
MSP does not Granger Cause COB		10.0084	0.0007	Reject	Causality
RBS does not Granger Cause MSP	34	10.0437	0.0006	Reject	Causality
MSP does not Granger Cause RBS		24.1088	7E-07	Reject	Causality

Source: Extraction from E-view (Computer) Result

The Granger Causality Test on table IV.10 suggests that there are difference direction of causality

between money supply and the explanatory variables included in model 2. For instance, it was observed that

there are independent causality between Interest Rate (RIR) and Money Supply (MSP), this means that RIR does not granger cause MSP, neither does MSP granger RIR. It also revealed that there is unidirectional causality from (MSP) to Currency outside Banks (COB); meaning that it is MSP that granger cause COB and not the other way round. Interestingly, there is bidirectional causality between National Income (RIC), Price Level (PRL), Reserves of the Banking System (RBS) and MSP. Meaning that as RIC, PRL, and RBS granger cause MSP, so does MSP granger cause them. This test shows how robust and important the relationship between the endogenous variables and money supply is.

V. DISCUSSION OF FINDINGS

Model 1

The parsimonious result on Table IV.4 is a long-run regression analysis of model 1 which took into account the stationarity of the variables. From this result we found that Treasury Bill Rate (TBR) has positive significant effect on money supply. It was observed that one unit increase in reserve money will increase money supply by 0.12 units. This supports the monetarist believe that the monetary authorities can control the money supply stock through the base money. The other variables (Monetary policy Rate–MPR, Open market Operation–OMO, Cash Reserve ratio –CRR and Liquidity Ratio–LQR) were insignificant. This may suggest that these variables are more useful in the short run.

The Adjusted R-squared of about 38.4 percent which represents the collective impact of the explanatory variables is low though the F-statistics is significant at 5% level of significant. It suggests that about 38.4 percent of changes in Money supply were accounted for by the explanatory variables in the exogenous model.

It is worthy of note that the expected signs (A Pirion expectations) of all the explanatory variables except Cash Reserve Ratio (CRR) were in line with economic theory. That the CRR failed to maintain the expected sign could be attributed to inability of the regulatory authorities to enforce laws. This is because most times, the CBN as a regulatory body does compromise and allow the commercial banks to use deposits above the required level thereby reducing the CRR contrary to law.

Interestingly, the model is valid, the coefficient of the Error correction Mechanism (ECM) is negative and significant which means that the model is useful for policy formulation and forecasting. However, the speed of adjustment given by -0.0000027 is relatively slow. This means that in case of any shock in the economy, the return to equilibrium would be very slow. It implies that about 0.00027 percent of any past deviation will be corrected in the current period. Thus it will take a long

time for any disequilibrium in money supply stock to be corrected using the exogenous model.

The Durbin-Watson statistics of about 1.80 (which approaches 2) with a low probability of F-statistics means that, the model is devoid of first order serial autocorrelation (Akpan 2008, Woodredge, 2006).

On Table IV.5, the results of Granger causality test show that there is bidirectional causality from OMO to MSP and from MSP to OMO. That is, $OMO \rightleftarrows MSP$. This means that both Open market operation (OMO) and Money Supply (MSP) granger cause each other. That OMO granger cause MSP (though it was not statistically significant in the long- run) depicts how important it is in the Model. However, there is independent causality among Treasury Bill Rate (TBR), Monetary Policy Rate (MPR), Cash Reserve Ratio (CRR), Liquidity Ratio (LQR) and MSP. This indicates that as MSP does not granger cause TBR, MPR, LQR and CRR, none of these variables granger cause MSP.

Model 2

The parsimonious result on Table IV.9 showed the long run relationship of the endogenous model. The result indicated that, National income (RIC), Currency outside Bank (COB) and Reserves of the Banking System (RBS) were statistically significant at 5 percent level, while Interest Rate (RIR) and Price Level (PRL) were found to be insignificant. A unit increase in National income will increase money supply by 0.27 units, while a unit increase in Currency outside Banks or Credit to the Private Sector will increase money supply by 0.30 or 0.20 units respectively. This result supports the post-Keynesians augment that activities of the commercial banks and production are the main forces that drive the Money Supply stock.

Furthermore, the apriori expectations of all the variables included in the model were in line with economic theory. It also has good explanatory powers as shown by the value of the adjusted R-squared (≈ 0.77) and F- statistic of about 208.530. This shows that the impact of the joint effect of the explanatory variables is not only significant but can really explain the reasons for changes in the level of Money Supply in Nigeria. It means that about 77 percent of the changes in the level of Money supply in Nigeria are explain by the endogenous variables, that is activities of the commercial banks and the non-banking sector of the economy. This supports the work of Barkara, 2011. The result also shows that the Error correction mechanism (ECM) is statistically significant and negative. Thus it will rightly act to correct any deviation from long-run equilibrium. In deed if the actual equilibrium values were too high the ECM will reduce it; while if it is too low the ECM will rise it (Kareem, 2009). The Coefficient of the ECM which is about -0.5613 denotes that about 56.1 percent of any past deviation will be corrected in the current period. The implication is that it will take a

moderate time for disequilibrium in money supply to be corrected using the endogenous model.

The Durbin-Watson statistic of 1.917 with a low probability of F-statistic means that the model is devoid of any serial correlation and is significant. It also means that the model is good for policy making and for economic forecasting.

The granger causality result shows that there is independent causality among interest rate (RIR) and money supply (MSP); and unidirectional causality among Currency outside Banks (COB) and MSP, running from MSP to COB. This means that MSP granger cause COB while COB does not granger cause MSP; that is,

MSP \rightarrow COB. It was found that there is bidirectional causality among National Income, (RIC), Price Level (PRL), Reserves of the Banking System (RBS) and Money supply (MSP). It implies that RIC, PRL, and RBS granger cause MSP and as well MSP granger causes them. Symbolically this can be represented as RIC \leftrightarrow MSP, PRL \leftrightarrow MSP, and RBS \leftrightarrow MSP. This shows how robust this model is in explaining the changes in money supply.

The implication of our results or the inference one may draw from the results is that the forces that move the money supply aggregates in Nigeria is more of endogenous in nature. And therefore, the money supply will behave better if commercial banks are provided with enabling environment and needed infrastructures provided for the real sector of the economy to perform at its best.

VI. CONCLUSION AND POLICY RECOMMENDATION

a) Conclusion

This work examined the determinants of money supply in Nigeria. The analyses carried out show that the determination of money supply in Nigeria has been strongly endogenous and weakly exogenous. As the endogenous variables are market driven and beyond the control of monetary authorities, the money supply in Nigeria has been largely endogenous.

The Nigerian monetary authority has tried to use conventional instruments such as to increase or reduce cash requirement ratio; increase or reduce monetary policy rate (MPR) and unconventional instruments such as to issue CBN bills and notes in the effort in curtailing the growth of money supply. But these CBN's efforts could only have played a marginal role. Ultimately, it is those market driven variables which have played the deterministic role in pushing the money supply growth in Nigeria.

It is arguably that the monetary policies implemented by the monetary authority in Nigeria, if by any means to be effective and meaningful could have only followed the money growth path required by the

market forces. It is the Nigerian economic growth model, the evolving financial system and the process of financial deepening which have fundamentally contributed to the changes of money supply aggregates in Nigeria. Thus, subject to the market-driven endogenous money supply growth, the monetary policies implemented by the Nigerian monetary authority could at most marginally affect the money supply growth part in the short-term but could hardly alter the long-run money supply growth part. This was clearly shown in the parsimonious ECM results. This means that any substantial actions from the Nigerian monetary authority to treat money as exogenous should be understood as being short-term in nature and not as being a deterministic initiative to set certain long-run monetary target for the market to follow.

This conclusion supports Ching (2011) who wrote that "in a modern open economy with a sophisticated profit maximizing banking system, a non-banking financial sector, dynamic currency in circulation affecting the supply of bank reserves and rapid international capital flows, it is at least questionable whether money is exogenously determined.

b) Policy Recommendation

On the basis of the findings of this work, the following recommendations are suggested;

- Nigerian monetary authority should reduce the dependence on the use of monetary instruments as a major means of managing or controlling the money supply growth and consider a policy mix as an option. This policy mix entails using monetary instruments without neglecting the market forces, the Nigeria economic growth model and the evolving financial system.
- For a more effective policy formulation that may moderate the growth of money supply, the government and the CBN should improve the activities of the money market to be more efficient in dealing with the issue of Treasury bill rate as such will ensure or moderate the growth of money supply.
- For the real sector of the economy to have its full impact in determining the growth of money supply in the Nigerian economy, there is need for adequate provision of financial and physical infrastructural facilities to enhance competition through increase production of goods and services.
- Lastly it is also necessary to strengthen policies that will discourage the holding of cash by the public. This will enable the banks to have enough cash at their disposal for credit delivery which will promote economic activities and enhance moderate money supply growth.

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Analysis of the Behavior of Biodiversity Expenditures of Key Institutions in the Guantanamo Territor

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Abstract- In establishing a viable strategy for resource mobilization for biodiversity, determining the level of expenditure incurred is a vitally important factor. Inasmuch as, it allows to guide decision-making and evaluate the effectiveness in the allocation of resources, and to know the contributions of different actors. Likewise, a management document would be available to the financing entities, and inputs that contribute to optimizing the management of resources, identifying emerging needs, and promoting participation in the processes aimed at the financial sustainability of development and conservation. Consequently, an analysis of the behavior of the biodiversity expenditures of key institutions in the Guantánamo province is carried out, using theoretical, empirical and mathematical statistical methods, for the conceptual theoretical foundation, the analysis of the established policies and the characterization of the main organizations and institutions that affect the problem addressed, and the proposal for improvement.

Keywords: *biological diversity, financing, institutional, expenditures.*

GJMBR-C Classification: *JEL Code: E60*



ANALYSIS OF THE BEHAVIOR OF BIODIVERSITY EXPENDITURES OF KEY INSTITUTIONS IN THE GUANTANAMO TERRITOR

Strictly as per the compliance and regulations of:



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Analysis of the Behavior of Biodiversity Expenditures of Key Institutions in the Guantánamo Territory

Análisis del comportamiento de los gastos en biodiversidad de instituciones clave en el territorio Guantánamero

Yudirka Matos Sánchez ^α, Happy Salas Fuente ^ο, María Elena Zequeira Álvarez ^ρ, Ramón Peñalver Vera ^ω & Lisnay Alvarez Piel [¥]

Resumen- En el establecimiento de una estrategia viable para la movilización de recursos para la biodiversidad, la determinación del nivel de gasto en que se incurre constituye un factor de vital importancia. Por cuanto, permite orientar la toma de decisiones y evaluar la efectividad en la asignación de recursos, y conocer los aportes de diferentes actores. Asimismo, se dispondría de un documento de gestión ante las entidades de financiamiento, e insumos que contribuyan a la optimización en la gestión de recursos, identificar necesidades emergentes, y potenciar la participación en los procesos encaminados a la sostenibilidad financiera. Consecuentemente, se realiza un análisis del comportamiento de los gastos en biodiversidad de instituciones clave en la provincia Guantánamo, empleándose métodos de carácter teórico, empíricos y estadísticos matemáticos para la fundamentación teórica conceptual, el análisis de las políticas establecidas, y la caracterización de los principales organismos e instituciones que inciden en la problemática abordada.

Palabras clave: diversidad biológica, financiación, institucionalidad, egresos.

Abstract- In establishing a viable strategy for resource mobilization for biodiversity, determining the level of expenditure incurred is a vitally important factor. Inasmuch as, it allows to guide decision-making and evaluate the effectiveness in the allocation of resources, and to know the contributions of different actors. Likewise, a management document would be available to the financing entities, and inputs that contribute to optimizing the management of resources, identifying emerging needs, and promoting participation in the processes aimed at the financial sustainability of development and conservation. Consequently, an analysis of the behavior of the biodiversity expenditures of key institutions in the Guantánamo province is carried out, using theoretical, empirical and mathematical statistical methods, for the conceptual theoretical foundation, the analysis of the established policies and the characterization of the main organizations and institutions that affect the problem addressed, and the proposal for improvement.

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Keywords: biological diversity, financing, institutional, expenditures.

I. INTRODUCCIÓN

En la actualidad existe un creciente interés por la preservación de la biodiversidad (BD) en el planeta, pues de ésta depende la vida y la supervivencia de las especies, incluida la humana; a pesar de ello, se enfrenta una progresiva pérdida a tasas no observadas anteriormente. América Latina y el Caribe es una de las regiones con mayor concentración de BD y de las más vulnerables frente a los efectos del cambio climático (CEPAL, 2010).

Las transformaciones dadas por las condiciones climáticas tienen consecuencias significativas en las actividades económicas, el bienestar de la población y los ecosistemas (Stern, 2007; Panel Intergubernamental de Expertos sobre el Cambio Climático [IPCC], 2014). Las que pueden traducirse en pérdidas aún mayores, algunas de ellas irreversibles (Stern, 2013; IPCC, 2014a).

Consecuentemente, la comunidad internacional se ha pronunciado hacia la búsqueda de soluciones mediante diversas convenciones, programas y protocolos. Así como la creación de instituciones científicas especializadas en la materia, con el liderazgo de la Organización de las Naciones Unidas¹. Aunque, la práctica se ha enfocado al establecimiento de políticas públicas y normativas que establecen medidas de mitigación y otros.

Asimismo, en el ámbito de la conservación de la biodiversidad las estrategias se han concentrado en

¹ Destacan entre otros los siguientes: Conferencia de las Naciones Unidas (1972), Programa para el medio ambiente (PNUMA), Panel Intergubernamental de expertos sobre el cambio climático (IPCC), fundado en 1988, Comisión mundial sobre medio ambiente, también conocido como Comisión Brundtland (1987), Conferencia de las Naciones Unidas sobre medio ambiente y desarrollo (1992), Convención Marco de las Naciones Unidas sobre Cambio Climático, Protocolo de Kioto (1997), Cumbre del milenio de las Naciones Unidas (2000), Cumbre Mundial de Johannesburgo (2002), Conferencia Río + 20.

el desarrollo de acciones de mitigación al CC, y de pagos por servicios ambientales; pero, la valoración económica de los costos y de los beneficios de dichas estrategias, aún es incipiente. Puesto que, la contabilidad nacional de los países se basa fundamentalmente en transacciones financieras, no se toma en consideración a la naturaleza, “a la que no se le debe nada en cuanto a pagos, pero a la que se debe todo en cuanto a medios de subsistencia” (Jouvenel, 1968, citado en Stavros y Sigmar 2008).

Si bien existen múltiples políticas y acciones gubernamentales que buscan atender esta problemática, es importante contar con información más detallada acerca del ejercicio de los recursos públicos orientados a ese objetivo. Lo cual propiciaría elaborar un diagnóstico sobre el flujo de recursos que inciden positivamente en la biodiversidad, e identificar programas que puedan significar un factor de presión.

Contradictoriamente, se incrementa la pérdida de la diversidad biológica, donde destaca como una de las causas subyacentes, la insuficiente disponibilidad de recursos financieros para su sostenimiento. Es exiguo el compromiso y participación de actores clave en su financiamiento y, baja la diversificación de los mecanismos financieros en las áreas protegidas, ecosistemas que reportan beneficios significativos que pueden convertirse en ventajas acumuladas para toda la economía nacional.

Por otra parte, acorde a las partidas presupuestarias asignadas a cada organismo, es difícil determinar el monto exacto destinado específicamente a la preservación y conservación de la BD. Estas se describen principalmente, dentro de ítems de recursos de operación del servicio público, tales como: sueldos, gastos en servicios, combustible, entre otros; situación que conlleva a que exista un alto grado de desconocimiento sobre la efectiva asignación de recursos destinados a la biodiversidad.

Al respecto, el Programa de las Naciones Unidas para el Desarrollo (PNUD) lanza en 2012 la Iniciativa Finanzas de la Biodiversidad (BIOFIN), para la identificación y el desarrollo de nuevas oportunidades que permitan incrementar, re alinear y hacer un uso más eficiente y sostenible de los recursos. Cuba se incorpora en el año 2016, coincidentemente con la definición de las Bases del Plan Nacional de Desarrollo Económico y Social hasta el 2030 (PNDES).

BIOFIN acompaña al Programa Nacional para la Diversidad Biológica (2016-2020), y ofrece herramientas metodológicas que potencian la movilización de recursos financieros en apoyo a la implementación del Plan de Estado para el enfrentamiento al Cambio Climático, “Tarea Vida” y contribuye al logro de los Objetivos del Desarrollo Sostenible. En 2019 se concluye el informe a nivel de país, con la propuesta de un plan financiero para la

movilización de recursos y su redistribución a la biodiversidad, para la conservación y uso sostenibles.

Pese a lo anterior, el estudio de estrategias, guías y metodologías, devela la necesidad de evaluar los gastos requeridos y el análisis de fuentes potenciales de financiación a escala local. Aún son insuficientes las herramientas empleadas para alcanzar criterios mínimos de conservación, y protección de la biodiversidad en los territorios, requiriéndose de mecanismos adicionales para su cumplimiento.

A la par, y como resultado del Proyecto “Desarrollo comunitario y adaptación basada en manejos eco sistémicos de cuencas hidrográficas en el Parque Nacional Alejandro de Humboldt”, se efectúa un análisis del comportamiento de los gastos en biodiversidad de instituciones clave en la provincia Guantánamo.

II. MATERIALES Y/O MÉTODOS

La revisión de la bibliografía especializada respecto al cambio CC y su influencia en la biodiversidad, la sostenibilidad financiera de las áreas protegidas, y las principales metodologías para el análisis de los gastos en biodiversidad, constituyen el principal hilo conductor en la confección del marco teórico conceptual que sustenta el presente trabajo.

a) *Principales resultados de la aplicación de instrumentos y revisión de documentos*

i. *Selección de instituciones clave para el análisis de gastos en biodiversidad*

Para el análisis de los gastos en biodiversidad se tomaron en cuenta las instituciones de mayor incidencia en la utilización de los recursos naturales, principalmente en el Parque Nacional Alejandro de Humboldt (PNAH). Se seleccionaron los organismos e instituciones clave, con actividades de mayor vinculación a los tres pilares del Convenio de la Diversidad Biológica, tomándose como base inicial a 60 empresas.

El sector empresarial de la Provincia Guantánamo al cierre de mayo 2020 (Departamento de Empresas. Ministerio de Finanzas y Precios Provincial) cuenta con un total de 60 empresas, distribuidas en los 10 municipios que la conforman. Del total, corresponden a la subordinación nacional 33 entidades, las que representan el 55%, mientras que 27 pertenecen a la subordinación local, representando el 45%, de ellas: 12 directas (2%) y 15 (2,5%) de Comercio. Estos datos no incluyen las de tratamiento especial como el Ministerio de Ciencia, Innovación, Tecnología y Medio Ambiente (CITMA).

Respecto al sector empresarial de subordinación nacional radicado en el territorio, el más representativo es el Agropecuario, que reúne un total de 17 empresas, que significan el 51 % del total, y en

la subordinación local destaca el sector de Comercio con 15 empresas, para un 55 %.)

Para determinar la muestra con la que se realizaría el estudio, se emplea el criterio de Fisher y Espejo (2004), a partir de la fórmula siguiente:

$$n = \frac{P(1 - P)}{\frac{E^2}{Z^2} + \frac{P(1 - P)}{N}} \quad (1)$$

Donde: P es la probabilidad de éxito, y puede asumir valores entre 0,1 y 0,9. En este trabajo se asume 0,5; E: error muestral, se considera un 5%; Z: es el nivel de confianza, se toma el 95% y N: es la población.

Como resultado, se obtiene una muestra ascendente a 36 instituciones, a las cuales se les

brindaron las herramientas básicas para el levantamiento de la información sobre los gastos en biodiversidad, en función de la metodología BIOFIN. Se les realizaron visitas por parte del equipo de proyecto, representado por las Facultades de Ciencias Económicas y Empresariales y, Sociales y Humanísticas de la Universidad de Guantánamo, conjuntamente con los estudiantes que conforman el grupo científico estudiantil sobre Gestión del medio ambiente y el desarrollo local.

Estas instituciones fueron objeto de encuestas, alcanzándose un 91.2 y 82 % de fiabilidad y concordancia, respectivamente.

Estadísticas de fiabilidad		Estadísticos de prueba	
Alfa de Cronbach	N de elementos	N	36
,912	36	W de Kendall ^a	,816
		Chi-cuadrado	261,540
		gl	11
		Sig. asintótica	,000

En los resultados que se presentan no se mencionan los nombres de las instituciones implicadas.

De los encuestados, el 17 % tiene más de ocho años de experiencia; seguido de un 11 % con más de 11 años en la actividad que desempeñan, según se observa en el gráfico 1. El 100 % es graduado de nivel universitario, con una edad promedio de 44 años (gráfico 2). Existe un predominio del sexo femenino, que representa el 89 % de los participantes (gráfico 3).

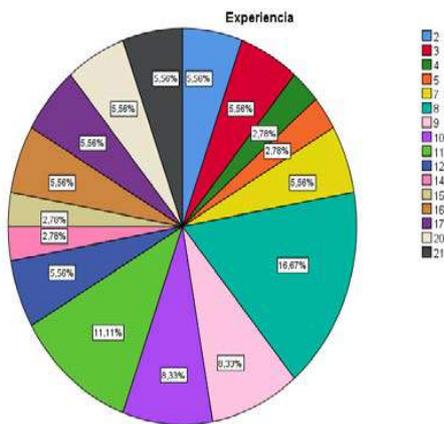


Gráfico 1: Experiencia profesional. Fuente: elaboración propia.

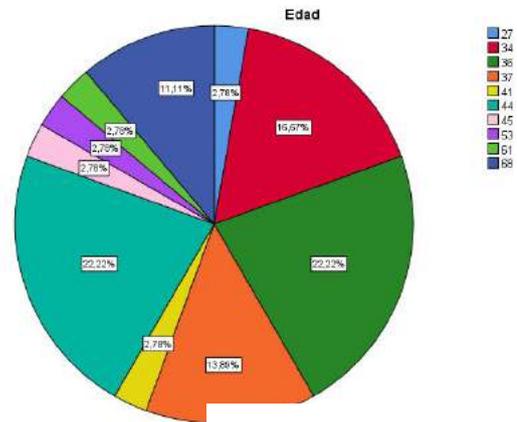


Gráfico 2: Edad promedio. Fuente: elaboración propia.

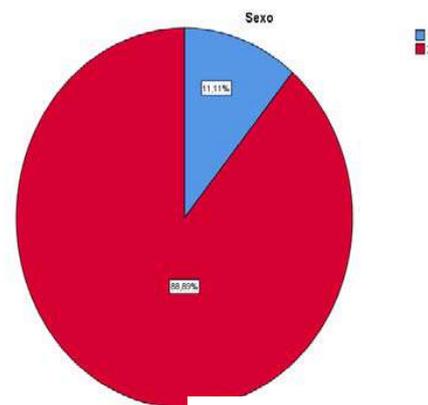


Gráfico 3: Sexo. Fuente: elaboración propia.

El 100 % promueve acciones para cumplimentar la Agenda de desarrollo 2030 y ejecutan proyectos/programas en función de la BD, de ellas, el 42 % dispone de al menos un proyecto, el 17 % desarrolla cinco y el 14 % tres (gráfico 4). Entre los más recurrentes destacan los siguientes: Manglar Vivo, Conectando Paisajes, Conservación de suelos, especies endémicas y amenazadas, Reconstrucción de bosques y programas de mantenimiento de infraestructuras e inversiones en cuencas hidrográficas.

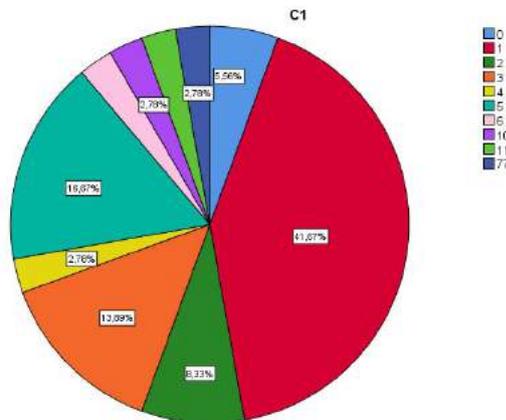


Gráfico 4: Cantidad de proyectos en función de la biodiversidad.

Fuente: elaboración propia.

El 67 % posee un conocimiento medio del monto que dedica a la biodiversidad, generalmente lo asocian al presupuesto planificado para cumplimentar las tareas que conforman el Plan de Estado. De igual forma, el 64 % refiere que en este proceso existe un nivel medio de integración entre los actores, aspecto en el que se debe continuar trabajando para alcanzar la efectividad en el manejo de los recursos naturales y el medio ambiente.

Respecto a cómo tributan estas instituciones al presupuesto provincial/municipal, cómo se benefician; y cuál es el monto que dedican a la biodiversidad, el 86 % no responde (Gráfico 5).

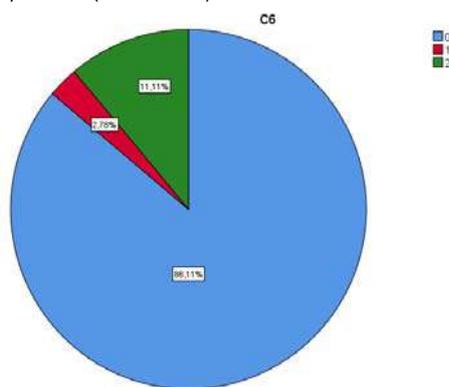


Gráfico 5: Presupuesto y monto dedicado a la biodiversidad

Como parte de los objetivos del proyecto, se les pregunta a los implicados en relación al total de fondos destinados a financiar medidas para el enfrentamiento al cambio climático; lo cual revela desconocimiento por parte del 53 % de los encuestados (Gráfico 6).

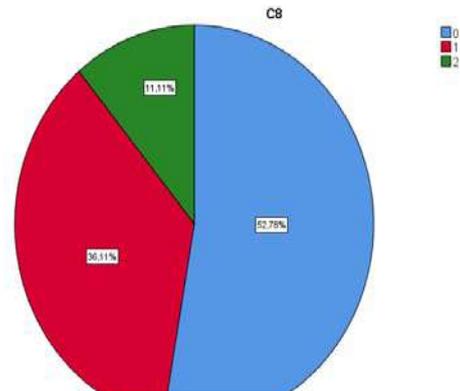


Gráfico 6: Financiamiento de medidas.

Fuente: elaboración propia.

Del mismo modo, se propicia el escenario para considerar el financiamiento de nuevas medidas que promuevan el enfoque de adaptación basado en los ecosistemas, y la disposición a colaborar. Como resultado, el 44 % alega que las únicas medidas que pueden financiar para contrarrestar los efectos del cambio climático contra la biodiversidad, son las concernientes a potenciar los conocimientos y capacidades. Un 56 % refiere que podría ejecutar acciones de sensibilización y educación ambiental; y el 100 % señala como principal recurso a aportar, la capacidad intelectual.

El presupuesto asignado revela entre sus principales tendencias un incremento en las cifras para cubrir los gastos vinculados a la biodiversidad, acorde a las políticas establecidas a nivel de país. Los principales egresos se visualizan en función de:

- La reforestación.
- La protección y saneamiento de cuencas hidrográficas.
- La conservación de parques naturales.
- El cuidado y limpieza de las playas.

Otra generalidad, es el incremento de los gastos corrientes respecto a los de inversión, y en los municipios, pese a las asignaciones siempre crecientes, estos sobrepasen los asociados a la gestión de la biodiversidad.

ii. Análisis de los gastos en biodiversidad

A continuación se presentan los principales resultados derivados del análisis de los gastos en biodiversidad, mostrándose los más significativos. En la tabla 1 se reflejan los gastos de la empresa (A) en el periodo (2011-2019), las categorías se desglosan en corrientes y de inversión por años.

Tabla 1: Plan y Ejecución de los gastos en biodiversidad. Expresado en miles de pesos

Años	Presupuesto o Plan (MP)		Biodiversidad		
	Asignado	Ejecutado	Gastos corrientes	Gastos de Inversión	Gasto Total
2011	18 504.90	18 004.90	3 253.50	6 133.60	9 387.10
2012	23 562.60	23 502.60	3 353.50	6 652.30	10 005.80
2013	24 022.10	24 022.10	3 509.80	8 984.00	12 493.80
2014	20 320.60	19 908.60	4 109.80		4 109.80
2015	26 340.80	26 340.80	7 787.30	10 393.20	18 180.50
2016	32 334.80	32 034.80	6 141.30	14 653.90	20 795.20
2017	33 364.10	33 364.10	6 792.30	16 551.40	23 343.70
2018	32 590.20	32 290.20	7 420.50	16 805.20	24 225.70
2019	35 409.30	35 409.30	8 059.80	18 160.30	26 220.10
Total	246 449.40	244 877.40	50 427.80	98 333.90	148 761.70

Fuente: elaboración propia, a partir de datos aportados por la empresa (2020).

En el periodo evaluado hubo una subejecución de un 1 % del presupuesto asignado; destinándose el 60 % a la biodiversidad, de él, el 66 % fundamentalmente a las inversiones. En el caso de los gastos corrientes (33 %), estuvieron enfocados a las acciones de saneamiento mecanizado para: la rehabilitación de lagunas de oxidación, el tratamiento de las zanjas a cielo abierto, la reducción de la contaminación de las aguas terrestres y el monitoreo

constante con análisis de laboratorio del estado de la calidad de las aguas.

La información contenida en la tabla 2 es de los últimos 9 años de forma acumulada. En el caso de la protección, se entendió el presupuesto ejecutado en la protección del recurso agua y la diversidad biológica contenida en ella, y otros ecosistemas acuáticos, esencialmente se refiere a gastos indirectos.

Tabla 2: Categorías de BIOFIN, Aichi y Plan nacional para la diversidad biológica

Categorías de los gastos en biodiversidad				
	Miles de pesos			%
	Biodiversidad			
BIOFIN	Gastos corrientes	Gastos de Inversión	Gasto Total	Estructura Porcentual
Conciencia y conocimiento	2 333.50	4 050.00	6 383.50	3
Gestión de la contaminación	35 728.90	93 573.30	129 302.20	52
Protección	12 365.40	710.60	13 076.00	5
Total	50 424.80	98 333.90	148 761.70	60

Fuente: datos aportados por la empresa (2020).

Se calcularon los porcentos del gasto total indirecto en biodiversidad por cada categoría de BIOFIN contra el presupuesto total asignado. En el caso de la categoría conciencia y conocimiento solo se ejecutaron 6 383.50 MP, que representa un 3 %, respecto al plan de la economía en los años analizados.

Los presupuestos ejecutados por la partida de gestión de la contaminación muestran un comportamiento irregular, pero con una tendencia al incremento en los últimos años (52 %). Estos presupuestos son mayores debido a que, están más acordes con el objeto social de la empresa.

En la partida de protección, los gastos corrientes han tenido años de mayor contribución a la protección de la biodiversidad (2015 al 2017). Sin embargo, las inversiones presentan pequeños montos

indirectos, ejecutados solo en los años 2015, 2016 y 2018.

Además de los gastos en que incurre la empresa en materia de cuidado del medio ambiente y con ello la diversidad biológica, existen otras acciones que se realizan en pos de minimizar los agentes que atentan contra la biodiversidad, tales como.

- El establecimiento de zonas de protección alrededor de los cuerpos de agua.
- Las fuentes subterráneas y zonas de recarga requeridas.
- La declaración de cuerpos de agua superficiales y subterráneos, sobreexplotados o en riesgo de estarlo.
- La declaración de los cuerpos de agua superficiales y subterráneos, contaminados o en proceso de contaminación.

- La aprobación del programa de regularización de las actuaciones hidrológicas correspondientes. ejecutados en el periodo (2015-2018). Las principales actividades estuvieron encaminadas a la plantación forestal y el manejo de la regeneración natural.

Empresa B

En la tabla 3 se presentan los principales gastos de inversiones directas en biodiversidad,

Tabla 3: Gastos de inversiones en biodiversidad por actividad y año

UM: MP			
Años	Gastos de inversiones directas en biodiversidad (1)	Gastos de inversiones indirectas en biodiversidad (2)	Gastos de inversiones totales en biodiversidad (1+2)
2015	8 516.10		8 516.10
2016	7 453.90		7 453.90
2017	7 692.60		7 692.60
2018	6 886.50		6 886.50
Total	30 549.10		30 549.10

Fuente: datos aportados por la empresa (2020)

Los gastos corrientes reflejan el manejo restauración de paisajes, la capacitación, educación silvícola y establecimiento de medidas para la ambiental, el extensionismo, y los estudios y servicios protección contra incendios, la conservación de suelos vinculados al desarrollo forestal (tabla 4). en ecosistemas forestales. También, la conservación y

Tabla 4: Gastos corrientes en biodiversidad por actividad y año

UM: MP			
Años	Gastos corrientes directos en biodiversidad (1)	Gastos corrientes indirectos en biodiversidad (2)	Gastos corrientes totales en biodiversidad (1+2)
2015	11 834.20	68.10	11 902.30
2016	16 161.00	58.70	16 219.70
2017	19 856.30	104.40	19 960.70
2018	25 111.30	71.0	25 182.30
Total	72 962.80	302.20	73 265.00

Fuente: datos aportados por la empresa (2020)

Como resultado, los gastos totales en biodiversidad se comportan de la forma siguiente, tal se observa en la tabla 5.

Tabla 5: Resumen total de los Gastos en biodiversidad por actividad y año

UM: MP			
Años	Gastos de inversiones en biodiversidad (1)	Gastos corrientes en biodiversidad (2)	Gastos totales en biodiversidad (1+2)
2015	8 516.1	11 902.30	20 418.40
2016	7 453.9	16 219.70	23 673.60
2017	7 692.6	19 960.70	27 653.30
2018	6 886.5	25 182.30	32 068.80
Total	30 549.10	73 265.0	103 814.10

Fuente: datos aportados por la empresa (2020)

En la tabla 6 se resumen los gastos totales dedicados a la biodiversidad y el monto que representan del presupuesto asignado.

Tabla 6: Plan y Ejecución de los gastos en biodiversidad. Miles de pesos

Años	Presupuesto o Plan (MP)		Biodiversidad		
	Asignado	Ejecutado	Gastos corrientes	Gastos de Inversión	Gasto Total
2015	25 613.80	20 646.30	11 902.30	8 516.10	20 418.40
2016	29 108.60	23 615.10	16 219.70	7 453.90	23 673.60
2017	27 501.00	27 548.10	19 960.70	7 692.60	27 653.30
2018	33 885.20	31 997.80	25 182.30	6 886.50	32 062.00
Total	116 108.60	103 807.30	73 265.00	30 549.10	103 807.30

Fuente: datos aportados por la empresa (2020)

En el periodo (2015-2018) la empresa empleó el 89 % del presupuesto asignado, a la biodiversidad, de ellos, el 29 % a las inversiones y el 71 % de los gastos corrientes, en labores de mantenimiento silvícola. Es importante señalar, que se dejó de ejecutar un 11 % del plan.

Empresa C

La Empresa expone el total de presupuesto asignado y ejecutado en el periodo 2015-2019 (tabla 7). Hubo una ejecución de un 99, 8 %, con pequeñas sub ejecuciones en los años 2015, 2016 y 2017, y un sobregiro en 2019 de 87.10 MP.

Tabla 7: Presupuesto asignado y ejecutado por año

UM: MP		
Flora y fauna Guantánamo	Presupuesto total asignado	Presupuesto ejecutado
2015	1 045.90	1 015.30
2016	1 074.40	1 065.00
2017	1 297.50	1 243.80
2018	1 737.40	1 737.40
2019	1 615.20	1 702.30
Total	6 770.40	6 763.80

Fuente: datos aportados por la empresa.

En la tabla 8 se detalla el presupuesto % corresponde a gastos corrientes directos en BD, y el ejecutado por concepto de gastos corrientes, solo el 4 96 % a los indirectos.

Tabla 8: Gastos corrientes en biodiversidad por actividad y año

UM: MP			
Años	Gastos corrientes directos en biodiversidad (1)	Gastos corrientes indirectos en biodiversidad (2)	Gastos corrientes totales en biodiversidad (1+2)
2015	6.50	156. 89	163.39
2016	6.60	159.70	166.30
2017	8.15	194. 63	202.78
2018	12.60	260.61	273.21
2019	11.40	242.28	253.68
Total	45.25	1014.11	1 059.36

Fuente: datos aportados por la empresa (2020)

Las principales inversiones estuvieron asociadas al proceso de plantaciones y de regeneración natural, con un monto de 22.30 MP, según se muestra en la tabla 9.

Tabla 9: Gastos de inversiones en biodiversidad por actividad y año

UM: MP			
Años	Gastos de inversiones directas en biodiversidad (1)	Gastos de inversiones indirectas en biodiversidad (2)	Gastos de inversiones totales en biodiversidad (1+2)
2019	22.30		22.30
Total	22.30		22.30

Fuente: datos aportados por la Empresa (2020).

En resumen, los gastos totales en biodiversidad se comportan tal se observa en la tabla 10.

Tabla 10: Resumen total de los Gastos en biodiversidad por actividad y año

UM: MP			
Años	Gastos de inversiones en biodiversidad (1)	Gastos corrientes en biodiversidad (2)	Gastos totales en biodiversidad (1+2)
2015		163.39	163.39
2016		166.30	166.30
2017		202.78	202.78
2018		273.21	273.21
2019	22.30	253.68	275.98
Total	22.30	1 059.36	1 081.66

Fuente: datos aportados por la empresa (2020).

Conforme a lo anteriormente expuesto, en la tabla 11 se resumen los gastos totales dedicados a la biodiversidad, y el monto que representan del presupuesto asignado.

Tabla 11: Plan y Ejecución de los gastos en biodiversidad. Miles de pesos

Años	Presupuesto o Plan (MP)		Biodiversidad		
	Asignado	Ejecutado	Gastos corrientes	Gastos de Inversión	Gasto Total
2015	1 045.90	1 015.30	163.39		163.39
2016	1 074.40	1 065.00	166.30		166.30
2017	1 297.50	1 243.80	202.78		202.78
2018	1 737.40	1 737.40	273.21		273.21
2019	1 615.20	1 702.30	253.68	22.30	275.98
Total	6 770.40	6 763.80	1 059.36	22.30	1081.66

Fuente: datos aportados por la empresa (2020).

Tal se aprecia, el porcentaje atribuible a la biodiversidad es de 15, lo cual no es representativo, elemento que debe ser tomado en consideración por los principales decisores de la organización.

Una vez evaluados los aspectos anteriores, se evidencian limitaciones que inciden en la situación actual que presenta la biodiversidad, las que se listan a continuación.

- No se logra el levantamiento de información en todas las instituciones que tienen implicación en el medio ambiente y los recursos naturales.

- Es insuficiente la preparación para enfrentar este proceso, por lo que se debe complementar el estudio con acciones de capacitación sistemáticas y bien organizadas.
- Limitaciones en la contabilidad empresarial y presupuestaria, ya que no se identifican partidas para medio ambiente, particularmente la biodiversidad.
- Algunas de las empresas no disponen de información priori al periodo de evaluación, o no contemplan los mismos en todos los años, lo que no permitió uniformidad en el proceso.

III. CONCLUSIONES

La protección y conservación de la biodiversidad es un tema prioritario a nivel mundial para la supervivencia de los seres vivos, frente a los embates del cambio climático, contrario a su implementación en las políticas públicas de los países, a pesar de los significativos niveles de pérdida de biodiversidad registrados.

Una de las vías para fomentar los montos presupuestales en función de la biodiversidad lo constituye el análisis de los gastos institucionales, como instrumento de diagnóstico para determinar si existe correspondencia con las prioridades normativas nacionales, y la efectividad en la asignación.

El examen de los gastos en biodiversidad en instituciones clave del territorio revela insuficiencias que deben ser perfeccionadas, de manera que se contribuya a la sostenibilidad financiera, para el enfrentamiento al cambio climático.

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By Said Sami Al Hallaq, Mohamad Mahmoud Ajlouni
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Keywords: hybrid genetic algorithm, analytic hierarchy process, portfolio selection, optimum portfolio and amman stock exchange.

GJMBR-C Classification: JEL Code: F65



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Said Sami Al Hallaq ^α, Mohamad Mahmoud Ajlouni ^σ & Mahmoud Faheem Al Saadi ^ρ

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I. INTRODUCTION

Selecting investment portfolio is one of the most important research areas in modern finance; it seeks to better allocate funds between baskets of securities. Portfolio selection was first introduced by "Harry Markowitz" in 1952, in his paper "portfolio selection." He explained the concept of diversification, and suggested that investors focus on portfolio selection depending on their overall risk-reward characteristics.. The Markowitz model consists of only two factors, which are the expected return and variance, and presumes investors are risk averse. The idea of the model is that an investor cannot achieve a high return without increasing portfolio risk.

Following Markowitz, many attempts have been conducted in the portfolio management to find new mathematical approaches to select the optimum portfolio. The computational capacity of the 21st century and the wide availability of computers have allowed the development of a new generation of intelligent computer techniques such as hybrid genetic algorithm (HGA). HGA is a problem-solving technique motivated by

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biological evolution, based on an artificially simulated natural selection process or the survival of the fittest, known as Darwinian evolution. HGA can only identify the portfolios being in the efficient frontier and has been used in many recent works to find the optimum portfolios, due to multiple objective functions in portfolio selection. Therefore, the Analytic Hierarchy Process (AHP) approach is tied to the HGA to select the optimal portfolio based on all criteria between the portfolios obtained by HGA. The main objective of this study is to investigate the ability of HGA and AHP in selecting the optimum portfolio using data of the Jordanian companies listed on the Amman Stock Exchange (ASE).

a) Study Questions

- Can HGA and AHP be used in selection of optimum portfolio?
- Can Efficient Frontier (EF) be identified using HGA?
- Can AHP select the optimum portfolio among the portfolios obtained by HGA?

b) Objectives of the Study

The main objective of this study is to investigate the ability of hybrid genetic algorithm and analytic hierarchy process in selecting the optimum portfolio. In particular, the study aims to identify the efficient frontier using HGA and selecting the optimum portfolio according to AHP from HGA's EF.

c) Importance of the Study

A review of the literature on the optimum portfolio selection using a hybrid genetic algorithm and analytic hierarchy process indicates that most of the studies on this topic have been conducted in developed countries. This is probably attributed to the fact that such studies require a relevant level of data disclosure and analyzing techniques. Thus, this study will contribute to the literature by producing answers regarding the selection of optimum portfolio using a hybrid genetic algorithm and analytic hierarchy process. HGA and AHP are new techniques, which are added to portfolio selection to reach EF and optimum portfolio. Therefore, the importance of this methodology is derived

from the importance of optimum portfolio, which all investors wish to reach.

d) *Structure of the Study*

The paper is organized as follows: In addition to the introduction, section two presents the theoretical background of the study. Section three covers the literature review, and what distinguishes the current study. Section four describes the methodology used. Section five presents the results. The final section presents recommendations and policy implications.

II. LITERATURE REVIEW

The beginning of the modern investment theory is traced back to 1952, when Harry Markowitz (1952) published an article titled "Portfolio Selection." He showed how to create a frontier of investment portfolios, so that everyone had the highest expected rate of return given its level of risk or the minimum level of risk given its rate of return. The calculation technique was very complex, especially given the technology of the time. In the past, the optimization of Markowitz's portfolio was used, mostly in the asset allocation decision. The investor decides on the amounts to invest in certain basic classes such as stock, bonds and real estate assets. The computing power needed to optimize more than a few asset classes is only a small fraction of what is needed to optimize more than thousands of stocks. There is a need to utilize the available quantitative data to solve the optimization problem. Prior to the spread of portfolio theory in the real world, three scholars simultaneously and independently asked the following questions: Assume that everyone successfully makes his investments using portfolio theory and invested in portfolios on the frontier, how would this affect the price of securities? In response to this question, Sharpe (1964), Lintner (1965) and Mossion (1966) developed the Capital Asset Pricing Model (CAPM), which is widely used in the real world to measure portfolio performance; securities value, make capital budgeting decisions, and even regulate utilities. However, the model was challenged by Richard Roll (1977, 1978), who argued that the model should be discarded because it was impossible to verify empirically its single economic forecast. This controversial issue remains the subject of a lively debate today. At the same time, Steve Ross (1976) developed an alternative model to CAPM. This model was called the Arbitrage Pricing Theory (APT) where expected return should be linked to risk so that no single investor could create unlimited return through arbitrage. The question of how to price option contracts has puzzled researchers in finance until a paper of Fisher Black and Myron Scholes was published in 1973. They argued that you could make a riskless hedged position with an option by taking a position in both the option and the stock it is written on. Although researchers in the finance science were trying to

determine the nature of the price structure in the securities markets, the issue of how efficient the market is in pricing to its structure was called into question. Fama (1970) stated that a market is efficient if security prices immediately and fully reflect all available relevant information. Fama, (1991) divided the overall EMH and the empirical test of the hypothesis into three sub-hypotheses depending on the information set including: Weak-Form of Efficiency, Semi Strong-Form of Efficiency, and Strong-Form of Efficiency (Haugen, 2001).

The Markowitz theory is now known as the Modern Portfolio Theory (MPT).. Although MPT is widely used in practice in the financial sector in recent years, the basic assumptions of the same have been largely questioned. MPT, as an improvement over traditional investment models, is an important mathematical modeling for the advancement of finance.

a) *Optimal Portfolio Selection*

Portfolio theory assumes that investors are essentially risk averse, meaning that given the choice between two assets with equal rates of return, they would select the asset with the lowest risk (Maginn *et al.*, 1990). This combination of risk preference and risk aversion can be explained by an attitude to risk that depends on the amount of money involved. Although diversity of attitudes is recognized, the basic assumption is that most investors who use large sums of money to develop an investment portfolio are averse to risk. As a result, there is a positive relationship between expected return and expected risk in the optimal selection process (Peavy, 1990). The optimal portfolio is a combination of investments, each of which has desirable individual risk-return characteristics that are also adjusted according to their correlations (Desai *et al.*, 2003). The optimal portfolio is the efficient frontier portfolio that has the greatest value for a given investor. It is at the point of tangency between the curve of the efficient frontier and the curve with the highest potential utility.

To expand Markowitz's model portfolio and the assumptions of EMH the risk-free rate of return should be considered. Correlation and covariance of any asset with a risk-free asset is zero. So any combination of an asset or portfolio with the risk-free asset generates a linear return and risk function. As a result, the combination of the risk-free asset with a risky asset in the Markowitz efficient frontier gives rise to linear portfolio opportunities while the dominant line is that which tangents the efficient frontier. This dominant line is known as the Capital Market Line (CML) (Haugen, 2001). Because all investors want to invest in the portfolio that is risky at the point of tangency, this portfolio - known market portfolio must contain all risky assets pro rata to their relative market values. In addition, the investment decision and financing decision

can be separated because, although everyone wants to invest in the market portfolio, investors make different financing decisions on loans or borrow depending on their preferences of individual risk (Davis and Norman, 1990). Given the CML and the predominance of the market portfolio, the relevant risk measure for an active individual risk is its covariance with the market portfolio. That is, it is systematic risk, when the covariance for the market portfolio is standardized, a known beta measure of the systematic risk and market line, which relates to the expected or required rate of return of an asset with its beta version (Lee and Su, 2014). Individual securities and portfolios are represented in the Security Market Line (SML) to determine the expected return because of a systematic risk (beta). Alternatively, assuming that markets are not always fully effective, one can identify undervalued and overvalued securities by comparing the estimated rate of return of an investment to its expected rate of return. The systematic variable risk (beta) for an active individual risk is calculated using a regression model that generates an equation referred to as the assets characteristic line (Hong and Sarker, 2007).

III. DATA AND METHODOLOGY

The study population consists of all companies listed in Amman Stock Exchange (ASE) during the period of January 1, 2015 to December 31, 2015. At the end of 2015, the total number of companies listed was 228 companies. The current study sample has been selected according to the criteria of continuous data availability. Therefore, the sample is limited to companies that met the following criteria:

- 1) Companies should have complete data availability during the study period.
- 2) Companies should have been established before 15 years.
- 3) Companies should not have been engaged in acquisitions or merger during the study period.

By applying these criteria, the final sample of this study is restricted to 60 companies. As for the data the study depends on secondary data that have been published in annual reports issued by Jordanian companies listed on Amman Stock Exchange (ASE), reports and trading data issued by ASE, statistical databases issued by the Central Bank of Jordan (CBJ), books and references, studies, previous researches related to the subject matter, and network (internet) publications. To achieve the purposes of the study, the following variables will be used: return, risk, beta, liquidity ratio, Sharpe ratio, Treynor's ratio and Jensen's alpha.

a) Mathematical Model

The current study aims to test the ability of HGA and AHP in selecting the optimum portfolio of shares

listed in Amman Stock Exchange. The model used in this study is based on the Yin-Wing and Yuping (2000) and Solimanpur *et al.* (2015) models.

Notations: The following notations are used to formulate portfolio selection problem:

- I : Index for stocks.
- N : total number of stocks.
- r_i : Return of stock i .
- R_p : Return of portfolio.
- σ_p : Risk of portfolio
- x_j : Percentage of stock j in portfolio.

Objective Functions: The attempted mathematical model includes two objective functions. Namely, return and risk of portfolio. These objective functions are formulated based on the following:

- *Return of Portfolio:* The portfolio return is defined as the weighted average returns of the portfolio shares and is expressed as follows (Haugen, 2001):

$$R_p = \sum_{i=1}^N r_i x_i \dots \dots \dots (1)$$

Risk of portfolio: Risk of a stock is defined as the tolerance of stock's return from the mean. The risk of a portfolio is expressed as follows (Haugen, 2001):

$$\sigma_p = \sqrt{\sum_{i=1}^N \sum_{j=1}^N r_i x_j cov_{ij}} \dots \dots \dots (2)$$

Where:

cov_{ij} : The covariance between returns of stock i and j expressed as $cov_{ij} = r_{ij} \sigma_i \sigma_j$.

r_{ij} : is the correlation coefficient between i and j .

Constraints: The attempted model has the following constraint:

$$\sum_{i=1}^N x_i = 1; \text{ if } x_i \geq 0, i = 1, 2, \dots, N$$

It should be noted that the non-negativity of the decision variables is used to prevent short selling.

IV. PROPOSED HYBRID GENETIC ALGORITHM (HGA)

a) Portfolio Display

In the proposed HGA, any portfolio is represented by $N \times num_bits$ genes in which N is the number of companies and num_bits is the number of binary bits used for representing the share of each company in the portfolio. The share of company i in the portfolio can be calculated by (Solimanpur, 2015):

$$x_i = \frac{v_i}{\sum_{i=1}^N v_i} \dots \dots \dots (3)$$

Where:

v_i : The decimal value of the binary code dedicated for company i .



This formula ensures that, after the execution of genetic operations, the constraints of mathematical models will be satisfied.

b) *Fitness Function*

Fitness of any chromosome in the proposed HGA is calculated in K directions. Fitness of chromosome S in direction k is computed by (Solimanpur, 2015):

$$fit_k(S) = w_{k1}R'_p(S) + w_{k2}\sigma'_p(S) \dots\dots\dots (4)$$

Where:

$$[(R \wedge)]_p(S) = R_s / \max_{T(U \in \Omega)} [(R_U)] \dots\dots\dots (5)$$

$$[(\sigma')]_S = \min_{T(U \in \Omega)} [(R_U)] / \sigma_S \dots\dots\dots (6)$$

c) *Selection*

In the proposed HGA, selection probability of chromosome S in direction k is proportional to the quality of this chromosome in the direction k , i.e $fit_s(S)$. In other words, the higher the fitness of a chromosome, the higher should be the selection probability.

d) *Portfolio Selection via Analytic Hierarchy Process (AHP)*

The method proposed an evaluation procedure comprising of the following steps (Islklar and Büyükcikan, 2007):

Step 1: Identify all the criteria to be taken into account in the choice of the portfolio (evaluation) and to build a hierarchy of decision-making.

Step 2: Calculate weights of criteria using AHP method. These steps are performed in the following subsections.

V. EVALUATION CRITERIA

Selecting the appropriate portfolio of performance measures to provide the necessary information to investors to assess the effectiveness with which they can invest their money is a vital issue. The performance appraisal is primarily related to the determination of how a particular investment portfolio has performed compared to a benchmark comparison. To effectively manage portfolio selection, it is necessary to consider the critical factors that reflect investor behavior and the state of the financial market. The different stakeholders within a decision process can be relatively diverse, with different objectives and conflicts of value systems. In this respect, a key concept is the relationship between risk and return. Each performance index provides a different perspective on the balance between the level of return and the exposure to risk. Therefore, in this study, seven measures, return, risk, beta, liquidity ratio, Sharpe ratio, Treynor's Ratio (TR) and Jensen's alpha (Alpha ratio) have been identified as criteria, which affect the investors decision in portfolio selection.

$fit_k(S)$: is the fitness value of chromo some S in direction k .

$R'_p(S)$: is the normalized value of return of chromosome S .

$\sigma'_p(S)$: is the normalized value of risk of chromosome S .

w_{k1} : is the weight of return in direction k .

w_{k2} : is the weight of risk in direction k .

The normalized values of return and risk of portfolio S in the population are defined as follows (Solimanpur, 2015): Ω

- *Beta:* Beta measures the price volatility of a share compared to the rest of the market. This measure of risk is defined as (Haugen, 2001):

$$\beta_i = \frac{Cov_{ri,rm}}{Var(r_M)} \dots\dots\dots (7)$$

Where:

$Cov_{ri,rm}$: The covariance between the rate of return of share i and the return of the market or index.

R_M : The rate of return of the market portfolio.

- *Liquidity Ratio:* This ratio indicates the annual liquidity of a stock. Haugen, (2001) derived from it the liquidity of a portfolio:

$$L_p = \sum_{i=1}^N L_i X_i \dots\dots\dots (8)$$

Where:

L_i : The liquidity of share i .

X_i : The percentage of share i in the portfolio.

- *Sharpe Ratio:* Sharpe ratio or RVAR measures the return into the portfolio risk (standard deviation of return) (Sharpe, 1966):

$$RVAR = \frac{\overline{TR}_p - \overline{RF}}{SD_p} \dots\dots\dots (9)$$

Where:

\overline{TR}_p : The mean of portfolio returns in a certain period.

\overline{RF} : The mean of non-risk return rate in time set.

SD_p : The standard deviation of portfolio returns in time set.

$\overline{TR}_p - \overline{RF}$: The surplus return of portfolio.

This ratio measures the surplus return of portfolio versus a risk unit. The higher the RVAR of a portfolio, the higher will be its desirability.

- *Treynor's ratio (TR)*

TR measures the proportion of extra return on beta (Treynor, 1965). The ratio is defined as:

$$TR = \frac{\overline{TR}_p - \overline{RF}}{\beta_p} \dots\dots\dots (10)$$

Where:

β_p : The systematic risk of portfolio (beta ratio).

This ratio measures the excess return of portfolio versus portfolio's systematic risk unit.

- Alpha Ratio

Alpha ratio is linked to Treynor's ratio and, hence, it provides a classification that is close to the performance of a portfolio (Jensen, 1968). This ratio is defined as:

$$\bar{\alpha}_p = \bar{R}_p - [\bar{RF} + (RM - \bar{RF})\beta_p] \dots \dots \dots (11)$$

The weakness and strength of a portfolio's performance has two sources: The first is the portfolio manager's ability to select appropriate shares, and the second is their ability to make appropriate decisions over time and to assess threats and market opportunities. Obviously, the manager who considers these aspects will have a better performance in managing the portfolio. The benefit of using this ratio is the possibility to measure $\bar{\alpha}_p$ and β_p at the same time (Haugen, 2001).

VI. THE ANALYTIC HIERARCHY PROCESS METHODOLOGY

AHP includes six basic steps, as summarized below (Islklar and Büyüzkcan, 2007; Saaty, 1980):

Step 1: AHP breaks down a complex multi-criteria decision-making problem to several small sub-problems each with a single criterion. Thus, the first step is to break the problem of decision in a hierarchy with a goal at the top, criteria and sub-criteria at levels and sub-levels and alternative decisions at the bottom of the hierarchy.

Step 2: The decision matrix, which is based on Saaty's nine-point scale, is constructed. The decision-maker uses the fundamental scale defined by Saaty to assess the priority score.

Step 3: It involves pair wise comparison of the elements of the constructed hierarchy. The aim is to set their relative priorities with respect to each of the elements at the next higher level.

Step 4: AHP also calculates an inconsistency index to reflect the consistency of decision maker's judgments during the evaluation phase. The inconsistency index in both the decision matrix and in pairwise comparison matrices can be calculated by the following equation (Saaty, 1980):

$$CI = \frac{\lambda_{max} - N}{N - 1} \dots \dots \dots (12)$$

The closer the inconsistency index to zero; the greater will be the consistency of decision-maker's judgments. The consistency of the assessments is

ensured if the equality $a_{ji} \cdot a_{jk} = a_{ik}$ holds for all criteria. The relevant index should be lower than 0.10 to accept the AHP results as consistent. If this is not the case, the decision-maker should go back to Steps 2 and 3 and redo the assessments and comparisons.

Step 5: Before any calculation, the comparison matrix has to be normalized. To normalize, each column is divided by the sum of entries of the corresponding column. In that way, a normalized matrix is obtained in which the sum of the elements of each column is 1.

Step 6: The relative values obtained in the third step should satisfy:

$$AW = \lambda_{max} W, \dots \dots \dots (13)$$

Where:

A: Represents the pairwise comparison matrix.

λ_{max} : The highest eigenvalue.

W: Weight of the vector or elements.

If there are elements at the higher levels of the hierarchy, the obtained weight vector is multiplied by the weights of the elements at the higher levels, until the top of the hierarchy is reached. The alternative with the highest weight is finally considered as the best alternative.

VII. DATA ANALYSIS

This section shows the descriptive statistics of the study variables, and then examines the ability of the HGA and AHP to select the optimum portfolio. In particular, this section aims to answer the questions and test the hypotheses of this study.

a) Hybrid Genetic Algorithm Process and implementation

To implement the previously discussed methodology, we created an application using Visual Studio 2010, and C#.NET as a programming language. As figure (1) shows, the first step in this work is to read the stocks data. In this step, the program reads the stocks data and creates an object for each stock, and then loads the daily data return for each stock. After that, it uses the stocks, data to create 10,000 portfolios, where by each portfolio consists of six stocks. Following that, it uses the daily data return of the assets to calculate the portfolios risk and return. Then it uses the portfolios risk and return to evaluate the fitness of the portfolios and select the top 10 portfolios to be used in the HGA. After that, it uses the top 10 portfolios in the crossover process to generate the second generation of portfolios. Finally, it selects the top 10 portfolios from the second-generation portfolios and draws the efficient frontier.

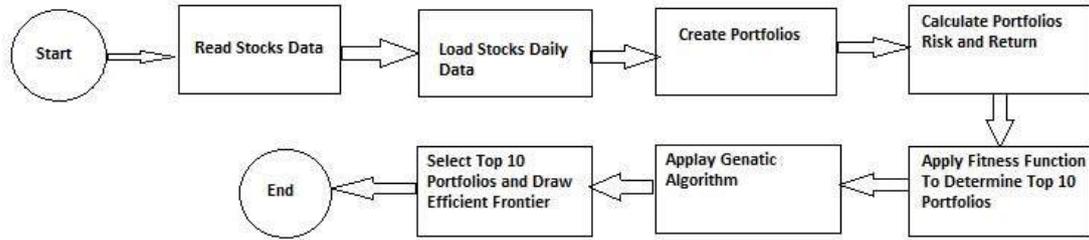


Figure 1: Flowchart of the Implementation Process

b) Implementation Details

The study gathered the stocks data from Amman Stock Exchange website for the year 2015 and used the data to create excel sheets and notepad files which are loaded to the system and an object for each stock is created consisting of five characteristics based on the following:

- 1) Stock ID: unique integer value varies between 60-120 which is used to identify each stock.
- 2) Stock Code: Company code as in Amman Stock Exchange.
- 3) Return: Stock expected return.
- 4) Risk: Stock risk.
- 5) Daily Data: The stock daily return.

We have assigned a unique ID for each stock which varies from 60-120. The ID will be used to calculate the weight of each stock in the portfolio, in a manner that the stock with the highest expected return has the highest ID and so on. It would be natural to choose the ID's from 1-60 but we chose to select the ID's from 60-120 for the following reason:

In the 1-60 ID's the share of each stock will dramatically vary between the following values:

Highest weight would be the result of company with ID 60 to be assigned in a portfolio with the stocks of ID's 1,2,3,4 and 5. In this situation the Stock with ID 60 will have a weight of $60/(60+1+2+3+4+5) = 80\%$.

Lowest weight would be the result of company with ID 1 to be assigned in a portfolio with the stocks ID's 60, 59, 58, 57 and 56. In this situation the Stock with the ID 1 will have a weight of $1/(60+59 + 58+57+56+1) = 0.34\%$

However, in the situation of ID's 60-120 we had the weights vary between 9.2% and 27.9%. As we can see, the second approach gives a better chance for the assets to affect the portfolio return and risk, and eliminates the possibility of a single asset to dominate the portfolio.

Having created the stocks and loaded the daily data, 10,000 portfolios are created with each portfolio containing six different stocks selected randomly from the previously created 60 stocks. Following the creation of the portfolios the risk and return of each portfolio will be calculated.

Portfolio return will be calculated according to the following formula (Haugen, 2001):

$$Return = w_1 * R_1 + w_2 * R_2 + w_3 * R_3 + w_4 * R_4 + w_5 * R_5 + w_6 * R_6 \dots\dots\dots (14)$$

Where:

W: The weight of each stock in the portfolio.

R: The rate of return of each stock in the portfolio.

The weight for each stock in the portfolio is calculated by dividing the asset ID over the summation of the total assets IDs of the portfolio.

The 6 asset portfolio risk will be calculated according to the following formula (Haugen, 2001):

$$\sigma^2 por = w_1^2 \sigma_1^2 + w_2^2 \sigma_2^2 + w_3^2 \sigma_3^2 + w_4^2 \sigma_4^2 + w_5^2 \sigma_5^2 + w_6^2 \sigma_6^2 + 2w_1w_2 cov(1,2) + 2w_1w_3 cov(1,3) + 2w_1w_4 cov(1,4) + 2w_1w_5 cov(1,5) + 2w_1w_6 cov(1,6) + 2w_2w_3 cov(2,3) + 2w_2w_4 cov(2,4) + 2w_2w_5 cov(2,5) + 2w_2w_6 cov(2,6) + 2w_3w_4 cov(3,4) + 2w_3w_5 cov(3,5) + 2w_3w_6 cov(3,6) + 2w_4w_5 cov(4,5) + 2w_4w_6 cov(4,6) + 2w_5w_6 cov(5,6) \dots\dots\dots (16)$$

$$And \sigma por = \sqrt{\sigma^2 por}$$

To calculate the covariance we used the stocks daily data to calculate the mean and variance for each stock and used the following formula to calculate the covariance between each two stocks in any portfolio:

$$Cov = \frac{\sum(x-\bar{x})(y-\bar{y})}{n} \dots\dots\dots (17)$$

Where:

\bar{x} and \bar{y} : are the sample means return averages.

n: is the sample size.

After calculating the risk and return for each portfolio, we apply the following fitness function to calculate the fitness factor for each portfolio (Solimanpur, 2015):

$$fit_k(S) = w_{k1}R'_p(S) + w_{k2}\sigma'_p(S) \dots\dots\dots (18)$$

Where:

$fit_k(S)$: is the fitness value of chromosome S in direction k.

$R'_p(S)$: is the normalized value of return of chromosome S.

$\sigma'_p(S)$: is the normalized value of risk of chromosome S.

w_{k1} : is the weight of return in direction k.

w_{k2} : is the weight of risk in direction k.

To produce our results, we used the following weights for risk and return:

Table 1: Fitness Function Weights.

Weight of risk	Weight of return
50%	50%
40%	60%
80%	20%
20%	80%
60%	40%

After calculating the fitness value for each portfolio, we select the top 10 portfolios based on the highest fitness value.

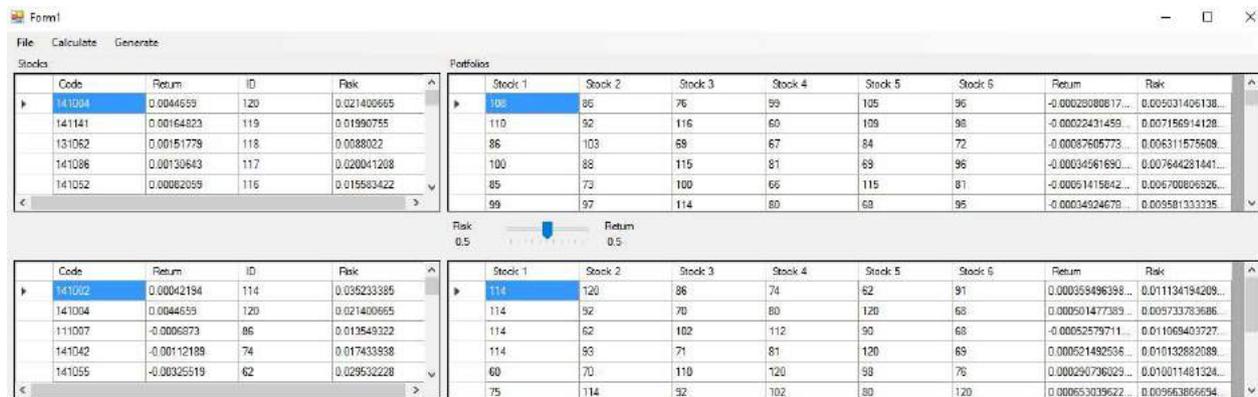


Figure 2: Portfolios and Stocks.

Figure (2) contains the data of the stocks and portfolios. The left top grid shows the stocks and data. The top right grid shows the 10,000 portfolios we have created earlier. In the bottom right grid we can find the assets of which the top 10 portfolios are created. In the bottom right grid, we can find the top 10 portfolios and their associated stocks risk and return.

Now after having determined the top 10 portfolios, it is time to use HGA. In the HGA, each portfolio is treated as a gene, where each gene consists of six chromosomes which represent the assets of the portfolio. A chromosome for a portfolio consists of the following assets {114, 120, 86, 74, 62, 91} would be [1110010 1111000 1010110 1001010 0111110 1011011] where each seven digits represent the chromosome for each asset which are the result of the ID conversion

from decimal to binary. The purpose of the HGA is to swap chromosomes between the best genes to generate better chromosomes. To do so, we separated the assets of the top 10 portfolios and used these assets to create the second generation of the portfolios using HGA. After separating the genes from which the chromosomes are created, we used these genes as the basis to create the new portfolios, which is known as the Crossover operation. We have created portfolios six times the number of the successful genes. The created portfolios are referred to as the second-generation portfolios.

After creating the second-generation portfolios, we selected the top 10 portfolios from the second-generation portfolios and created the efficient frontier graph.

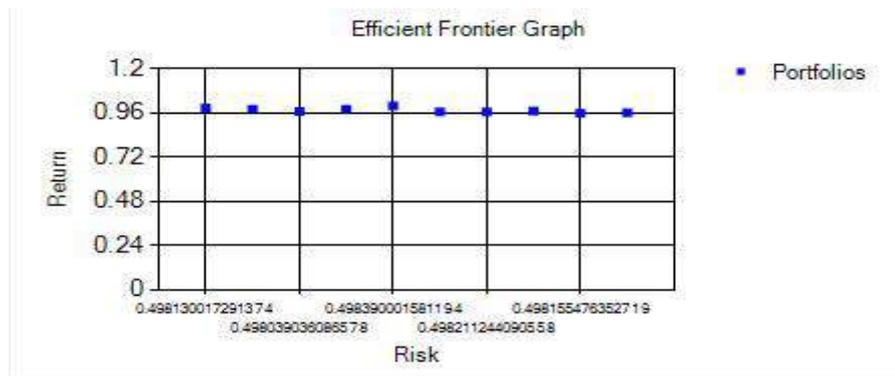


Figure 3: Efficient Frontier

As figure (3) shows, the points on the graph represent the top 10 portfolios according to the fitness function. We can notice that there are some portfolios on the graph that meets the efficient frontier criteria which we are going to discuss in the results section.

VIII. RESULTS OBTAINED USING THE HYBRID GENETIC ALGORITHM

Five different tests were applied. In each test, we selected different weights for the risk and return for portfolio fitness calculation.

a) Risk & Return weights

In this test we selected a weight of 0.5 for each of the risk and the return in the fitness function. Using

Top 10 portfolios selected from the 10000 portfolios:								
1	1010001	1111000	1000101	1101101	1110111	1100001	0.00771894662218939	0.0946752554621849
2	1111000	1000101	1101101	1110111	1100001	1001011	0.00837236649310477	0.0932574499151104
3	1100110	1010001	1111000	1000101	1101100	1110110	0.00624016282231191	0.0916182892976589
4	1100111	1010001	1111000	1000101	1101100	1110110	0.00564187490618866	0.0920396711185309
5	1010001	1111000	1000101	1101100	1110110	1100000	0.00599002959296613	0.0914739476351351
6	1010001	1111000	1000101	1101100	1110110	1100001	0.00692759672921441	0.0918478178752108
7	1100111	1010001	1111000	1000101	1101101	1110110	0.00561666820085502	0.0921562816666667
8	1111000	1000101	1101100	1110110	1100000	1001011	0.00654011026950142	0.0900161058020478
9	1111000	1000101	1101100	1110110	1100000	1001010	0.00638947117316662	0.0901506017094017
10	1100111	1010001	1111000	1000101	1101101	1110111	0.00657791258693496	0.0948382429284526

For example let's consider the first portfolio shown in figure (4).

Figure 4: Top 10 Portfolios Selected from the 10,000 Portfolios

The portfolio chromosome is [1010001 1111000 1000101 1101101 1110111 1100001], this chromosome is composed of six different genes, when each gene is converted to its equivalent decimal number the portfolio stocks IDs are: [81 120 69 109 119 97]. Therefore, the weights for each stock are calculated as follows (Solimanpur, 2015):

$$\begin{aligned}
 v_1 &= 1010001 \rightarrow v_1 = 81 \\
 v_2 &= 1111000 \rightarrow v_2 = 120 \\
 v_3 &= 1000101 \rightarrow v_3 = 69 \\
 v_4 &= 1101101 \rightarrow v_4 = 109 \\
 v_5 &= 1110111 \rightarrow v_5 = 119 \\
 v_6 &= 1100001 \rightarrow v_6 = 97
 \end{aligned}$$

The share of each company in this portfolio is obtained as follows (Solimanpur, 2015):

$$\begin{aligned}
 x_1 &= \frac{81}{81 + 120 + 69 + 109 + 119 + 97} = 13.6\% \\
 x_2 &= \frac{120}{81 + 120 + 69 + 109 + 119 + 97} = 20.2\% \\
 x_3 &= \frac{69}{81 + 120 + 69 + 109 + 119 + 97} = 11.6\% \\
 x_4 &= \frac{109}{81 + 120 + 69 + 109 + 119 + 97} = 18.3\% \\
 x_5 &= \frac{119}{81 + 120 + 69 + 109 + 119 + 97} = 20.0\% \\
 x_6 &= \frac{97}{81 + 120 + 69 + 109 + 119 + 97} = 16.3\%
 \end{aligned}$$

these weights we obtained the following top 10 portfolios selected from the created 10,000 portfolios, the selection was based on the higher fitness.

Figure (4) shows the portfolios that are selected as the top 10 portfolios from the 10,000 portfolios we created based on the fitness function. The first six segments represent the chromosomes of the portfolio, where each chromosome represents a stock. The last two segments are the risk and the return respectively. Each chromosome is converted into the equivalent decimal number which represents the stock ID, and then the ID is used to calculate the stock weight in the portfolio.

Then we use the top 10 portfolios to extract the genes which we are going to use in the crossover operation.

Figure (5) shows the genes and the stocks that were extracted from the top 10 portfolios. After extracting the genes we used them in the crossover operation to create the second generation of the portfolios, and then we selected the top 10 portfolios of the second generation based on the fitness function.

Top 10 portfolios stocks		
131003	81	1010001
141004	120	1111000
141019	69	1000101
111004	109	1101101
141141	119	1110111
142041	97	1100001
141059	75	1001011
111001	102	1100110
141014	108	1101100
131062	118	1110110
141081	103	1100111
111033	96	1100000
141042	74	1001010

Figure 5: Genes and Stocks used to Create Top 10 Portfolios

Figure (6) shows the top 10 portfolios of the crossover results. These portfolios are used to draw the efficient frontier graph.

Crossover top 10 portfolios

1110111	1110110	1100110	1100000	1101101	1111000	0.00646079742249487	0.134291109939759
1110111	1110110	1100110	1001010	1101101	1111000	0.00675520227248665	0.129273693146417
1000101	1100110	1110111	1110110	1111000	1001010	0.0074520919325518	0.118732436877076
1111000	1001011	1110111	1110110	1010001	1100000	0.00731863679208056	0.12119884729064
1100001	1110110	1111000	1001010	1110111	1000101	0.00817775246464712	0.119187514237856
1010001	1110111	1110110	1100110	1001010	1111000	0.00707252922642634	0.121227885993485
1110111	1110110	1001011	1100000	1101101	1111000	0.00695421613566113	0.12930908477237
1100110	1100000	1110110	1111000	1100001	1101101	0.00678583435607438	0.10551735046729
1100110	1100001	1110110	1111000	1001010	1110111	0.00787473981489722	0.126203511111111
1001010	1110111	1110110	1100110	1100000	1111000	0.00712075374560816	0.125906252782194

Figure 6: Top 10 Second Generation Portfolios

Figure (7) illustrates the generated efficient frontier by the proposed HGA. Overall, the annual return of optimal portfolios varies between 10.552% and 13.429%, while their risk changes between 0.646%

and 0.818%. A decision-making technique based on AHP is proposed in the next section which helps decision-makers to select the most suitable portfolio from among 10 portfolios.

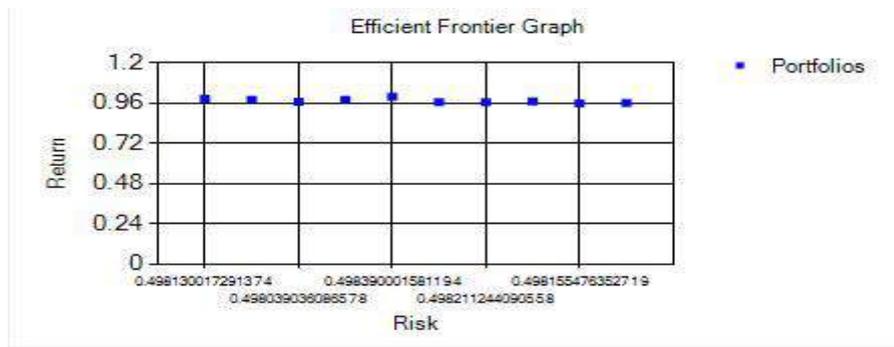


Figure 7: Efficient Frontier Graph

b) Portfolio Selection via Analytic Hierarchy Process

The proposed hierarchical structure of the optimum portfolio selection problem along with the alternatives obtained by HGA and the identified criteria are depicted in Figure (8). As seen, the decision hierarchy consists of three levels. The optimum portfolio

selection is the prime objective of the problem and takes place at the topmost level (Level 1) of the hierarchy. The seven criteria: return, risk, beta ratio, liquidity, RVAR, TR and alpha ratio take place at the second level. Finally, the 10 portfolios identified by HGA take place at the most bottom level (Level 3) as decision alternatives.

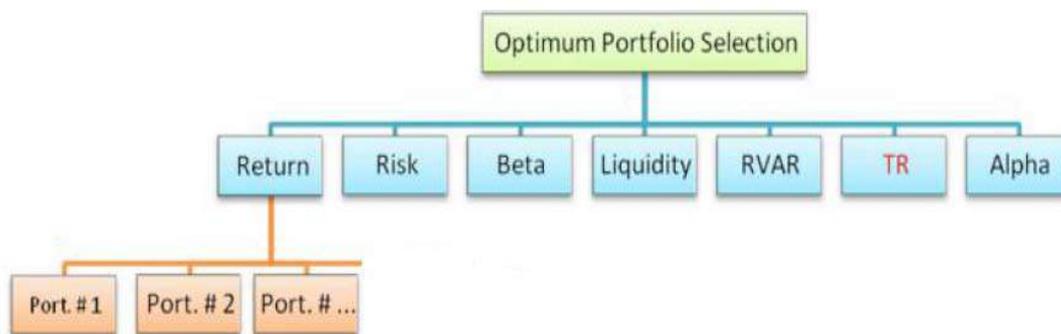


Figure 8: Proposed Hierarchy of the Portfolio Selection Problem

Table (2) shows the top 10 portfolios that resulted from the (GA) operation and their criteria which were mentioned before, and it should be noted that the Sharpe and Tryner for the market portfolio was calculated and they were (-8.646) and (-0.038049125) respectively.

Table 2: Seven Criteria's Portfolios

Por.#	Risk	Return	liquidity	Sharpe	Beta	TR	Alpha
1	0.646%	13.429%	1.702	14.904	0.153	0.631	0.102
2	0.676%	12.927%	1.815	13.512	0.191	0.478	0.099
3	0.745%	11.873%	2.159	10.834	0.197	0.410	0.088
4	0.732%	12.120%	2.462	11.368	0.295	0.282	0.094
5	0.818%	11.919%	2.301	9.928	0.146	0.554	0.087
6	0.707%	12.123%	2.018	11.768	0.281	0.296	0.094
7	0.695%	12.931%	1.913	13.130	0.211	0.434	0.099
8	0.679%	10.552%	0.860	9.950	0.133	0.507	0.073
9	0.787%	12.620%	1.966	11.201	0.335	0.263	0.101
10	0.712%	12.591%	1.843	12.345	0.166	0.529	0.094

Figure (9), shows the result of the hierarchy analysis process, where the (Y) axis represents the portfolio number and the (X) axis represents the relative weight of the portfolio in terms of preference. As illustrated by the figure the optimum portfolio is portfolio number (8).

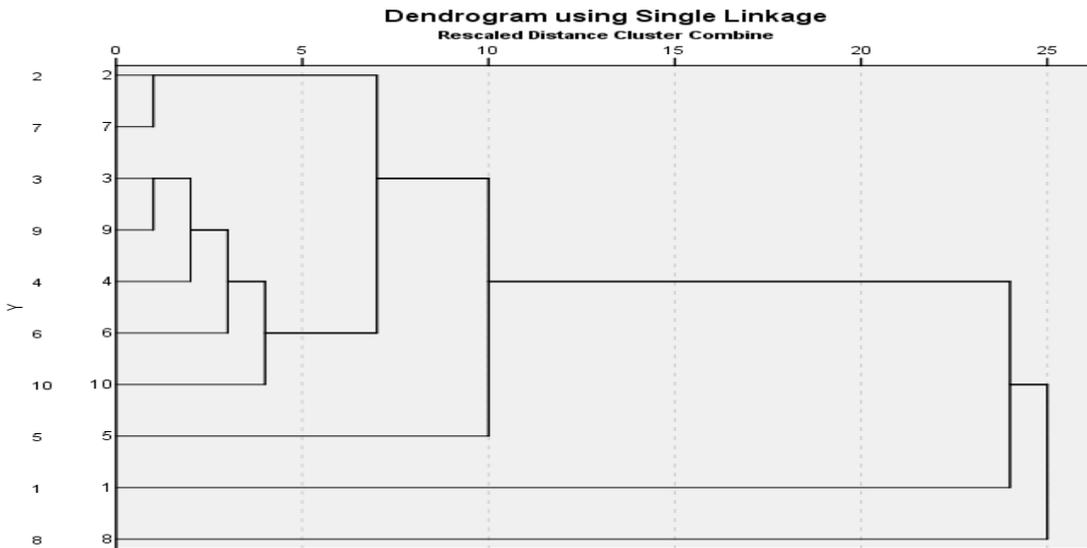


Figure 9: Portfolio Hierarchy Analysis

Therefore, the portfolios can be displayed according to its optimality as in the following table (3):

Table 3: Portfolios Optimality

Portfolio #	Optimality Order
1	2
2	7
3	7
4	6
5	3
6	5
7	7
8	1
9	7
10	4



IX. CONCLUSION AND POLICY IMPLICATIONS

The main objective of this study is to investigate the ability of a Hybrid Genetic Algorithm and Analytic Hierarchy Process in selecting the optimum portfolio. The study creates portfolios using the daily return of the companies listed in Amman Stock Exchange, during the period from January 1, 2015 to December 31, 2015. With reference to the findings of the analysis, the findings could be listed as follows:

- 1) Hybrid Genetic Algorithm can identify the portfolios on the efficient frontier.
- 2) Hybrid Genetic Algorithm does not have any restriction as far as the number of assets, is concerned.
- 3) Hybrid Genetic Algorithms have advantage over problems for the portfolio selection cases which scale of the problem or the nonlinear constraints of the problem unable us to use linear or quadratic models.
- 4) Analytic Hierarchy Process can select the optimum portfolio among the portfolios obtained by HGA.
- 5) Finally, the selected optimal portfolio achieves a return of 10.552% with a risk of 0.679%, where the liquidity of this portfolio is 0.860, Sharpe ratio 9.950, Beta 0.133, Try nor ratio 0.507 and Alpha ratio 0.073.

a) Policy implications

The results discussed above can lend support the following recommendations:

- 1) To make portfolio selection and optimization problems more accurate, we can present other main parameters such as taxes and transaction costs in order to make more perfect decisions.
- 2) AHP in this article includes seven criteria. This hierarchy can be more complete by adding other quantitative or qualitative criteria not used here.
- 3) Individuals, Investors and governments can employ this method to construct optimized portfolio and modify their portfolios investment depending on their Investment strategy.

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Keywords: *servqual, service gap, tangibility, reliability, responsiveness, assurance, empathy and northern region of Bangladesh.*

GJMBR-C Classification: *JEL Code: G21*



Strictly as per the compliance and regulations of:



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Tarannum Islam ^α, Shekh Md. Sahiduj Jaman ^ο & Tanzila Rahman Lubna ^ρ

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I. INTRODUCTION

The expansion of the banking system influences and accelerates Bangladesh's economic growth and development. The Bangladeshi banking industry has shown tremendous growth over the past ten to two decades. Commercial banking is a service industry and brings services to the consumer. Also, it strongly believes that a satisfied customer is the best

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person to produce sound word of mouth in a commercial bank. The current world is rapidly changing to meet the challenge of a competitive free-market economy. In the current competitive environment, proper service marketing is a requirement for customer satisfaction, and customer satisfaction is a necessity for living in the market over time. Therefore the importance of service marketing is enormous. The banking sector is facing fierce competition for service delivery. So they always try to provide the best customer service. As they strive to provide better customer service, periodic testing of their services is much needed. This analytical study has tried to focus on that in all banking organizations. Before choosing a bank, each customer expects certain types of banking services. Provided gap exists between customer perception and bank management perspective, it influences the customer. These gaps create from the following issues such as verbal communication, personal needs, expected service, experience, banking service, personal service delivery, customers management vision, external communication, work value, image value, amount of time, costs of energy. The current banking business completely influence of the globalization process. The impact is felt, in particular, on the liberalization of financial markets, which in turn creates more competition. To survive the competitive struggle, banks have to offer their customers something new and cheap because the competitive power of a bank widely determine by the degree of its compliance with customer needs. Cutting-age, organizations need new competitive success skills, such as customer relationships, innovation, customized products, staff skills, motivation, and information technology (Titkoet., al 2010). The Bangladesh banking industry has changed at sea after independence. More recently, liberalization, the economic boom of the 1990s, and the government's decision to commercialize banks by reducing state ownership turned to bank transformation. Financing by the private commercial banks in industrial production has been quite laudable. After 1995, the growth rate has never been in the negative territory. It becomes manifest from the years 2000 onward that the growth rate has been fully healthy. This growth supports of the emergence of newer private banks and the establishment of new branches by the existing ones.

- a) *Research Objective*
- To identify the factor/service(s) incorporated for the quality of bank
 - To know the expectations of the clients regarding those benefits/ factors (services) for the quality of banks (Expectation)
 - To identify the existing factors (benefits) are available in the selected banks (Perception)
 - To calculate the deviation between expectation and perception in terms of the benefits/services/factors
 - To tests the Hypothesis for justifying the difference between the benefits/services/factors of expectation and perception

b) *Hypotheses of the Research*

Five hypotheses postulate in this survey such as,

H_{o1} = There is no gap in private commercial banks of tangibility dimension.

H_1 = There is a gap in private commercial banks of tangibility dimension.

H_{o2} = There is no gap in private commercial banks of the reliability dimension.

H_2 = There is a gap in private commercial banks of the reliability dimension.

H_{o3} = There is no in gap private commercial banks of responsiveness dimension.

H_3 = There is a gap in private commercial banks of responsiveness dimension.

H_{o4} = There is no gap in private commercial banks of assurance dimension.

H_4 = There is a gap in private commercial banks of assurance dimension.

H_{o5} = There is no gap in private commercial banks of empathy dimension.

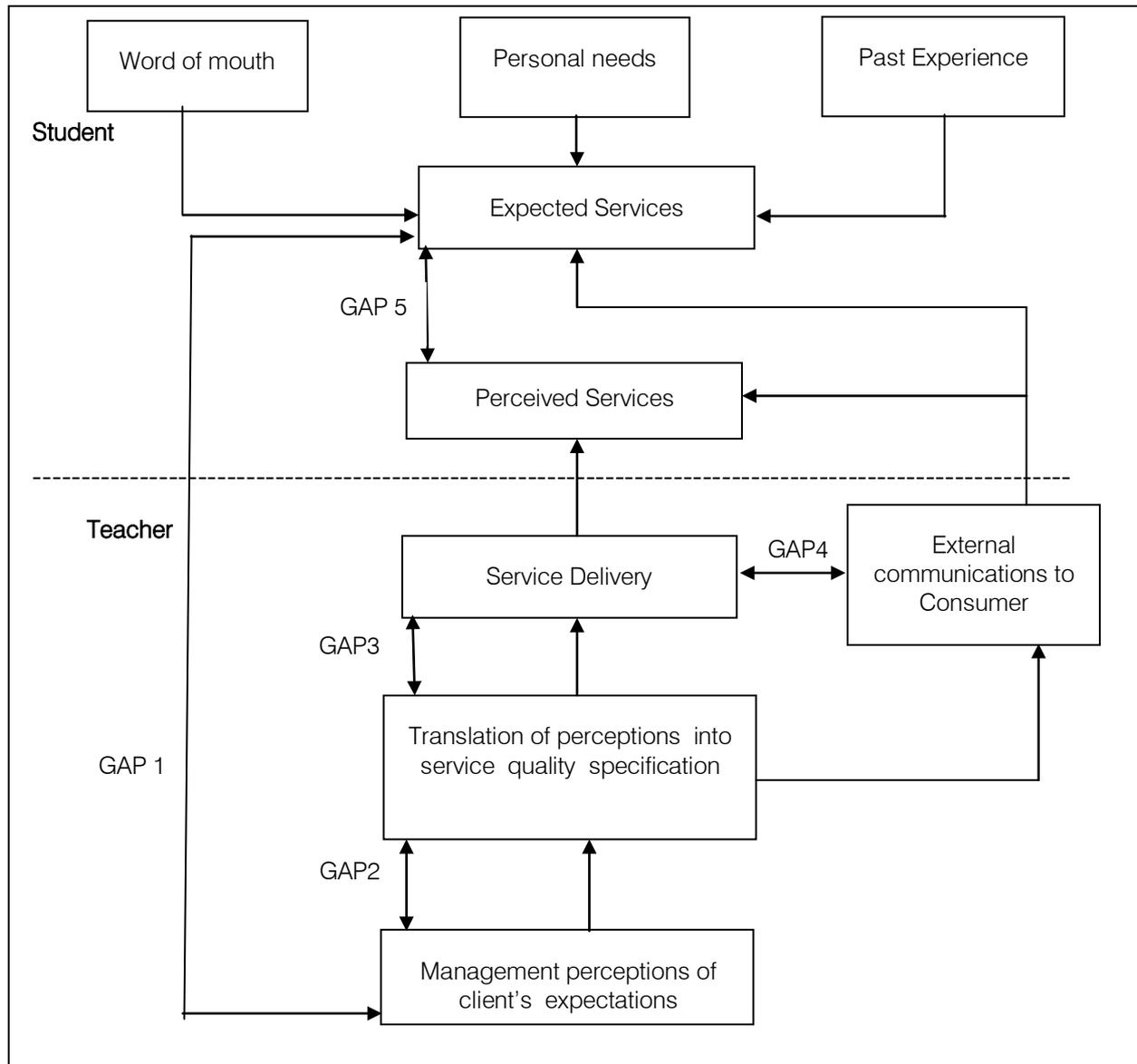
H_5 = There is a gap in private commercial banks of empathy dimension.

II. LITERATURE REVIEW

The evaluation of banking services in Bangladesh should determine the gap in customer expectations and satisfaction (MD Zahid Hossain et., al 2015) recommend something new for customers to gain a high-profile and long-term business impact and help develop the industry in a competitive environment. This paper attempts to show the correlation between the provider gaps and the gap between expected service and perceived service (customer gaps) in public and private commercial banks. The author suggests and recommends some measures when the quality of services occurs losses, management should investigate wherever service gaps lie and try to close the gaps for current standard service to their customers (Mst. Momena Akhter, 2012). Islamic banks differ than that of conventional banks of customers' perceptions of service quality and image of expected services. According to (Md Abu Saleh et., al 2016), here examine the dissent insight of Islamic and conventional banking system in an

emerging market, which has often been noticed by re-examining the SERVQUAL model. This study's effect on customer satisfaction related to the existing image of banking services where Islamic bank customers' perceptions of the level of reliability, responsiveness, security, and reputation were significantly higher than those of conventional banks. Authors try to evaluating of how Islamic bank practices activities differ from those of banks in case of service quality and image-related benefits and also describe customers' perceived assessment of satisfaction and loyalty in a comparative research setting. To measure the service quality in one of the leading private banks in Bangladesh, Dutch Bangla Bank Limited (DBBL concerns with the customers who have opened accounts in Dhaka city and receive services through its large number of branches and other service-providing sectors and the research method used by SERVQUAL model where all the five dimensions average perception scores exceeds the customer expectation with overall positive results except three statement. The only recommendation was to reduce those three statements which fail to match the expectation level through their internal strategies and techniques (Ahmed, Md. Forkan, 2019). Attracting new customers and retaining existing customers have no alternatives to a financial institution to survive and succeed in the competitive superior business environment. These are the reasons companies are placing more and more focus on service quality. SERVQUAL model with five different dimensions and twenty-two statements used to evaluate service quality of a leading private commercial bank in Bangladesh and measure the gap between expectation and perception of customers about financial services offered by it. The management of the bank should get the insights of their service quality based on the scores of different dimensions and take some measures to reduce gaps (Mohammed Masum Iqbal, 2013).

III. CONCEPTUAL FRAMEWORK OF SERVQUAL MODEL



Source: A. Parasuraman, Valarie A. Zeithamal, and Leonard L Berry (Fall, 1985): p.44.

Figure 1: Conceptual Framework of service quality gaps

IV. RESEARCH DESIGN AND METHOD

Two types of data need for the research: primary data for statistical analysis and secondary data for the literature review. A Likert scale uses to question the respondents on the five-point scale where, 5= Strongly agree, 4= Agree, 3= Neutral, 2= Disagree, and 1= Strongly disagree. For conducting the study, we selected only 20 private commercial banks as the sample. Therefore, the clients of those banks consider as respondents of the research. All the banks are from Rangpur and Rajshahi divisions. 20 Private Commercial Banks namely: Bank Asia Limited, BRAC Bank Limited, City Bank Limited, Dhaka Bank Limited, Dutch-Bangla

Bank Limited, IFIC Bank Limited, Meghna Bank Limited, Mercantile Bank Limited, Mutual Trust Bank Limited, National Bank Limited, Prime Bank Limited, Pubali Bank Limited, Standard Bank Limited, Southeast Bank Limited, South Bangla Agriculture and Commerce Bank Limited, Trust Bank Limited, Exim Bank Limited, NCC Bank Limited, Jamuna Bank Limited. We physically communicated with the clients of selected banks to collect data for the study. The sample size is very significant for getting an expected result of research work. From the mentioned area, we take 200 clients of different banks for conducting the study. Thus, the total sample size was 200. We use judgmental as well as the convenience sampling method for the research.

Stepwise regression uses to test the hypothesis and find the mean and standard deviation to know the relationship between independent variables and dependent variable and to assess the service gap. Ms. Excel uses to carry out calculations in some cases. SPSS (Statistical Package for Social Science) software uses for descriptive analysis, correlation, reliability statistics, and testing hypothesis as well.

V. ANALYSIS AND FINDINGS

a) Factors incorporated the service-quality of private commercial banks in Bangladesh

Customers' perception of service quality heavily influences by the banks where they receive service at,

Table 5.1.1 Factors incorporated the service-quality on private commercial banks in Bangladesh

S.L	Factors	Actual Respondent	Response Respondent	Percentage
1.	Satisfactory Environment	25	24	96%
2.	Updated Technology	25	25	100%
3.	Enough ATM Booth	25	23	92%
4.	Employees Professional Appearance	25	24	96%
5.	Timely Delivery System	25	25	100%
6.	Accurately Serve Promise Services	25	25	100%
7.	Solve Customer Problem	25	24	96%
8.	Error Free Transection	25	25	100%
9.	Security at Entrance and Exit	25	23	92%
10.	Informed New Services or Product	25	25	100%
11.	Employees Capacity to Solve Problem	25	25	100%
12.	Smoothly Address Customer Complain	25	25	100%
13.	Employees Willingness to help Customer	25	24	96%
14.	Keep Confidential of Clients' Information	25	25	100%
15.	Transection Security	25	24	96%
16.	Employees' Competency	25	25	100%
17.	Trustworthy of Bank Staff	25	25	100%
18.	Cordial Behave of Bank Staff	25	24	96%
19.	Convenient Banking Hours	25	25	100%
20.	Individual Attention of Customer	25	24	96%
21.	Fair and Unbiased	25	25	100%
22.	Provide Suitable Product	25	25	100%

Source: Field data

b) Reliability Statistics

Scale	Cronbach's Alpha	N of Items
All Factors	.920	22

The above table 5.2, to measure the reliability, Cronbach's alpha calculates. The given table 5.1.1 had shown the value for the different 22 variables we used in the study. The data from the Likert Scale put in the SPSS to calculate the reliability of these scales in the form of Cronbach's alpha. Values of alpha are between "0" to "1". The higher the value of alpha, the higher the reliability is. Values of alpha that are more than "0.70" show more reliability. On the other hand, the values which are less than "0.60" indicate less reliability. In our

as like relevant documents, personal information, and interview with specific bank officers and customers. This work indicates that the environment created by clients' perceptions influence the quality of banks. Here pre-test is done before selecting the 22 factors under five dimensions on the SERVQUAL model according to the importance of response respondent. The following table: 5.1.1 shows that the highest percentages give the highest priority for selecting the 22 factors.

research the values are in the acceptable range, and the table shows that. We use 22 variables that are environment, technology, ATM booth, employees' appearance, timely delivery, promised services, solving a problem, transection system, security, informed customer, employees' capacity, address complaints, employees' willingness, confidentiality, secured transections, staffs' competency, trustworthy of staffs, cordial behave, individual attention, fair and unbiased, and suitable product. The value of alpha calculated for

all items is "0.920". The value calculated for all the variables we use above the acceptable range, so we can say that our scales are reliable.

c) *Service Gap of Private Commercial Banks in Bangladesh*

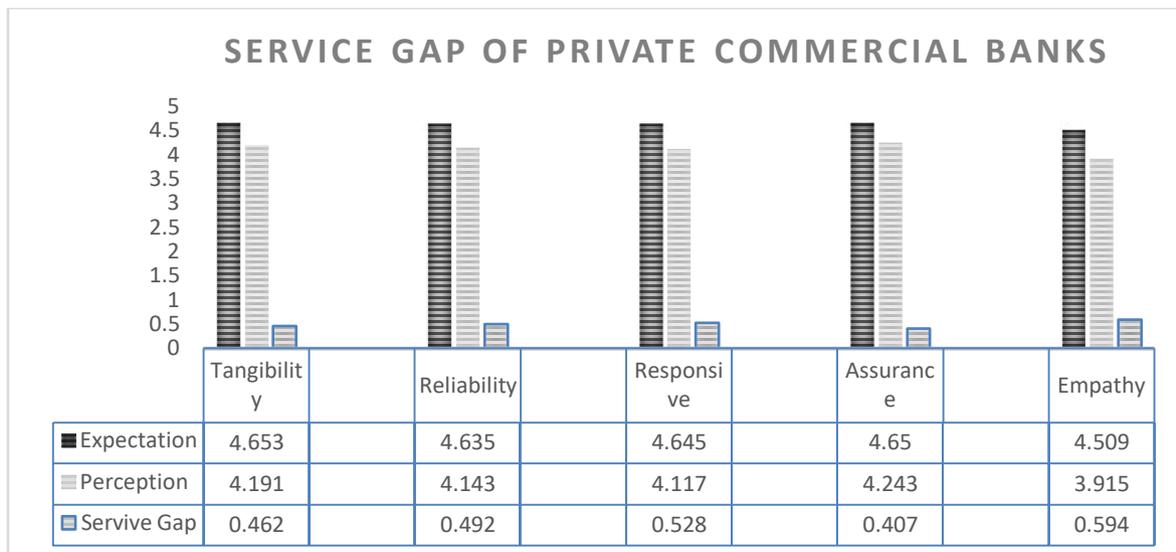
The relative position of service quality gap based on five dimensions of private commercial banks in Bangladesh have been shown below in table 5.3.1

Table 5.3.1: Service Gap of Private Commercial Banks in Bangladesh

S.L	Dimensions	Expectation (Grand Mean Scores)	Perception (Grand Mean Scores)	Service Gap
1	Tangibility	4.653	4.191	0.462
2	Reliability	4.635	4.143	0.492
3	Responsiveness	4.645	4.117	0.528
4	Assurance	4.65	4.243	0.407
5	Empathy	4.509	3.915	0.594

Source: Field data

The following figure represents above table: 5.3.1



Graph 5.3.1: Service Gap of Private Commercial Banks in Bangladesh

Graph 5.3.1 indicates that grand mean scores of service expectation and perception on different service dimensions like tangibility, reliability, responsiveness, assurance & empathy are 4.653, 4.635, 4.645, 4.650, 4.509, and 4.191, 4.143, 4.117, 4.243, 3.915 respectively in private commercial banks in Bangladesh. Here the service gaps are 0.462

(tangibility), 0.492 (reliability), 0.528 (responsiveness), 0.407 (assurance) & 0.594 (empathy). Moreover, it has been evident that the service gaps (Expected service - Perceived service) of all the dimensions are far below perceived service. So there is a significant gap that exist among all the dimensions under the service quality model.

VI. RESULT OF HYPOTHESIS

a) *Paired Samples Correlations*

Table 5.4.1: Paired Samples Correlations

		N	Correlation	Sig.
Tangible	Expectation and Perception	200	0.610	.000
Reliability	Expectation and Perception	200	0.612	.000
Responsiveness	Expectation and Perception	200	0.606	.000

Assurance	Expectation and Perception	200	0.654	.000
Empathy	Expectation and Perception	200	0.606	.000

Source: SPSS output

Table 5.4.2: Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Tangible	Expectation-Perception	0.462	0.446	0.031	0.400	0.524	14.640	199	.000
Reliability	Expectation-Perception	0.492	0.418	0.029	0.433	0.550	16.623	199	.000
Responsiveness	Expectation-Perception	0.527	0.494	0.034	0.458	0.596	15.096	199	.000
Assurance	Expectation-Perception	0.397	0.433	0.030	0.337	0.457	12.967	199	.000
Empathy	Expectation-Perception	0.588	0.525	0.037	0.514	0.661	15.839	199	.000

Source: SPSS output

Table 5.4.2 states that expectation and perception scores are positively (strongly) correlated ($r = 0.610, 0.612, 0.606, 0.654, 0.606, p < 0.05$). Table-5.5.1.2 indicates on average, expectation is 46%, 49%, 52%, 39%, and 58% higher than perception of tangibility, reliability, responsiveness, assurance, and empathy dimension of private commercial banks with 95% CI (0.400, 0.524), (0.433, 0.550), (0.458, 0.596), (0.337, 0.457), and (0.514, 0.661) respectively. Provided the

calculated p value must be less than the significance level (= 0.05 at 95% CI) to reject null hypothesis. Here, the P-value < level of significant (=0.05). So, the null hypothesis ($H_{01}, H_{02}, H_{03}, H_{04},$ and H_{05}) rejected at a 5% level of significance, i.e., there is a significant gap of private commercial banks of tangibility, reliability, responsiveness, assurance, and empathy dimensions, respectively.

b) Test Result

S.L	Dimensions	Hypothesis	Result
1	Tangibility	$P = 0.05 > P_{\text{Critical}=0.000}$	$H_{01} = \text{Rejected}$
2	Reliability	$P = 0.05 > P_{\text{Critical}=0.000}$	$H_{02} = \text{Rejected}$
3	Responsiveness	$P = 0.05 > P_{\text{Critical}=0.000}$	$H_{03} = \text{Rejected}$
4	Assurance	$P = 0.05 > P_{\text{Critical}=0.000}$	$H_{04} = \text{Rejected}$
5	Empathy	$P = 0.05 > P_{\text{Critical}=0.000}$	$H_{05} = \text{Rejected}$

VII. RECOMMENDATIONS

We know that the service gap is the difference between the customer perception of service and customer expectations. The service gap is a function of the knowledge gap, the standard gap, the delivery gap, and the communication gap. As each of these gaps increases or decreases, the service gap responds similarly. To minimize the service gap, these recommendations can be followed: as the highest gap exists in the empathy dimension of the SERVQUAL

model, the banks should concentrate on all the items of this dimension to minimize the gap. Government and policy maker should give more emphasis to solve the problems or queries to customers, convenient banking hours, give customer individual attention, treat individual customer fair and unbiased, and provide the suitable product to the customers. The second gap exists in the responsiveness dimension of the SERVQUAL model; the banks should keep informing the customer of the new services or products. Bank staff should increase their capacity to solve customer problems and always be

willing to help them. They also should address customer complaints smoothly. The third gap exists in the reliability dimension of the SERVQUAL model; the educational institution should have staffs who give the students personal attention. They should understand the actual need of their students as they are offering services. The educational institutions should have the student's best interest at heart. The bank should give emphasis to deliver cheque book, debit and credit cards timely and serve promised service accurately. They should be more sincere to solve customer problems. Error-free transaction system and security at entrance and exit should be more cutting-edge with technology.

Further research is needed to determine the customers' zone of tolerance. Owing to resource restrictions, rules, regulations, as well as policies, in some instances, it is almost impossible for the private commercial banks to provide everything that customers want. Future research should focus on the service quality from other stakeholders (such as internal customers, government, industries). A comprehensive study would help the department to review and beef-up its overall service quality in the banking sector.

VIII. CONCLUSION

The study explored the variables associated with customer expectations and perceptions with their experiences at the private commercial bank in Bangladesh. The questionnaire was reliable. To determine and assess the service gap with bank sector is not easy but not impossible. The results may very effective in minimizing the service gap for the management of any banks to leverage or enhance the services provided. In this study, the results indicated that customers have a strong relationship with the dependent variables. This study also showed that generally, the private commercial banks in Bangladesh are correlated with the service quality. The results also indicate that generally customers are satisfied with the service quality performed by the banks, i.e., tangibility, reliability, responsiveness, assurance, and empathy. Banks, which can make a quick and better decisions, have better potential to increase their market share i.e. number of customers. All the findings are significant criteria for segmenting the total area and then targeting the most attractive group(s) of customers. Further scope to conduct the study by considering the more variables and generalize the results in other settings over Bangladesh.

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Economic & Social Impact of Microfinance: An Empirical Evidence from Bangladesh

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Abstract- This is an empirical study about the current situation and the economic and social impact of microfinance programs in Bangladesh with their respective significance. The findings reveal that the microfinance programs have important and significant effects on the beneficiaries in alleviation of poverty, generation of income, and savings. Microfinance programs also help to generate employment to a little extent, but it is still not up to the mark. The results show that microfinance service holders' savings and consumptions increased as well since they now have a better living standard. The conclusion prioritizes that microfinance programs need to be accelerated more for socio-economic development, economic expansion and above all, poverty eradication. Proper implementation of the policies is needed and more training programs have to be initiated for the expansion of activities.

Keywords: *microfinance, savings, income, beneficiaries.*

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Economic & Social Impact of Microfinance: An Empirical Evidence from Bangladesh

Dr. Mosaddak Ahmed Chowdhury ^α, Dr. Syed Mohammad Khaled Rahman ^σ & Md. Abdul Gaffar Salman ^ρ

Abstract- This is an empirical study about the current situation and the economic and social impact of microfinance programs in Bangladesh with their respective significance. The findings reveal that the microfinance programs have important and significant effects on the beneficiaries in alleviation of poverty, generation of income, and savings. Microfinance programs also help to generate employment to a little extent, but it is still not up to the mark. The results show that microfinance service holders' savings and consumptions increased as well since they now have a better living standard. The conclusion prioritizes that microfinance programs need to be accelerated more for socio-economic development, economic expansion and above all, poverty eradication. Proper implementation of the policies is needed and more training programs have to be initiated for the expansion of activities.

Keywords: microfinance, savings, income, beneficiaries.

I. INTRODUCTION

Microfinance is a widely used term in present days throughout the globe. It has been used as an income generation tool for poorer section of population and effectively running in many third-world countries. This tool has great significance in alleviating poverty and vulnerability of the poorer groups through shattering the disastrous cycle of poverty (Chowdhury, 2009). Microfinance is a kind of financial service that is provided to unemployed or poor people or groups who would otherwise have no other way of getting benefitted by any other financial services. It is a variety of services for low-income individuals, mostly women and young clients. The goal of microfinance is to aid poor people by giving them an opportunity to be self-sufficient and economically empowered through different ways (K. A. Islam, 2016).

Microfinance activities encompass providing small amount of loans because the clients of MFIs are low-income earners and usually have limited access to any other financial services. Loans, savings, insurance, and remittances are included in these financial services. Loans are provided for different purposes like microenterprise establishment and development.

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Microfinance institutions also charge interests on loans that are offered to their clients.

Microcredit is not a new concept. Money-lenders, credit institutions and credit unions had been practicing it since the 19th century (M. W. Rahman, Luo, Ahmed, & Xiaolin, 2012). However, the modern and new concept of microcredit had become popular in Bangladesh in the 1970s. The microfinance programs had been pioneered by Bangladesh and it is now regarded as a poverty alleviating program around the globe (Mizanur & Ahmad, 2010). According to the modern concept, microfinance itself is a provision of microcredit combining with savings, insurance, remittance, health, education, skill training, and social awareness. It is a combination of financial and non-financial services designed especially for the poor people that are usually not provided by conventional financial institutions. These services increased the potentials of the poor individuals towards entrepreneurship, generation of income, being self-reliant and self-sufficient, creation of employment, generation of wealth and finally, reduction of poverty (M. W. Rahman et al., 2012).

II. OVERVIEW OF MFIS

The primary objective of the MFIs is providing financial services (credit and savings) to the poor in order to relieve them from financial constraints and help eradicating poverty. Irrespective of being profit-oriented or not, each MFI tries to maximize its repayment performance. Both the MFIs and the borrowers are greatly associated with high repayment rates. The high interest rates enable the MFIs to decrease the financial cost of loans and allow more borrowers to have access to it by cutting the interest rate charged to the borrowers. Improved repayment rates can also help decrease the reliance on incentives of the MFIs which would ensure sustainability (Godquin, 2004). There are generally three types of institutions that are operating microfinance activities in Bangladesh. These are (i) non-governmental organizations (such as Grameen Bank, BRAC, ASA etc.), (ii) specialized and commercial banks, (iii) other government-sponsored microfinance activities that are being operated through BRDB, BARD, RDA and some other departments and ministries of the government. They include social welfare, youth and sports, women and children affairs (Ali & Ahmed, 2014).

It has been over three decades in Bangladesh that microfinance services are being provided to the poor households through microfinance institutions in full bloom (Khalily, 2004). Bangladesh achieved worldwide reputation through microfinance activities initiated by Grameen Bank - a specialized financial institution that won noble peace prize. In Bangladesh, a broad number of MFIs started operating to grant collateral-free loans to the poor, being motivated by the incessant success of Grameen Bank and for the failure of other formal financial institutions to reach the poor rural people (Nabi et al., 2015). Microfinance industry is matured in current years, and therefore, competition has increased too among well-known MFIs in Bangladesh. As poor individuals have more choices to select MFIs for borrowing money, the number of borrowers from multiple institutions has increased tremendously. Because of that, there are lots of indebted poor people in Bangladesh and this becomes a threat for MFIs and microfinance industry (Yuge, 2011).

Now, as we know, a good number of recognized microfinance institutions are operating in Bangladesh. In addition, many smaller MFIs have started their operations in Bangladesh in small-scale and many others have applied for license simultaneously. Among them, Bangladesh Rural Advancement Committee (BRAC), Grameen Bank and Association for Social Advancement (ASA) are recognized as the leading microfinance institutions in Bangladesh (Mizanur & Ahmad, 2010). Since 1990s, Bangladesh experienced gigantic expansion of microfinance programs and activities throughout the country which brought the focus of all important stakeholders such as donors, helping partners and policy-makers around the world (Bhuiya, Khanam, & Rahman, 2016). It is also proved that Bangladesh is

ahead of providing microfinance services in comparison with other countries (Saeed, 2014). The impact of microfinance programs in poverty alleviation has been recognized all over the world too. The UN announced the year 2005 as 'UN International Year of Microcredit' throughout the globe. It was expected that through the combined efforts of governments, MFIs, NGOs as well as the people of the nations, the curse of the poverty will soon be eradicated from the world (Ahmed, 2009).

However, microfinance has become a great tool for poverty eradication in the developing and least-developed countries, but there rarely is a poor country found which is not engaged in microfinance programs. Many achievements and recognitions were claimed about the effects of microfinance activities and a foreign observer cannot but wonder at the wide range of benefits brought by microfinance. For many socio-economic reasons, Bangladesh was one of the poorest countries of the world and about half of the total population lived below the poverty line at a time. Therefore, poverty reduction and generation of rural employment were the top priorities of Bangladesh government. So, the government initiated broad approach to alleviate poverty by emphasizing economic independence, macroeconomic stability, empowerment and support for MFIs. In this way, MFIs became widespread throughout the country and helped tremendously in order to alleviate poverty and to expand the economy (Ahmed, 2009). The leading MFIs of Bangladesh are Grameen Bank, BRAC and ASA (Mizanur & Ahmad, 2010). We will first look at the overall microfinance sector of Bangladesh and then we will have a brief discussion about BRAC, Grameen Bank and ASA. The below table demonstrates the recent microfinance sector of Bangladesh.

Table 1: The Microfinance Sector of Bangladesh

Particulars	2014	2015	2016	2017	2018
Licensed MFIs	742	752	758	783	805
Branches	14,730	15,609	16,284	17,120	18,196
Employees	109,628	110,781	127,820	139,526	153,919
Clients (in Million)	25.11	26.00	27.79	30.82	31.22
Borrowers (in Million)	19.42	20.35	23.28	24.94	25.40
Loan Disbursement (in Billion BDT)	462.00	634.00	787.00	1,046.00	1,201.91
Amount of Savings (in Billion BDT)	106.99	135.41	171.19	216.71	262.96

(Source: Microcredit Regulatory Authority Database, 2018)

As we can see, there were a huge number of licensed MFIs working in Bangladesh in 2014. Still new MFIs are getting license to start their microfinance activities. The number of branches continued to increase recent years. Clients and borrowers are also increasing day by day as well. Therefore, the loan disbursements of MFIs and the amount of savings are also experiencing growth in Bangladesh as shown in the above table.

III. LITERATURE REVIEW

There are many available and existing research papers about microfinance programs in Bangladesh. Microfinance has been playing significant roles in alleviating poverty since 1970s and because of this, microfinance activities got a huge reputation throughout the country (Bhuiya et al., 2016). In spite of poverty alleviation, microfinance is helping in employment generation, accumulation of assets, empowerment of women, mobility of household members, vulnerability reduction and increase of total consumption (Hasan & Malek, 2017). An empirical analysis over eight districts of Bangladesh on the impact of microfinance programs revealed that the perceived change of eradicating poverty by microfinance activities is more than 75% and over 50% of them permanently overcame the poverty line (Khatun, Islam, & Majumder, 2012). Similarly, at that time, another household panel data analysis showed that the overall effects of microfinance are positive and it is significantly eliminating poverty in Bangladesh (Imai & Azam, 2012). Trying to find out the impact of the leading MFIs in Bangladesh like Grameen Bank, ASA and BRAC on the beneficiaries, a paper revealed that there is a positive relationship between access to microcredit and poverty reduction and after taking microcredit loan, the poverty level of the participants decreased (Al Mamun, Hasan, & Rana, 2013). Microfinance is assisting in women empowerment too. Microfinance has some positive impacts under certain circumstances as it increased women's economic independence and social position (Nawaz, 2017). Women's revenue and resources also experienced growth and this continued to play a greater role in improving women's financial liberty and feeling of self-possession in Bangladesh as revealed by another study (Hassan & Saleem, 2017).

Finding the impact of micro financing in Bangladesh, a study revealed that most of the women become socio-economically empowered through microfinance programs by acquiring self-esteem, business skills, decision-making capability and high confidence level (K. A. Islam, 2016). It is also showed that the women who are benefitted through microfinance activities make much decision on children's education, medical facilities, visiting relatives, purchasing things, consumption expenditure etc. They also feel more secure and strong in family as well as in society (M. M.

Rahman, Khanam, & Nghiem, 2017). It can be said that microcredit programs may not be able to empower women in terms of entrepreneurship but women are feeling that they are empowered. Because by microcredit programs, they try to fulfill their basic needs and wants as it is particularly a blessing for women in Bangladesh, a mental relief for them and works as an awareness building tool (Huque, 2017).

In income generation and crisis coping, microfinance plays a vital role. Bangladesh achieved greater socio-economic advancement in recent decades and it is perceived that microfinance programs have immense impact on this improvement (Mia, 2017). Microfinance has so far focused on rural households in respect to income, consumption, savings, asset building, health and schooling programs (Bhuiya et al., 2016). Microfinance institutions are playing a great role in financing disadvantaged people in society who are disqualified to get loans by formal banks (Mazumder, 2015). MFIs help generating income and consumption levels of poor households, decreasing income inequality, and enhancing welfare. This reminds that microfinance is really an important and effective development tool for poverty reduction and income distribution (Mahjabeen, 2008).

To assess the impact of microfinance on rural development, a study found that the income of households, productivity of livestock and crops, employment and expenditure increased significantly because of the impact of invested money by microfinance (Mizanur & Ahmad, 2010). The MFIs are contributing significantly for the prosperity and development of socio-economic sectors of Bangladesh as well as they are operating within the context of national planning for the development of Bangladesh (Roy, 2017). Surprisingly, in the context of rural Bangladesh, people's access to microfinance decreases the number of borrowings from informal sources. The poor households get more benefits by eliminating their dependence on borrowing from informal sources (A. Islam, Nguyen, & Smyth, 2015). MFIs can make expansions and sustain their income generating activities for the purpose of taking advantages of diversification benefits. Once an institution is in self-sustainable position, it holds a better opportunity to meet its core objectives of financial inclusion since much resources can be utilized to serve poor people effectively (Zamore, 2017).

IV. STATEMENT OF THE PROBLEM

It has recently been found that in spite of reducing poverty, microfinance programs increased income generation and consumption, but microfinance failed to support sustainable business enterprises for some reasons (Dutta & Banerjee, 2018). Microfinance institutions also ensured economic empowerment to a

greater degree. There is a huge need for arranging credit plus programs by MFIs in order to achieve more empowerment of their beneficiaries (Mazumder, 2015). Some papers also disclosed that microfinance programs could not properly contribute for socio-economic development and alleviation of poverty as much as expected earlier. In another study, it was found that though the effects of microfinance on income and assets were not significant at all in Bangladesh but microcredit itself has significant impact on consumption or expenditure (Churchill, Danso, & Appau, 2016). Microfinance loan is sometimes used as a source for consumption expenditure. Sometimes the credit-holder spends the money in non-economic activities. So, at the repayment installment, the poor credit-holder has to borrow money from any other source and thus things become more complicated for him (R. Rahman, Nasrin, & Islam, 2015). Therefore, the study focusses on the current microfinance programs of Bangladesh and whether these programs are effectively working as expected or not.

V. OBJECTIVES

The general objective of the study is to assess the impact of microfinance programs on the beneficiaries in Bangladesh. Specific objectives are as follows:

- To describe the demographic profile of beneficiaries of the microfinance programs.
- To explore the impact and significance of microfinance programs on economic condition of beneficiaries through income, savings and employment generation.
- To evaluate the impact and significance of microfinance programs on social condition of beneficiaries through expenditure, living standard and decision making.

VI. METHODOLOGY

This is an empirical study with qualitative and quantitative data about the impact of microfinance in Bangladesh. The primary sampling units were the MFIs and the secondary sampling units were the beneficiaries of selected MFIs in Sylhet district of Bangladesh. The sample items were the local branches of Grameen Bank, BRAC and ASA in Sylhet district of Bangladesh. Purposive and convenient sampling techniques were used in selecting MFI branches and the beneficiaries of micro-credit loans. The sample size of the beneficiaries was 60 from the three local branches of Grameen Bank, BRAC and ASA. Semi-structured and self-administered questionnaire was used to collect primary data in order to prepare this paper.

VII. RESULTS & DISCUSSIONS

a) Demographic Profile of Beneficiaries

Table 2: Gender Specification

Gender Specification		Frequency	Percent	Cumulative %
Valid	Male	35	35.0	35.0
	Female	65	65.0	100.0
Total		100	100.0	

(Source: Field Survey, 2019)

Table 3: Age Distribution

Age Distribution		Frequency	Percent	Cumulative %
Valid	Within 25 years	3	5.0	5.0
	26-40 years	24	40.0	45.0
	40+ years	33	55.0	100.0
Total		60	100.0	

(Source: Field Survey, 2019)

Table 4: Educational Status

Educational Status		Frequency	Percent	Cumulative %
Valid	None	22	36.7	36.7
	Primary	16	26.7	63.3
	Secondary	16	26.7	90.0
	Higher Secondary	6	10.0	100.0
Total		60	100.0	

(Source: Field Survey, 2019)

Table 5: Age of Membership

Age of Membership		Frequency	Percent	Cumulative %
Valid	Less than 2 years	3	5.0	5.0
	2-5 years	13	21.7	26.7
	5+ years	44	73.3	100.0
Total		60	100.0	

(Source: Field Survey, 2019)

From the above tables, it is seen that the majority of beneficiaries are female and 95% of respondents' age is above 25 years. Maximum proportion of respondents (55%) are 40 and above age group. It is to be noted that about 63.3% of beneficiaries' education status is below secondary level. Only 10% of beneficiaries have passed higher secondary level. Regarding age of membership,

maximum proportion of respondents (73.3%) has membership of five or more years with MFIs.

b) Impact of Microfinance Programs on Economic Condition of Beneficiaries

The following table shows the amount of loans received by the beneficiaries from the MFIs. It is seen that about 90% respondents received a loan of more than BDT 10,000.

Table 6: Amount of Loans

Amount of Loans		Frequency	Percent	Cumulative %
Valid	Within BDT 10 thousand	6	10.0	10.0
	BDT 11-20 thousand	26	43.3	53.3
	BDT 20+ thousand	28	46.7	100.0
Total		60	100.0	

(Source: Field Survey, 2019)

The following table shows the amount of monthly income of the respondents. It is seen that

maximum proportion of respondents has a monthly income below BDT 10,000.

Table 7: Monthly Income

Monthly Income		Frequency	Percent	Cumulative %
Valid	Within BDT 10 thousand	24	40.0	42.9
	BDT 11-20 thousand	12	20.0	64.3
	BDT 21-40 thousand	17	28.3	94.6
	BDT 40+ thousand	3	5.0	100.0
	Total	56	93.3	
Missing		4	6.7	
Total		60	100.0	

(Source: Field Survey, 2019)

Table 8: Economic Condition before Taking Loans

Economic Condition before Taking Loans		Frequency	Percent	Cumulative %
Valid	Good	10	16.7	17.5
	Average	31	51.7	71.9
	Poor	16	26.7	100.0
	Total	57	95.0	
Missing		3	5.0	
Total		60	100.0	

(Source: Field Survey, 2019)

Table 9: Economic Condition after Taking Loans

Economic Condition after Taking Loans		Frequency	Percent	Cumulative %
Valid	Very Good	10	16.7	17.9
	Good	46	76.7	100.0
	Total	56	93.3	
Missing		4	6.7	
Total		60	100.0	

(Source: Field Survey, 2019)

Table 8 and 9 show the economic condition of beneficiaries before and after taking loans. It is seen that number of respondents in good economic condition has increased from 10 to 46 and 10 respondents move from

good to very good economic condition which indicates that microfinance programs have positive impact on economic condition.

Table 10: Income Generation after Taking Loans

Income Generation after Taking Loans		Frequency	Percent	Cumulative %
Valid	Much increased	4	6.7	7.0
	Increased	47	78.3	89.5
	Average	6	10.0	100.0
	Total	57	95.0	
Missing		3	5.0	
Total		60	100.0	

(Source: Field Survey, 2019)

Table 11: Savings Generation after Taking Loans

Savings Generation after Taking Loans		Frequency	Percent	Cumulative %
Valid	Much increased	7	11.7	12.3
	Increased	44	73.3	85.6
	Average	6	10.0	100.0
	Total	57	95.0	
Missing		3	5.0	
Total		60	100.0	

(Source: Field Survey, 2019)

Table 12: Employment Generation after Taking Loans

Employment Generation after Taking Loans		Frequency	Percent	Cumulative %
Valid	Increased	21	35.0	36.8
	Average	36	60.0	100.0
	Total	57	95.0	
Missing		3	5.0	
Total		60	100.0	

(Source: Field Survey, 2019)

From table 10 and 11, it is seen that both income and savings have increased due to microfinance programs to a significant extent. The proportions of respondents whose income and savings have increased

are 89.5% and 85.6% respectively. Besides, as to table 12, about 35% respondents' employment opportunities have been increased.

c) Impact of Microfinance Programs on Social Condition of Beneficiaries

Table 13: Educational Expenses of Children after Taking Loans

Educational Expenses of Children after Taking Loans		Frequency	Percent	Cumulative %
Valid	Much increased	2	3.3	3.5
	Increased	47	78.3	86.0
	Average	8	13.3	100.0
	Total	57	95.0	
Missing		3	5.0	
Total		60	100.0	

(Source: Field Survey, 2019)

Table 14: Health Expenses of Family Members after Taking Loans

Health Expenses of Family Members after Taking Loans		Frequency	Percent	Cumulative %
Valid	Increased	48	80.0	84.2
	Average	9	15.0	100.0
	Total	57	95.0	
Missing		3	5.0	
Total		60	100.0	

(Source: Field Survey, 2019)

Table 15: Living Standard after Taking Loans

Living Standard after Taking Loans		Frequency	Percent	Cumulative %
Valid	Much increased	3	5.0	5.3
	Increased	48	80.0	89.5
	Average	6	10.0	100.0
	Total	57	95.0	
Missing		3	5.0	
Total		60	100.0	

(Source: Field Survey, 2019)

From table 13 and 14, it is seen that both educational and health expenses have increased for majority of respondents (86% and 84.2%) which implies that their solvency have increased. Increased

expenditure leads to better standard of living and table 15 confirmed that about 89.5% of respondents' living standards were better after taking microfinance.

Table 16: Role in Taking Decision about Family Matters after Taking Loans

Role in Taking Decision about Family Matters after Taking Loans		Frequency	Percent	Cumulative %
Valid	Much increased	3	5.0	5.3
	Increased	39	65.0	73.7
	Average	12	20.0	94.7
	Declined	3	5.0	100.0
	Total	57	95.0	
Missing		3	5.0	
Total		60	100.0	

(Source: Field Survey, 2019)

Table 16 reveals that the beneficiaries' decision-making role in family matters has increased to a significant extent, which is 73.7%. Since microfinance programs are generating income, there is an increase of savings as well as consumption expenditure. The service-holders of microfinance programs are spending more for their children's education, their health expenses also increase after taking loans from microfinance institutions. It is also found that after taking loans, the occurrence of decision-making role about family matters are not much increased. In most of the families of the respondents, they make decision about their family matters jointly with all members of the family.

d) *Assessing Socio-Economic Impact by Simple Linear Regression Analysis*

The models, which are used to assess socio-economic impact of microfinance, are as follows:

$$IG = \alpha + \beta.MA \dots\dots\dots (1)$$

$$SG = \alpha + \beta.MA \dots\dots\dots (2)$$

$$EC = \alpha + \beta.MA \dots\dots\dots (3)$$

$$SG = \alpha + \beta.IG \dots\dots\dots (4)$$

$$CE = \alpha + \beta.IG \dots\dots\dots (5)$$

$$LS = \alpha + \beta.IG \dots\dots\dots (6)$$

$$LS = \alpha + \beta.MI \dots\dots\dots (7)$$

Where, α =constant, β =Co-efficient of independent variable and IG=Income Generation, SG=Savings Generation, EC=Economic Condition, CE=Creation of Employment, LS=Living Standard, MA=Membership Age, MI=Monthly Income.

Table 17, 18, and 19 below respectively demonstrate the coefficients of independent variables, the model summaries, and analysis of variances that have been found significant. In the 1st, 2nd and 3rd models, it is shown that, the more the age of membership in MFIs, the more possibility there will be for income generation, savings generation and better

economic condition. The 4th, 5th and 6th models show that income generation in microfinance institutions leads to more savings generation, employment creation and better living standard. The 7th model shows that the more the monthly income is, the more there will have a better living standard.

More elaborately, these models tell us that if the age of membership for beneficiaries from MFIs is increased by 1%, then income generation will be

increased by 26%, savings generation will be increased by 56% and economic condition will be better than before by 41%. Also, if income generation is increased by 1%, then savings generation will be increased by 71%, creation of employment will be increased by 48% and living standard will be better than before by 29%. It is also seen that if monthly income is increased by 1%, then the living standard will be better than before by 13%.

Table 17: Coefficient Table

Models		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.327	.264		5.017	.000
	MA	.261	.095	.346	2.734	.008
	Dependent Variable: IG					
2	(Constant)	.473	.246		1.920	.060
	MA	.555	.089	.645	6.254	.000
	Dependent Variable: SG					
3	(Constant)	.707	.206		3.439	.001
	MA	.411	.074	.599	5.543	.000
	Dependent Variable: EC					
4	(Constant)	.541	.251		2.150	.036
	IG	.708	.121	.620	5.854	.000
	Dependent Variable: SG					
5	(Constant)	1.661	.295		5.632	.000
	IG	.477	.142	.413	3.361	.001
	Dependent Variable: CE					
6	(Constant)	1.459	.251		5.805	.000
	IG	.292	.121	.309	2.409	.019
	Dependent Variable: LS					
7	(Constant)	1.815	.121		14.953	.000
	MI	.125	.056	.297	2.223	.031
	Dependent Variable: LS					

From the above table, it is seen that the p-value of t-statistic of all coefficients of independent variables are below 0.05, which means that all independent

variables have significant impact on dependent variables of their respective models.

Table 18: Model Summaries

Models	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.346	.120	.104	.399	.120	7.477	1	55	.008
	Predictors: (Constant), MA, Dependent Variable: IG								
2	.645	.416	.405	.371	.416	39.111	1	55	.000
	Predictors: (Constant), MA, Dependent Variable: SG								
3	.599	.358	.347	.310	.358	30.720	1	55	.000
	Predictors: (Constant), MA, Dependent Variable: EC								
4	.620	.384	.373	.381	.384	34.274	1	55	.000
	Predictors: (Constant), IG, Dependent Variable: SG								
5	.413	.170	.155	.447	.170	11.294	1	55	.001
	Predictors: (Constant), IG, Dependent Variable: CE								
6	.309	.095	.079	.381	.095	5.803	1	55	.019
	Predictors: (Constant), IG, Dependent Variable: LS								
7	.297	.088	.070	.397	.088	4.942	1	51	.031
	Predictors: (Constant), MI, Dependent Variable: LS								

Table 19: Analysis of Variances

	Models	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.188	1	1.188	7.477	.008
	Residual	8.741	55	.159		
	Total	9.930	56			
Dependent Variable: IG, Predictors: (Constant), MA						
2	Regression	5.395	1	5.395	39.111	.000
	Residual	7.587	55	.138		
	Total	12.982	56			
Dependent Variable: SG, Predictors: (Constant), MA						
3	Regression	2.955	1	2.955	30.720	.000
	Residual	5.291	55	.096		
	Total	8.246	56			
Dependent Variable: EC, Predictors: (Constant), MA						
4	Regression	4.984	1	4.984	34.274	.000
	Residual	7.998	55	.145		
	Total	12.982	56			
Dependent Variable: SG, Predictors: (Constant), IG						
5	Regression	2.260	1	2.260	11.294	.001
	Residual	11.004	55	.200		
	Total	13.263	56			
Dependent Variable: CE, Predictors: (Constant), IG						
6	Regression	.844	1	.844	5.803	.019
	Residual	7.998	55	.145		
	Total	8.842	56			
Dependent Variable: LS, Predictors: (Constant), IG						
7	Regression	.780	1	.780	4.942	.031
	Residual	8.050	51	.158		
	Total	8.830	52			
Dependent Variable: LS, Predictors: (Constant), MI						

Table 18 and 19 show the fitness tests of the models. It is seen from table 19 or ANOVA table that p-value of F-statistic of all the models is below 0.05, which means that the models are significant at 5% significance level.

From the results of the models, it is found that microfinance programs are playing vital roles in income and savings generation, which are statistically significant. It is also found that the living standards of microfinance service-holders are significantly increasing day by day. Microfinance programs help generating more employment opportunities and thus economic expansion emerges significantly. The MFIs are providing training for service-holders too and there some other services except lending activities like opening DPS account, financing for microenterprise development, providing educational loans and scholarships, life insurance programs, providing health and medical facilities.

VIII. RECOMMENDATIONS

In a glimpse, the specific recommendations are the followings:

- There is no doubt to recommend that microfinance activities should be expanded more and more for the expansion of socio-economic development.

- Since microfinance programs are generating income and savings, it should be the prime activity of microfinance institutions to find other ways for maximization of the benefit.
- As it is found in the study, creation of employment by microfinance activities is still not up to the mark. It needs to have more focus.
- The road communication system should be more developed by the authority so that the officials cannot find it difficult to provide their service to the remote areas of the country.
- Above all, as microfinance programs are playing major role in alleviating poverty, the government should focus more on the implementation of proper policies that can help more poor people to participate in microfinance activities.

IX. CONCLUSION

As found in the study, microfinance programs have important and significant impacts on the beneficiaries in alleviation of poverty, generation of income and savings. Microfinance programs help generating employment to a little extent in Sylhet district of Bangladesh; but it is still not up to the mark. Microfinance service holders' savings and consumptions also increased as well as they now have

a better living standard. Therefore, microfinance programs should be accelerated more for economic expansion, socio-economic development, and above all, poverty eradication. Finally, there is always an opportunity for conducting research in this field in large-scale. If there is a large-scale research with enough time and resources, there will be more opportunity to find matters that should more be focused on by the government as well as microfinance institutions.

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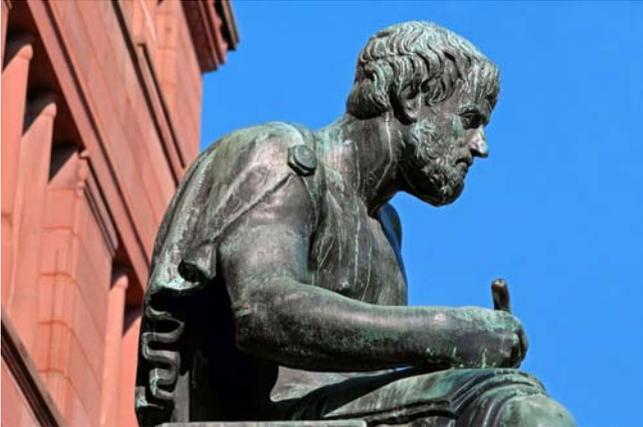
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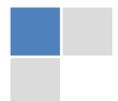
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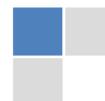
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3. Ensure corresponding author's email address and postal address are accurate and reachable.
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6. Proper permissions must be acquired for the use of any copyrighted material.
7. Manuscript submitted *must not have been submitted or published elsewhere* and all authors must be aware of the submission.

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- Ideas
- Findings
- Writings
- Diagrams
- Graphs
- Illustrations
- Lectures



- Printed material
- Graphic representations
- Computer programs
- Electronic material
- Any other original work

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Unless specified in the notification, the Editorial Board's decision on publication of the paper is final and cannot be appealed before making the major change in the manuscript.

Acknowledgments

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Authors can submit papers and articles in an acceptable file format: MS Word (doc, docx), LaTeX (.tex, .zip or .rar including all of your files), Adobe PDF (.pdf), rich text format (.rtf), simple text document (.txt), Open Document Text (.odt), and Apple Pages (.pages). Our professional layout editors will format the entire paper according to our official guidelines. This is one of the highlights of publishing with Global Journals—authors should not be concerned about the formatting of their paper. Global Journals accepts articles and manuscripts in every major language, be it Spanish, Chinese, Japanese, Portuguese, Russian, French, German, Dutch, Italian, Greek, or any other national language, but the title, subtitle, and abstract should be in English. This will facilitate indexing and the pre-peer review process.

The following is the official style and template developed for publication of a research paper. Authors are not required to follow this style during the submission of the paper. It is just for reference purposes.



Manuscript Style Instruction (Optional)

- Microsoft Word Document Setting Instructions.
- Font type of all text should be Swis721 Lt BT.
- Page size: 8.27" x 11", left margin: 0.65, right margin: 0.65, bottom margin: 0.75.
- Paper title should be in one column of font size 24.
- Author name in font size of 11 in one column.
- Abstract: font size 9 with the word "Abstract" in bold italics.
- Main text: font size 10 with two justified columns.
- Two columns with equal column width of 3.38 and spacing of 0.2.
- First character must be three lines drop-capped.
- The paragraph before spacing of 1 pt and after of 0 pt.
- Line spacing of 1 pt.
- Large images must be in one column.
- The names of first main headings (Heading 1) must be in Roman font, capital letters, and font size of 10.
- The names of second main headings (Heading 2) must not include numbers and must be in italics with a font size of 10.

Structure and Format of Manuscript

The recommended size of an original research paper is under 15,000 words and review papers under 7,000 words. Research articles should be less than 10,000 words. Research papers are usually longer than review papers. Review papers are reports of significant research (typically less than 7,000 words, including tables, figures, and references)

A research paper must include:

- a) A title which should be relevant to the theme of the paper.
- b) A summary, known as an abstract (less than 150 words), containing the major results and conclusions.
- c) Up to 10 keywords that precisely identify the paper's subject, purpose, and focus.
- d) An introduction, giving fundamental background objectives.
- e) Resources and techniques with sufficient complete experimental details (wherever possible by reference) to permit repetition, sources of information must be given, and numerical methods must be specified by reference.
- f) Results which should be presented concisely by well-designed tables and figures.
- g) Suitable statistical data should also be given.
- h) All data must have been gathered with attention to numerical detail in the planning stage.

Design has been recognized to be essential to experiments for a considerable time, and the editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned unrefereed.

- i) Discussion should cover implications and consequences and not just recapitulate the results; conclusions should also be summarized.
- j) There should be brief acknowledgments.
- k) There ought to be references in the conventional format. Global Journals recommends APA format.

Authors should carefully consider the preparation of papers to ensure that they communicate effectively. Papers are much more likely to be accepted if they are carefully designed and laid out, contain few or no errors, are summarizing, and follow instructions. They will also be published with much fewer delays than those that require much technical and editorial correction.

The Editorial Board reserves the right to make literary corrections and suggestions to improve brevity.



FORMAT STRUCTURE

It is necessary that authors take care in submitting a manuscript that is written in simple language and adheres to published guidelines.

All manuscripts submitted to Global Journals should include:

Title

The title page must carry an informative title that reflects the content, a running title (less than 45 characters together with spaces), names of the authors and co-authors, and the place(s) where the work was carried out.

Author details

The full postal address of any related author(s) must be specified.

Abstract

The abstract is the foundation of the research paper. It should be clear and concise and must contain the objective of the paper and inferences drawn. It is advised to not include big mathematical equations or complicated jargon.

Many researchers searching for information online will use search engines such as Google, Yahoo or others. By optimizing your paper for search engines, you will amplify the chance of someone finding it. In turn, this will make it more likely to be viewed and cited in further works. Global Journals has compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

Keywords

A major lynchpin of research work for the writing of research papers is the keyword search, which one will employ to find both library and internet resources. Up to eleven keywords or very brief phrases have to be given to help data retrieval, mining, and indexing.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy: planning of a list of possible keywords and phrases to try.

Choice of the main keywords is the first tool of writing a research paper. Research paper writing is an art. Keyword search should be as strategic as possible.

One should start brainstorming lists of potential keywords before even beginning searching. Think about the most important concepts related to research work. Ask, "What words would a source have to include to be truly valuable in a research paper?" Then consider synonyms for the important words.

It may take the discovery of only one important paper to steer in the right keyword direction because, in most databases, the keywords under which a research paper is abstracted are listed with the paper.

Numerical Methods

Numerical methods used should be transparent and, where appropriate, supported by references.

Abbreviations

Authors must list all the abbreviations used in the paper at the end of the paper or in a separate table before using them.

Formulas and equations

Authors are advised to submit any mathematical equation using either MathJax, KaTeX, or LaTeX, or in a very high-quality image.

Tables, Figures, and Figure Legends

Tables: Tables should be cautiously designed, uncrowned, and include only essential data. Each must have an Arabic number, e.g., Table 4, a self-explanatory caption, and be on a separate sheet. Authors must submit tables in an editable format and not as images. References to these tables (if any) must be mentioned accurately.



Figures

Figures are supposed to be submitted as separate files. Always include a citation in the text for each figure using Arabic numbers, e.g., Fig. 4. Artwork must be submitted online in vector electronic form or by emailing it.

PREPARATION OF ELETRONIC FIGURES FOR PUBLICATION

Although low-quality images are sufficient for review purposes, print publication requires high-quality images to prevent the final product being blurred or fuzzy. Submit (possibly by e-mail) EPS (line art) or TIFF (halftone/ photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Avoid using pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings). Please give the data for figures in black and white or submit a Color Work Agreement form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

For scanned images, the scanning resolution at final image size ought to be as follows to ensure good reproduction: line art: >650 dpi; halftones (including gel photographs): >350 dpi; figures containing both halftone and line images: >650 dpi.

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TIPS FOR WRITING A GOOD QUALITY MANAGEMENT RESEARCH PAPER

Techniques for writing a good quality management and business research paper:

1. Choosing the topic: In most cases, the topic is selected by the interests of the author, but it can also be suggested by the guides. You can have several topics, and then judge which you are most comfortable with. This may be done by asking several questions of yourself, like "Will I be able to carry out a search in this area? Will I find all necessary resources to accomplish the search? Will I be able to find all information in this field area?" If the answer to this type of question is "yes," then you ought to choose that topic. In most cases, you may have to conduct surveys and visit several places. Also, you might have to do a lot of work to find all the rises and falls of the various data on that subject. Sometimes, detailed information plays a vital role, instead of short information. Evaluators are human: The first thing to remember is that evaluators are also human beings. They are not only meant for rejecting a paper. They are here to evaluate your paper. So present your best aspect.

2. Think like evaluators: If you are in confusion or getting demotivated because your paper may not be accepted by the evaluators, then think, and try to evaluate your paper like an evaluator. Try to understand what an evaluator wants in your research paper, and you will automatically have your answer. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

3. Ask your guides: If you are having any difficulty with your research, then do not hesitate to share your difficulty with your guide (if you have one). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work, then ask your supervisor to help you with an alternative. He or she might also provide you with a list of essential readings.

4. Use of computer is recommended: As you are doing research in the field of management and business then this point is quite obvious. Use right software: Always use good quality software packages. If you are not capable of judging good software, then you can lose the quality of your paper unknowingly. There are various programs available to help you which you can get through the internet.

5. Use the internet for help: An excellent start for your paper is using Google. It is a wondrous search engine, where you can have your doubts resolved. You may also read some answers for the frequent question of how to write your research paper or find a model research paper. You can download books from the internet. If you have all the required books, place importance on reading, selecting, and analyzing the specified information. Then sketch out your research paper. Use big pictures: You may use encyclopedias like Wikipedia to get pictures with the best resolution. At Global Journals, you should strictly follow here.



6. Bookmarks are useful: When you read any book or magazine, you generally use bookmarks, right? It is a good habit which helps to not lose your continuity. You should always use bookmarks while searching on the internet also, which will make your search easier.

7. Revise what you wrote: When you write anything, always read it, summarize it, and then finalize it.

8. Make every effort: Make every effort to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in the introduction—what is the need for a particular research paper. Polish your work with good writing skills and always give an evaluator what he wants. Make backups: When you are going to do any important thing like making a research paper, you should always have backup copies of it either on your computer or on paper. This protects you from losing any portion of your important data.

9. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several unnecessary diagrams will degrade the quality of your paper by creating a hodgepodge. So always try to include diagrams which were made by you to improve the readability of your paper. Use of direct quotes: When you do research relevant to literature, history, or current affairs, then use of quotes becomes essential, but if the study is relevant to science, use of quotes is not preferable.

10. Use proper verb tense: Use proper verb tenses in your paper. Use past tense to present those events that have happened. Use present tense to indicate events that are going on. Use future tense to indicate events that will happen in the future. Use of wrong tenses will confuse the evaluator. Avoid sentences that are incomplete.

11. Pick a good study spot: Always try to pick a spot for your research which is quiet. Not every spot is good for studying.

12. Know what you know: Always try to know what you know by making objectives, otherwise you will be confused and unable to achieve your target.

13. Use good grammar: Always use good grammar and words that will have a positive impact on the evaluator; use of good vocabulary does not mean using tough words which the evaluator has to find in a dictionary. Do not fragment sentences. Eliminate one-word sentences. Do not ever use a big word when a smaller one would suffice. Verbs have to be in agreement with their subjects. In a research paper, do not start sentences with conjunctions or finish them with prepositions. When writing formally, it is advisable to never split an infinitive because someone will (wrongly) complain. Avoid clichés like a disease. Always shun irritating alliteration. Use language which is simple and straightforward. Put together a neat summary.

14. Arrangement of information: Each section of the main body should start with an opening sentence, and there should be a changeover at the end of the section. Give only valid and powerful arguments for your topic. You may also maintain your arguments with records.

15. Never start at the last minute: Always allow enough time for research work. Leaving everything to the last minute will degrade your paper and spoil your work.

16. Multitasking in research is not good: Doing several things at the same time is a bad habit in the case of research activity. Research is an area where everything has a particular time slot. Divide your research work into parts, and do a particular part in a particular time slot.

17. Never copy others' work: Never copy others' work and give it your name because if the evaluator has seen it anywhere, you will be in trouble. Take proper rest and food: No matter how many hours you spend on your research activity, if you are not taking care of your health, then all your efforts will have been in vain. For quality research, take proper rest and food.

18. Go to seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

19. Refresh your mind after intervals: Try to give your mind a rest by listening to soft music or sleeping in intervals. This will also improve your memory. Acquire colleagues: Always try to acquire colleagues. No matter how sharp you are, if you acquire colleagues, they can give you ideas which will be helpful to your research.

20. Think technically: Always think technically. If anything happens, search for its reasons, benefits, and demerits. Think and then print: When you go to print your paper, check that tables are not split, headings are not detached from their descriptions, and page sequence is maintained.



21. Adding unnecessary information: Do not add unnecessary information like "I have used MS Excel to draw graphs." Irrelevant and inappropriate material is superfluous. Foreign terminology and phrases are not apropos. One should never take a broad view. Analogy is like feathers on a snake. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Never oversimplify: When adding material to your research paper, never go for oversimplification; this will definitely irritate the evaluator. Be specific. Never use rhythmic redundancies. Contractions shouldn't be used in a research paper. Comparisons are as terrible as clichés. Give up ampersands, abbreviations, and so on. Remove commas that are not necessary. Parenthetical words should be between brackets or commas. Understatement is always the best way to put forward earth-shaking thoughts. Give a detailed literary review.

22. Report concluded results: Use concluded results. From raw data, filter the results, and then conclude your studies based on measurements and observations taken. An appropriate number of decimal places should be used. Parenthetical remarks are prohibited here. Proofread carefully at the final stage. At the end, give an outline to your arguments. Spot perspectives of further study of the subject. Justify your conclusion at the bottom sufficiently, which will probably include examples.

23. Upon conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium through which your research is going to be in print for the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects of your research.

INFORMAL GUIDELINES OF RESEARCH PAPER WRITING

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form which is presented in the guidelines using the template.
- Please note the criteria peer reviewers will use for grading the final paper.

Final points:

One purpose of organizing a research paper is to let people interpret your efforts selectively. The journal requires the following sections, submitted in the order listed, with each section starting on a new page:

The introduction: This will be compiled from reference matter and reflect the design processes or outline of basis that directed you to make a study. As you carry out the process of study, the method and process section will be constructed like that. The results segment will show related statistics in nearly sequential order and direct reviewers to similar intellectual paths throughout the data that you gathered to carry out your study.

The discussion section:

This will provide understanding of the data and projections as to the implications of the results. The use of good quality references throughout the paper will give the effort trustworthiness by representing an alertness to prior workings.

Writing a research paper is not an easy job, no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record-keeping are the only means to make straightforward progression.

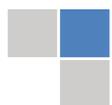
General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear: Adhere to recommended page limits.

Mistakes to avoid:

- Insertion of a title at the foot of a page with subsequent text on the next page.
- Separating a table, chart, or figure—confine each to a single page.
- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.



- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
- Present your points in sound order.
- Use present tense to report well-accepted matters.
- Use past tense to describe specific results.
- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
- Avoid use of extra pictures—include only those figures essential to presenting results.

Title page:

Choose a revealing title. It should be short and include the name(s) and address(es) of all authors. It should not have acronyms or abbreviations or exceed two printed lines.

Abstract: This summary should be two hundred words or less. It should clearly and briefly explain the key findings reported in the manuscript and must have precise statistics. It should not have acronyms or abbreviations. It should be logical in itself. Do not cite references at this point.

An abstract is a brief, distinct paragraph summary of finished work or work in development. In a minute or less, a reviewer can be taught the foundation behind the study, common approaches to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Use comprehensive sentences, and do not sacrifice readability for brevity; you can maintain it succinctly by phrasing sentences so that they provide more than a lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study with the subsequent elements in any summary. Try to limit the initial two items to no more than one line each.

Reason for writing the article—theory, overall issue, purpose.

- Fundamental goal.
- To-the-point depiction of the research.
- Consequences, including definite statistics—if the consequences are quantitative in nature, account for this; results of any numerical analysis should be reported. Significant conclusions or questions that emerge from the research.

Approach:

- Single section and succinct.
- An outline of the job done is always written in past tense.
- Concentrate on shortening results—limit background information to a verdict or two.
- Exact spelling, clarity of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else.

Introduction:

The introduction should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable of comprehending and calculating the purpose of your study without having to refer to other works. The basis for the study should be offered. Give the most important references, but avoid making a comprehensive appraisal of the topic. Describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will give no attention to your results. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here.

The following approach can create a valuable beginning:

- Explain the value (significance) of the study.
- Defend the model—why did you employ this particular system or method? What is its compensation? Remark upon its appropriateness from an abstract point of view as well as pointing out sensible reasons for using it.
- Present a justification. State your particular theory(-ies) or aim(s), and describe the logic that led you to choose them.
- Briefly explain the study's tentative purpose and how it meets the declared objectives.



Approach:

Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done. Sort out your thoughts; manufacture one key point for every section. If you make the four points listed above, you will need at least four paragraphs. Present surrounding information only when it is necessary to support a situation. The reviewer does not desire to read everything you know about a topic. Shape the theory specifically—do not take a broad view.

As always, give awareness to spelling, simplicity, and correctness of sentences and phrases.

Procedures (methods and materials):

This part is supposed to be the easiest to carve if you have good skills. A soundly written procedures segment allows a capable scientist to replicate your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order, but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt to give the least amount of information that would permit another capable scientist to replicate your outcome, but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section.

When a technique is used that has been well-described in another section, mention the specific item describing the way, but draw the basic principle while stating the situation. The purpose is to show all particular resources and broad procedures so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step-by-step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

Materials may be reported in part of a section or else they may be recognized along with your measures.

Methods:

- Report the method and not the particulars of each process that engaged the same methodology.
- Describe the method entirely.
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures.
- Simplify—detail how procedures were completed, not how they were performed on a particular day.
- If well-known procedures were used, account for the procedure by name, possibly with a reference, and that's all.

Approach:

It is embarrassing to use vigorous voice when documenting methods without using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result, when writing up the methods, most authors use third person passive voice.

Use standard style in this and every other part of the paper—avoid familiar lists, and use full sentences.

What to keep away from:

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings—save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part as entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Use statistics and tables, if suitable, to present consequences most efficiently.

You must clearly differentiate material which would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matters should not be submitted at all except if requested by the instructor.



Content:

- Sum up your conclusions in text and demonstrate them, if suitable, with figures and tables.
- In the manuscript, explain each of your consequences, and point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation of an exacting study.
- Explain results of control experiments and give remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or manuscript.

What to stay away from:

- Do not discuss or infer your outcome, report surrounding information, or try to explain anything.
- Do not include raw data or intermediate calculations in a research manuscript.
- Do not present similar data more than once.
- A manuscript should complement any figures or tables, not duplicate information.
- Never confuse figures with tables—there is a difference.

Approach:

As always, use past tense when you submit your results, and put the whole thing in a reasonable order.

Put figures and tables, appropriately numbered, in order at the end of the report.

If you desire, you may place your figures and tables properly within the text of your results section.

Figures and tables:

If you put figures and tables at the end of some details, make certain that they are visibly distinguished from any attached appendix materials, such as raw facts. Whatever the position, each table must be titled, numbered one after the other, and include a heading. All figures and tables must be divided from the text.

Discussion:

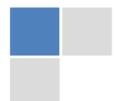
The discussion is expected to be the trickiest segment to write. A lot of papers submitted to the journal are discarded based on problems with the discussion. There is no rule for how long an argument should be.

Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implications of the study. The purpose here is to offer an understanding of your results and support all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of results should be fully described.

Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact, you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved the prospect, and let it drop at that. Make a decision as to whether each premise is supported or discarded or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."

Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work.

- You may propose future guidelines, such as how an experiment might be personalized to accomplish a new idea.
- Give details of all of your remarks as much as possible, focusing on mechanisms.
- Make a decision as to whether the tentative design sufficiently addressed the theory and whether or not it was correctly restricted. Try to present substitute explanations if they are sensible alternatives.
- One piece of research will not counter an overall question, so maintain the large picture in mind. Where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.



Approach:

When you refer to information, differentiate data generated by your own studies from other available information. Present work done by specific persons (including you) in past tense.

Describe generally acknowledged facts and main beliefs in present tense.

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