Volume-03, December, 2016 | ISSN : 2073- 5448

BGC TRUST UNIVERSITY JOURNAL

BGC Trust University Bangladesh

BGC Biddyanagar, P.O. Kanchannagar-4381, Chandanaish, Chittagong, Bangladesh.

BGC Trust University Journal

Volume : 03, December 2016

BGC Trust University Bangladesh
BGC Biddyanagar, Chandanaish, Chittagong

BGC Trust University Journal
Volume : 03, December 2016
ISSN : 2073- 5448

Price : Tk. 250.00
US$ 20

Copyright:
BGC Trust University Bangladesh

Published by
A.F.M. Aktaruzzaman Kaisar
Registrar-in- charge
BGC Trust University Bangladesh

Campus: BGC Biddyananagar, Post office: Kanchannagar-4381
Chandanaish, Chittagong, Bangladesh. Tel:03033-56192, 56193
E-mail: info-bgctub@bgctrustbd.org
Web:www.bgctub-edu.net

Printed by:
Fatema Printers
Anderkilla, Chittagong.
Cell: 01760 482559, 01819-349076

BGC Trust University Journal

Volume : 03, December 2016
ISSN : 2073- 5448

Chief Patron : **Engineer Afsar Uddin Ahmad**
Chairman, Board of Trustee, BGCTUB

Patron : **Barrister Imtiaz Uddin Ahmad Asif**
Member, Board of Trustee, BGCTUB

Executive Editor :Prof. Dr. Saroj Kanti Singh Hazari
Vice Chancellor, BGCTUB

Members of the Editorial Board:

Professor Ajit Kumar Das	Treasurer, BGCTUB
Professor Ranajit Kumar Dey	Dean, Faculty of Business Administration, BGCTUB
Prof. Dr. Md. Tayub Chowdhury	Prof. of Marketing, University of Chittagong
Professor A.B.M. Abu Noman	Dean, Faculty of Law, University of Chittagong
Professor Dr. Hazarat Ali Miah	Professor, Dept. of Pharmacy, BGCTUB
Professor Sharafat Ullah	Professor and Chairman, Dept. of English, BGCTUB
Professor Shaswati Das	Professor, Dept. of English, BGCTUB
Mr. Sukanta Bhattacharjee	Associate Professor, Dept. of English, University of Chittagong
Mr. Sudipta Deb	Chairman, Dept. of CSE, BGCTUB
Mr. Rana Karan	Associate Professor and Coordinator, FBA BGCTUB
Dr. Md. Sarwar Uddin	Associate Professor and Coordinator, FBA, BGCTUB
Mrs. Nazneen Akter	Chairman, Dept. of Law, BGCTUB
Mr. Aninda Kumar Nath	Chairman, Dept. of Pharmacy, BGCTUB

The Journal is an official Publication of BGC Trust University Bangladesh. Opinions expressed in the articles, however, are those of the concerned authors and so don't necessarily reflect the views of the authority or of the editorial board

EDITORIAL

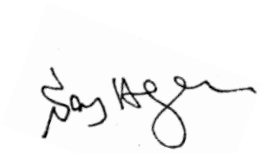
I am exceedingly happy to write a few words on the eve of publication of BGC Trust University Journal, Volume 3. It is a fact that a Journal is the mirror of research performance of academicians of ours and others. Research work is an integral part of any academic institutions like University. It is a place that provides opportunity and avenue for researchers. Journal is a tool for disseminating research findings derived from the studies conducted by the academicians.

The quality of papers determines the standard of the Journal and we were committed to maintain the standard of the journal. Hence, the guidelines formed for selection of articles and publication of Journal has strictly been followed. The editorial board primarily screened the articles and the executive editor selected the reviewers for their comments. Each article was reviewed by two well-known academicians in the relevant area of research. Following the comments of the two reviewers, the concerned paper was selected / rejected. The respective authors were asked to revise the scripts keeping pace with the recommendations of the concerned reviewers. In case of difference of opinion in between the two academicians, a third reviewer was selected for the purpose.

The journal has been sponsored and financed by BGCTUB. I like to thanks to all the members on the editorial board for their hearty cooperation to make this venture a success.

I would also like to express my gratitude to the authors for undertaking ventures of preparing articles with utmost care and sincerity in the teeth of many limitations.

In spite of my utmost efforts, the Journal may not be free from errors and for that I should shoulder the responsibility.



Prof. Dr. Saroj kanti Singh Hazari
Executive Editor
BGC Trust University Journal

BGC Trust University Journal
Volume-03, December, 2016
ISSN 2073-5448

Content

01. Evaluation of Anti-arthritic, Erythrocyte Membrane Stabilizing and Anti-thrombotic Attributes in In Vitro Screening of Centtella asiatica Linn. 7-22
Md. Zia Uddin * Mycal Dutta * Aninda Kumar Nath * Jewel Mallick *

02. In vitro Kinetic Studies of Ranitidine Hydrochloride Film Coated Tablets Available in Bangladesh 23-40
Aninda Kumar Nath * Md. Zia Uddin * Md. Didaruzzaman Sohel** Md. Hassan Kawsar **

03. Studies on Biologically Important Transition Metal Complexes of a Diazacyclic Ligand 41-56
Saroj Kanti Singh Hazari *, Tapashi Ghosh Roy **, Md. Masudur Rahman *** Saswata Rabi ** and Md. Shah Alam **

04. Molybdenum complexes of some Tetradentate Ligands: Syntheses, Characterization and Antimicrobial Studies 57-76
Saroj Kanti Singh Hazari *, Debashis Palit ** and Sukla Rakshit ***

05. Feedback on Writing: The tertiary level EFL teachers' perceptions and practices 77-88
Md. Khaled Bin Chowdhury * Shakila Mustaque **

06. Impact of Marketing Cost on Revenue and Operating Profit- A Study of Pharmaceutical Companies of Bangladesh 89-110
Golam Shahria * Mrs. Mouri Dey **

07. Empowering students in EFL classroom: Literature Circle Approach 111-124
Mosammat Sabera Begum *

08. An Analysis of 10 Indicators of Grameen Bank's Micro-Credit in Alleviating Poverty-A Study on Chittagong Region 125-138
Md. Siraz Meah *

09. Dimensions of Organizational Justice and Job Satisfaction: An Empirical Study 139-160
Mita Mazumder * Soman Chakraborty **

10. Enhancing Quality Banking Service Rendering Skill Through Training and Development Programs: Executive Trainers' View 161-180
Mohd. Kamal Uddin * Syeda Sunjeeda Showkat **

11. Quality Education and Private Universities: Challenges and Strategies in Bangladesh 181-198
Dhiman Barua * Dr. Md. Sarwar Uddin **

12. Employees' Perception towards Herzberg's Hygiene Factors at Private Commercial Banks of Bangladesh: An Empirical Study 199-214
Mohd. Kamal Uddin *

Evaluation of Anti-arthritic, Erythrocyte Membrane Stabilizing and Anti-thrombotic Attributes in *In Vitro* Screening of Centella asiatica Linn

Md. Zia Uddin * Mycal Dutta * Aninda Kumar Nath * Jewel Mallick *

Abstract

The present study was undertaken to explore the qualitative phytochemicals, in vitro anti-arthritic, membrane stabilizing and anti-thrombotic activities of methanol extract of Centella asiatica Linn and its different fractions. In vitro anti-arthritic, membrane stabilizing and anti-thrombotic activities were evaluated by inhibition of protein denaturation, stabilization of red blood cell membrane lysing and clot lysis technique respectively. The crude methanol extract and its ethyl acetate fraction of C. asiatica significantly ($p < 0.05$) inhibited protein denaturation than chloroform and pet-ether fraction compared to standard diclofenac sodium. The crude methanol, ethyl acetate and pet ether fraction significantly ($p < 0.05$) protected erythrocyte membrane lysis compared to standard indomethacine demonstrating its strong anti-inflammatory activity. In anti-thrombotic study the crude methanol extract and its different fractions demonstrated moderate to strong significant ($p < 0.05$) anti-thrombotic activity (23.68-49.34% lysis of human blood clot), in comparison to 71.14% clot lysis by standard Streptokinase. These findings indicate that C. asiatica could be a potential source of natural anti-arthritic, membrane stabilizing and anti-thrombotic agent.

Key Words: Centella asiatica, anti-arthritic, membrane stabilizing, anti-thrombotic, streptokinase.

BGC Trust University Journal
Vol. 03, December, 2016, pp. 7 - 22
© BGC Trust University Bangladesh
ISSN : 2073- 5448

* *Department of Pharmacy, BGC Trust University Bangladesh*
Corresponding author: Md. Zia Uddin, Assistant Professor, Department of Pharmacy, BGC Trust University Bangladesh, Chittagong-4000, Bangladesh.
Email: zia_ctg@live.com, Tel.: +8801818764117.

Introduction

The investigation of medicinal properties of various plants attracted an increasing interest since last couple of decades due to their potent pharmacological activities, convenience to users, economic viability and low toxicity.[1, 2] Rheumatoid arthritis is a type of autoimmune disorders that may affect many tissues and organs but principally attack synovial joints. It is a major cause of disability throughout the world. The modern medicine uses synthetic non-steroidal anti-inflammatory drugs, diseases modifying anti-rheumatic drugs, TNF- antagonists and immunosuppressant drugs for the treatment of Rheumatoid arthritis. These drugs have potent activity and as well as they produce some toxicities include gastric ulcer, liver damage, renal damage etc.[3] Therefore the use of natural plant extract has gained much attention from the consumers because they are considered safer than synthetic anti-arthritic drugs. Now-a-days herbal plant extracts and their isolated compounds were used both internally as well as externally for treating inflammatory conditions like arthritis.

The erythrocyte membranes refer to the lipid bilayer (phospholipids and cholesterol) containing the transmembrane proteins of the cytoskeleton and an assembly of proteins regularly interconnected.[4, 5] In some abnormal conditions of the RBCs membrane, such as hereditary spherocytosis (HS), hereditary elliptocytosis (HE), hereditary pyropoikilocytosis (HPP) or the Southeast Asian Ovalocytosis (SAO), these membrane proteins are usually defective because of their specific inherited gene mutation.[6] Studies have revealed that several herbal derived drugs have been demonstrated to contain principles that possess ability to facilitate the stability of biological membranes when exposed to induced lyses.[7]

In recent years thromboembolic disorders are increasing at a remarkable rate due to the imbalance of homeostatic system of human body. Haemostasis maintains the integrity of circulatory system after vascular damage. Circulating platelets are recruited to the site of injury, where they become a major component of the developing thrombus. Thrombosis is a fatal disease which is characterized by the development of a blood clot (thrombus) in the circulatory system because of the imbalance of homeostatic system of the body and this critical event in the arterial diseases associated with acute coronary disorders such as pulmonary emboli, deep vein thrombosis, strokes, heart attacks and venous thromboembolic disorders account for considerable morbidity and mortality and leads to vascular blockade and while recovering causes fatal consequences, such as myocardial or cerebral infarction and even death.[8]

Thrombolytic agents that include tissue plasminogen activator (t-PA), urokinase (UK), and streptokinase (SK) are used across the world for the treatment of these diseases. In India, though streptokinase and urokinase are widely used due to lower cost as compared to other thrombolytic drugs.[9] But due to the weak substrate specificity of these first generation drugs (Streptokinase and Urokinase), they lead to systemic fibrinolysis, anaphylactic reaction and bleeding complications (haemorrhage).[10] Again, multiple treatments with streptokinase are restricted in a given patient as a result of immunogenicity.[11] Because of the shortcomings of the available thrombolytic drugs, attempts are underway to develop improved recombinant variants of these drugs.[12, 13] Thrombolytic therapy with recombinant t-PA is effective in acute myocardial infection, but the treatment is limited by a fairly slow reperfusion rate and frequent early reocclusions. Moreover, the platelet-rich thrombi are highly resistant to lysis by t-PA.[14]

Centella asiatica L. urban belonging to the family Umbeliferae is a common perennial herbaceous creeper flourishing abundantly in moist areas and distributing widely in tropical and subtropical countries including Bangladesh. Various chemical constituents are reported in C. asiatica like asiaticoside, madecassoide, madecassic acid, asiatic acid, glucose, rhamnose, terpenoids, sitosterol, stigmasterol, fatty oils consist of glycerides of palmitic acid, stearic acid, linoleic acid, linolenic acid vitamins like ascorbic acid. It also contains calcium, iron, and phosphate.[15] C. asiatica is claimed to possess a wide range of pharmacological effects, being used for human wound healing, mental and neurological disorders, atherosclerosis, fungicidal, antibacterial, antioxidant and anticancer purposes. C. asiatica has also been reported to be useful in the treatment of inflammations, diarrhoea, asthma, tuberculosis and various skin lesions and ailments like leprosy, lupus, psoriasis and keloid.[16] In addition, numerous clinical reports verify the ulcer-preventive and anti-depressive sedative effects of C. asiatica preparations, as well as their ability to improve venous insufficiency and microangiopathy.[17]

In this study, we reported the further progress whereby the methanol, chloroform, petroleum ether and ethyl acetate extract of C. asiatica L. was subjected to an analysis of in vitro anti-arthritic, membrane stabilizing and anti-thrombotic activities since there is no scientific report against these activities.

Methods

Collection and identification of plant

The plant C. asiatica was collected from Bandarban. The plant was identified by Dr. Shaikh Bokhtear Uddin, Taxonomist and Professor, Department of Botany, University of Chittagong, Chittagong-4331, Bangladesh.

Extract preparation by solvent-solvent partitioning

The fresh plant materials were dried and ground (Moulinex Blender CK-243, Moulinex, France) into powder (50-80 mesh, 450 gm approx.) and soaked (500 gm) for 14 days with 2-3 days interval in 2.5 L of methanol at room temperature (23 ± 0.5)^{o}C. Filtrate obtained through cheesecloth and Whatman filter paper No. 1 were concentrated under reduced pressure at the temperature below 45^{o}C using rotary evaporator (Buchi Rotavapor R-200, Germany). The solvent was completely removed by using rotary evaporator (Buchi Rotavapor R-200, Germany) and obtained C. asiatica 33 gm (yield 6.6% w/w) of dried crude extracts. The extracts were placed in glass Petri dishes (90 X 15 mm, Pyrex, Germany).

After that, solvent-solvent partitioning was done by using the protocol designed by Kupchan and Tsou (1973).[18] The crude extract was (5 gm) triturated by dissolving in 10% aqueous methanol (methanol: water; 9:1 v/v) to make the mother solution which was partitioned off successively by four solvents such as n-hexane, chloroform, petroleum ether and ethyl acetate in order of increasing polarity by using separating funnel. The n-hexane fraction part was discarded as we know that it contains lipid part of the plant extract. The amount of extract found after partitioning and their physical appearances are shown in Table 1. All the four fractions of each plant extract were dried by evaporating respective solvent using rotary evaporator. All extracts were stored at 4^{o}C in air tight containers till further analysis.[19]

Chemicals and reagents

In this study Methanol (Merk, Germany), Ethyl acetate (Sigma-Aldrich, USA), Chloroform (Sigma-Aldrich, USA), Petroleum ether (Merk, Germany), Bovine Serum Albumin (BSA) (Sigma-Aldrich, USA), Ultrafen (Diclofenac Sodium, Beximco Pharmaceuticals Ltd.), Indomet (Indomethacin, Opsonin Pharma Ltd.) and commercially available lyophilized streptokinase (SK) vial (Polamin Werk GmbH, Herdecke, Germany) of 15,00,000 I.U. were used.

Phytochemical screening

Different phytochemical group tests were done to investigate the presence of Phytochemical constituents like alkaloids, terpenoids, glycosides, steroids, tannins, flavonoids, saponins and reducing sugar by subsequent standard procedures.[20]

Evaluation of in vitro anti-arthritic activity

Anti-arthritic activity was carried out by inhibition of protein denaturation method was described by Mizushima and Kobayashi[21] with minor modifications. Fractionated plant extract of different concentrations (50, 100, 200, 400 and 800 µg/ml) were made for test solution and product control. Then 0.45 ml of bovine serum albumin (5% w/v aqueous solution) and 0.05 ml of extract solution of different concentrations were added in each test solution to make the total volume 0.5 ml and for product control 0.45 ml of distilled water was added instead of bovine serum albumin. For test control solution 0.05 ml of distilled water was added with 0.45 ml of bovine serum albumin (5% w/v aqueous solution). Diclofenac sodium was used as standard against anti-arthritic activity. All of the above solutions were adjusted to pH 6.3 by using phosphate buffer and were incubated at 37°C for 20 minutes and heated at 57°C for 3 min. OD of the solutions was measured by using UV-Visible spectrophotometer at 416 nm.

The percentage inhibition of protein denaturation was calculated using the following formula.

% of inhibition of protein denaturation = $[100 - \{(A_1-A_3) / A_2\} \times 100]$

Where, A_1 = OD of test solution, A_2 = OD of test control and A_3 = OD of product control.

Determination of membrane stabilizing potentials

Red blood cell membrane stabilizing potentials of plant extract were evaluated using the method of Shinde et al.,[22] with minor modifications. For this study at first rat blood samples were collected from rat by using anti-coagulant (heparin) and centrifuged at 3000 rpm for 10 min. at room temperature. The supernatants (plasma and leucocytes) were carefully removed while the red blood cell was washed by fresh normal saline (0.85% w/v NaCl) for five times until supernatants were clear. Then the erythrocyte (2% v/v) was prepared [23]. Then fractionated plant extract of different concentrations (50, 100, 200, 400 and 800 µg/ml) were made. Then for hypotonic test solution 0.5 ml of RBC (2% v/v) was mixed with 2 ml of hypotonic solution, 1 ml phosphate buffer solution of pH 7.4 and each concentration (50, 100, 200, 400 and 800 µg/ml) of all fractionated plant extracts

and for isotonic test solution 2 ml of isotonic solution was added instead of hypotonic solution. For control, 0.5 ml of RBC (2% v/v) was added with 2 ml of hypotonic solution, 1 ml of isotonic saline solution. Indomethacin was used as standard against membrane stabilization activity. The reaction mixtures were incubated for 30 minutes at 37°C. All the test-tubes were centrifuged for 3000 rpm for 20 minutes at room temperature. Absorbance of supernatants was estimated at 540 nm using visible spectrophotometer (Shimadzu UV PC-1600). The percentage of inhibition of haemolysis was calculated by using following formula.

% of inhibition of haemolysis = $\{1- (OD_2-OD_1) / (OD_3-OD_1)\} \times 100$

Where, OD_1 = Absorbance of test sample in isotonic solution, OD_2 = Absorbance of test sample in hypotonic solution and OD_3 = Absorbance of control solution.

Determination of anti-thrombotic activity

From twenty healthy human volunteers, six ml of whole blood was drawn without a history of oral contraceptive or anticoagulant therapy using a protocol approved by the Institutional Ethics Committee of Chittagong University, Faculty of Medicine. An earlier consent, approval number HET-CU2011/1, was taken from the Faculty of Medicine, University of Chittagong, for collection of blood samples from Human volunteers. Clot lysis approaches were carried out by method described by Parasad et al., 2006. [24] A 6 ml venous blood drawn from the healthy volunteers was distributed in 10 different pre-weighed sterile micro centrifuge tubes (0.5 ml/tube) and incubated at 37°C for 45 min. After clot formation, serum was completely removed without disturbing the clot and each tube having clot was again weighed to determine the clot weight. (Clot weight = weight of clot containing tube – weight of tube alone). 100 µl of all fractionated extracts of C. asiatica, were added separately. As a positive and negative control, 100 µl of SK and distilled water respectively were added separately. All the tubes were then incubated at 37°C for 90 min and observed for clot lysis. Released fluid was removed and tubes were again weighed to observe the difference in weight after clot disruption. Difference obtained in weight taken before and after clot lysis was expressed as percentage of clot lysis. The experiment was repeated with the blood samples of the informed donors.

Statistical analysis

All data are presented as mean ± standard deviation (SD). The data were analyzed by a statistical software package (SPSS, version 19.0 IBM Corporation, NY, USA) using Tukey's multiple range post hoc tests. The values were considered significantly different at $p < 0.05$.

Results

Chemical extraction

The amount of different fractionated (Methanol, Petroleum ether, Chloroform and Ethyl acetate) extracts found after Kupchan-partitioning method and their physical appearances are shown in Table 1.

Table 1

Different Fractions of C. asiatica Obtained after Kupchan-Partitioning of the Crude Methanol Extract

Plants	Extract/Fractions	Amount (mg)	Yield (% w/w)	Physical appearance
Centella asiatica	Methanol (crude)	33000 mg	6.6	Greenish sticky mass
	Petroleum ether	820 mg	16.4	Deep green gummy mass
	Chloroform	550 mg	11	Red muddy structure
	Ethyl acetate	665 mg	13.3	Blackish sticky mass

Phytochemical investigation

Phytochemical investigation of methanol extract of C. asiatica under this study explored the presence of medicinally active secondary metabolites. Ethyl acetate fraction showed the presence of alkaloids, terpenoids and flavonoids. Petroleum ether fraction revealed the presence of alkaloids, steroids, tannins, saponins and terpenoids. Chloroform fraction revealed the presence of alkaloids, glycosides, terpenoids and flavonoids. These findings with their corresponding results are summarized in Table 2.

Table 2

Phytochemical Investigation of Methanol Extract and Its Pet-ether, Chloroform and Ethyl Acetate Fractions of C. asiatica

Secondary metabolites	Test performed	Methanol extract	Pet-ether fraction	Chloroform fraction	Ethyl acetate fraction
Alkaloids	Meyers Test	++	-	+	+
	Wagners Test	+++	+	-	++
Glycosides	Legal Test	-	-	-	-
	Baljits Test	-	-	+	-

Steroids	Salkowski Test	++	+	-	-
	Libermann-Burchred Test	++	+	-	-
Flavonoids	Concentrated HCl and Alcoholic Test	+++	-	+	++
Tannins	Ferric Chloride Test	++	+	-	-
Saponins	Froth Test	+	+	-	-
Terpenoids	Salkowski Test	++	+	+	+
Reducing Sugar	Benedicts Test	+	-	-	-

Note. + = Mild, ++ = Moderate, +++ = Highly Present, - = Absent

Anti-arthritic activity

Anti-arthritic effect of different fractionated extract of C. asiatica were studied significantly by using in vitro inhibition of protein denaturation method in various concentrations i.e. 50, 100, 200, 400 and 800 µg/ml respectively. The activity was compared against diclofenac sodium as a standard which inhibited 91.40 ± 3.58% of protein denaturation of its highest (800 µg/ml) concentration. In this investigation, methanol extract of C. asiatica inhibited 46.38 ± 3.38% of protein denaturation of its highest (800 µg/ml) concentration where as ethyl acetate fraction showed 39.48 ± 3.18%, chloroform fraction showed 28.48 ± 4.21% and pet-ether fraction showed 25.63 ± 3.21% of protein denaturation activity. The crude methanol and its ethyl acetate fraction showed significant ($p < 0.05$) inhibition of protein denaturation when compared to standard diclofenac sodium. Results of percentage inhibition of protein denaturation of all fractionated extract are represents in Figure 1.

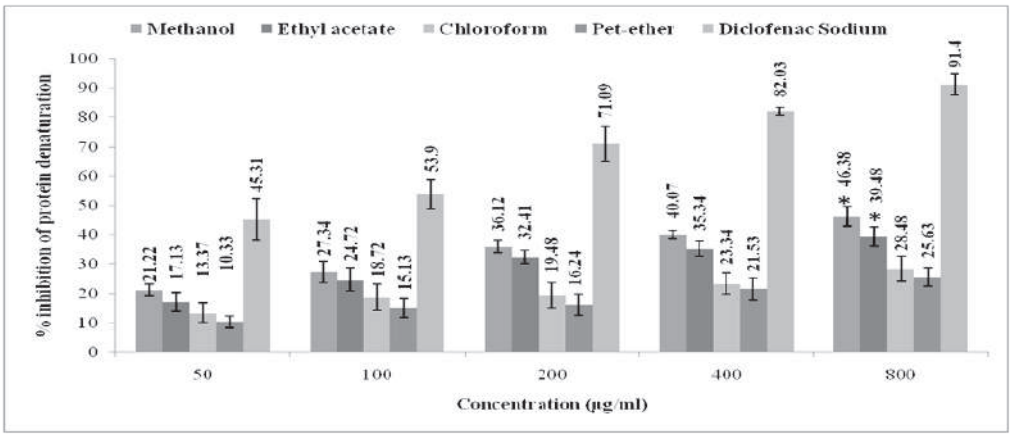


Figure 1. Anti-arthritic activity of all fractionated extract of C. asiatica. All results are presented as mean ± STD and *p < 0.05 indicates that the result is significant compared to standard diclofenac sodium.

Membrane stabilizing activity

In this study membrane stabilizing activity of erythrocyte of different fractionated extract of C. asiatica were studied significantly in various concentrations i.e. 50, 100, 200, 400 and 800 µg/ml respectively. The activity was compared against indomethacin as a standard which showed 74.36 ± 8.10% of haemolysis activity at its highest (800 µg/ml) concentration. In this investigation, methanol extract of C. asiatica showed 45.83 ± 3.23% of haemolysis activity at its highest (800 µg/ml) concentration where as ethyl acetate fraction showed 40.76 ± 3.83%, pet-ether fraction showed 33.27 ± 2.83% and chloroform fraction showed 26.46 ± 2.03% of hemolytic activity. The crude methanol and its pet-ether and ethyl acetate fraction showed significant (p < 0.05) inhibition of red blood cell membrane lysis when compared to standard indomethacine. Results of percentage inhibition of haemolysis of all fractionated extract are represents in Figure 2.

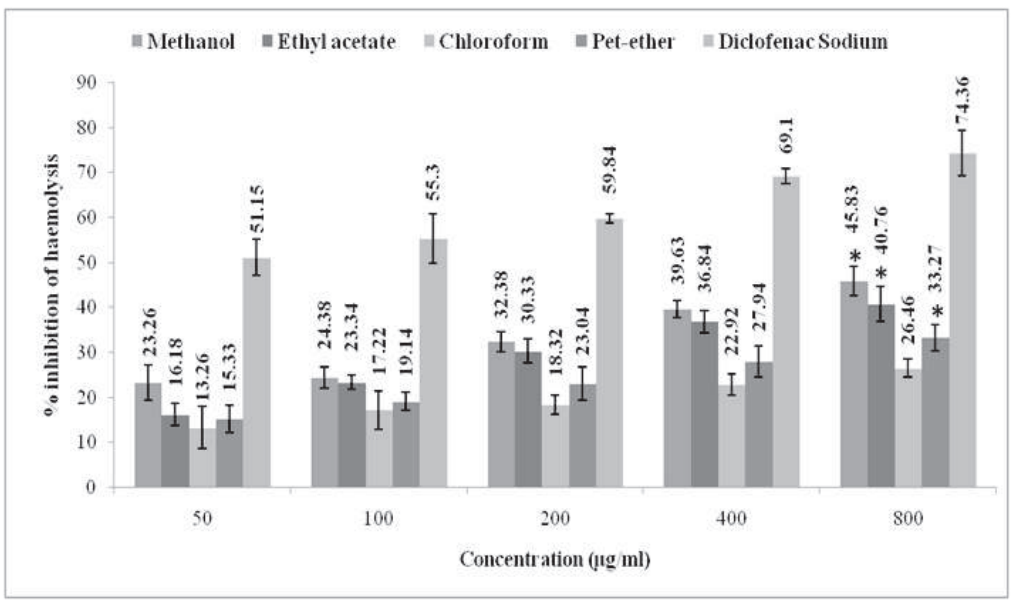


Figure 2. Membrane stabilizing activity of all fractionated extract of C. asiatica. All results are presented as mean ± STD and *p < 0.05 indicates that the result is significant compared to standard indomethacine.

In vitro anti-thrombotic activity

Addition of 100 µl Streptokinase (Durakinase, Dongguk Pharma. Co. Ltd, South Korea), a positive control (30,000 I.U.) to the clots along with 90 min incubation at 37°C, showed 71.14 ± 6.91% clot lysis activity. On the other hand, clots when treated with 100 µl sterile distilled water (negative control) showed only negligible clot lysis which was only 8.90 ± 2.22%. The mean difference in clot lysis percentage between positive and negative control was very significant. But when 100 µl methanolic extract of C. asiatica was added to 20 different clots, 49.34 ± 1.25% clot lysis were obtained and when compared with the positive control (Streptokinase) the mean clot lysis percentage differences was significant ($p < 0.05$). Again ethyl acetate fraction showed 35.46 ± 3.45% ($p < 0.05$), chloroform showed 27.44 ± 3.05% ($p > 0.05$) and pet-ether fraction showed 23.68 ± 4.87% ($p > 0.05$) anti-thrombotic activity. All results for anti-thrombotic activity are shown in Table 3.

Table 3

Anti-thrombotic Activity of Methanol Extract and Its Ethyl Acetate, Chloroform and Petroleum Ether Fraction of C. asiatica, Streptokinase and Water

Effectors	% of clot lysis activity	p-value
Streptokinase (Positive control)	71.14 ± 6.91*	-
Water (Negative control)	8.90 ± 2.22*	-
Methanol extract of *Centella asiatica*	49.34 ± 1.25*	$p < 0.001$
Ethyl acetate fraction of *Centella asiatica*	35.46 ± 3.45*	$p = 0.002$ (< 0.05)
Chloroform fraction of *Centella asiatica*	27.44 ± 3.05	$p > 0.05$
Petroleum ether fraction of *Centella asiatica*	23.68 ± 4.87	$p > 0.05$

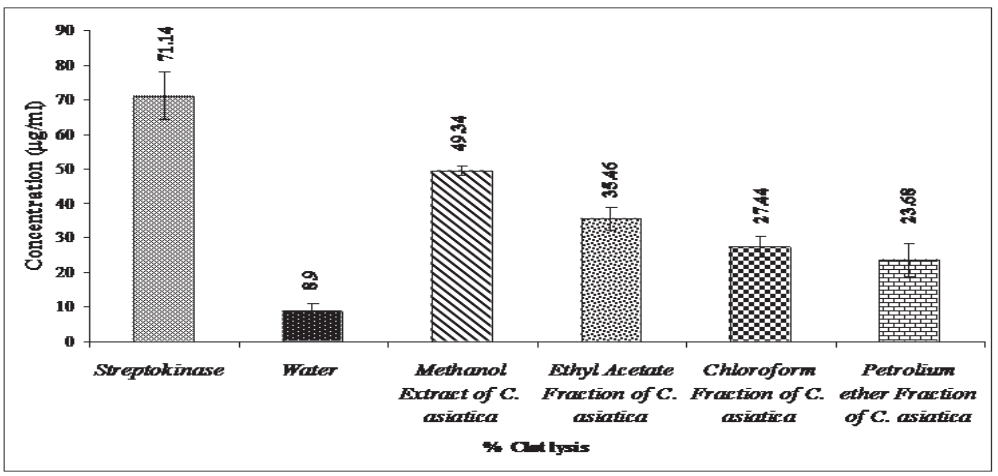


Figure 3. Anti-thrombotic activity of all fractionated extract of C. asiatica. All results are presented as mean ± STD. *p < 0.05 indicates that the result is significant compared to positive control.

Discussion

The secondary metabolites existing in the plant extract play a key role in the pharmacological actions of any plant or plant parts. This study was conducted to make an evidential approach in ascertaining the mentioned biological functions of all fractionated C. asiatica extracts. Methanol extract of C. asiatica under this study explored the presence of medicinally active secondary metabolites like alkaloids, glycoside, steroids, tannins, terpenoids, flavonoids and saponins. Ethyl acetate fraction showed the presence of alkaloids, terpenoids and flavonoids. Petroleum ether fraction revealed the presence of alkaloids, steroids, tannins, saponins and terpenoids. And chloroform fraction revealed the presence of alkaloids, glycosides, terpenoids and flavonoids. These screened results were consistent with the previously conducted partial studies.[25]

To evaluate the anti-arthritic activity of all fractionated extracts of C. asiatica in this study most popular inhibition of protein denaturation method was used against diclofenac sodium as standard drug. In arthritic disease condition auto antigens were produced due to denaturation of protein, membrane lysis and proteinase action. The mechanism of protein denaturation involves alteration of electrostatic hydrogen, hydrophobic and disulfide bonding. [26] A slightly higher inhibition of protein denaturation and proteinase inhibition was observed in the present study. This effect may be due to the presence of steroids, alkaloids and flavonoids. In this investigation, methanol extract of C. asiatica inhibited highest (46.38 ± 3.38) % of protein denaturation possibly by controlling the production of auto antigens.

During inflammation, there are lysis of lysosomes which release their component enzymes that produce a variety of disorders. Exposure of RBCs to injurious substances such as hypotonic medium, heat, methyl salicylate or phenyl hydrazine results in the lysis of the membrane accompanied by haemolysis and oxidation of haemoglobin.[27] Injury to RBC membrane will render the cell more susceptible to secondary damage free radical induced lipid peroxidation.[28] Membrane stabilization leads to the prevention of leakage of serum protein and fluids into the tissues during the period of increased permeability caused by inflammatory mediators.[29] These techniques include uncoupling of oxidative phosphorylation, inhibition of protein denaturation, erythrocyte membrane stabilization, fibrinolytic assay and platelet aggregation [23]. In the present study, stabilization of erythrocyte

membranes exposed to hypotonic induced lysis was employed due to its simplicity and reproducibility. The methanol extract of C. asiatica showed highest (45.83 ± 3.23) percentage of haemolysis activity at its highest (800 µg/ml) concentration against indomethacin as a standard which showed highest 74.36 ± 8.10% of haemolysis activity at same concentration.

Platelets play a significant role in the formation of clot by adhering to the broken regions of the epithelial tissue surface. Most fibrinolytic agents work by regulating the enzyme plasminogen, which cuts the cross-linked fibrin mesh. This makes the clot soluble and leads to further proteolysis by other enzymes, and thus causes blood flow over occluded blood vessels. Thus fibrinolytic agents are useful for the treatment of myocardial infarction, thromboembolic strokes, deep vein thrombosis etc. The comparison of the positive management (streptokinase) with negative management clearly showed that clot dissolution didn't occur when water was added to the clot. In the present study methanol extract of C. asiatica showed 49.34 ± 1.25% clot lysis activity against standard Streptokinase which showed 71.14 ± 6.91% clot lysis activity. The mean clot lysis percentage differences between methanol extract and streptokinase was significant ($p < 0.05$). Again ethyl acetate fraction showed 35.46 ± 3.45% ($p < 0.05$), chloroform showed 27.44 ± 3.05% ($p > 0.05$) and pet-ether fraction showed 23.68 ± 4.87% ($p > 0.05$) anti-thrombotic activity which were not significant. Since phytochemical analysis showed that the crude extract contains flavonoids, triterpenes, saponins, phenols, diterpenes, proteins and tannins. It can be predicted that these phyto-constituents could also be liable for its clot lysis activity.[30, 31]

Conclusion

In conclusion, the study demonstrates that methanol extract and its ethyl acetate fraction of C. asiatica have promising anti-arthritic, membrane stabilizing and anti-thrombotic activity than chloroform and pet-ether fraction. However, further studies are suggested to investigate these effects for the isolated and identified pure compounds from C. asiatica.

Acknowledgements

Authors are thankful to Prof. Dr. S. K. S. Hazari, Vice-Chancellor, BGC Trust University Bangladesh, for providing research grant to conduct the research at the Department of Pharmacy, BGC Trust University Bangladesh. The authors are also thankful to Dr. Shaikh Bokhtear Uddin, Taxonomist and Professor, Department of Botany, University of Chittagong, Chittagong-4331, Bangladesh for identifying the plant sample.

References

[1] A. L., Chew, J. J. A., Jessica, & S., Sasidharan, Antioxidant and antibacterial activity of different parts of Leucas aspera, Asian Pacific Journal of Tropical Biomedicine, **2**, 176-180 (2012).

[2] K. R., Prashant, J., Dolly, K. R., Singh, K. R., & G. Watal, Glycemic properties of Trichosanthes dioica leaves, Pharmaceutical Biology **46**, 894-899, (2008).

[3] R., Lavanya, S., Maheshwari, G., Harish, J., Bharath, S., Kamali, D., Hemamalani, V. J., Bharath, & C. R., Umamaheswara, Investigation of in vitro anti-inflammatory, anti-platelet and anti-arthritic activities of the leaves of Anisomeles malabarica Linn., Research Journal Pharmaceutical Biology and Chemical Sciences **1**(4), 745-752, (2010).

[4] D. E., Discher, & C. P., Et, New insights into red cell network structure, elasticity and spectrin unfolding: a current review, Cellular Molecular and Biological Letter, **6**, 593-606, (2001).

[5] P., Gallagher, & L. S., Et, Disorders of the erythrocyte membrane in Nathan and Oski's haematology of infancy and childhood, Philadelphia: Elsevier-Saunders, 560-684, (2003).

[6] S. W., Eber, J. M., Gonzalez, M. L., Lux, A. L., Scarpa, T., Tse, M., Dornwell, & J., Herbes, Ankyrin-1 mutations are a major cause of dominant and recessive hereditary spherocytosis, Nature Genetics **13**, 214-218, (1996).

[7] O. O., Oyedapo, B. A., Akinpelu, M. O., Akinwunmi, & F. O., Sipeolu, Red blood cell membrane stabilizing potential of extracts of Lantana camara and its fractions. International Journal of Plant Physiology and Biochemistry, **2**(4), 46-51, (2010).

[8] F. A., Nicolini, W. W., Nichols, J. L., Mehta, T., G., Saldeen, R., Schofield, M., Ross, D., W., Player, G. B., Pohl & C., Mattsson, Sustained re-flow in dogs with coronary thrombosis with K2P, a novel mutant of tissue plasminogen activator, Jouranl of American Coll. Cardiology, **20**, 228-235, (1992).

[9] S., Dwivedi, Terminalia arjuna Wight & Arn. -A useful drug for cardiovascular disorders, Journal of Ethnopharmacology, **114**(2), 114-129, (2007).

[10] A., Mannan, J. M., Kawser, & A. M. A., Ahmed, Assessment of antibacterial, thrombolytic and cytotoxic potential of Cassia alata seed oil, Journal of Applied Pharmaceutical Science, **1**(9), 56-59, (2011).

[11] B., Furie, & B. C., Furie, Mechanisms of thrombus formation, The New England Journal of Medicine, **359**(9), 938-949, (2008).

[12] J. C., Mucklow, Thrombolytic treatment: Streptokinase is more economical than alteplase, British Medical Journal, 311, 7018, 1506, 1995, (1995).

[13] V., Rajkumar, G., Guha, A. R., Kumar, & L., Mathew, Evaluation of cytotoxic potential of Acorus calamus rhizome, Ethnobotanical Leaflets, **13**, 832-839, (2009).

[14] I. K., Jang, H. K., Gold, A. A., Ziskind, J. T., Fallon, R. E., & Holt, R. C., Leinbach, J. W. May, & D., Collen, Differential sensitivity of erythrocyte-rich and platelet-rich arterial thrombi to lysis with recombinant tissue-type plasminogen activator, Circulation, **79**, 920-928, (1989).

[15] G. E., Trease, & W. C., Evans, Textbook of Pharmacognosy, The Williams & Wilkins Company, Baltimore 2, Maryland, p. 130, 303,480, (1966).

[16] M. O., Ullah, S., Sultana, & A., Haque, Antimicrobial, cytotoxic and antioxidant activity of Centella asiatica, European Journal of Scientific Research, **30**(2), 260-264, (2009).

[17] C. J., Zheng, & L. P., Qin, Chemical components of Centella asiatica and their bioactivities, Chinese Journal of Integrative Medicine, **5**(3), 348-351, (2007).

[18] S. M., Kupchan, G.,Tsou, & C. W., Sigel, Datiscacin, a novel cytotoxic cucurbitacin 20-acetate from Datisca glomerata, Journal of Organic Chemistry, **38**(7),1420-1421, (1973).

[19] Y., Bibi, S., Nisa, F.M., Chaudhary, & M., Zia, Antibacterial activity of some selected medicinal plants of Pakistan, BMC Complementary and Alternative Medicine, **11**(52),1472-6882, (2011).

[20] P. G., Vital, & W. L., Rivera, Antimicrobial activity, cytotoxicity and phytochemical screening of Voacanga globosa (Blanco) Merr. leaf extract (Apocynaceae), Asian Pacific Journal of Tropical Medicine, **4**(10), 824-828, (2011).

[21] Y, Mizushima, & M., Kobayashi, Interaction of anti inflammatory drugs with serum proteins, especially with some biologically active proteins, Journal of Pharmacy, **20**, 169-173, (1968).

[22] U. A., Shinde, A. S., Phadke, A. M., Nair, A. A., Mungantiwar, V. J. Dikshit, & M. N., Saraf, Membrane stabilizing activity-a possible mechanism of action for the anti-inflammatory activity of Cedrus deodara wood oil. Fitoterapia, **70**, 251-257, (1999).

[23] O. O., Oyedapoo, & A. J., Famurewa, Anti-protease and membrane stabilizing activities of extracts of Fagara zanthoxyloides, Olax subscorpioides and Tetrapleura tetraptera, International Journal of Pharmacology, **33**, 6569, (1995).

[24] S., Prasad, R. S, Kashyap, J. Y, Deopujari, H. J, Purohit, G. M, Taori, & H. F., Daginawala, Effect of Fagonia arabica (Dhamasa) on in vitro thrombolysis, BMC Complement and Alternative Medicine, **7**, 36, (2007).

[25] K., Srinivasan, D., Natarajan, C., Mohanasundari, C., Venkatakrishnan, & N., Nandakumar, Antibacterial, preliminary phytochemical and pharmacognostical screening on the leaves of Vicoa indica (L.) DC, Iranian Journal of Pharmacology and Therapeutics, **6**, 109-111, (2007).

[26] K. N, Shravan, G., Kishore, K. G., Siva, & E. S. S., Priya, In vitro anti-inflammatory and anti-arthritic activity of leaves of Physalis angulate L., International Journal of Pharm. & Ind. Research, **1**(3), 211-213, (2011).

[27] M., Feirrali, C., Signormi, L., Ciccolili, & M., Comporti, Iron release and membrane damage in erythrocytes exposed to oxidizing agents, phenyl hydrazine, devicene and iso-uranil, Biochemical Journal, 285, 295-301, (1992).

[28] B., Halliwell, & M., Whiteman, Measuring reactive species and oxidative damage in vivo and in cell culture: how should you do it and what do the results mean, Brazilian Journal of Pharmacology, **142**(2), 231-225, (2004).

[29] R. S., Chaitanya, B., Sandhya, I., David, K. R., Vinod, & S., Murali, HRBC membrane stabilizing property of Root, Stem and Leaf of Glochidion velutinum. International Journal of Research in Pharmaceutical and Biomedical Sciences, **2**(1), 256-259, (2011).

[30] S., Quideau, D., Deffieux, C. C., Douat, & G. L., Pouysé, Plant polyphenols: chemical properties, biological activities and synthesis, Angew. Chem. Int. Ed. Engl., **50**, 586-621, (2011).

[31] M.S., Ali, M.R., Amin, C.M., Kamal, M.A., Hossain, & M.E., Hossain, In vitro antioxidant, cytotoxic, fibrinolytic activities and phytochemical evaluation of methanol extract of the A. philippense L. Leaves, Asian Pacific Journal of Tropical Biomedecine, **3**(6), 464-469, (2013).

In vitro Kinetic Studies of Ranitidine Hydrochloride Film Coated Tablets Available in Bangladesh

Aninda Kumar Nath * Md. Zia Uddin * Md. Didaruzzaman Sohel**
Md. Hassan Kawsar **

Abstract

Ranitidine hydrochloride is a potent H2 blocker recommended for hyperacidity related disorders and most common OTC drug that frequently used by the common people in the world. In Bangladesh, commercially available 21 brands of ranitidine hydrochloride film coated tablets were studied in distilled water (pH 7.5) for their complete organoleptic in vitro dissolution and in vitro disintegration profiles. Nine brands (Code: RH-3, RH-5, RH-6, RH-10, RH-11, RH-12, RH-13, RH-14 and RH-17) showed delayed disintegration time instead of quick release formulation, which often claimed by those manufacturer. Other twelve brands (Code: RH-1, RH-2, RH-4, RH-7, RH-8, RH-9, RH-15, RH-16, RH-18, RH-19, RH-20 and RH-21) showed the moderate disintrigation time. The tablets were studied for in-vitro dissolution behavior for 1 hour in distilled water using USP reference dissolution apparatus. The in vitro dissolution profiles of the thirteen brands (Code: RH-1, RH-2, RH-4, RH-7, RH-8, RH-9, RH-13, RH-15, RH-16, RH-18, RH-19, RH-20 and RH-21) were fulfilled the USP in vitro dissolution specification of 80% drug release within 45 minutes. On the other hand, five of the total selected brands (Code: RH-3, RH-5, RH-10, RH-12 and RH-17) were failed to fulfill the USP in vitro dissolution specification. Rest three brands (Code: RH-6, RH-11 and RH-14) exhibited very poor release pattern among the selected brands and their drug release rate were 23%, 11% and 19% respectively after one hour study. The drug potency, multiple coefficient, (from zero order, first order, Higuchi and Hixson-Crowell cube root law) similarity and dissimilarity factors were determined. The predicted steady state plasma concentration determined by comparing the in vivo pharmacokinetic data of reference brand (Zantac) using superposition principle of steady state plasma levels determination..

Key Words: Ranitidine hydrochloride, H2 blocker, Hyperacidity, Film coated tablet, *In vitro* dissolution, *In vitro* disintegration time, Market preparation

BGC Trust University Journal
Vol. 03, December, 2016, pp. 23 - 40
© BGC Trust University Bangladesh
ISSN : 2073- 5448

* *Department of Pharmacy, BGC Trust University Bangladesh*
** *Department of Pharmacy, State University of Bangladesh*
Correspondence to: Aninda Kumar Nath, Assistant Professor, Department of Pharmacy, BGC Trust University Bangladesh. E-mail: anindapharm248@yahoo.com Mobie No: +8801712207540

Introduction

Hyperacidity is a serious health care problem and almost 67% of total global population suffered by any form of acid related gastrointestinal disorders (GD). Thus management of hyperacidity becomes very important to improve the human patho-physiology. A number of nonsystemic antacid drugs are used however, their therapeutic potential is very ambiguous. On the other hand, H_2 blockers replaced the therapeutic discrepancies of nonsystemic antacids and successfully managed the hyperacidity problems in pathological and NSAIDs induced condition.

Ranitidine hydrochloride is completive H_2 antagonist that potentially inhibits excess acid secretion in pathologic situation in diseases state from the gastric cell of the stomach without any cholinregic effect. The drug is effective at maintenance dose therapy for gastroesophageal reflux disease (GERD), erosive esophagitis and Zollinger-Ellison syndrome. It is also given in combination with different NSAIDs to prevent gastric irritation caused by excess acid secretion from the stomach. It is contraindicated in patient's known to have hypersensitivity to the drug or the ingredients used for medicament. Ranitidine hydrochloride formulated for oral dosage as film coated tablet. The plasma half-life is 6 to 8 hours. The most common side effect of H_2 receptor blocker is diarrhea, headache and achlorhydria.[1]

The process of *in vitro* disintegration and *in vitro* dissolution played vital roles in liberating a drug from the tablet matrix and marking whether it is available for subsequent gastrointestinal absorption. The *in vitro* dissolution of the drug from the tablet matrix depends on many factors, which include not only the physicochemical properties of drug, rather the nature of formulation and manufacturing process.[2] Hence *in vitro* dissolution analysis of pharmaceutical dosage form has emerged a very important parameter that ensures product quality as well as for differentiating among formulations of the same therapeutic agent.[3] In vitro dissolution studies is an important tool in the evaluation of the best formulation and also in the understanding of possible risks related to specific gastrointestinal environment, dose dumping, food effects on bioavailability and interaction with other drugs.[4] In continuation of our research on different finished pharmaceutical dosage form here we further focused on *in vitro* evaluations of different brands of ranitidine hydrochloride film coated tablets in Bangladesh.[5] This paper deals with the comparative *in vitro* dissolution and *in vitro* disintegration characteristics of different brands of ranitidine hydrochloride film coated tablet most commonly available in Bangladesh.

Material and Method

Chemicals: USP references standard of Ranitidine Hydrochloride (Merk, Germany). Refenance brand: Zantac, (Glaxco SmithKline, Bangladesh.)

Equipment: Shimadzu UV Spectrophotometer (Shimadzu, Model UV-160A, Tokyo, Japan), Digital pH meter, Electrolab Tablet Dissolution Test machine (XXII), Tablet disintegration test machine. Sartorius electronic balance, Thickness gauge (Campbell Electronics, India), Monsanto hardness tester (Campbell Electronics, India), Roche friabilator (Campbell Electronics, India)

Dosages Forms: Twenty one national brands of marketed (production date not more than four months ago from the time of purchase) ranitidine hydrochloride film coated tablets of the test drug were purchased from various stores. The samples were properly checked for their manufacturing license number, batch number, date of manufacture and expiry dates before collection. They were randomly coded (RH-1, RH-2, RH-3, RH-4, RH-5, RH-6, RH-7, RH-8, RH-9, RH-10, RH-11, RH-12, RH-13, RH-14, RH-15, RH-16, RH-17, RH-18, RH-19, RH-20, RH-21). The labeled active ingredient containing ranitidine hydrochloride was 150 mg and packaged in strip or in blister packing. The strip or blister packs were stored at 25±2°C for four weeks before the dissolution study in order to evaluate any organoleptic changes.

Organoleptic Evaluation of Tablet

The tablets were evaluated for the following parameters:

Thickness and diameter test: [6]

Five tablets were taken and their thickness and diameter were measured using Varnier callipers. Five trials for each formulation were made and are expressed in mm.

Weight variation: [7]

Ten tablets from each formulation were randomly selected and average weight was determined.

% weight variation= {(Average weight – Individual weight) / Average weight} ×100

Friability test: [7]

Three tablets were initially weighed and placed to a friabilator, operated at 25 rpm for 4 min or run upto100 revolutions and dropping the tablets at a height of 6 inches in each revolution. Tablets were de-dusted using a soft muslin cloth, re-weighed and

the loss in weight (friability) was determined as follows:

% Friability = {(initial weight – final weight) / (initial weight)} × 100

Hardness test: [8]

Three tablets were randomly picked and hardness of tablets was determined by Fabrication and in vitro Evaluation of Allopurinol Fast 75 using a hand operated hardness test apparatus Monsanto hardness tester (Campbell Electronics, India).

In vitro disintegration time: [9]

The disintegration time for all formulations was determined by using disintegration test apparatus containing 900 ml of 0.01N HCl solution.

Drug content: [10]

The percentage of drug content by the following equation for five tablets:

$$\text{Percent drug content} = \frac{A_{spl} \times W_{std} \times \text{Average Weight} \times P_{std}}{A_{std} \times W_{spl} \times \text{Label Claimed Value}}$$

Where, Aspl = absorbance of sample, Wstd = weight of standard, Pstd = potency of standard Astd = absorbance of standard and Wspl = weight of sample.

Dissolution Study:

The release rate of ranitidine hydrochloride film coated tablets was determined by United States Pharmacopoeia (USP) referred dissolution testing apparatus 2 (paddle method). The dissolution test was performed in distilled water (900 ml) at 37 ±0.5°C and at 50 rpm paddle speed.

The medium was preheated to 37°C and then added to the vessels. The paddle rotation was started after the medium was placed in the vessels and the system was allowed to equilibrate for 15 min. Thus, for each sub sample of six tablets tested simultaneously, every individual tablet result was identified with a particular vessel and position.

The in-vitro release profile of those formulations were studied in distilled water (pH 7.5) continued for 1 hour using USP reference dissolution apparatus. Six tablets from each formulation were weighed and placed in the baskets. At every ten minutes interval sample (10 ml) of the solution was withdrawn from the dissolution medium and immediately replaced with equal volumes of dissolution medium.

The withdrawn sample (10 ml) was then filtered, diluted and analyzed at 314 nm for

ranitidine hydrochloride by UV spectrophotometer (Shimadzu, Model UV-160A, Kyoto, Japan). The amount of drug present in the samples was calculated from calibration curves constructed from the standard solution of USP reference standard of the test drugs.

Drug Release Kinetics

The *in vitro* drug release kinetic data were tested with the following mathematical model.

Zero order equation: The equation assumes that the cumulative amount of drug release vs time. The equation may be as follows: [11]

$C = K_0 t$---------- (1)

Where, K0 is the zero order rate constant expressed in unit concentration/time and t is the time in hours. A graph of concentration vs time would yield a straight line with a slope equal to K_0 and intercept the origin of the axes.

First order equation: The release behavior of first order equation expressed as log cumulative percentage of drug remaining vs time. The equation may as follows: 12

$LogC = LogC_0 - kt / 2.303$ ---------- (2)

Where, C is the amount of drug undissolved at t time, the C_0 is drug concentration at t = 0, k corresponding release rate constant.

Higuchi square root law: The Higuchi release models describe as cumulative percentage of drug release vs square root of time. The equation may be as follows: [13]

$Q = K t$ ---------- (3)

Where, Q = (100-C) the amount of drug dissolved at time t. K is the constant reflecting the design variables of the system. Hence, drug release rate is proportional to the reciprocal of the square root of time.

Hixson-Crowell cube root law: It is the law that presenting idea about the evaluation of drug release pattern changes with the surface area and the diameter of the particles/tablets. It is mentioned as the cube root of the percentage of drug remaining in the matrix vs time. The equation may be as follows: [14]

$Q_0 1/3 - Q_t 1/3 = kHC\ t$---------- (4)

Where Q_0 is initial amount of the drug in the tablets, Q_t is the amount of drug release in time t and kHC is rate constant for the Hixson-Crowell cube root law

Distinguish the similarity and dissimilarity factors: Dissolution profile were compared by fit factors (similarity and dissimilarity factor) using the dissolution profile of reference brand. In vitro drug release parameters (R0= rate of input and tdel= time of drug release) of similar release profile (based on f2 value) to that of the reference product were fit to in vivo drug concentrations using reported pharmacokinetic properties. Method of superposition was used for steady state prediction concentration. The values of Cmax and Cmin obtained by comparing the actual plasma level of reference brand.15

The goodness of modified release formulations were evaluated from calculated dosage form index, $DI = C_{max} / C_{min}$ ---------- (5)

And fluctuation (%) = $(C_{max} - C_{min}) \times 100 / C_{av}$ ---------(6)

Where C_{max} and C_{min} are maximum and minimum blood concentration. C_{av} = average blood concentration at steady state.

Results and Discussion

Commercially available twenty one brands (Code: RH-1, RH-2, RH-3, RH-4, RH-5, RH-6, RH-7, RH-8, RH-9, RH-10, RH-11, RH-12, RH-13, RH-14, RH-15, RH-16, RH-17, RH-18, RH-19, RH-20 and RH-21) of ranitidine hydrochloride film coated tablet were thoroughly evaluated for their physical properties which were Hardness; (kg/cm2) 3.19±0.01 to 4.35±0.03, Friability (%); 00 to 0.12±0.02, thickness (mm); 2.51±0.02 to 3.19±0.12 and Weight Variation Test (%); 1.132±0.02 to 2.903±0.23 parameters are in acceptable range. The potency of those selected brands were estimated and found four brands (Code RH-6, RH-11 and RH-14) did not meet the declared potency (Table -1).

The in vitro disintegration of the selected brands were studied and compared with reference brand (Zantak) as shown in Fig: 1. The declared disintegration time of brands (Code: RH-3, RH-5, RH-6, RH-10, RH-11, RH-12, RH-13, RH-14 and RH-17) showed delayed disintegration time instead of exhibited quick release formulation that often claimed by those manufacturers. Moreover, other brands (Code: RH-1, RH-2, RH-4, RH-7, RH-8, RH-9, RH-15, RH-16, RH-18, RH-19, RH-20 and RH-21) showed the moderate disintegration time which was similar to that of reference (9.8 min).

The tablets were studied for in vitro dissolution behavior for 1 hour time period in distilled water using USP reference dissolution apparatus as shown in Table and Fig (Table: -2 and Fig:- 2,3,4 and 5). The in vitro dissolution profile of the thirteen brands (Code: RH-1, RH-2, RH-4, RH-7, RH-8, RH-9, RH-13, RH-15, RH-16, RH-18, RH-19, RH-20

and RH-21) fulfill the USP in vitro dissolution specification of 80% drug release within 45 minutes. On the other hand, five of the brands (Code: RH-3, RH-5, RH-10, RH-12 and RH-17) failed to fulfill the USP in vitro dissolution specification that was very much related with error in formulation. Rest three brands (Code: RH-6, RH-11 and RH-14) exhibited very poor release pattern among the selected brands and their drug release rate were 23%, 11% and 19% respectively after 1 hour study.

In-vitro dissolution studies of all the brands (RH-1 to RH-21) studied throughout the stipulated period and theoretical release profiles of the drug analyzed (Table-3) by multiple coefficients (r^2), zero order release kinetics, first order release kinetics, Higuchi release kinetics and Hixson-Crowell release kinetics.

The result obtained indicated the highest linearity of all analyzed formulations and the fit factors found (f_1 and f_2) discussed (Table-4). Considering the dissolution profile, similar value of f_2 should lie 50 to 100 and dissimilarity factor f_1 was also calculated to approximate the percentage error between different release profiles. The value of f1 is Zero when the test and reference formulation profiles are identical and increase proportionally with the dissimilarity between different profiles. If the value of f_2 is 50, 90% similarity in the profile was indicated and if it is 40 then 80% similarity may be indicated. Eight brands (Code: RH-1, RH-5, RH-9, RH-10, RH-16, RH-20 and RH-21) showed dissimilarity between their different release profiles (Table-4). On the other hand, eleven brands (Code: RH-2, RH-3, RH-4, RH-7, RH-11, RH-12, RH-13, RH-14, RH-15, RH-17and RH-18) showed 80% similarity and two brands (Code: RH-8and RH-19) showed 90% similarity between their different release profiles (Table-4).

Using superposition principle study, a steady state plasma level was calculzated (Table-5). The predicted steady state plasma drug concentration of all brands showed some dissimilarity compared to reference brand (Zantac). The calculated plasma drug concentration of six brands (Code: RH-5, RH-6, RH-10, RH-11, RH-12 and RH-14) were in below therapeutic level and other fifteen brands (Code: RH-1, RH-2, RH-3, RH-4, RH-7, RH-8, RH-9, RH-13, RH-15, RH-16, RH-17, RH-18, RH-19, RH-20 and RH-21) lied within the therapeutically acceptable range compared to the reference brand. The dosage form index (DI) and fluctuation (%) determined by using zero order, first order and Higuchi release profile (Table-5).

Table-1: The amount of drug present in different commercial brands of ranitidine hydrochloride film coated tablets available in Bangladesh pharma market

Code	Potency		Code	Potency
RH-1	96.4		RH-12	99.7
RH-2	94.8		RH-13	92.3
RH-3	98.4		RH-14	69.7
RH-4	96.6		RH-15	97.6
RH-5	97.9		RH-16	93.2
RH-6	72.8		RH-17	92.8
RH-7	93.4		RH-18	99.1
RH-8	94.8		RH-19	94.1
RH-9	95.4		RH-20	96.7
RH-10	94.7		RH-21	98.2
RH-11	85.4		Reference	98.7

Table- 2: Release profile of different commercial brands of ranitidine hydrochloride film coated tablets available in Bangladesh pharma market

A: Code: RH-1 to RH-11

Time	RH-1	RH-2	RH-3	RH-4	RH-5	RH-6	RH-7	RH-8	RH-9	RH-10	RH-11
0	0	0	0	0	0	0	0	0	0	0	0
10	12.6	16.4	12.8	14.9	11.3	3.2	12.7	13.5	14.9	13.1	1.6
20	38.5	33.9	21.5	29.9	25.4	6.8	31.7	29.6	25.8	23.8	3.2
30	57.8	51.1	30.2	47.8	38.9	8.7	48.5	41.4	57.8	37.5	6.8
40	74.2	68.4	42.6	66.2	54.7	13.6	64.1	63.2	74.2	55.1	8.3
50	87.6	83.9	57.3	80.3	69.8	18.5	81.1	80.4	88.1	64.1	9.9
60	94.1	90.3	72.4	88.5	78.3	23.3	90.3	89.4	93.5	76.4	11.4

B: Code: RH-12 to Reference

Time	RH-12	RH-13	RH-14	RH-15	RH-16	RH-17	RH-18	RH-19	RH-20	RH-21	Reference
0	0	0	0	0	0	0	0	0	0	0	0
10	11.8	14.9	2.5	12.3	13.2	14.9	11.6	13.4	12.4	14.6	12.6
20	24.7	33.9	7.8	24.7	28.9	25.8	25.3	24.5	26.3	32.4	40.5
30	37.5	57.8	11.9	38.7	44.3	39.7	43.5	42.7	41.5	45.2	57.8
40	51.9	66.2	15.8	56.3	64.3	57.2	62.1	63.2	61.3	64.3	78.2
50	65.7	81.1	17.1	80.2	80.4	68.9	81.2	80.1	80.9	81	89.6
60	74.7	94.1	19.6	87.3	89.3	78.2	89	89.3	88.1	90.1	98.1

Table-3: Drug release mechanism (Multiple coefficient [r^2]) of different commercial brands ranitidine hydrochloride film coated tablets available in Bangladesh pharma market

Code	Zero order	First order	Higuchi	Hixson-Crowell
RH-1	0.8873	0.9839	0.8331	0.7295
RH-2	0.9836	0.9506	0.8997	0.6893
RH-3	0.9748	0.885	0.9203	0.7195
RH-4	0.9379	0.9714	0.9621	0.6872
RH-5	0.2212	0.6419	0.8682	0.4661
RH-6	0.7265	0.8902	0.9871	0.6865
RH-7	0.9998	0.9057	0.9856	0.8704
RH-8	0.9816	0.9993	0.913	0.6225
RH-9	0.978	0.893	0.8267	0.4561
RH-10	0.8584	0.9464	0.8977	0.4961
RH-11	0.9833	0.9269	0.8558	0.4271
RH-12	0.9865	0.9105	0.8474	0.7691
RH-13	0.8822	0.9789	0.9125	0.8524
RH-14	0.9823	0.9142	0.8524	0.7165
RH-15	0.9836	0.9252	0.8453	0.6661
RH-16	0.8835	0.9788	0.9254	0.689
RH-17	0.9846	0.9387	0.8824	0.7244
RH-18	0.9809	0.9387	0.8721	0.7052
RH-19	0.9697	0.959	0.9158	0.4724
RH-20	0.8949	0.9563	0.8559	0.7195
RH-21	0.873	0.9139	0.8649	0.6145
Reference	0.9836	0.893	0.9267	0.6872

Table-4: Similarity and dissimilarity factor values for drug release profile of different commercial brands of ranitidine hydrochloride film coated tablets available in Bangladesh pharma market

Code	f_1	f_2
RH-1	108.9	24.5
RH-2	28.5	48.5
RH-3	31.3	41.3
RH-4	17.2	47.2
RH-5	98.3	12.8
RH-6	78.6	18.9
RH-7	25.6	46.3
RH-8	23.1	56.3
RH-9	85.6	16.2
RH-10	102	12.6
RH-11	25.8	40.1
RH-12	14.6	42.9
RH-13	21.3	41.2
RH-14	23.5	40.2
RH-15	21.7	40.1
RH-16	78.9	25.6
RH-17	27.3	42.6
RH-18	24.1	42.7
RH-19	21	50.6
RH-20	89.6	19.9
RH-21	101.3	21.8
Reference	28.3	45.6

f1 = Dissimilarity factor and f2 = Similarity factor

Table-5: Predicted steady state plasma concentration level of different commercial brands of ranitidine hydrochloride film coated tablets determined from in vitro drug release profile by comparing with in-vivo pharmacokinetic data of references brands available in Bangladesh pharma market

Code	Dose (mg)	*k*	C_{max} (ng/ml)	C_{min} (ng/ml)	DI	Fluctuation (%)
RH-1	100	0.345[a]	435[a]	418[a]	1.04	3.82
RH-2	100	1.976[b]	427[b]	411[b]	1.04	3.596
RH-3	100	1.356[b]	408[b]	201[b]	2.03	46.52
RH-4	100	0.894[a]	445[a]	412[a]	1.08	7.416
RH-5	100	1.458[b]	324[b]	86[b]	3.77	53.48
RH-6	100	24.218[c]	368[c]	314[c]	1.17	12.13
RH-7	100	1.147[b]	418[b]	392[b]	1.07	5.843
RH-8	100	0.387[a]	432[a]	411[a]	1.05	4.719
RH-9	100	1.156[b]	441[b]	410[b]	1.08	6.966
RH-10	100	0.142[a]	389[a]	100[a]	3.89	64.94
RH-11	100	1.261[b]	359[b]	130[b]	2.76	51.46
RH-12	100	1.487[b]	289[b]	40[b]	7.23	55.96
RH-13	100	18.341[c]	426[c]	405[c]	1.05	4.719
RH-14	100	1.132[b]	289[b]	240[b]	1.2	11.01
RH-15	100	1.325[b]	415[b]	395[b]	1.05	4.494
RH-16	100	0.621[a]	422[a]	398[a]	1.06	5.393
RH-17	100	1.213[b]	389[b]	165[b]	2.36	50.34
RH-18	100	1.712[b]	440[b]	422[b]	1.04	4.045
RH-19	100	1.167[b]	429[b]	410[b]	1.05	4.27
RH-20	100	0.371[a]	421[a]	390[a]	1.08	6.966
RH-21	100	0.154[a]	425[a]	410[a]	1.04	3.371
Reference	100	1.214[b]	445[b]	412[b]	1.08	7.416

Cmax = maximum plasma concentration; Cmin = minimum plasma concentration; DI = dosage form index; k = release rate constant (a = first order release order, b = zero order release order and c = higuchi release)

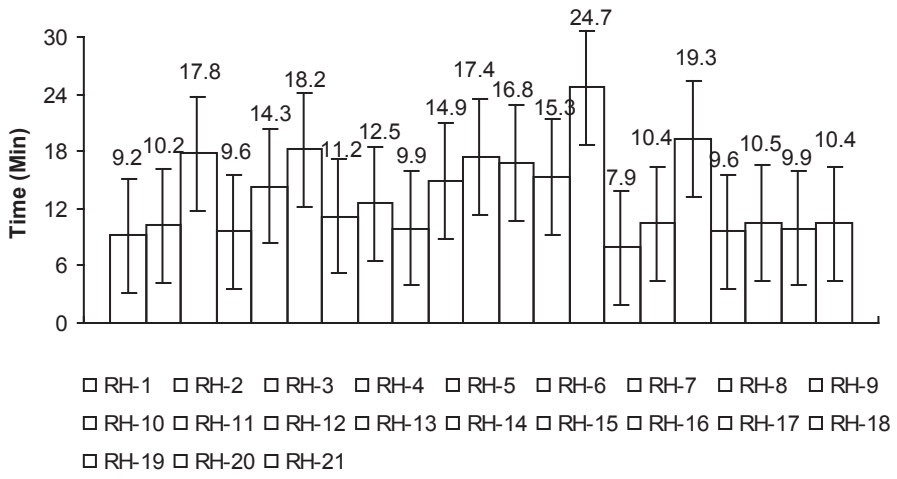
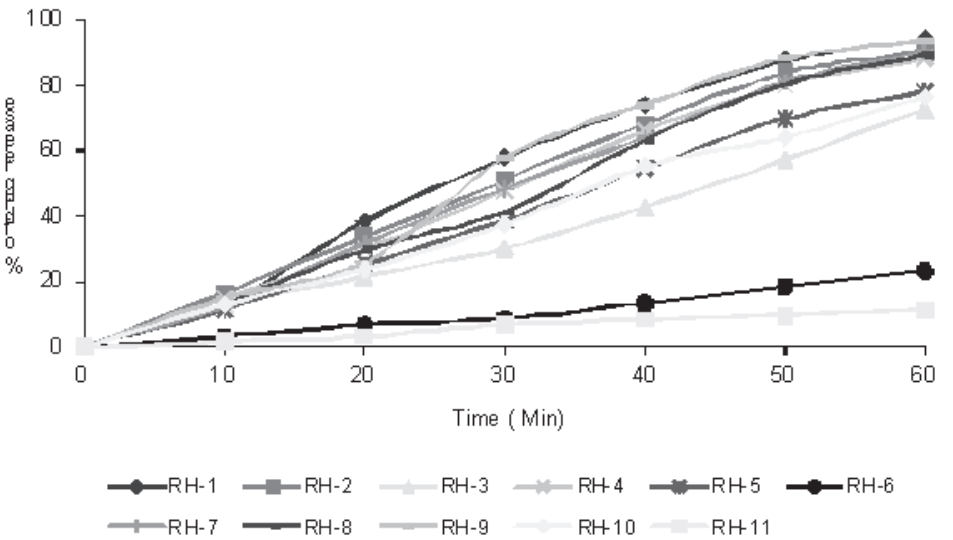


Fig-1: *In-vitro* disintegration profile of different commercial brands of ranitidine hydrochloride film coated tablets available in Bangladesh pharma market.



A: Code: RH-1 to RH-11
B: RH-12 to Reference

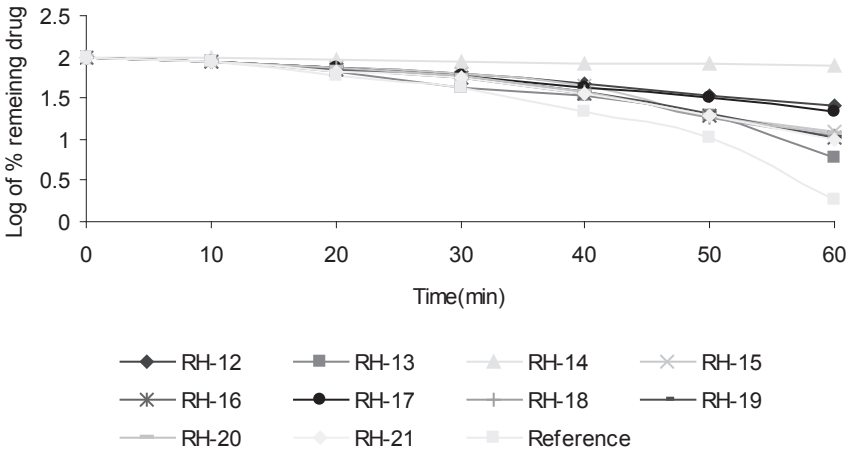
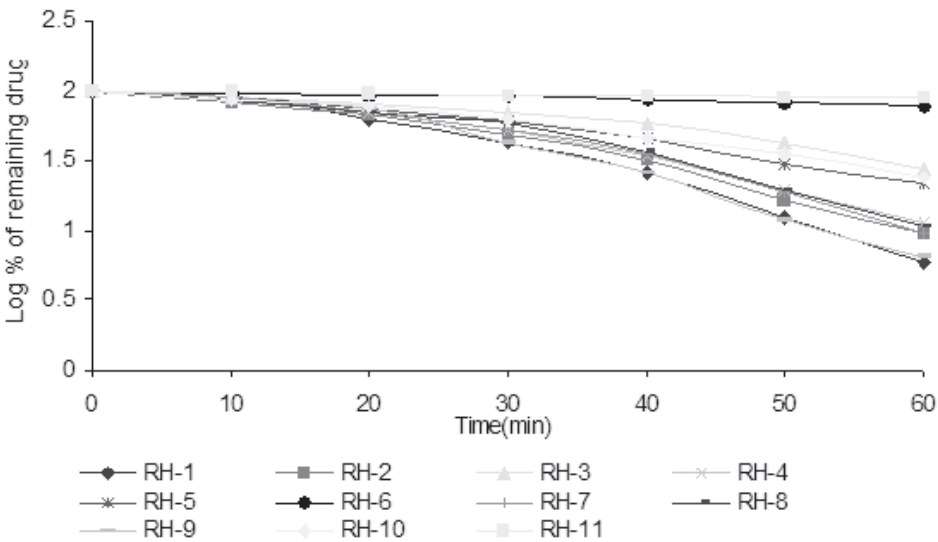
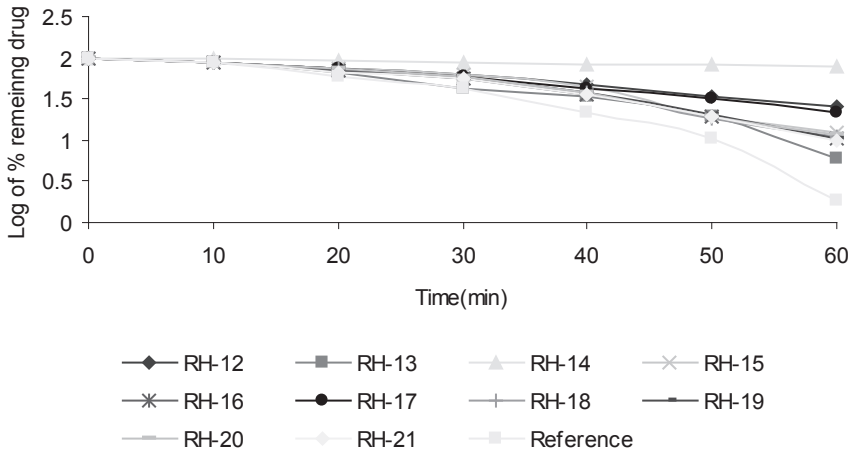


Fig-2: Zero order release kinetic of different commercial brands of ranitidine hydrochloride film coated tablets available in Bangladesh pharma market

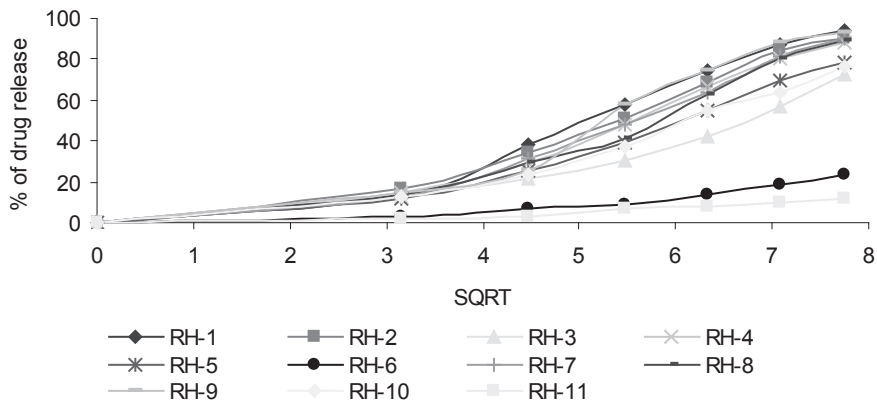


A: Code: RH-1 to RH-11

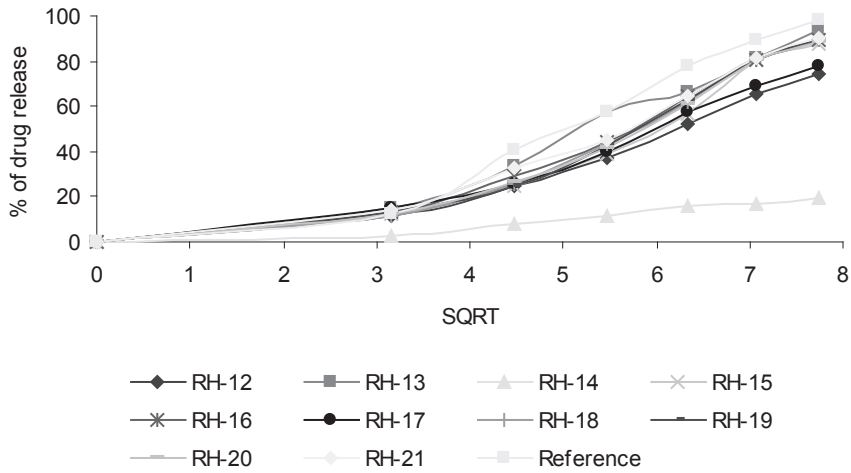


B: RH-12 to Reference

Fig-3: First order release kinetic of different commercial brands of ranitidine hydrochloride film coated tablets available in Bangladesh pharma market

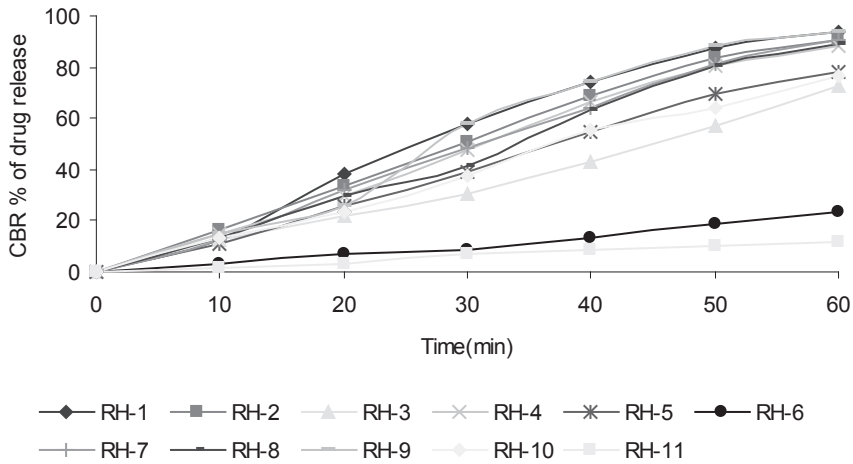


A: Code: RH-1 to RH-11



B: RH-12 to Reference

Fig-4: Higuchi release kinetic of different commercial brands of ranitidine hydrochloride film coated tablets available in Bangladesh pharma marke



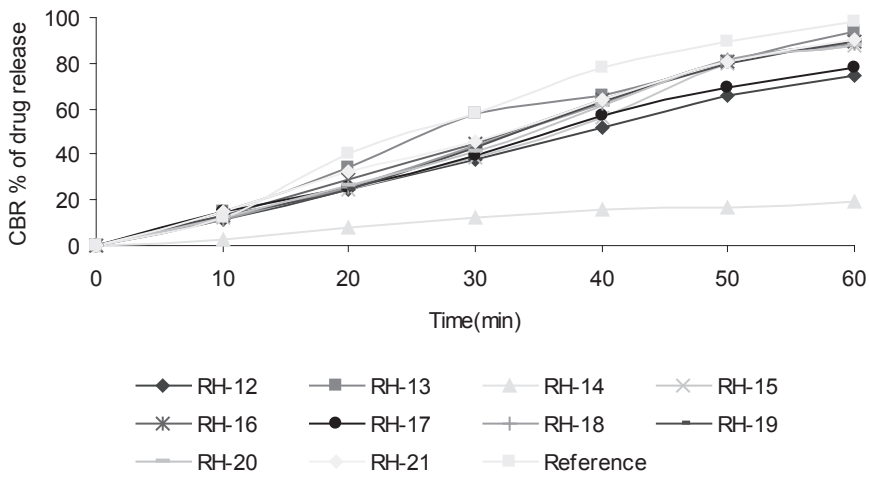
A: Code: RH-1 to RH-11

B: RH-12 to Reference

Fig-5: Hixson-Crowell release kinetic of different commercial brands of ranitidine hydrochloride film coated tablets available in Bangladesh pharma market

Conclusion

The present study indicated that most of the brands meet the official requirements, which are very essential parameters for the prediction of *in vivo* drug release by oral route. As a result the patients will get the proper therapeutic effect to combat against hyperacidity problems while they use those brands of ranitidine hydrochloride film coated tablets. This investigation was performed to evaluate quality of drug products, ensure patient's health at home and promote export of medication from Bangladesh.



References

1. Goodman and Gilman's The Pharmacological Basis of Therapeutics.11th edition. McGrew-Hill Medical publishing division. P, 971-972, (2001).
2. Augsburger LL, Shangraw RF, Giannini RP, Shah VP, Prasad VK and Brown , D Thiazides VIII: Dissolution Survey of marketed Hydrochlorothiazide tablets, J. Pharm.Sci. **72**(8), 876-81 (1983).
3. Ayres JW, Huang H and Albert K, Effect of polymer in sustained release matrix tablet J.Pharm. Sci, 73, 1629 (1984).
4. Sungthongjeen S, Pitaksuteepong T, Somsiri A. and Sriamornsak PStudies, on pectins as potential hydrogel matrices for controlled-release drug delivery. Drug Dev Ind Pharm, **25** (12): p1271-1276, (1999).
5. Addnan A, Sukumar B and Abu SSR: In Vitro Dissolution study of different brands of sustained release diclofenac sodium matrix tablet available in Bangladesh, Pak J. Pharm. Sci., **21**(1) p. 70-77 (2008).
6. Longer, M.A. and Robinson, J.R. ,Remington's Pharmaceutical Sciences. Mack Publishing Company, Pennsylvania. 18th ed. pp. 1675-1684, (1990).
7. British Pharmacopoeia, Her Majesty's stationary office, London, England. **2**, pp. 266-268, (2000).
8. Abdelbary, G., Eouani, C., Prinderre, P., Joachim, J., Reynier, J.P. and Piccerelle, P.H., Determination of the in vitro disintegration profile of rapidly disintegrating tablets and correlation with oral disintegration. Int. J. Pharm. **292**, 29-41, (2004).
9. Sweetman, S.C., Martindale: The Complete Drug Reference. Pharmaceutical Press, London. **33**rd ed. pp. 1235- 1237, (2002).
10. Korsmeyer RW, Gurny R, Doelker E, Buri P, Peppas NA. Mechanisms of solute relese from porous hydrophilic polymers. Int J Pharm. **15**, p25-35, (1983).
11. Hadjiioannou TP, Christian GD, Koupparis MA. Quantitative Calculation in Pharmaceutical Practice and Research. New York, NY: VCH Publishers Inc; p345-348 (1993).
12. Bourne DW. Pharmacokinetics. In: Banker GS, Rhodes CT, eds. Modern Pharmaceutics. **4**th ed. New York, NY: Marcel Dekker Inc; p67-92, (2002).
13. Higuchi, T, Mechanism of sustained action medication, Theoretical analysis of rate of release of solid drugs dispersed in solid matrices, J. Pharm. Sciences, **52**(12), p1145-1149 (1963).
14. Hixson AW, Crowell JH. Dependence of reaction velocity upon surface and agitation: I-theoretical consideration. Ind Eng Chem. **23**, p923-931, (1931).
15. Gladziwa U. and Klotz U. Pharmacokinetics and Pharmacodynamic of H2 receptor antagonists with renal insufficiency. Clin. Pharmacokinet. **24**: p319-332, (1993).

Studies on Biologically Important Transition Metal Complexes of a Diazacyclic Ligand

Saroj Kanti Singh Hazari *, Tapashi Ghosh Roy **[1], Md. Masudur Rahman ***, Saswata Rabi ** and Md. Shah Alam **

Abstract

Preparation of a new tetraazmacrocyclic ligand was attemted by the condensation of acetyl acetone and ethylenediamine in the presence of perchloric acid, but a new diazacyclic ligand was formed instead of expected macrocyclic ligand. The ligand on interaction with MX_2 (M= Cu, Ni & Co and X= ClO_4 & CH_3COO), produced the corresponding metal complexes. The ligand and its complexes have been characterized on the basis of elemental analyses, IR, UV-vis, ^{1}H-NMR and ^{13}C-NMR spectroscopic; magnetic and molar conductivity data. The complexes show different electrolytic behavior in different solvents. The antibacterial activities of the ligand and its complexes against different phytopathogenic bacteria and fungi have been investigated.

Key Words: Azacyclic, metal complexes, cobalt, nickel, copper, spectroscopic studies, antibacterial, antifungal activities

BGC Trust University Journal
Vol. 03, December, 2016, pp. 41 - 56
© BGC Trust University Bangladesh
ISSN : 2073- 5448

* *Vice Chancellor, BGC Trust University Bangladesh, Chandanaish, Chittagong, Bangladesh*
** *Department of Chemistry, University of Chittagong*
**[1] *Corresponding author, E-mail: tapashir57@gmail.com*
*** *Assistant Director, Anti corruption commission, 1/Shegunbagicha, Dhaka, Bangladesh*

Introduction

The use of coordination complexes of azamacrocyclic ligands are increasing day by day because of their role in different sectors. Their importance is also accounted for their anticancer [1], antifungal [2] and antibacterial [2] activities in the medicinal sector. Keeping this in mind, preparation of new tetraazamacrocyclic ligand and its metal complexes were attempted, but during the preparation of ligand, a diazacyclic ligand was formed. The coordination chemistry of cyclic ligands is a fascinating area of research. It is an impressive and well recognized fact that many of the significant roles played in living systems by metal ions depend on their confinement within an approximately planar tetradentate, totally enclosed framework [3-4]. Under these conditions, the dynamic functions of the metal ions are particularly facilitated. The quadridentate nitrogen donor azacycles, which can be easily synthesized and have simple structures, present an environment capable of promoting this dynamic functions. A major thirst of many of these studies has been to investigate the unusual properties frequently associated with cyclic ligand complexes. In particular, the investigations on spectral, electrochemical, structural, kinetic, and thermodynamic aspects of azacyclic complex formation have received considerable attention. Studies on different metal complexes with tetraazmacrocyclic ligands have been reported in the literature [5-10]. But reports on metal complexes of diazacyclic ligands are not available except in some cases [11-13]. So it was attracting to observe how this diazacyclic ligand and its metal complexes would behave. An effort to do so, the concerned diene ligand and its copper(II), nickel(II) and cobalt(III) complexes have been prepared successfully. The synthesized ligand and complexes have been characterized by using different spectroscopic and analytical methods and antibacterial & antifungal activities have been studied. The results of these studies are reported herein.

2. Experimental

All chemicals were of analytical grade (Sigma Aldrich) or equivalent grades and were used without further purification. The solvents used were of reagent grade and dried according to standard procedure. Equipments used were of standard ones.

2.1. Synthesis

2.2. Preparation of dimethyl diaza cycloheptadiene monohydroperchlorate, $Me_2[7]dieneN_2.HClO_4$, $[L_1H][ClO_4]$

10.29 mL (0.1 mol) acetylacetone and 50 mL methanol were taken in a 500 mL

conical flask. To this, 6.7 mL (0.1 mol) ethylene diamine were added. The solution was stirred on a magnetic stirrer while 8.9 mL (0.1 mole) of 70% percholoric acid was slowly added from a dropping funnel .The temperature of the reaction mixture was maintained at 55°C – 60°C during reaction. Yellowish color was developed at that stage. After 45 minutes, yellowish product started to appear. After addition of the acid, the solution was stirred for more three hours. Then the reaction mixture was allowed to stand overnight at room temperature. The solid product was filtered off, washed with methanol and finally with ether. At last the yellowish crystalline product was dried under vacuum. Further concentration of the mother liquor gave another crop of the product, which was found to give an infrared spectrum identical with the first crop.

2.3. Synthesis of transition metal complexes of L_1

2.3.1. Synthesis of nickel(II) perchlorate complex of L_1, $[Ni(L_1)_2(ClO_4)](ClO_4)$

0.294 g (1.0 mmol) of nickel(II) acetate tetrahydrate was dissolved in 25mL methanol and 0.906g (2.0 mmol) of $[L_1H][ClO_4]$ was also dissolved in 25 mL methanol. Both the solutions were mixed and the reaction mixture was heated over water bath for 30 minutes. At the end of the reaction 0.1 g of sodium perchlorate hexahydrate was added. After cooling at room temperature, the deep brown product was filtered off, washed with methanol followed by diethylether and dried in a desiccator over silica gel.

2.3.2. Synthesis of copper(II) perchlorate complex of L_1, $[Cu(L_1)_2(ClO_4)_2]$

0.453g (1.0 mmol) of $[L_1H][ClO_4]$ was dissolved in 25 mL methanol and 0.640g (2.0 mmol) of copper(II) perchlorate hexahydrate was also dissolved in 25 mL of methanol.Both the solutions were mixed and the reaction mixture was heated over water bath for 30 minutes. A blue solution was allowed to vaporize at room temperature after filtration. After three days, a blue product was deposited at the bottom of the beaker. Blue product was separated from the mother ligand. The blue product was washed with methanol followed by diethylether and dried in a desiccator over silica gel.

2.3.3. Synthesis of cobalt(III) perchlorate complex of $L_1.HClO_4$; $[Co(L_1)_2(CH_3COO)_2](ClO_4)$

0.249 g (1.0 mmol) of cobalt(II) acetate hexahydrate was dissolved in 25mL methanol and 0.906 g (2.0 mmol) of $[L_1H][ClO_4]$ was also dissolved in 25 mL methanol. Both the solutions were mixed and the reaction mixture was heated over water bath for 30 minutes. During the reaction 0.05 g of $Na(ClO_4).6H_2O$ was added

simultaneously. After cooling at room temperature, the orange red product was filtered off, washed with methanol followed by diethylether and dried in a desiccator over silicagel.

2.2.4. Physical measurements

Microanalysis (C, H, N analysis) of the complexes have been carried out on a C, H, N analyzer at the Inorganic Research Laboratory of the Institut der Anorganische und Angewandle Chemie, Hamburg Universitaet, Germany and at Department of Chemistry, Kyungpook National University, Daegu, South Korea and INQUIMAE, University of Buenos Aires, Argentina. UV- visible spectra were recorded on a Shimadzu UV-visible spectrophotometer in DMSO. Conductance measurements were carried out on a conductivity bridge Hanna instrument HI-8820 in DMSO. Magnetic measurements were performed on Gouy Balance which was calibrated using $Hg[Co(NCS)_4]$. IR spectra were recorded on a Shimadzu IR 20 spectrophotometer as KBr disks. ^{1}H-NMR spectra were recorded in DMSO with a 400 MHz Bruker DPX-400 spectrometer using TMS as internal standard and ^{13}C-NMR at the BCSIR Laboratory, Dhaka, Bangladesh.

2.2.5. Antibacterial activities

Antibacterial activities of the ligand and its complexes against selected gram-positive and gram-negative bacteria were investigated by the disc diffusion method. Paper disc (6 mm in diameter) and Petri plates (70 mm in diameter) were used throughout the experiment. Pour plates were made with sterilized melted nutrient agar NA (45°C) and after solidification of pour plates, the test organisms (suspension in sterilized water) were spread uniformly over the pour plates with sterilized glass rod separately. The paper discs after soaking with test chemicals (1 mg/1mL in DMSO) were placed at the center of the inoculated pour plates. A control plate was also maintained in each case with DMSO. At first the plates were left for four hours at low temperature (4°C) and the test chemicals diffused from disc to the surrounding medium by this time. The plates were then incubated at (35±2)°C for growth of test organisms and were observed at 24-hours interval. The activity was expressed in terms of zone of inhibition in mm. The results for all concerned compounds have been reported after subtracting values for solvent DMSO itself. Tests were repeated thrice for statistical analysis.

2.2.6. Antifungal activities

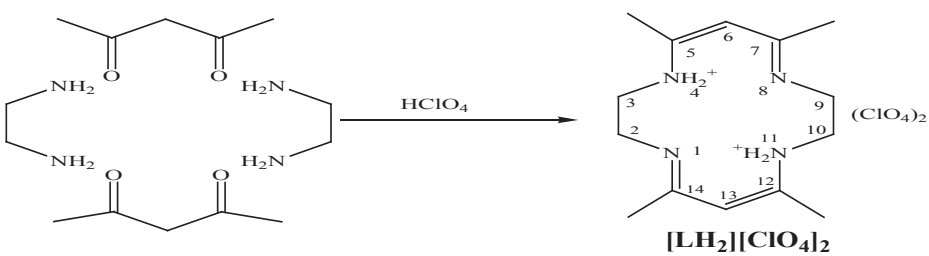
The *in vitro* antifungal activities of the ligand and its complexes against selected

phytopathogenic fungi were assessed by the poisoned food technique. Potato Dextros Agar (PDA) was used as a growth medium. Dimethylsulphoxide was used as the solvent to prepare solutions of the tested compounds. The solutions were then mixed with the sterilized PDA so as to maintain concentrations of the compounds of 0.01 % (ca. 3 µL). 20 ml of these solutions were each poured into a petri dish. After the medium had solidified, a 5 mm micelial disc of each fungus was placed in the center of each assay plate, along with a control. Linear growth of the fungus was measured in mm after five days of incubation at 25 ± 2°C.

3. Results and Discussion

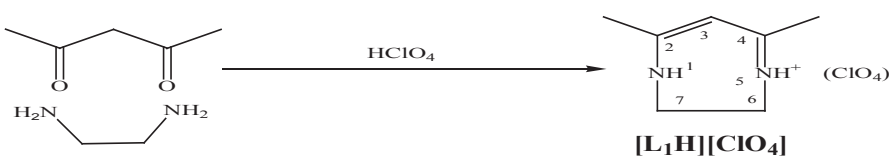
Since methyl substituted macrocyclic ligands are very much important from their biological and stereochemical viewpoint, and the biological activities vary from ligand to ligand so it was planned to synthesize a new methyl substituted macrocyclic ligand and its metal complexes. Thus the reaction of acetylacetone with ethylene diamine in presence of perchloric acid was carried out to result expected ligand and the reaction of the prepared ligand with copper(II) nickel(II) and cobalt(II) were performed to produce corresponding complexes. All compounds have been characterized on the basis of elemental analyses (Table-1), IR (Table-2), ^{1}H-NMR (Table-3), ^{13}C-NMR (Table-4) and UV-vis (Table-6) spectroscopic; magnetic (Table-6) and molar conductivity data (Table-5). The antibacterial activities of the compounds against selected fungi (Table-7) and bacteria (Table-8) have been studied.

Expected Reaction



[LH$_2$][ClO$_4$]$_2$

Real Reaction



[L$_1$H][ClO$_4$]

Scheme-1

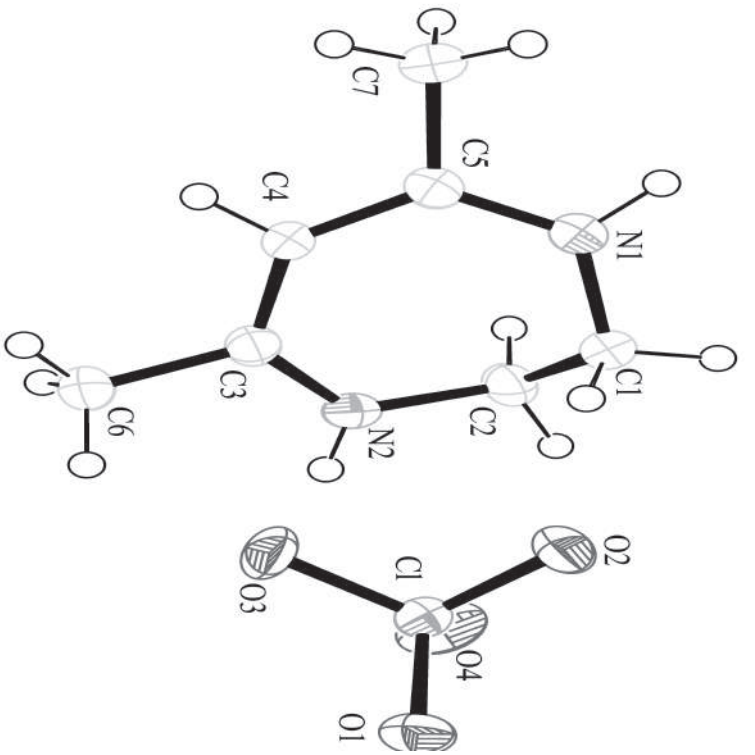


Fig. 1: X-ray structure of $[L_1H][ClO_4]$

Table:-1 Analytical data

Ligand	Mol. formula	%C		%H		%N	
		Cal.	Found	Cal.	Found	Cal.	Found
$[L_1H][ClO_4]$	$C_7H_{13}N_2ClO_4$	37.45	37.43	5.79	5.82	12.47	12.29
$[Ni(L_1)_2(ClO_4)](ClO_4)$	$C_{14}H_{24}N_4Cl_2O_8Ni$	33.23	33.01	4.78	4.63	11.07	11.00
$[Cu(L_1)_2(ClO_4)_2]$	$C_{14}H_{24}N_4Cl_2O_8Cu$	32.92	32.82	4.74	4.78	10.97	10.85
$[Co(L_1)_2(CH_3COO)_2](ClO_4)$	$C_{16}H_{30}N_4ClO_8Co$	38.37	38.12	6.04	5.98	11.19	11.01

Table:-2 IR Spectral data

Ligand	Assignment(cm^{-1})						
	υ_{N-H}	$\upsilon_{C=N}$	υ_{C-H}	υ_{CH3}	$\upsilon_{C=C}$	υ_{C-C}	Other bands
$[L_1H][ClO_4]$	3156	1597	2972	1380	1597	1180	1100, 620, υ_{ClO4}
$[Ni(L_1)_2(ClO_4)](ClO_4)$	3160	1587	2917	1362	1587	1209	1105,1065,1049, 621, υ_{ClO4}
$[Cu(L_1)_2(ClO_4)_2]$	3150	1572	2912	1383	1572	1187	1014,936, 610, υ_{ClO4}
$[Co(L_1)_2(CH_3COO)_2](ClO_4)$	3248	1600	2929	1380	1600	-	1082.1019,948,622 υ_{ClO4}; 1600, υ_{CH3COO}

Table:-3 ^{1}H-NMR spectral data

Ligand	Assignments, δppm				
	CH_3 protons	CH protons	CH_2 protons	NH protons	CH_3 protons of CH_3COOH
$[L_1H][ClO_4]$	2.22 (s), 2.24 (s) 3H 3H	3.42 (s) 1H	3.67 (m) 4H	5.31 (m) 2H	-
$[Ni(L_1)_2(ClO_4)](ClO_4)$	1.65(s), 1.89(s) 6H 6H	2.95(s) 2H	2.99(m) 8H	4.89 (m) 4H	-
$[Co(L_1)_2(CH_3COO)_2](ClO_4)$	1.99(s), 2.24(s) 6H 6H	2.75(s) 2H	3.39(m) 8H	5.04 (m) 4H	2.13(s,3H), 2.15(s,3H)

s- meaning singlet, m- multiplet

Table:-4 ^{13}C-NMR spectral data

Ligand	Assignments, δppm		
	Peripheral Carbons	Ring Carbons (sp^3)	Ring Carbons (sp^2) and CH_3COOH group
$[L_1H][ClO_4]$	18.3, 28.7	36.8, 39.1	95.3, 162.9, 193.6
$[Ni(L_1)_2(ClO_4)](ClO_4)$	20.7, 23.6	36.5, 52.6	99.1, 164.6, 174.3
$[Co(L_1)_2(CH_3COO)_2](ClO_4)$	21.7, 24.6,	51.6, 52.1	95.2, 167.6, 168.1, 176.4, 176.7

Table:-5 Color, Solubility and molar conductivity data

Complex	Colour	Solubility	Conductance in DMSO ($ohm^{-1}cm^2mole^1$)
$[Ni(L_1)_2(ClO_4)](ClO_4)$	Brown	Methanol, Ethanol, DMSO, Chloroform	61
$[Cu(L_1)_2(ClO_4)_2]$	Blue	Hot DMSO	3
$[Co(L_1)_2(CH_3COO)_2](ClO_4)$	Orange-red	DMSO, DMF	66

Table:-6 Electronic spectral and magnetochemical data

Complex	Solution in	λ_{max} in nm in DMSO	μ_{eff} (B.M)
$[Ni(L_1)_2(ClO_4)](ClO_4)$	DMSO	564	Diamagnetic
$[Cu(L_1)_2(ClO_4)_2]$	DMSO	484, 670	1.73
$[Co(L_1)_2(CH_3COO)_2](ClO_4)$	DMSO	521	Diamagnetic

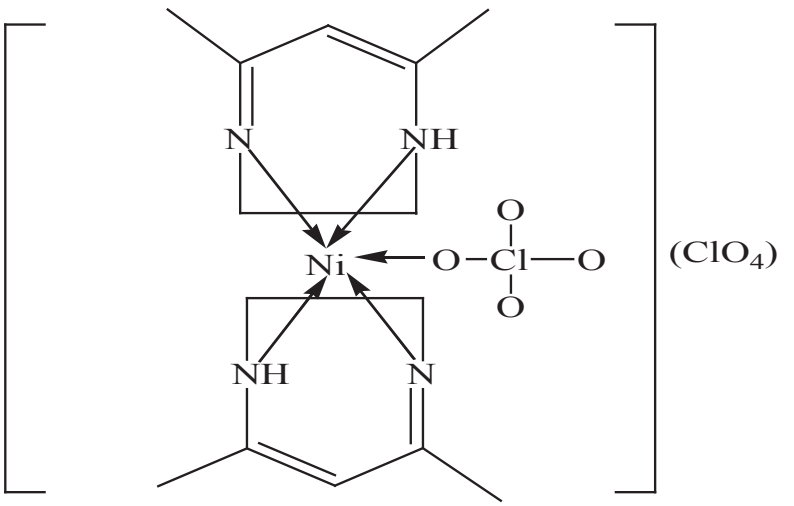
3.1. Diazaligand

The acetylacetone was supposed to condense with ethylenediamine in presence of quantitive amount of $HClO_4$ to produce dihydroperchlorate salt of a macrocyclic ligand namely 5, 7, 12,14-tetramethyl-1, 4, 8, 11- tetraazacyclotetradeca-5, 7, 12, 14-tetraene dihydroperchlorate, $[LH_2](ClO_4)_2$ (Scheme-I). In contrast analytical and experimental data show that condensation took place to produce a smaller cyclic ligand, 2, 4-dimethyl-1, 5-diazacyclohepta-2, 4-diene monohydroperclorate, $[L_1H][ClO_4]$ instead of the expected macrocyclic ligand $[LH_2](ClO_4)_2$. The structure of $[L_1.H][ClO_4]$ has been confirmed by X-ray crystallography [Fig-1][14]. The Infrared spectrum of this compound was not well resolved. However V_{NH} band at 3156 cm^{-1}, V_{ClO4} bands at 1100 cm^{-1} & 620 cm^{-1}, $\nu_{C=N}$ & $\nu_{C=C}$ at around 1590 cm^{-1} and other characteristic bands for ν_{C-H}, ν_{C-C} and ν_{CH3} at 2972, 1180 and 1380 cm^{-1} respectively (Table-2) have been identified as expected. It has been noted that $\nu_{C=N}$ and $\nu_{C=C}$ are overlapped. The 400 mHz ^{1}H-NMR spectrum of ligand $[L_1H][ClO_4]$ shows (Table-3) three sharp singlets at 2.22 ppm, 2.24 ppm and 3.42 ppm. The singlets at 2.22 ppm and 2.24 ppm can be assigned to peripheral methyl protons while the one at 3.42 ppm to CH proton. The spectrum further exhibits multiplets at 3.76 ppm and 5.31 ppm which may be attributed to other CH_2 and NH protons. This ligand salt contains

7 carbons. The ^{13}C-NMR spectrum (Table-4) also displays 7 resonances. These 7 peaks can be accounted for 7 nonequivalent carbon atoms. The peaks at 18.3 and 28.7 ppm can be assigned to peripheral methyl carbons, while the ones at 36.8 and 39.1 ppm for methylene carbons. The downfield resonance at 95.3 ppm can be identified for sp^2 CH carbon. The spectrum further displays two more downfield resonances at 162.9 and 193.6 ppm (Table-4) which can be attributed to two sp^2 carbons attached to two NH groups. This assignment is in complete agreement with the structure shown in Scheme-I.

3.2. Nickel(II) complex, $[Ni(L_1)_2(ClO_4)](ClO_4)$

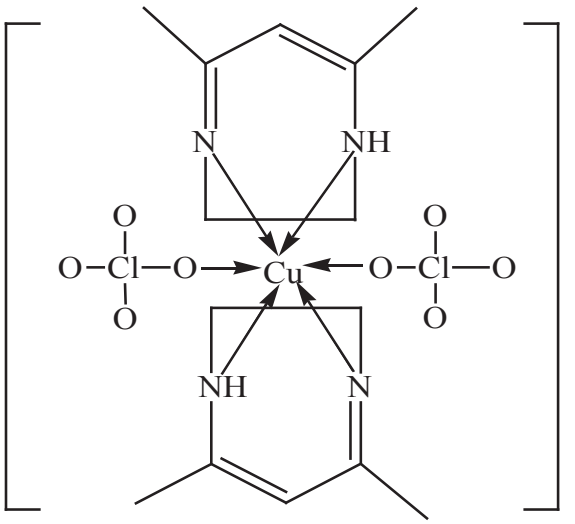
Interaction of nickel(II) acetate with $[L_1H][ClO_4]$ in methanol in the ratio of 1:2 yielded brown colored product of molecular formula $[Ni(L_1)_2(ClO_4)][ClO_4]$. The analytical data and other experimental data are consistent with the assigned molecular formula. The Infrared spectrum of this compound exhibits ν_{NH} band at 3160 cm^{-1}, ν_{ClO4} bands at 1105, 1065, 1049 & 621 cm^{-1} and other characteristic bands for ν_{C-H}, ν_{C-C} and ν_{CH3} at proper positions (Table-2) as expected. The molar conductivity value of 61 $ohm^{-1}cm^2$ $mole^{-1}$ (Table-5) in DMSO corresponds to 1:1 electrolyte [15] i.e. one ClO^{4-} ion is inside the coordination sphere and the other is out of the coordination sphere which gives evidence in favor of five coordinated square pyramidal geometry. The results of electronic spectral measurements of the complex, $[Ni(L_1)_2(ClO_4)](ClO_4)$ is given in Table-5. This complex shows a d-d band (Table-6) at 564 nm which can be assigned for square pyramidal nickel(II) complex. The magnetic measurement (Table-6) of this complex is in good agreement with square pyramidal diamagnetic nickel(II) complex. The 400 mHz ^{1}H-NMR spectrum (Table-3) of the complex $[Ni(L_1)_2(ClO_4)](ClO_4)$ shows three sharp singlets at 1.65 ppm, 1.89 ppm and 2.95 ppm. The singlets at 1.65 ppm and 1.89 ppm can be assigned to peripheral methyl protons while the one at 2.95 ppm to CH proton. The spectrum further displays multiplets at 2.99 ppm and 4.89 ppm which may be attributed to other CH_2 and NH protons. This complex $[Ni(L_1)_2(ClO_4)](ClO_4)$ contains 14 carbons. The ^{13}C-NMR spectrum (Table-4) displays 7 resonances (half the number of carbons) like its ligand. These 7 peaks can be accounted for 14 pairwise equivalent carbon atoms. Since this complex contains two molecule of ligands each containing 7 carbons so only 7 signals are observed as expected. The assignment has been given in Table 4. From the above discussion square pyramidal structure I can be assigned for $[Ni(L_1)_2(ClO_4)][ClO_4]$.



Structure I

3.3. Copper(II) complex of L1, $[Cu(L_1)_2(ClO_4)_2]$

Interaction of copper(II) perchlorate hexahydrate with $[L_1H][ClO_4]$ in methanol in the ratio of 1:2 yielded blue product of molecular formula $[Cu(L_1)_2(ClO_4)_2]$. The analytical data and other experimental data are consistent with the assigned molecular formula. Infrared spectrum of this complex exhibits ν_{NH} band at 3150 cm^{-1}, perchlorate bands around 1014, 936, 610 cm^{-1} and other characteristic bands for ν_{C-H} ν_{C-C}, $\nu_{C=C}$ & ν_{CH3} at 2912, 1187, 1572 & 1383 cm^{-1} respectively (Table-2) as expected. It has been noted that $\nu_{C=N}$ and $\nu_{C=C}$ are overlapped. The molar conductivity value of 3 ohm^{-1} cm^2 $mole^{-1}$ (Table-5) in DMSO corresponds to nonelectrolyte i.e. two ClO^{4-} ions are coordinated to copper(II) ion which gives evidence in favor of formation of octahedral complex. The electronic spectrum of this complex shows broad d-d band at 484 and 670 nm in DMSO (Table-6) as expected for octahedral copper(II) complex. Due to machinery fault the Cu-N charge transfer band could not be detected. The magnetic moment value of 1.73 B.M (Table-6) of the complex $[Cu(L_1)_2(ClO_4)_2]$ is in good agreement with the normal copper(II) complex having one unpaired electron. Since copper(II) complex is a paramagnetic complex and ^{1}H-NMR spectra of paramagnetic complexes are less informative, so ^{1}H-NMR was not taken. So on the basis of above discussion the octahedral structure II can be assigned for $[Cu(L_1)_2(ClO_4)_2]$.

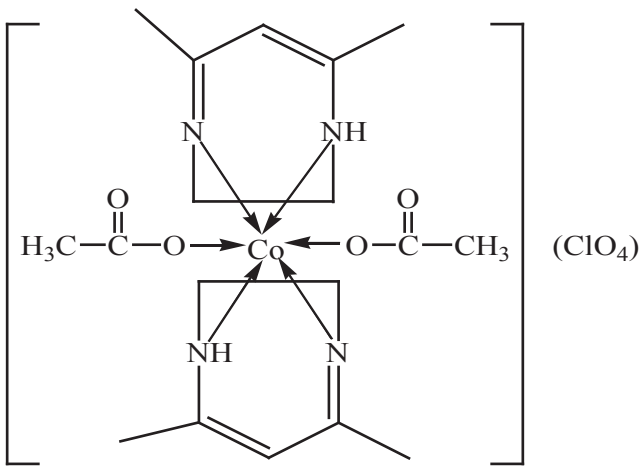


Structure-II

3.4. Cobalt(III) complex, $[Co(L_1)_2(CH_3COO)_2](ClO_4)$

Interaction of cobalt(II) acetate with $[L_1H](ClO_4)$ in methanol in the ratio of 1:2 yielded orange-red product of molecular formula $[Co(L_1)_2(CH_3COO)_2](ClO_4)$. The analytical data and other experimental data are consistent with the assigned molecular formula. The Infrared spectrum of this compound exhibits all characteristic bands at proper positions (Table-3) like corresponding copper(II) and nickel(II) complexes as expected. However the expected band for CH_3COO group is overlapped with band for $\nu_{C=C}$ and $\nu_{C=N}$. The molar conductivity value of 66 $ohm^{-1}cm^2$ $mole^{-1}$ (Table-4) in DMSO corresponds to 1:1 electrolyte [15] i.e. two CH_3COO- inside the coordination sphere and the other one ClO_4- ion is out of the coordination sphere which gives evidence in favour of six coordinated octahedral geometry. The electronic spectrum of this complex is not well resolved. However a d-d band at 521 nm can be assigned for CoN_4O_2 chromophore of the complex $[Co(L_1)_2(CH_3COO)_2](ClO_4)$. The magnetic measurement (Table-5) of this complex is in good agreement with octahedral diamagnetic cobalt(III) complex, $[Co(L_1)_2(CH_3COO)_2][ClO_4]$. For diamagnetic property of this complex it is concluded that cobalt(II) has been oxidized to cobalt(III) while heated in open air. The 400 mHz 1H-NMR spectrum of $[Co(L_1)_2(CH_3COO)_2](ClO_4)$ displays similar pattern of signals like corresponding nickel(II) complex except appearance of two closely spaced singlets

at 2.13 ppm and 2.15 ppm each corresponding to 3 protons. Each of these singlets can be assigned to 3 protons of CH_3COO groups. The ^{1}H-NMR spectral data of this complex is summarized in Table-3. This complex $[Co(L_1)_2(CH_3COO)_2](ClO_4)$ contains 18 carbons. The ^{13}C-NMR spectrum exibits 9 resonances (half the number of carbons). These 9 peaks can be accounted for 18 pairwise equivalent carbon atoms. Since this complex contains two molecule of ligands each containing 7 carbons and two CH_3COO^- groups each containing 2 carbons so only 9 signals are observed as expected. The assignment has been given in Table 4. From the above discussion octahedral structure III can be assigned for $[Co(L_1)_2(CH_3COO)_2][ClO_4]$



Structure III

3.5. Antifungal activities

The results of antifungal activities have been summarized in the Table-6. Though the cyclic ligand salt $[L_1H](ClO_4)$ does not show any activity against these fungi, Its copper(II) complex against *A. alternate,* Co(III) complex against three fungi exibit measurable amount of activity. However its nickel(II) complex exhibits stimulation. However all show less activity than standard Nystatin. From the above discussion it can be concluded that nature of ligands, metals and type of axial ligands play a significant role on the inhibition of mycelial growth. However, in order to understand the functions responsible for antifungal activities of macrocycles and their complexes, more studies are needed to be carried out with a series of analogous ligands and their complexes against a series of phytopathogenic fungi.

Table-:-7 In-vitro antifungal activities of the compounds

Ligands and metal complexes(100 µg dw /ml PDA)	% Inhibition of mycelial growth		
	Macrophomina phaseolina	*Alternaria alternata*	*Colletotrichuns corcolei*
$[L_1H_2](ClO_4)_2$	0	0	0
$[Ni(L_1)_2(ClO_4)](ClO_4)$	0	0	+22.00
$[Cu(L_1)_2(ClO_4)_2]$	-	10.00	0
$[Co(L_1)_2(CH_3COO)_2](ClO_4)$	20.00	21.00	22.00
Nystatin	76	51	41

'-' meaning 'not done'

3.6. Antibacterial activities

The results (Table-8) show that the ligand salt and its concerned complexes show different antibacterial activities. Here the cyclic ligand and its nickel(II) complex do not show any activity against bacteria. Having a look on these results, one can not make any gradation on the rate of inhibition power of the complexes on a particular bacterial growth. Copper (II) and cobalt (III) complexes are found to exhibit higher antibacterial activities against almost all bacteria. However for a clear understanding of the functions responsible for antibacterial activities of macrocycles, and their complexes, more studies are needed to be performed with a series of analogous ligands and their complexes against a series of bacteria. By using the chelation theory [16] activity of the complexes compared to ligands can be explained. As a possible mechanism, the complexes disturb the respiration process of the cell and thus block the synthesis of proteins, which fact restricts the growth of the organism [17].

Table-8 In-vitro antibacterial activities of the compounds

Compounds	Diameter of zone of inhibition in mm after 24 hours								
	B. cereus	*B. megaterium*	*B. subtilis*	*E. coli*	*S. paratyphi*	*S. typhi*	*S. dysenteriae*	*S. aureus*	*V. cholerae*
$[L_1H][ClO_4]$	0	0	0	0	0	0	0	0	0
$[Ni(L_1)_2(ClO_4)](ClO_4)$	0	0	0	0	0	0	0	0	0
$[Cu(L_1)_2(ClO_4)_2]$	12	14	15	-	14	13	10	0	12
$[Co(L_1)_2(CH_3COO)_2](ClO_4)$	10	12	0	13	8	10	16	0	0

4. Conclusion

Though condensation of the ketones and amines produce azamacrocyclic ligands, but in this study expected tetraazamacrocyclic ligand did not result rather a comparatively smaller diaza cyclic ligand was produced which underwent facile complexation with copper(II), nickel(II) and cobalt(II) salts to form corresponding metal complexes. Some of these complexes exhibit measurable antifungal and antibacterial activities.

Acknowledgement

The authors would like to extend their sincere appreciation to the Research Cell, University of Chittagong, Chittagong-4331, Bangladesh for awarding a research grant to Professor Dr. Tapashi Ghosh Roy.

References

1. H.A. El-Boraey and O. A. EL-Gammal, *Spectrochim. Acta.* A, **138**, 553 (2015).
2. S.G. Shankarwar, B.B. Nagolkar, V.A. Shelke and T.K. Chondhekar, *Spectrochim. Acta.* A, **145**, 188 (2015).
3. I. G. Santos, S. J. S. Ana, M. G. Deibe, M. Fondo and E., Góme, *Inorg. Chim. Acta.* **363**, 1193 (2010).
4. D. H. Butch, *Rec. Chem. Prog,* **25**, 107 (1964).
5. P. Gull, O. A Dar, M. A. Malik, and A. A. Hashmi, *Microb. Pathog,* **100**, 237 (2016).
6. N.F. Curtis and R.W Hay, *Chem. Commun.* 524 (1966).
7. T. J. Hubin, N. W. Alcock, M. D. Morton and D. H. Busch, *Inorg. Chim. Acta,* **348**, 33 (2003).
8. T. G. Roy, S. K. S. Hazari, B. K. Dey, S. Dutta, M. A. Monsur and E. R. T. Tiekink, *J. Coord. Chem,* **59**, 1757 (2006).
9. S. M. A Yusoff, A. Sallehhuddin, L. M. Yusoff, B. M. Yamin, I. Nazlina and O. E. Leng, *Orient. J. Chem,* **31(3)**, 1751 (2015).
10. T. G. Roy, S. K. S. Hazari, B. K. Dey, H. A. Miah, C. Bader and D.Rehder. *Eur. J. Inorg. Chem,* 4115 (2004).
11. K. Nagashri, J. Joseph, C. Justin and Dhanaraj, *Arabian Journal of Chemistry,* **9**, 548 (2016).

12. R. A. Shiekh, I. A. Rahman, M. A. Malik, N. Luddin, S. M. Masudi and S. A. Al-Thabaiti. *Int. J. Electrochem.* Sci, 8, 6972 (2013).

13. A. D. Wilson, R. K. Shoemaker, A. Miedaner, J. T. Muckerman, D. L. DuBoi, and M. R. DuBois. *PNAS*, **104(17)**, 6951 (2007).

14. G. Ferguson, W.C. Marsh, D. Lloyd, D. R. Marshall *J. Chem. Soc.,* Perkin Trans.2 , 1, 74 (1980).

15. N. N. Greenwood, B. P. Straughan, A. E. Wdson, J. Chem. Soc. A, 2209 (1968).

16. M. Salehi and M. Hasanzadeh, *Inorg. Chim. Acta,* **426**, 6 (2015).

17. N. Dharmaraj, P. Viswanathamurthi and K. Nataranjan, *Transit. Met. Chem,* 26, 105 (2001).

Molybdenum complexes of some Tetradentate Ligands: Syntheses, Characterization and Antimicrobial Studies

Saroj Kanti Singh Hazari *, Debashis Palit ** and Sukla Rakshit ***

Abstract

Ten new ligands were prepared by the condensation of S-methyl dithiocarbazate with freshly prepared o-aminobenzaldehye and salicylaldehyde. The ligands were characterized by their melting point, IR and ^{1}HNMR spectra. Dioxo molybdenum complexes of all the ligands were prepared. From the IR, ^{1}HNMR and UV-Visible spectra of the complexes, it is evident that the ligands are acting as tetradentate ONNS ligand. From the spectral data and analytical data a regular octahedral structure of the molybdenum complexes was suggested with one molecule of water of crystallization (in two complexes). The antifungal and gram positive and gram negative antibacterial properties of the ligands and complexes were studied extensively.

Key Words: Molybdenum, S-methyl dithio carbazate, salicylaldehyde, Schiff base

BGC Trust University Journal
Vol. 03, December, 2016, pp. 57 - 76
© BGC Trust University Bangladesh
ISSN : 2073- 5448

* *Vice Chancellor, BGC Trust University, Chittagong*
** *Professor, Department of Chemistry, University of Chittagong*
*** *Assistant Evaluation Officer, Board of Intermediate and Secondary Education , Chittagong*

Introduction

Condensation of primary amines with aldehydes or ketones yields Schiff bases containing imine (-C=N) functional group. Such Schiff base molecules decorated with necessary groups are important in various branches of chemistry as potential biomimics. Necessary groups can be integrated into those molecules by appropriately choosing the derivatives of amines and aldehydes or ketones. Scientists synthesized Schiff base derivatives possessing different O, N and S cores that are capable of binding transition metal ions[1-10]. Results regarding such derivatives are expected to throw light on the aspects relevant to the coordination chemistry of metal ions including those present in the biological systems.

As continuation of our ongoing investigations on new model molybdenum complexes, in this paper, the synthesis and characterization of some molybdenum complexes of tetradentate ligands will be discussed. Here the core primary amine is S-methyldithiocarbazate. These primary amine was first condensed with amino benzaldehyde and the resulting compound was condensed again with different substituted salicylaldehydes. A systematic variation of substituents in this series of ligands will serve to study the influences of electronic ligand effects on the spectroscopic, electrochemical and functional properties of biomimetic model complexes.

Experimental:

Synthesis of the ligands and their molybdenum complexes

Condensation of aminobenzaldehyde and S-methyldithiocarbazate

Procedure:

A filtered solution of o-aminobenzaldehyde (1.21g, 10mmol) in dry ethanol (50ml) was mixed with the solution of S-methyldithiocarbazate (1.22g, 10mmol) in the same solvent (50 ml). The resulting yellow colored mixture was heated on a hot plate for 10 minutes. When some fine needle like yellow crystals appeared, the mixture was allowed to cool for about 2hrs. The product formed was filtered off, washed with dry ethanol for several times and dried in a vacuum desiccator over silica gel. Yield: 1.24g, Melting point: 148°C. This product denoted by "L".

Syntheses of the salicylaldehyde and substituted salicylaldeshyde ligands of aminobenzaldehyde and S-methyldithiocarbazate (H_2A^1 toH_2A^{10}):

Procedure:

A hot solution of salicylaldehyde or substituted salicylaldehyde (10mmol) in absolute ethanol was mixed with a hot solution of L(10mmol) in the same solvent. The mixture was refluxed for 10 hours. After reducing volume to about 50 ml a yellow product appeared which was filtered off. This product was washed with ethanol for several times and dried in a vacuum desiccator over silica gel.

Preparation of the molybdenum complexes of the ligand H_2A^1 toH_2A^{10}:

The ligand with appropriate weight (10mmol) was dissolved in hot ethanol and mixed with a hot ethanolic solution of $[MoO_2(acac)_2]$ (3.27g, 10mmol). This mixture was refluxed for 8 to 12 hours. After reducing volume to about 50 ml and leaving overnight, a deep product appeared which was filtered off. This product was washed with dry ethanol for several times and dried in vacuum desiccator over silica gel.

Physical measurements

The infrared spectra were taken in the range of 4000 – 400 cm^{-1} as KBr discs on a Perkin Elmer model 883 spectrometer. The ^{1}H-NMR spectra were recorded on a JEOL JNM-A-400FT spectrometer using $CDCl_3$ as a solvent and TMS as an internal standard reference. Conductivity measurement were carried out in N,N-dimethylformamide (DMF) by means of Philips conductivity bridge model PW 9501 using Philips 9515/10 conductivity cell. Molybdenum analyses were done by digesting the complex with acid and then by weighing as molybdenum oxine complex.

Antibacterial activity test

The antibacterial activities of the synthesized chemicals were detected by disc diffusion method as described below:

Paper discs of 4 mm in diameter and glass petri plate of 90 mm in diameter were used throughout the experiment. Paper discs were sterilized in an autoclave and dried at 100°C in an oven. Then the discs were soaked with test chemicals at the rate of 200µg (dry weight) per disc for antibacterial analysis. One drop of bacterial suspension was taken in a sterile petridish and then approximately 20 mL of sterilized melted NA (45°C) was poured into the plate, then mixed thoroughly with the direction of clockwise and anticlockwise. After solidification of the seeded NA medium, paper disc after soaking with test chemicals (1% in DMSO) were placed at the centre of the inoculated pour plate. A control plate was also maintained in each case with DMSO. Firstly, the plates were kept for 4 hours at low temperature (4°C) and the test chemicals diffused from disc to the surrounding medium by this time.

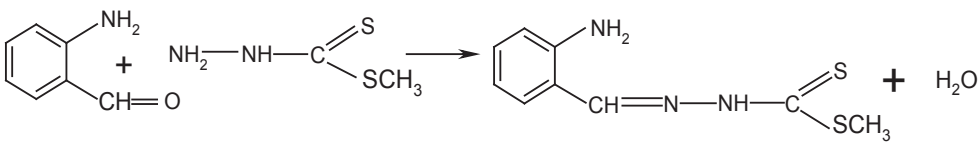
The plates were incubated at (35+ 2)°C for growth of the test organisms and were observed at 24 hours-interval for two days. The activity was expressed in terms of inhibition zone diameter in mm. Each experiment was repeated thrice.

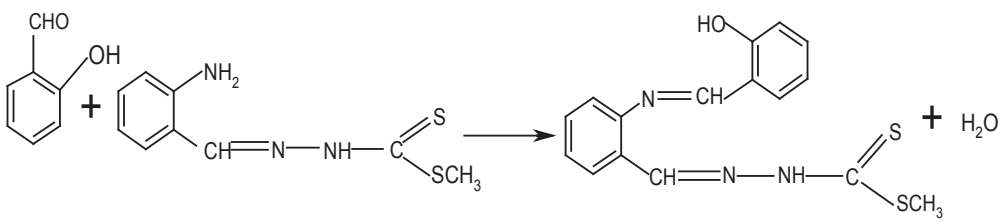
Antifungal activity test

The antifungal activities of the synthesized Schiff base ligands and their molybdenum complexes were investigated against five plant pathogenic fungi. The investigation was based on food poisoning technique and the technique was in some modified condition. Potato Dextrose Agar (PDA) medium was used as basal medium throughout the investigation. DMSO was used as a solvent to prepare the desired solution (1%) of the compounds initially. Proper control was maintained with DMSO.

Results and Discussion

Ten ligands were prepared by the condensation of S-methyldithiocarbazate with freshly prepared aminobenzaldehyde and salicylaldehyde or substituted salicylaldehyde. A representative reaction with salicylaldehyde has been given below. The structures of the ligands are given in Table 1.

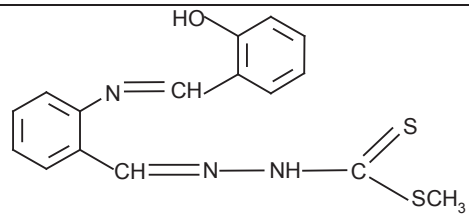
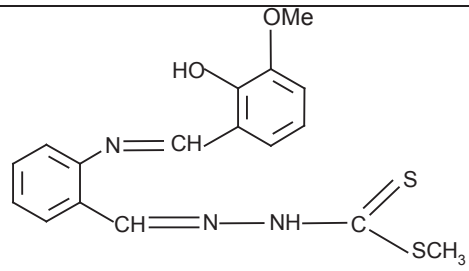


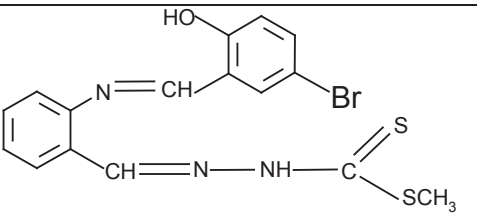
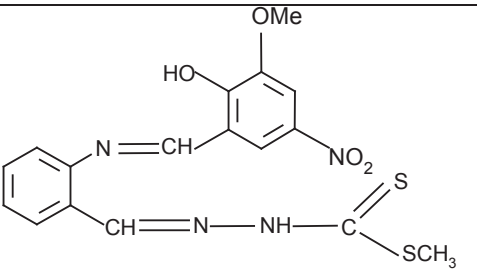
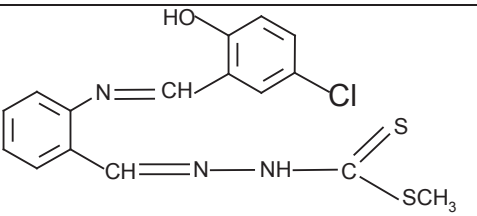
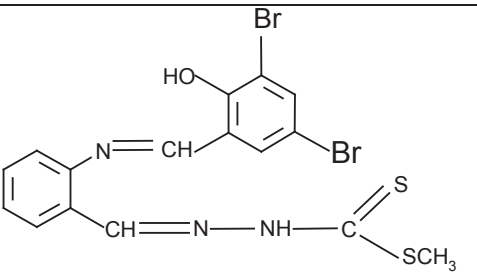


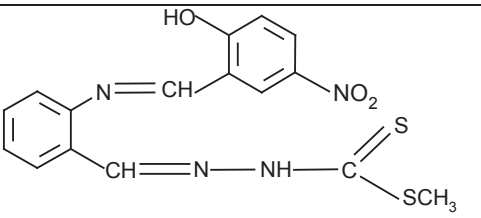
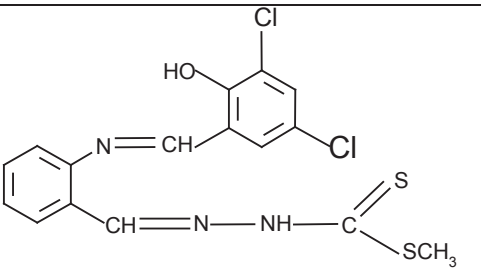
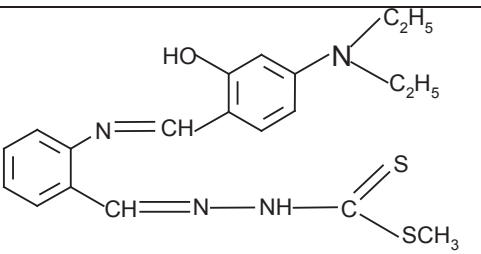
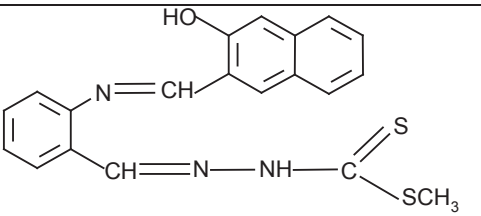
Elemental analysis (Table 2) and IR (Table 3), ^{1}H-NMR (Table 4) and mass spectral results agree well with the structural formula of the ligands as shown in Table 1. The structures of the ligands show that there are several donor atoms in the ligands. But all of them can not coordinate to the metal atom due to the steric hindrance of the other atoms present in the ligands. The IR spectra of the Schiff bases show the $\nu_{(NH)}$ modes at ca. 3110 cm^{-1}. The C=N stretching[11,12] mode is observed as a strong absorption at 1580-1630 cm^{-1}. All other bands for different functional groups are presented in Table 3. Like all other Schiff bases derived from S-alkyldithiocarbazoic acid, the present Schiff bases have a proton adjacent to the thione group. Aliphatic thiocarbonyl groups are relatively unstable in the monomeric form and easily tend to turn to a stable C-S bond by enethiolization if there is at least one proton adjacent to it[13]. The Schiff bases, therefore, are capable of thiol-thionetautomerism as shown byFig.- IA and Fig.-IB for a representative Schiff base.

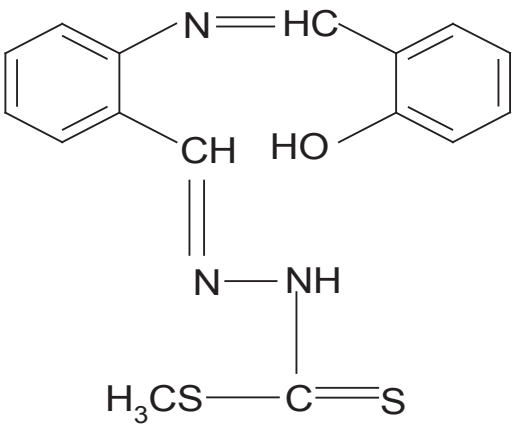
The IR spectra of the Schiff bases, however, do not show the presence of $\nu_{(S-H)}$ stretching at 2700 cm^{-1} suggesting that in the solid state it remains as the thione form[13]. The ^{1}H-NMR spectra of the Schiff bases in $CDCl_3$ also do not show resonance of the thiol proton at around 4.2 ppm.

Table-1: Names and structures of the ligands derived from S-methyldithiocarbazate and their structures

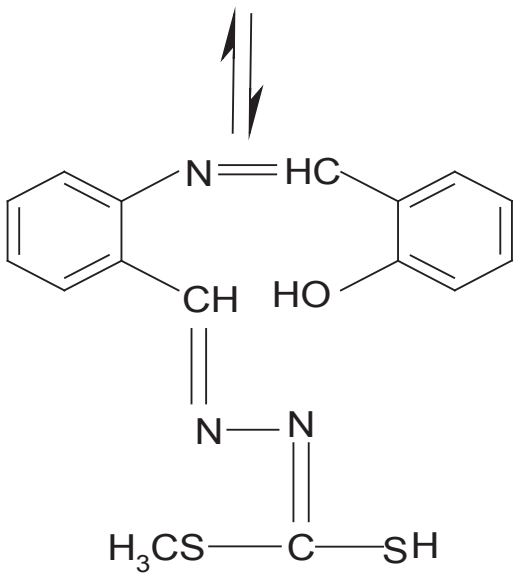
Name of the ligands	Structures
H_2A^1 Salicylaldehyde Schiff base ligand of aminobenzaldehyde and S-methyldithiocarbazate	
H_2A^2 3-Methoxy salicylaldehyde Schiff base ligand of aminobenzaldehyde and S-methyldithiocarbazate	

H_2A^3 5-Bromo salicylaldehyde Schiff base ligand of aminobenzaldehyde and S-methyldithiocarbazate	
H_2A^4 3-methoxy-5-nitro salicylaldehyde Schiff base ligand of aminobenzaldehyde and S-methyldithiocarbazate	
H_2A^5 5-Chloro salicylaldehyde Schiff base ligand of aminobenzaldehyde and S-methyldithiocarbazate	
H_2A^6 3,5-Dibromo salicylaldehyde Schiff base ligand of aminobenzaldehyde and S-methyldithiocarbazate	

H_2A[7] 5-Nitro salicylaldehyde Schiff base ligand of aminobenzaldehyde and S-methyldithiocarbazate	
H_2A[8] 3,5-Dichloro salicylaldehyde Schiff base ligand of aminobenzaldehyde and S-methyldithiocarbazate	
H_2A[9] p-Diethylamino salicylaldehyde Schiff base ligand of aminobenzaldehyde and S-methyldithiocarbazate	
H_2A[10] 2-Hydroxy napthaldehyde Schiff base ligand of aminobenzaldehyde and S-methyldithiocarbazate	



IA



IB

The electron impact mass spectrum of the Schiff base H_2A[1] shows a peak at m/z= 329 corresponding to the moleculer M+ ion in accord with the structural formula IA. The other major peaks in the mass spectrum at m/z = 314, 281, 223 and 106 may be described to the $[M\text{-}OCH_3]^+$, $[M\text{-}SCH_3]^+$, $[M\text{-}NHCSSCH_3]^+$, and $[NHCSSCH_3]^+$ fragments respectively. The above IR, NMR and mass spectroscopic results are consistent with formulation of the compounds as shown IA. The Schiff bases have several potential donor atoms through which co-ordination with a metal ion can occur. But because of steric constraints a maximum of four donor atoms can participate in the co-ordination process at any time. Therefore, they can act as a bivalent tetradentate ligand by forming bonds with metal ions through the phenolic oxygen atom, the two azomethine nitrogen atoms and the thiole or thioether sulphur atoms.

$[MoO_2(acac)_2]$ has been used as a precursor to prepare dioxomolybdenum(VI) complexes of the ligands described above by ligand exchange reactions. When the ligands and $[MoO_2(acac)_2]$ were refluxed in ethanol, solid non-hygroscopic complexes were formed. The molybdenum complexes found were found brown, green and grey coloured. The complexes are fairly stable with a melting/ decomposition temperature of 150 to > 200°C. The molar conductance data show that all the compounds are non-electrolyte in DMF and magnetic susceptibility data reveals that all compounds are diamagnetic in nature (Table 2).

The IR spectra of the complexes show two bands at 902 cm^{-1} to 997 cm^{-1} and at 752 cm^{-1} to 883 cm^{-1} due to $\nu_{sym(O=Mo=O)}$ and $\nu_{asym(O=Mo=O)}$ stretches, respectively. Dioxomolybdenum (VI) complexes possessing a *cis* O=Mo=O moiety exhibit two strong bands at this region[14]. This is a strong evidence for the formation of molybdenum complexes due to the reaction between the ligands and the molybdenum complexes. A broad band at around 3420 cm^{-1} in the IR spectra of all the complexes indicates the presence of water of crystallization in the complexes. A medium sharp band at around 550 cm^{-1} which is absent in the ligand is assigned for the Mo-N stretching frequency[15]. The IR spectra of the complexes and the ligands are given in Table 3.

Table 2 :Some physical and analytical data of molybdenum complexes

Complexes	Colour	Melting/Decomposition point(ligand)^{0}C	%Mo (calculated)	Conductance (ohm^{-1} cm^2mol^{-1})	μ_{eff}
$[MoO_2A^1].H_2O$	Green	148(152)	21.0(20.5)	0	Diam.
$[MoO_2A^2]$	Green	150(118)	19.6(18.4)	0	Diam.
$[MoO_2A^3] .H_2O$	Brown	148(152)	17.8(17.5)	0	Diam.
$[MoO_2A^4] .H_2O$	Brown	>210 (130)	18.5(17.6)	0	Diam.
$[MoO_2A^5] .H_2O$	Grey	>210(160)	19.5(20.0)	0	Diam.
$[MoO_2A^6] .H_2O$	Brown	>214(140)	15.6(14.9)	0	Diam.
$[MoO_2A^7] .H_2O$	Green	>210(126)	19.1(18.6)	0	Diam.
$[MoO_2A^8] .H_2O$	Brown	208 (140)	18.2(17.6)	0	Diam.
$[MoO_2A^9] .H_2O$	Grey	150 (159)	18.7(19.6)	0	Diam.
$[MoO_2A^{10}]$	Brown	>210 (120)	18.8(17.9)	0	Diam.

Table 3: Selected IR absorption bands of ligands and their molybdenum complexes

Ligand/Complex	$\nu_{(OH)}$	$\nu_{(C=O)}$	$\nu_{(C-N)}$	$\nu_{(N-N)}$	$\nu_{(O=Mo=O)}$ (sym)	$\nu_{(O=Mo=O)}$ (Asym)	$\nu_{(Mo-N)}$	$\nu_{(Mo-S)}$
H_2A^1	--	1636ms	1215ms	1082s	--	--	--	--
$[MoO_2A^1].H_2O$	3421br	1616ms	1217ms	1082s	902sho	820sho	526ms	412w
H_2A^2	--	1606s	1270s	1053s	--	--	--	--
$[MoO_2A^2]$	--	1596s	1267s	1041s	954s	890s	540ms	412w
H_2A^3	--	1606s	1217ms	1055s	--	--	--	--
$[MoO_2A^3] .H_2O$	3421br	1594s	1205ms	1043s	991s	798s	--	412w
H_2A^4	--	1605s	1220ms	1080ms	--	--	--	--
$[MoO_2A^4] .H_2O$	3421br	1595s	1215ms	1082sm	960s	881s	522ms	459w
H_2A^5	--	1606ms	1272st	1083s	--	--	--	--
$[MoO_2A^5] .H_2O$	3421br	1600ms	1269st	1082s	991ms	794s	522ms	412w
H_2A^6	--	1604s	1217s	1082s	--	--	--	--
$[MoO_2A^6] .H_2O$	3384br	1591st	1215st	1082s	937st	800st	520ms	414w
H_2A^7	--	1604s	1296s	1055s	--	--	--	--

$[MoO_2A^7]\ .H_2O$	3421br	1598s	1290st	1060s	993s	752s	516ms	407w
H_2A^8	--	1616ms	1267s	1041s	--	--	--	--
$[MoO_2A^8]\ .H_2O$	3421br	1595s	1259s	1043s	997s	883ms	524ms	421w
H_2A^9	--	1604ms	1217ms	1041s	--	--	--	--
$[MoO_2A^9]\ .H_2O$	3421br	1593s	1213ms	1043s	910sm	--	524ms	407w
H_2A^{10}	--	1558s	1224s	1020s	--	--	--	--
$[MoO_2A^{10}]$	--	1550s	1218ms	1029s	997s	883s	547ms	423w

[Here s, ms, m, w. br means strong, medium strong, medium, weak and broad. – means no band observed.]

The ^{1}H-NMR spectra of the ligands exhibit a singlet at 10 – 10.3 ppm and several multiplets in the 7.2 - 7.8 ppm region owing to –NH and aromatic protons respectively. All the aromatic proton signals are also observed at nearly identical positions in the complexes. However, the signal due to –NH proton is not found in the spectra of the complexes. This proves the enethiolisation of the ligands in the complexes. A sharp singlet at 8.5 – 8.9 ppm due to azomethine proton shifts downfield in the spectra of the complexes. This suggests the coordination of the azomethine nitrogen atom to the molybdenum ion[16]. A singlet which is found at ca. 2.5 ppm is due to $-SCH_3$ proton[17]. In case of ligand H_2A^2 and H_2A^4 and their molybdenum complexes there is an extra peak at ca. 3.7 ppm which is due to the presence of $-OCH_3$ group[16]. The ^{1}H-NMR spectral data are given in Table 4.

Table 5 shows the electronic spectral data of the molybdenum complexes of the ligands derived from S-methyldithicarbazate. All the complexes display an intense band centered either at ca. 390nm or at ca. 320nm. This can be assigned as $\pi - \pi^*$ transition arising from the residue of the coordinated ligand, such a band usually occurs at higher energy in the free ligand. In addition another peak is also observed in some complexes.

Considering all these facts, spectral data and analytical data a regular octahedral structure of the molybdenum complexes is suggested with one water of crystallization as shown below.

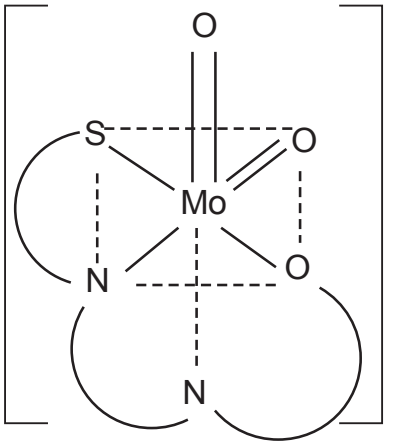


Fig.-III

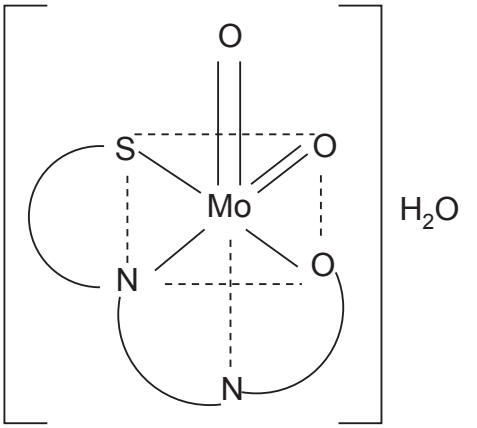


Fig.-IV

Table 4: ^{1}H-NMR spectral data (**δ** in ppm) of ligands and their molybdenum complexes

Ligand/Complex	Phenyl proton	Azomethine proton	-SCH_3proton	–NH proton	Other peaks
H_2A^1	7.2-7.8	8.6	2.5	10.00	--
$[MoO_2A^1].H_2O$	7.2-7.8	8.5	2.5	--	--
H_2A^2	7.2-7.7	8.8	2.5	10.3	3.9(OCH_3)
$[MoO_2A^2]$	7.2-7.7	8.6	2.5	--	3.8(-OCH_3)
H_2A^3	7.2-7.6	8.6	2.5	10.2	--
H_2A^4	7.2-7.8	8.5	2.5	10.2	3.7(-OCH_3)
$[MoO_2A^4].H_2O$	7.2-7.8	8.6	2.5	--	3.5(-OCH_3)
H_2A^8	7.3-7.5	8.9	--	--	--
H_2A^9	7.2-7.6	8.5	2.5	10.3	--

[Here – means not observed]

Table 5 :The electronic spectral data of the molybdenum complexes of tetradentate ligands derived from S-methyldithiocarbazate.

Complexes	λ_{max}(nm)
$[MoO_2A^3]$	388
$[MoO_2A^4].H_2O$	339
$[MoO_2A^5].H_2O$	316
$[MoO_2A^7].H_2O$	389,347
$[MoO_2A^8].H_2O$	324
$[MoO_2A^9]$	315
$[MoO_2A^{10}].H_2O$	445,374

Antimicrobial Studies

Antifungal activity of the ligands and their molybdenum complexes

Here we intend to compare the results of antifungal screening effect between different O-N-N-S donor ligands derived from S-methyldithiocarbazate and their molybdenum complexes. The antifungal evaluation results of the ligands, their complexes and the standard fungicide Nystatin are incorporated in Table 6.

Table 6: Antifungal activity of the ligands and their molybdenum complexes

Ligands and complexes (100µg dw/disc	% Inhibition of mycelial growth after 48 and 72 hours of incubation									
	Macrophomina phaseolina		*Alternaria alternata*		*Fusarium equiseti*		*Colletotrichum corchori*		*Curvularia lunata*	
	48h	72h	48h	72h	48h	72h	48h	72h	48h	72h
H_2A^2	90	80	100	85	100	94	100	85	75	37
A^2C	90	80	100	71	100	88	85	71	68	21
H_2A^3	94	80	100	94	100	88	100	85	75	53
A^3C	100	100	100	100	100	100	94	71	68	21
H_2A^4	90	80	100	100	100	100	100	100	75	21
A^4C	80	60	100	100	94	88	100	85	100	68
H_2A^5	96	80	100	100	100	100	100	77	100	68
A^5C	84	80	100	100	100	100	100	88	68	37
H_2A^6	94	84	100	100	100	100	100	100	100	100
H_2A^7	96	84	100	100	100	100	100	100	68	37
A^7C	84	90	100	94	100	88	100	85	100	100
H_2A^8	80	70	100	100	100	100	100	100	100	75
A^8C	84	80	100	100	100	91	100	100	100	81
H_2A^9	100	100	100	100	100	100	100	100	100	100
A^9C	100	100	100	94	88	82	100	100	81	75
H_2A^{10}	100	100	100	85	100	100	100	100	100	100
$A^{10}C$	84	90	100	100	100	100	100	100	81	75
**Nystatin	76		51		45		41		70	

N.B '**'=Standard fungicide;'dw' = dry weight

C = Molybdenum complex of the respective ligand

From the results it was found that all the compounds in this series inhibited the growth of fungus *Alternaria alternata* completely (100%) after 48 hours. This is an important finding of our research. More importantly this inhibition remains same for almost all the compounds after 72 hours of incubation also. *Alternaria alternata* is responsible to cause leaf spot, rots and blights on many plant part. It can also cause infections inupper respiratory tract and asthma in people with sensitivity. *Alternaria alternata* is a type of fungus that will develop on any paint surface which is periodically moist and which can provide sufficient nutrients. Growth on a paint film of this fungus normally appears as dark spots on the surface and is sometimes confused with dirt. As well as disfiguring the surface, the organism can actually penetrate the film and make it more permeable to water. Growth can also develop under the film and causes loss of adhesion. In practice this means that, without a fungicide, all external coatings films are liable to fungal colonization unless they

are located in very dry situations. As because, its growth is 100% inhibited due to the application of almost all the test compounds of this series, the compounds can be used as effective fungicide after further research. The test organism *Fusarium equiseti* was also found to be (100%) inhibited by almost all of the test compounds except A^4C(molybdenum complex of the ligand aminobenzaldehyde, 3-methoxy-5-nitro salicylaldehyde and S-methyldithiocarbazate) and A^9C (molybdenum complex of the ligand aminobenzaldehyde, 4-diethylaminosalicylaldehyde and S-methyldithiocarbazate) after 48 hours of incubation. In some cases this inhibition decreased with longer time. The action of the test compounds towards the growth of *Colletotrichum corchori* was so prominent that in most cases this action is 100% except in the cases A^2C (molybdenum complex of the ligand aminobenzaldehyde, 3-methoxysalicylaldehyde and S-methyldithiocarbazate) and A^3C (molybdenum complex of the ligand aminobenzaldehyde, 5-bromosalicylaldehyde and S-methyldithiocarbazate). In most cases this inhibition remains unchanged with time.

From Table 6 it is also observed that test compounds A^3C (complex of the ligand aminobenzaldehyde, 5-bromosalicylaldehyde and S-methyldithiocarbazate), A^9C (complex of the ligand aminobenzaldehyde, 4-diethylaminosalicylaldehyde and S-methyl dithiocarbazate), H_2A^{10} (ligand derived from aminobenzaldehyde, 2-hydroxynapthaldedehyde and S-methyldithiocarbazate), were 100% effective. Rest of the compounds also showed considerable effectiveness against *Macrophomina phaseolina*.

Antibacterial activity study of the ligands and their molybdenum complexes

The antibacterial activity testing of some tetradentate O-N-N-S ligands derived from S-methyldithiocarbazate and their molybdenum complexes against some selected gram positive and gram negative bacteria was done. The *in vitro* antibacterial screening result against four Gram positive and seven Gram-negative human pathogens are shown in Table 7 and Table 8.

Table 7: Antibacterial activity of the ligandsand their molybdenum complexes against Gram positive bacteria

Ligands and complexes(100µg dw/disc)	Zone of inhibition in mm after 24 and 48 hours of incubation							
	Bacillus cereus		*Bacillus subtilis*		*Staphylococcus aureus*		*Bacillus megaterium*	
	24h	48h	24h	48h	24h	48h	24h	48h
H_2A^2	15	15	12	12	0	0	5	5
A^2C	10	10	10	10	0	0	8	8
H_2A^3	15	15	15	15	20	20	20	20
A^3C	18	18	20	20	5	5	18	18
H_2A^4	25	25	20	20	20	20	28	28
A^4C	28	28	20	20	20	20	25	25
H_2A^5	25	25	25	25	38	38	40	40
A^5C	12	12	15	15	15	15	15	15
H_2A^6	30	30	20	20	38	38	30	30
H_2A^7	15	15	18	18	30	30	22	22
A^7C	18	18	15	15	30	30	20	20
H_2A^8	20	20	23	23	20	20	15	15
A^8C	22	22	18	18	15	15	18	18
H_2A^9	20	20	5	5	15	15	0	0
A^9C	10	10	5	5	10	10	0	0
H_2A^{10}	15	15	10	10	10	10	0	0
$A^{10}C$	15	15	10	10	10	10	10	10
**Ampicillin (20µg dw/disc)	16		16		20		15	

N.B '**'=Standard antibiotic; 'dw' = dry weight

C = Molybdenum complex of the respective ligand

Table 8: Antibacterial activity of ligands and their molybdenum complexesagainst Gram negative bacteria

Ligands and complexes(100µg dw/disc)	Zone of inhibition in mm after 24 and 48 hours of incubation													
	Escherichia coli		*Vibrio cholerae*		*Salmonella typhi*		*Salmonella paratyphi*		*Pseudomonus species*		*Shigella sonnei*		*Shigella dysenteriae*	
	24h	48h	24h	48h	24h	48h	24h	48h	24h	48h	24h	48h	24h	48h
H_2A^2	0	0	0	0	10	10	8	8	20	20	0	0	0	0
A^2C	0	0	0	0	5	5	8	8	20	20	0	0	10	10
H_2A^3	0	0	0	0	0	0	12	12	10	10	18	18	15	15
A^3C	0	0	0	0	18	18	18	18	15	15	15	15	18	18
H_2A^4	0	0	0	0	18	18	15	15	25	26	20	20	18	18
A^4C	0	0	0	0	28	28	18	18	22	22	18	19	18	18
H_2A^5	0	0	0	0	28	28	10	10	30	30	20	20	0	0
A^5C	0	0	0	0	13	13	12	12	10	10	10	10	0	0
H_2A^6	30	30	0	0	25	25	20	21	40	40	30	30	0	0
H_2A^7	0	0	0	0	18	18	15	15	15	15	0	0	15	15
A^7C	0	0	0	0	13	13	15	15	10	10	8	8	18	18
H_2A^8	0	0	0	0	20	20	30	30	18	19	20	20	20	20
A^8C	0	0	0	0	12	12	18	18	28	29	0	0	15	15
H_2A^9	0	0	18	18	5	5	8	8	5	5	0	0	28	28
A^9C	0	0	20	20	0	0	5	5	5	5	0	0	0	0
H_2A^{10}	0	0	0	0	15	15	10	12	0	0	10	10	18	18
$A^{10}C$	0	0	0	0	10	10	15	15	15	15	15	15	15	15
**Ampicillin (20µg dw/disc)	28		24		25		12		19		24		13	

N.B '**'=Standard antibiotic; 'dw' = dry weight
C = Molybdenum complex of respective ligand.

It is evident from Table 7 that the test compounds show more effective inhibition against the Gram-positive bacteria *Bacillus cereus* and Bacillus *subtilis* than the other two bacteria (*Staphylococcus aureus* and *Bacillus megaterium*) with some exceptions. All the bacteria showed a good zone of inhibition, when the ligand H_2A^6 (ligand derived from aminobenzaldehyde, 3,5-dibromosalicylaldehyde and S-methyldithiocarbazate) was applied to them and observed much higher zone of inhibition while compared it with an antibiotic Ampicillin. All of the compounds like H_2A^4 (ligand derived from aminobenzaldehyde 3-methoxy-5-nitrosalicylaldehyde and S-methyldithiocarbazate), A^4C (28mm) (molybdenum complex of the ligand H_2A^4), H_2A^5 ((ligand derived from aminobenzaldehyde, 5-cholorosalicylaldehyde and S-methyldithiocarbazate), H_2A^8((ligand derived from aminobenzaldehyde, 3,5-dicholorosalicylaldehyde and S-methyldithiocarbazate), showed effective zone of inhibition against all the Gram positive bacteria. Among them the test compounds H_2A^5 (38mm), H_2A^6 (38mm), H_2A^7 (30mm), were found highly active against *Staphylococcus aureus* and H_2A^5 (40mm), H_2A^6 (30mm) showed remarkable activity against *Bacillus megaterium*. Generally all bacteria showed greater zone of inhibition due to ligands rather than their molybdenum complexes. Of course there were exceptions for a few cases where complexes showed more effectiveness than ligands or the effectiveness of ligands and complexes were same.

If we consider the results for the Gram negative bacteria (Table 8) it is evident that here also almost all the test compound showed a good zone of inhibition against all bacteria except H_2A^6 against *Escherichia*. Coli and H_2A^9, A^9C against *Vibrio cholerae*. No test compound was found effective for this bacterium except H_2A^9 ((ligand derived from aminobenzaldehyde, 3-diethylaminosalicylaldehyde and S-methyl dithiocarbazate), A^9C (molybdenum complex of H_2A^9). Another Gram negative bacterium *Escherichia coli* was found ineffective towards all test compounds except H_2A^6. Besides this two, all other compound show effective zone of inhibition for almost all the bacteria. The effectiveness of the compounds with Ampicillin, showed that many compounds can inhibit the zone of bacteria more effectively than Ampicillin. The zone of inhibition by the test chemicals A^4C (30mm), H_2A^5 (28mm), in case of Salmonella typhi, H_2A^8 (30mm) in case of *Salmonella paratyphi*, H_2A^6 (40mm), H_2A^5 (30mm), in case of *Pseudomonas species*, H_2A^6 (30mm) in case of *Shigella sonnei* and A^8C (28mm) in case of *Shigella dysenteriae* were mentionable. Some test compounds showed little sensitivity towards the tested human pathogenic micro-organisms.

During comparison of the effectiveness of the compounds towards Gram positive

and Gram negative bacteria it was observed that the Gram positive bacteria were more sensitive towards the compounds than the Gram negative bacteria. The compound H_2A^6 was the most effective one in both the cases.

Acknowledgement

The experiment was done in the Inorganic Research Laboratory of Department of Chemistry, University of Chittagong. The authors gratefully acknowledge Department of Microbiology, University of Chittagong for their help regarding Antifungal and Antibacterial activity study. One of the authors (SuklaRakshit) is gratefully acknowledge the scholarship from UGC for doing this research.

References

1. W. K. Goh and M. C. Lim, Aust. J. Chem., 1984,37,2235.

2. J. Topich and J. T. Lyon III, Polyhedron,1984,3,61.

3. K. Yamanouchi and S. Yamada, Inorg. Chim.Acta, 1974,9,161.

4. A. Rana, R. Dinda, P. Sengupta, S. Ghosh, L. R. Falvello, Polyhedron, 2002,21,1023.

5. M. Gulloti, A. Pasini and G. M. Sanderight, J. Chem. Soc. Dalton Trans., 1981, 902.

6. P. Subramani, Rus. J. Chem.,2009,2,243.

7. S. N. Rao, N. Kathale, N. N. Rao, K. N. Munshi,Inorg. Chim.Acta, 2007,360,4010.

8. D. Eierhoff, W. C. Tung, A. Hammerschmidt, B. Krebs, Inorg. Chim.Acta, 2009, 362, 915.

9. N. Monadi, I. Sheikhshoaie, A. Rezaeifard and H. Stoeckli-Evans,ActaCryst., 2009,E65, 1124.

10. D. Mandal, R. Ganguly, P. Chatterjee, A. Endo, T. Weakley, Mol. Struct. Chem.,2007,18, 187.

11. M. A. Ali and R. N. Bose, Polyhedron,1985,3 758.

12. J. Topic and J. T. Lyon III, Inorg. Chem., 23,1984, 3202.

13. L. M. Thomson, M. B. Hall, J. Am. Chem. Soc., 2001,123,3995.

14. M. Nazimuddin, Ph.D thesis, (1989). I. Stiefel, Prog. Inorg.Chem., 1977,22,1.

15. M. A. Ali and S. G. Teaoh, J. Inorg. Nucl.Chem.,1979,41, 809.

16. P. Novak, K. Piculjan, T. Hrenar and V. Smreeki, Croat. Chim.Acta,2009,82,477.

17. S. Ray, T .N. Mandal, A. Barik, S. Pal, S. Gupta, A. Hazra, R. J. Butcher, A. D. Hunter, M. Zeller and S. K. Kar, Polyhedron, 2007, 26, 2603.

Feedback on Writing: The tertiary level EFL teachers' perceptions and practices

Md. Khaled Bin Chowdhury * Shakila Mustaque **

Abstract

The role of feedback as an essential tool for students' writing development cannot be denied. Teachers follow varieties of ways to give feedback on students' writing and remove their weaknesses in writing. But, their efforts do not always become fruitful due to absence of appropriate method and knowledge. This paper through a quantitative method investigates the perceptions of the tertiary level EFL Teachers about the issues of feedback on student writing. This study is based on teachers' survey and analysis of samples of teachers' feedback on student writing. The results of this study indicate that a majority of EFL teachers prefer product approach to process approach of feedback like the students, feedback on form to feedback on organization, direct feedback to indirect feedback and teacher feedback to peer feedback. Large class size has also been mentioned as the most prominent obstacle to providing ongoing feedback on students' writing.

Key Words: Feedback, direct feedback, indirect feedback, Teacher feedback, peer feedback

BGC Trust University Journal
Vol. 03, December, 2016, pp. 77 - 88
© BGC Trust University Bangladesh
ISSN : 2073- 5448

* *Assistant Professor, Dept. of English, BGCTUB*
** *Lecturer, Dept. of English, BGCTUB*

1.0 Introduction

Since the late 1950s, attitudes towards the role of corrective feedback have changed along with the evolution of language teaching methodologies grounded on theories of both educational psychology and second language acquisition with the aim of enabling learners to acquire the target language effectively. In the late 1950s and 1960s, the Audio Lingual Method (ALM), based on behaviorism and structuralism, was very popular in second and foreign language classrooms. Error connection was seen as helping learner to form good habits by giving correct responses instead of only marking their structural mistakes. In the 1970s and 1980s, Communicative Language Teaching (CLT) was commonly practised to bring communicative competence in the learners and "function over form" or "comprehensibility over grammaticality" was emphasized in communication. It implies that formal correction should not be given because it appeared to be interfering rather than facilitating the acquisition of the target language (UKessays, 2015). The fact is that whatever method the teachers follow, the importance of feedback on writing cannot be overlooked.

Feedback is an indispensable part of writing development. From among the many definitions of feedback the following ones may be accepted as a complete one. Feedback is "information that is given to the learner about his or her performance of a learning task, usually with the objective of improving this performance" (Ur, 1996:242). Teachers give feedback on learners' writing as they want to "affect [their] students' language use in the future as well as comment upon its use in the past" (Harmer, 2017:151). It is a fact that feedback if given during the drafts has immense benefits to the development of writing of learners. Feedback is also beneficial to the students if given on organization as well as form. But, it is a common practice in our country to give feedback on finished product, form and grammar rather than on organization and content. Moreover, in the socio- cultural and educational setting of our country teachers as well as students prefer teacher feedback to peer feedback.

2.0 Objective of the research

Most of the studies done on feedback failed to examine which mode of feedback, direct or indirect was more effective in improving student writing. Even though some of them were comparative in nature, the studies were conducted solely with a group of English-as-a-second-language (ESL) learners. As a result, conclusion is hard to be drawn with regard to the effectiveness of each feedback strategy when it is applied in another classroom setting where English is in the Kachru's (1985)

expanding circle or where English is taught as a foreignlanguage. Our research is to explore the perception of tertiary level EFL teachers about the importance of feedback, ways of feedback, comparative study of importance between teacher and peer feedback. What makes our research different from the previous researches in this area is that in our research we also investigated whether teachers realize the importance of multi drafts and encourage students to practice it and if teachers made any extra efforts to help the less skilled students. To investigate the issues the following research questions have been framed.

3.0 Research Questions

1. Do teachers encourage students to do multiple drafts?
2. Do teachers give feedback between drafts?
3. Does feedback on the first draft help students to improve their writing?
4. Does the teacher encourage peer feedback?

4.0 Literature Review

A number of studies have been done to examine the role of feedback in students' writing. For example, in a study, Leki (1990) asked 100 ESL freshmen to complete questionnaires to examine what effective feedback was and how they reacted to the positive and negative comments on both form and content. He found that correcting errors in both form and content is beneficial since good writing is viewed as error-free writing. In a similar vein, Weaver (2006) explored how 44 students in the Faculty of Business, Art and Design perceived written feedback and if the feedback that they received showed a student-centered approach to learning. In light of interviews, questionnaires, and feedback content, he found that teachers' comments are useful only if they are specific and clear, give sufficient guidance, focus on positive points, and are related to assessment criteria. Marginal comments are also deemed to be more motivating since the reader in actively engaged with writer's text (Goldstein, 2004, as cited in Hyland & Hyland, 2006)

The effectiveness of oral feedback for improving student writing has still got very few answers (Hyland & Hyland, 2006). As, such several studies have been done to examine teacher-student dialogue, and they found that successful conferencing rests on the interactive nature. For example, Hyland (2003) claimed that conferencing is fruitful when students are actively involved, asking questions, clarifying meaning, and arguing instead of accepting advice. Zaman and Azad (2012) did an empirical study on the perception of 12 Bangladeshi tertiary level

teachers and 120 students of different private universities of Bangladesh. The results of the survey show that these Bangladeshi EFL learners and teachers value corrective feedback and they believe that it helps student writers a lot to develop their writing. The learners in that study showed their preference for direct feedback and most of the learners and teachers opted for direct feedback and feedback on form which reflect the uniqueness of EFL context.

5.0 Shift in writing pedagogy

During the last few decades there has been a shift in the writing pedagogy from product to process approach of writing. This change in approach has brought in a change in the role of teachers and their way of providing feedback. In the early product approach teachers' role is viewed as a critic, examiner, who only judged the single final written product without any interferences at various points of writing process. On the other hand, in the process approach a teacher is seen as an intervening factor in the students' writing process where writing instruction is accompanied with multi drafts assignment, teacher-student conferences and assignment (Hedgcock and Letkomitz, 1994). In the current approach a teacher has to play a multi-dimensional role, such as, reader, audience, coach, mentor, fellow inquirer and guide, consultant, assistant and facilitator (cited in Zamel, 1985). Thus in process-based instruction feedback is seen as very crucial in writing development because of the constant guidance of the teachers.

6.0 Direct and Indirect feedback

L2 writing researchers have identified a number of strategies for providing corrective feedback. Two strategies which have attracted the attention from researchers are direct and indirect feedback. In direct feedback the teacher marks the errors and provides the correct form and in indirect feedback the teacher indicates the errors by underlining, circling or by using codes but does not provide the correct form. Diagnosis and correction in indirect feedback is therefore left to the students. Ellis (2009) points out that direct feedback provides explicit guidance to the learners about their errors and it is particularly helpful to those learners who are not capable of self-correcting the errors. He also asserts that a disadvantage of direct correction is that it "requires minimal processing on the part of the learner." (Ellis, 2009:99). Therefore, it may not contribute significantly to long term learning. (Zaman and Azad, 2012).

Research on the effectiveness of different types of feedback has produced mixed results. Lalande (1982) (cited in Storch and Wigglesworth, 2010) compared direct

feedback and indirect feedback and found indirect feedback more effective than direct feedback in promoting greater accuracy in the subsequent writing of the students. Ferris' (2006) study also points to the superiority of indirect feedback over direct feedback for facilitating student writing improvement over time. Chandler (2003) in contrast, found direct correction superior to other types of indirect correction in producing more accurate writing. The students in her study also preferred direct correction. Robb et al (1986) compared four different types of feedback (direct correction, coded feedback, un-coded feedback and marginal feedback). They found no major differences among the four treatment types. So, L2 writing research on the effectiveness of different types of feedback is not conclusive. Some favor indirect feedback while others support direct feedback (Zaman and Azad, 2012).

7.0 Feedback on form or content

There are two ways to give feedback on student writing, i.e. feedback on form and feedback on content. Feedback on form takes into account grammar and mechanics such as spelling, punctuation and vocabulary. On the other hand, feedback on content emphasizes on organizations, ideas and amount of detail (Fathman and Whalley, 1990).

Although both types of feedback are important for developing learners' writing, feedback on form is a more common phenomenon in second language writing. Since feedback on the form is more prevalent in second language writing research, it attracts more criticism as well. (Zaman and Azad, 2012).

Truscott (1996:328) claims, "Grammar correction has no place in writing courses and should be abandoned" as the correction is not 'ineffective', but also 'harmful'. However, Ferris (2002) stresses the necessity of feedback on form. She states, "No matter how interesting or original a students' ideas are, an excess of sentence and discourse-level errors may distract and frustrate instructors and other readers" (p. 328). Citing a number of studies, Ferris points out that a lack of grammatical accuracy in ESL student writing may impede students' progress at the tertiary level at large. On the other hand, teacher feedback on content is not free from flaws either. (cited in Zaman and Azad, 2012). However, Fathman and Whalley`(1990) suggest that feedback on both form and content are equally effective in improving student writing. While the debate is still going on over the focus of feedback, there is general agreement that attention should be paid to both form and content. (Zaman and Azad, 2012)

8.0 Teacher feedback and peer feedback

There is considerable debate on who should provide the feedback: teacher or the learners themselves. Many experts consider peer feedback as an important alternative to the teacher feedback (Zaman and Ahad, 2012). However, teachers and researches have mixed opinion about peer feedback.Rollinson (2005) has pointed out that peer feedback can be helpful ina number of ways. Peers can provide useful and valid feedback and student writers revise their texts efficiently following peer feedback. Another important thing about peer feedback is that as it operates on a more informal level, it provides a switch from the traditional one way communication between the teacher and the students. A disadvantage of it is that learners may be doubtful about the value of peer feedback. Rollinson (2005:26) comments,"Many students may need significant amount of initial persuasion of the value of peer feedback, since they may not easily accept the idea that their peers are qualified to act as substitutes for the teacher, and critique their writing." Studies on learners' perception of peer feedback indicates that learner usually prefer teacher feedback to peer feedback. In a study Saito (1994) found that the majority of ESL students in her study favored teacher feedback over peer feedback or self-correction.

9.0 Methodology

This research is based on the quantitative method of investigation. A questionnaire has been used to find out the opinions of the teachers teaching writing at university level. The questionnaire covers the issues such as regular feedback, multiple drafts, obstacles in giving feedback in class, students' responses to teachers' and peers' feedback, teachers' way of dealing with less skilled students and so on. Ten teachers were approached for the data collection and all of them positively responded. Five teachers were from a private university where the researchers are working and the other five were from a government college of Chittagong city. The teachers' teaching experience ranges from four years to twenty years. The data were tabulated and presented in percentage terms. In addition to it, the samples of feedback of four teachers were collected. They were not informed beforehand of the purpose of collecting the samples of feedback given by them. The samples of the student write-ups with feedback given by the teachers were analyzed one by one.

10.0 Findings

In reply to question no. 4, 40% of teachers say that they always give feedback and 60% of them say that they give feedback occasionally. In response to the question

'how do you usually give feedback', 80% of teachers say that they give direct feedback, that is, they point out the errors and write the correct word or structure. That is, they put a lot of effort into giving feedback. Only one teacher circles and underlines and one teacher gives an overall feedback. While replying to the question no.5, whether they encourage students to make multiple drafts of their writing, none out of ten does it. If we correlate this answer with question no. 4, it appears that they prefer feedback on the finished product in detail. However, 40% of teachers say that they do it sometimes. In replying to the question no.6, 60% of respondents say that they do not provide feedback between drafts and only 40% of them do so. Actually in our country teacher feedback often takes the form of written comments on their final graded compositions. Received by students at the end of their writing process, these comments rarely have any impact on students' writing development. Students generally feel that they have finished working on the writing when they hand it in for a grade. Although appreciation and high grades may create confidence in some students, few students are interested in incorporating feedback to improve compositions for which they've already received grades. But if students receive feedback during drafts, they will be more interested to use it to revise and edit their drafts.

In pointing out the obstacles to providing feedback, 70%of teachers complain about the large class size. It is true that it is not possible to give feedback in a large class if teacher follow the product writing feedback approach. In our universities language classes are still large than standard ones. While asking the teachers about their class size a majority of them said that their classes had 50 to 60 students on average. Since checking writings critically, giving feedback on them and again checking whether learners have implemented the suggestions are a time consuming process, it is not always possible for teachers to go through these rigorous process, especially in large classes.

While replying to the question, 'how do students respond to the teachers' feedback',60% of them say that the responses vary as there are both successful and unsuccessful students. It is very natural because successful students become happy if much feedback is not needed, that is, there are not many errors. Unsuccessful students might become either scared or try to accommodate to the feedback. However, 40% of respondents say that students are interested only in good grade. In reply to the question, 'does feedback in the first draft help students to overcome their problems in the final draft', 90%of them reply in the affirmative, that is, they are aware of the beneficial effects of feedback between drafts but the fact is that they

do not practise it. So incongruity is noticed in their reply to question no.4 where 60% of them say that they do not provide feedback between drafts. That is, they do not practise what they believe. It is true that verbal or written feedback can be a powerful teaching tool at the time of writing drafts. When students receive feedback while they are writing, they become more enthusiastic to accommodate to it and edit their drafts than they would be if they received the suggestions on a graded, polished copy or finished product.

While replying to the question, if' they give extra efforts to deal with less skilled students' 40% of them say that they correct major errors themselves and 30% of them say that they cannot take extra care of the less skilled students due to the shortage of time. Whatever be the reason, the majority of teachers in our country are averse to giving extra efforts and time to the marginal students. They are more intent on finishing the writing syllabus perfunctorily. They do not realize that instead of cramming so many things fruitlessly upon students and to hurry through the syllabus unproductively, it is better to teach something fruitfully. While replying to the question 'if they encourage their students to take peer feedback', 60% of teachers say that they do not do it because students prefer teachers' feedback. Only 2 teachers say that they encourage peer feedback. Researchers have different opinions regarding this issue. Some researchers have the opinion that learners' feedback affects learner autonomy, whereas learners feel more comfortable with peer feedback. This matter, however, varies from context to context. In the socio-cultural setting of Bangladesh, learners are not open to criticism by their classmates. They do not feel comfortable with correction by their peers. Besides, learners maynot have faith in their peers for giving feedback.

Some researchers say that in the writing process, especially during the drafts before the final draft, peer feedback is more effective because teacher feedback influences learners' autonomy. However it has been observed that teacher feedback at an earlier stage affects student autonomy, but just in the draft immediately before the final draft it is found to be more helpful because by this time, several stages of revision and reconsideration have been completed by the learners. If peer feedback is guided and followed by teacher feedback, it may instill confidence in learners and then it may be more constructive. (Zaman and Azad, 2012).

11.0 Analysis of the writing samples

Samples of feedback on student writing given by four teachers were collected. It was found that among the four teachers, three gave feedback on form and grammar only. They just circled and underlined the incorrect words and grammar. One

teacher gave comment on organization and content too besides underlining and circling. One teacher followed peer-checking in addition to circling and underlining. A majority of teachers tend to give feedback at surface level. The practice of encouraging students for peer checking is hardly noticed among the Bangladeshi teachers. In Bangladesh, feedback on form appears to be more important to both learners and teachers because of several factors. One of the important reasons is the status of English; in EFL setting learning is mainly based on formal study in the classroom. Unlike naturalistic SLA, there is no opportunity for natural communication here. Grammatically correct sentence is emphasized over contextually appropriate expression. As a result, in EFL writing both learners and teachers usually focus on the accuracy rather than fluency. So feedback on content and organization often fails to attract learners' attention and thus its goal is not always attained.(Zaman and Azad, 2012).

12.0 Limitations of the study

The study was conducted on 10 teachers teaching at tertiary level in two institutions. The study could have been more logically grounded if the number of participant teachers were 20 or more and taken from varied institutions. The students should have also been included in this study. Their perceptions about feedback are very important because any activity of teachers, not only feedback is guided by students' expectations. To study their perception form teachers' perspective cannot be fully justified. So, if survey were done with students too, the study would have been more inclusive, conclusive and representative.

13.0 Conclusion

This study clarifies the point that teachers' beliefs about feedback on students' writing are traditional and reflect the typical practice being followed by teachers in EFL settings. The majority of teachers follow the product method of feedback and prefer feedback on form to that of organization and content. Majority of teachers still blame the large class size as an obstacle for their preference for written feedback to oral one-to-one feedback explaining that conferencing is not possible in a large class for time constraint. The results also reveal that fact that teachers themselves do not rely on peer feedback and hence do not encourage peer feedback or checking. Teachers do not encourage students to do multiple drafts or follow the process approach of feedback even though they are aware of its huge benefits. So, in a sense these feedbacks given by teachers do not become fruitful because through the product-approach, it is not possible to check whether students have incorporated the feedback given by teachers in their writings.

References:

Chandler, J. (2003).The efficacy of various kinds of error feedback improvement in the accuracy and fluency of L2 students writing.Journal of Second Language Writing, 12, 267-296.

Ellis, R. (2009).Corrective feedback and teacher development.L2 Journal, 1, 3-18.

Ellis, R. (2009). A typology of written corrective feedback types.ELT Journal, 63(2), 97-107.

Fathman, A.K., Whalley, E. (1990). Teacher response to student writing: Focus on form versus content". In B. Kroll (Ed.), Second Language Writing (pp.178-190), Cambridge, UK: Cambridge University Press.

Ferris, D. (2006). Does error feedback help student writers? New evidence on the short and long- term effects of written error correction. In Ken Hyland and Fiona Hyland, Feedback in Second Language Writing: Contexts and Issues. Cambridge: Cambridge University Press.

Ferris, D. (2002). Teaching students to self-edit. In Jack C. Richards and Willy A. Renandya (Eds.), Methodology in Language Teaching: An Anthology of Current Practices. Cambridge: Cambridge University Press.

Harmer, J. (2007).The Practice of English Language Teaching. 4th ed. London: Longman.

Hedgcock, J., and N. Lefkowitz (1994). Feedback on feedback: Assessing learner receptivity to teacher response in L2 composing.Journal of Second Language Writing 3(2), 141-163

Hyland, F. and Hyland, K. (2006) .Feedback on Second Language Students' Writing.Language Teaching, 39, 83-101. Cambridge: Cambridge University Press.

Hyland, K. (2003). Second Language Writing. Cambridge: Cambridge University Press.

Leki, L. (1990). Coaching from the margins: issues in written response. In Kroll, B.(ed.) Second Language Writing: Research insight for the Classroom, (pp.57-68). Cambridge: Cambridge University Press.

Oral and written feedback to improve writing English Language Essay, UK essays,

English Language, Published: 23rd March 2015. Available at: www.ukessays.co/essays, Retrieved on 10th November 2016

Robb, T., Ross, S., and Shortreed, I. (1986). Salience of feedback on error and its effect

on EFL writing quality.TESOL quarterly, 20(1), 83-95.

Rollinson, P. (2005). Using peer feedback in the ESL writing class.ELT Journal 59(1), 23-30.

Saito, H. (1994). Teachers' practices and students' preference for feedback on second language writing: A case study of adult ESL learners. TESOL Canada Journal, 11(2), 46-70.

Storch, N., and Wigglesworth, G. (2010).,Learners' processing uptake and retention of corrective feedback on writing. Studies in Second Language Acquisition, 32(2), 303-334.

Truscott, J.(1996). The case against grammar correction in L2 writing classes.Language Learning, 46, 327-369.

Ur, P. (1996). A Course in Language Teaching. Cambridge: Cambridge University Press.

Weaver, M. R. (2006). Do Students Value Feedback? Student Perceptions of Tutors' Written Responses. Assessment & Evaluation in Higher Education. 31, 379-394.

Zaman, M.M. and Azad M. A. K. (2012) .Feedback in EFL Writing at Tertiary Level:Teachers' and Learners' Perceptions. ASA University Review, Vol.6 No.1.

Zamel, V. (1985).Responding to student writing.TESOL Quarterly, 19(1), 79-101.

Impact of Marketing Cost on Revenue and Operating Profit- A Study of Pharmaceutical Companies of Bangladesh

Golam Shahria * Mrs. Mouri Dey **

Abstract

In Bangladesh, Pharmaceutical is one of the fastest growing sectors and stands at the basic foundation level of healthcare sector. Like other business enterprises, pharmaceutical enterprises invest billions of money annually on marketing drugs they manufacture. The impact of such marketing cost on revenue and profit was examined with reference to five sample firms. We found that the dependence of sales revenues and operating profit of pharmaceutical industry on marketing cost are represented by equations, b = 6.4596 &

b = 1.3802 respectively. And dependence of sales revenues and operating profit of pharmaceutical industry on advertisement & promotional cost is shown by the equation, b = 11.7421& b = 2.2988. It is also found that marketing cost is correlated with revenue and operating profit and the coefficients of correlation are 0.9899 & 0.9448 respectively. Correlation of advertisement & promotional cost with revenue and operating profit is reflected by coefficients, which are 0.8632 & 0.7692 respectively. It seems that, pharmaceutical companies can generate more revenue and operating profit from advertisement & promotional cost compared to the marketing cost. However, for public interest these enterprises need to avoid unnecessary costs and attempt to cost reduction approach significantly.

Key Words: Pharmaceutical Companies, Marketing Cost, Advertisement & Promotional Cost, Sales Revenue, Operating Profit

BGC Trust University Journal
Vol. 03, December, 2016, pp. 89 - 110
© BGC Trust University Bangladesh
ISSN : 2073- 5448

* *Lecturer in Accounting, BGC Trust University Bangladesh*
** *Assistant Professor, Department of Accounting, University of Chittagong*

1.0 Introduction

The pharmaceutical industry of Bangladesh is now one of the well-established manufacturing companies. It is now the third largest taxpayer industry in Bangladesh. The history of Pharmaceutical's industry dates back to 1950s. Over the years, the industry has gone through some significant changes. After liberation of Bangladesh in 1971, the industry was largely dominated by MNCs, and the country was very much imported dependent. In this context it may be mentioned that due to finance constraint, Bangladesh after several years of liberation, could not increase (in relative terms) budgetary allocations for the health sector. At that time, most of the people had little access to the essential lifesaving medicines. In 1982, through the formulation of national drug policy, and drug control ordinance, a defined guideline for the development of the industry was provided. National Drug Policy (NDP) had established the Drugs Control Ordinance 1982, to ensure availability, affordability and safety of essential drugs. The Drugs Control Ordinance banned certain types of drugs from the market, imposed limits on the marketing rights of foreign companies and established a price control for both finished drugs and their raw materials. Since then, the local firms established a stronger foothold, and the country has now transformed from an import dependent to an active exporter of pharmaceutical products. After the promulgation of Drug Control Ordinance-1982, the development of pharmaceutical industry has accelerated. The skills and knowledge of the professionals and innovative ideas of the people involved in this industry are the key factors for these developments. In fact, the pharmaceutical sector, which is widely regarded as a "hi-tech" industry, is the most developed among the manufacturing industries in Bangladesh. Due to recent development of this sector, the country is exporting medicines to global market including European countries and on the top of it; the industry has been supplying about 95 per cent of the domestic demand for medicines (http://www.pharmadu.net). From the perspective of business nature, the industry can be classified as- 1. High-End products (Anti-Cancer, Insulin, Vaccines etc.), 2. Branded generics (products with a brand presence) 3. Low End generics 4. Contract manufacturing (domestic and export). Top Listed Pharmaceutical Companies in Bangladesh are Square Pharmaceuticals Limited, Beximco Pharmaceuticals Limited, Renata Limited, GlaxoSmithKline Bangladesh Limited, ACI Limited, IBN Sina Pharmaceuticals Limited, Pharma Aids Limited, and Central Pharmaceuticals Limited.

The Millennium Development Goals (MDGs) highlight the imperative to adopt collaborative approaches. In particular, Goal 8 promotes global partnership for

development, and Target 8 goal specifically aims to, "in co-operation with pharmaceutical companies, provide access to affordable, essential medicines in developing countries". Collaboration is now part and parcel of the research-based pharmaceutical industry's approach to improving the effectiveness of healthcare systems. The pharmaceutical industry constitutes one of the building blocks of an effective and well-functioning healthcare system. Research-based pharmaceutical companies make a unique contribution to improving global health through the innovative medicines they develop. In addition, they have a strong track record of sustaining programs to improve the health of patients in low and middle income countries like Bangladesh. The contribution of the research-based pharmaceutical industry is vital in the fight against neglected tropical diseases (NTDs).

2.0 Statement of the Problems:

The crux of the problem in the context of marketing of pharmaceutical industry is that the market in Bangladesh remains tiny compared to the population size because of the lack of spending power of the population. Pharmaceutical spending is also amongst the lowest in the world in per capita terms. On the contrary, the encouraging feature is that the increased awareness of healthcare and the government's increased expenditure in this sector is causing the demand to increase in this sector. In addition to the demand of therapeutic drugs, the demand for "wellness" drugs such as vitamins and minerals are increasing gradually and the future growth of the sector lies in it. Domestic market size of pharmaceuticals has a direct relationship with economic variables, such as population growth, healthcare expenditure, income level, etc. In Bangladesh, the industry has been experiencing a good growth over the last few years. The growth is attributable to rising population with increasing healthcare expenditure per capita. Noticeably, the increase in healthcare expenditure is due to higher level of private spending, demonstrating rising health awareness among the people. In this connection it is also notable that a significant number of drug consumers obtain drugs without a prescription. When consumers lack a prescription, they will usually either ask a pharmacist for a specific drug or describe their ailment to a pharmacist who diagnoses the problem and recommends a drug on the spot. In this regard the popular products include a variety of antibiotics, painkillers, and gastric remedies. Consumers purchase one to ten tablets or capsules at a time. The quantity of drugs purchased often depends more on the consumer's finances than on the required dose of medicine. Medicine is very essential for each and every person, when it is needed. But the cost/price calculation of medicine does not consider 'the ability to pay' of population in under developed or developing counties like Bangladesh. In

case of some drugs that are not subject to a fixed price, there is considerable price sensitivity in Bangladesh, which is explained by the very high variation in quality with significant incidents of health-damaging spurious drugs and fake drugs that contain no active ingredient. Thus, it is not uncommon for the high quality branded generics of the leading manufacturers to have a 100% price premium over their competitors. In some cases the premium is even higher. Marketing cost which includes also advertisement and promotional expense is one of the elements of cost of sale of medicine. Marketing cost and advertisement & promotional cost are necessary for providing medicine to the customers. But unfortunately, it includes some irrelevant expenses such as physician sample, gift to doctor & clinic etc. From the view point of consumer, these is unwarranted expenditure are burden which need to be borne by the ultimate consumers. In this context the nature of marketing cost, its relation to profit, the extent of advertisement cost in the marketing cost and its impact on profit too reveals to be an important area of investigation to which this paper makes an attempt.

3.0 Literature Review

At the global level, valuable studies are available on pharmaceuticals industry and related sectors on various aspects. But such studies are not many in Bangladesh especially in the aspect of marketing costs and their impact on sales revenue & profit. In such a context a brief review on some select studies are made below with reference to aspects of marketing costs and advertising costs.

Verdon et al (1968) while studying the relationship between advertising and aggregate demand found that advertising has a positive relation with aggregate demand. Elliot (2001) revealed that advertising has a significantly positive effect on food industry sales and that the relationship between advertising expenditure and sales appears to be stable. Kremer (2002) in a study observed that the Pharmaceuticals have greatly improved health in developing countries, but many people in developing countries do not obtain even inexpensive pharmaceuticals and thus pharmaceuticals research & development (R&D) oriented towards products is needed to be undertaken by developing countries, such as malaria vaccine and access to existing products could be improved by facilitating differential pricing. He suggested that under conditions of rapidly changing demand (as found in pharmaceuticals), price-caps could be manipulated. Morgenson (2011) in a study defined profitability as a measure of the difference between the purchase price and the cost of bringing to market i.e the revenue the company derives from its operations, minus all explicit costs. He emphasized on

profitability denoting sustainability of excess earnings of a venture or from product. According to him it is a reflection of the value consumers get from the product or service, the employees getting fair wages and the company making an expected return on their investment.

In the context of the aspect of profit and profitability a number of studies were found. For instance, Nimalathasan (2009) defined profit as an absolute measure of earning capacity, while profitability is a relative measure of earning capacity. On the other hand, Harvey et al (2012) labeled profitability ratio as a benchmark for evaluating the financial position and performance of a firm. Engel (1996) outlined financial ratios such as Gross Profit Margin, Operating Profit Margin and Net Profit Margin as the main indicators of profitability. Engel (1996) stressed a company's gross margin as a very important measure of profitability, because it looks at the company's major inflows and outflows of money. The Operating Profit margin is the indicator of the company's earning power from its current operations, obtained by dividing Operating Profit by sales. This particular ratio can evaluate a firm's competitiveness. According to Raval (2006)a financial ratio can give a financial analyst an excellent picture of a company's financial situation and the trends that are developing. Profitability of pharmaceutical industries follows the same general definition as profitability of other commercial institutions. As to impact of marketing cost and advertisement cost on sales and profit some studies came to our notice. For example, Pagan (2001) is seen to have conducted a study on the effectiveness of advertising on sales using bivariate Vector Auto Regression model and showed that one time increase in advertising expenditure leads to increase in the sales of orange with a one month lag. Joshi & Hanssens (2010) stated that, there exists a long – term relationship between advertising spending and market capitalization. Dan et al (1984) explained, the effects on profitability that occur when a firm advertises increase significantly when the product is introduced and decreases advertising as the product moves through its life cycle and interpersonal communications take effect. Kamber (2002) found a measurable relationship between advertising expenditure and sales, even after controlling other factors, such as, company size and past sales growth, etc.

The above review divulges that there is some consensus on the economic impact of marketing cost and advertising & promotional costs on sales revenue and operating profit although some studies have shown diverse results. In such a context it is considered worthwhile to examine the situation as to the impact of marketing cost and advertising & promotional costs on sales revenue and operating profit of pharmaceutical industry in Bangladesh.

4.0 Objectives of the Study

The present study has been designed to examine the impact of marketing cost, specially advertisement costs and promotion costs on sales and revenue of pharmaceutical industry in Bangladesh. In such a context the followings were taken as the specific objectives:

a. To identify the elements of marketing costs and the constituents of advertising & promotional costs and to point out the basic difference between these two sets.

b. To evaluate the extent to which the marketing costs and specially the advertising & promotional costs effect on sales revenue and operating profit.

c. To examine the growth pattern and trend of sales revenue and operating profit with marketing – advertising – promotional costs.

5.0 Methodology of the Study

The study is mainly based on secondary data and information. Most of the organizational data and information have been collected from the annual reports of the respective sample companies. Along with this information revealed in case studies, journal articles, books, newspapers, bulletins, reports of Bangladesh Association of Pharmaceutical Industries (BAPI), companies' websites and different government and non-government organizations' websites, etc. have been consulted to collect necessary data for the study. After collection of data, they were tabulated and analyzed.

Simple statistical tools like percentage, regression and correlation have been used to interpret the data and draw inferences there from.

6.0 Scope of the study

The scope of this study is limited to five pharmaceutical companies out of 11 listed pharmaceuticals companies in the country. These five companies which have nation – wide operational area have been selected as sample for this study with the expectation that they will be of representative character. Data for three years were collected which have been analyzed for arriving at conclusions. The data thus collected have been tabulated and explained by the researchers as per need of the analysis. It is to be mentioned that, for three sample companies accounting year is 1st January to 31st December of each financial year. In two sample companies, the accounting year was 1st July to 30th June, which was converted into 1st January to 31st December.

7.0 Marketing Cost: The Conceptual Aspects

A marketing cost is an amount of money the company spends on marketing. Marketing costs are an important consideration for all businesses because marketing is a primary business function that creates a customer for the business. It includes employee costs, agency fees, advertising, digital marketing, direct marketing, publications, sponsorships, seminars, business travel, gifts to clients, etc.

In fact marketing costs are essential for every type of business. Business enterprises invest in marketing to increase marketing orbit, enhance sales revenue and accelerate growth. To ensure that a company spends required amount it is essential to set budget vis – a – vis its elements. It requires proper planning and ensures along with a properly set operating programs together.

As regards elements of marketing cost, the employee costs can be significant if there is an internal marketing department. Businesses houses may employ specialists, such as website managers, marketing communications managers or press officers, in addition to a marketing manager or director. It is further reported that hiring of freelance specialists or contract staff to handle specific projects, such as exhibitions, brochure design, copywriting, provides a lower cost alternative to employing full-time marketing specialists. However, if advertising agencies or public relations consultancies are hired to handle campaigns, this will incur agency fees.

As to advertising and promotion costs, companies with small advertising budgets may plan and manage campaigns internally, rather than using an agency. It requires paying the media owner for the space or time slot with discounts available for booking a series of advertisements or running advertisements in positions or time slots that are less popular. Large companies often resort to agency help and use their expertise, which of course requires large advertising expenditure.

Digital marketing is becoming popular now. Such marketing expenses include the internal or external costs of designing and managing the website together with the ongoing costs of developing and updating site contents.

Companies, especially small ones, significantly emphasizes on direct marketing. Direct marketing by mail or email is a cost-effective way to communicate with customers and prospective customers. One can compile mailing lists from internal sales and customer records or rent a database of prospects from a specialist company. Product leaflets, data sheets, corporate brochures and annual reports form an important part of a company's marketing communications program.

If a company offers seminars, webinars and workshops to the staff or customers, these are marketing expenses. Any travel, refreshments, materials and wages for presenters that to present seminars to potential customers qualify as marketing expenses. When one travels to meet clients or prospective clients, such travel expenses count as marketing expenses. The gifts to clients including promotional coupons are also included in marketing costs to the effort.

Indirect marketing effort can be resorted with social efforts. For example, when a company sponsors a local sporting event, charity fundraiser or a local athlete or artist, this is a marketing expense. The cost of having a logo applied to sportswear, as well as any funding of an event's marketing efforts is included under this head.

8.0 Elements of Marketing Costs:

In the context of study of marketing costs of the sample enterprises, first an attempt was made to identify the elements / items of marketing costs that are spent by the sample firms. In this regard the following items of marketing costs are found to have been incurred by the Pharmaceutical companies in Bangladesh:

Salaries, wages, bonus and welfare &allowances to relevant staff, Sales Deport Rent; Sales Promotion & Business Development; Carriage Outward; Mobile Bill; Postage; Motorcycle Maintenance; TA/DA; Utility; Contributions to retirement benefit scheme; Advertisement and sales promotion; Travelling & training; Physician samples; Professional books; Communications; Conference and seminar; Vehicle running expenses; Depreciation; Office expenses; Insurance; fees, charges and incentive; detailing bag & brief case; product development expenses; product pad & literature; market survey & research; delivery expenses; staff uniform; Telephone, Fax & Telex; Tiffin and Refreshment; Godown Rent; Head office & sales centres rent; Printing& stationery; Repairs & maintenance; building equipment repairs& maintenance; Water, electricity & gas; Filed forces conference expenses; Handling; freight and transport; Entertainment Staff welfare; Licence Fees; Field Staff Salaries, Packing Expenses Export Expenses; Special Discount; Sample Expenses; Security Services; Depreciation of Software; Hardware Support & VSAT; Other expenses, etc.

9.0 Advertisement and Promotion costs: Importance and Constituents

As to marketing the products and enhancing sales, the role of advertising and sale promotion is found to be very significant. It is especially important to face competition, expand market share both for maintaining status and to enlarge the orbit of market share for sustaining and growth.

Advertising is any form of non - personal presentation and promotion of ideas,

goods, or services by an identified sponsor. An advertising objective is a specific communication task to be accomplished with a specific target audience during a specific period of time. Advertisement encompass activities relevant to suggesting new uses for a product, informing the market of a price change, describing available services and support, correcting false impressions, persuading customers to purchase now and to receive a sales call, convincing customers to tell others about the brand, reminding consumers where to buy the product and finally keeping the brand in customer's mind during off – seasons.

In this study, the following heads of advertisement & promotional costs have been segregated from marketing cost which is incurred by the Pharmaceutical companies in Bangladesh:

Printing and stationery expenses, marketing and promotional expenses, advertisement, delivery and packing expenses, special discount, sample expenses, books and periodicals, field force conference expenses, product pad and literature, communications, promotional allowance, physician's sample, Health Care Organization (HCO) support expenses, Health Care Professionals (HCP) expenses, Professional books, Training expenses, etc.

10. Significance of Measurement and Evaluation of Marketing Cost and Advertisement & Promotional Cost

Marketing costs are considered as an expense under a profit and loss statement. But it is also an investment in supporting company's greatest asset concerned with production and brand. As such, it's important to measure the marketing expense against its return on investment. In other words, although marketing costs in fact can be called an expense for accounting purposes, a profitable marketing campaign that returns a net profit should be considered a practical investment and primary driver of immediate sales and revenues. All these requires evaluation of overall costs, it impact vis – a – vis impact of each element of costs towards achieving goals, role in sales revenue earning and overall impact on profit performance and growth of sales. This study makes an attempt towards this end.

11.0 Social impact of marketing cost and Advertisement & Promotional Cost in the context of Pharmaceutical firms in Bangladesh: A fantastic scenario

Consumers of pharmaceutical products hold mixed or even slightly unfavorable attitudes toward marketing practices and costs thereof. Consumers and some other concerned parties many a times accuse some marketing approach as harmful with regard to aggressive sales strategy and window dressing. The costs relevant to this,

some of such costs are accused of increasing the greedy channel intermediary's mark up prices beyond the value of their service. Large pharmaceutical companies have too many intermediaries. Those intermediaries are either inefficient or they advocate for unnecessary or wrong products and services. Such distribution costs are many a times too much and consumers pay for these excessive costs in the form of higher price. Kotler (2010) gave an example about some medicine of pharmaceutical industry, where a pill costing Rs. 0.50 to make may cost the consumer Rs. 2 to Rs. 200 to buy. He asserted that consumers' senses are being constantly assaulted by marketing and advertising. Pharmaceutical firms sometimes undertake serious programs; pages of advertisements in obscure magazines; billboards mar beautiful scenery; spam fills our inboxes. These efforts continually pollute people's minds with message of materialism, power or status. In fact like all other business, pharmaceutical firms need to incur marketing cost specially undertaking advertisement / sales promotion costs. But what is required is to ensure ethics in marketing and sales promotion costs as pharmaceuticals are the enterprises which are engaged in peoples' health care sector. Here humanitarian approach and overall improvement of people's health and hygiene are of utmost important. They have special responsibility which must not be ignored and that along with enterprises, government and concerned agencies have a role to play in this regard.

12.0 Financial Performance of Sample Firms vis-a-vis Marketing Costs and Advertisement and Promotional Costs:

Against the backdrop of the significance of marketing costs, especially advertisement and promotion costs, now an attempt is made below to evaluate performance of sample pharmaceutical firms with reference to marketing costs and sales / promotion costs.

At the set an attempt is made to depict average revenue, profit, marketing costs and advertisement costs of the sample firm. Table 1 below shows the picture:

Table - 1: Status of Financial Performance of Pharmaceutical Industry: context of Revenue and Operating Profit vis – a – vis Marketing and Advertisement Costs.

(Figures in Million Taka)

Companies	Year	Revenue	Marketing Cost*	Advertisement &Promotional Cost*	Operating Profit
GlaxoSmithKline Bangladesh Ltd.	2013	6,775	1,341	1,112	605
	2012	5,554	1,087	876	354
	2011	4,735	756	709	441
	Average	5,688	1,062	899	467
IbnSina Pharmaceuticals Industry Ltd.	2013	2,209	702	66	115
	2012	20,09	634	67	87
	2011	1,755	558	65	79
	Average	1,991	631	66	94
Square Pharmaceuticals Ltd.	2013	19,435	3,046	1,185	4,482
	2012	17,007	2,626	1,061	3,587
	2011	14,763	2,276	964	3,036
	Average	17,068	2,649	1,070	3,702
Central Pharmaceuticals Ltd.	2013	539	43	6	208
	2012	339	33	4	112
	2011	255	26	1	70
	Average	378	34	3.6	130
Pharma Aids Ltd.	2013	112	2	0.6	20
	2012	103	3	0.6	18
	2011	103	2	0.8	23
	Average	106	2	0.7	20

Source: Annual Reports of respective companies.

*Marketing cost means Selling and Distribution Expenses.

**Advertisement and Promotional costs have been segregated from the gross Marketing Cost stated in the reports of the companies.

Against this backdrop of absolute figure as to revenue, profit, marketing and advertising costs an attempt is made to evaluate the picture as to share of marketing and advertising costs to revenue and profit. Table – 2 below exhibits the picture.

Table – 2: Average Revenue, Profit and Share of Marketing Costs and Advertisement and promotional cost thereof of Sample Enterprises:

(Figures in Million Taka)

Sample firms	Revenue	Operating profit	Marketing costs		Advertising and promotional costs	
			To Revenue (%)	To operating profit (%)	To Revenue (%)	To operating profit (%)
Sample 1	5688	467	18.67	227.41	15.80	192.51
Sample 2	1991	94	31.69	671.27	3.31	70.21
Sample 3	17068	3702	15.52	71.56	6.27	28.90
Sample 4	378	130	8.99	26.15	0.95	2.76
Sample 5	106	20	1.89	10.00	.66	3.50

[Source: Annual Reports of sample firms. Computations have been made by author.]

The above table 2 shows that, the percentage of marketing cost of sample 1 of its revenue and operating profit are 18.67 and 227.41 respectively. And it also found that, the percentage of advertisement and promotional costs to its revenue and profit are 15.80 & 192.51 respectively. In case of sample 2, the percentage of marketing cost in terms of revenue and operating profit are 31.69 and 671.27respectively. And it also revealed that, the percentage of advertisement and promotional costs in terms of its revenue and operating profit are 3.31&70.21 respectively. On the other hand, the percentage of marketing cost of sample firm 3 of its revenue and operating profit are 15.52 and 71.56 respectively. Further, it also reveals that, the percentage of advertisement and promotional costs of its revenue and profit are 6.27 & 28.90 respectively. It also found that, the percentage of marketing cost of sample 4 of its revenue and operating profit are 8.99 and 26.15 respectively. And that the percentage of advertisement and promotional costs of its revenue and profit are 0.95 & 2.76 respectively. The table also shows that, the percentage of marketing cost of sample 4 of its revenue and operating profit are 1.89 and 10.00 respectively. And that, the percentage of advertisement and promotional costs of its revenue and profit are 0.66&03.50 respectively. It is revealed from an analysis of the table that, the sample firm 2 incurred more marketing cost in terms of revenue and operating profit than other sample firms and sample firm 1 and sample firm 2 invest a significant amount in marketing in terms of operating profit. The table also reveals that, sample firm 1 invests a significant amount in advertisement and sales promotion in terms of both revenue and operating profit than other sample firms.

Against this backdrop the correlation of marketing costs to revenue taking all the samples together has been evaluated. Table 3 below shows the picture.

Table – 3: Regression and Correlation Analysis of Marketing Cost & Revenue

$\bar{x}$	875.60
$\bar{y}$	5,046.2
Constant of Regression Equation = a	- 609.8258
Slope of Regression Equation = b	6.4596
Regression Equation	y = - 609.8258 + 6.4596x
Coefficient of Correlation = r	0.9899

The above table shows that, the revenue and marketing cost is highly correlated. The relationship between marketing cost and revenue is positively strong. This relationship also implies that, 98.99% of sales revenue is affected by marketing cost and remaining 1.01% is affected by other fact.

In this regard an attempt was made to show what would be position on revenue of companies if they spend same amount of marketing and advertisement costs i. e. impact of marketing costs on revenue. Table 4 below shows the picture.

Table – 4: Estimated Revenue in terms of marketing cost

Companies	Average Marketing Cost (x)	Average Revenue (y)	Estimated Revenue Y = a + bx
GlaxoSmithKline Bangladesh Ltd.	1,062	5,688	6250.2694
Ibn Sina Pharmaceuticals Industry Ltd.	631	1,991	3466.1818
Square Pharmaceuticals Ltd.	2,649	17,068	16,501.6546
Central Pharmaceuticals Ltd.	34	378	- 390.20
Pharma Aids Ltd.	2	106	- 596.91

Evaluation of the Impact of Marketing Cost on Revenue

The above findings (Table 4) as to impact on marketing and sales cost on revenue reveals that marketing costs and revenues are very highly correlated (r = 0.9899). The slope of the regression equation is b = 6.4596. It indicates that, if a company increases Tk. 1 in marketing cost, sales revenue will increase by Tk. 6.4596. As a result, we observed three different scenarios as to natures of dependence of revenue on marketing cost. Firstly, estimated revenues of GlaxoSmithKline Bangladesh Ltd. and Ibn Sina Pharmaceuticals Industry Ltd are largely depended on marketing cost. Because estimated revenue of GlaxoSmithKline Bangladesh Ltd. and Ibn Sina

Pharmaceuticals Industry Ltd will increase by Tk. (6250.2694 - 5,688) = Tk. 562.2694, and Tk. (3466.1818 - 1,991) = Tk. 1475.1818 (in million) respectively. It may positively influence the growth of pharmaceutical industry in Bangladesh. Secondly, estimated revenue of Square Pharmaceuticals Ltd is not largely depended on marketing. It may cause economy of scale of sales and very strong marketing channel. Thirdly, estimated revenues of Central Pharmaceuticals Ltd and Pharma Aids Ltd are negative. In this backdrop a regression analysis was restarted to the findings of regression analysis is shown below.

Table-5: Regression and Correlation Analysis of Marketing Cost & Operating Profit

$\bar{x}$	875.600
$\bar{y}$	882.6000
Constant of Regression Equation = a	- 325.9031
Slope of Regression Equation = b	1.3802
Regression Equation	y =- 325.9031 + 1.3802x
Coefficient of Correlation = r	0.9448

The above table 5 revealed that, marketing cost and operating profit is strongly correlated. The relationship between marketing cost and revenue is high. This relationship also implies that, 94.48% of operating profit is affected by marketing cost and remaining 5.52% is affected by other factor.

In this context a further attempt was made in this regard in table 6 to show what would be the impact on operating profit, if sample enterprises spend same amount of marketing costs.

Table-6: Estimated operating profit in terms of marketing costs

Companies	Average Marketing Cost (x)	Average Operating Profit (y)	Estimated Operating Profit Y = a + bx
GlaxoSmithKline Bangladesh Ltd.	1,062	467	1,139.8693
Ibn Sina Pharmaceuticals Industry Ltd.	631	94	545.0031
Square Pharmaceuticals Ltd.	2,649	3,702	3,330.2467
Central Pharmaceuticals Ltd.	34	130	- 278.9763
Pharma Aids Ltd.	2	20	- 323.1427

Evaluation of the Effect of Marketing Cost on Operating Profit:

It has been revealed in table 6 that the relationship between marketing cost and operating profit is significantly correlated (r = 0.9448). The slope of the regression equation is b = 1.3802. It indicates that, if a company increases Tk. 1 in marketing cost, operating profit will increase by Tk. 1.3802. As a result, three types of dependence of operating profit on marketing cost have been observed among the sample units. Firstly, estimated operating profits of GlaxoSmithKline Bangladesh Ltd. and Ibnsina Pharmaceuticals Industry Ltd are found to largely depend on marketing cost. Because estimated revenues of them may increase by Tk. (1,139.8693 - 467) = Tk. 672.8693, and Tk. (545.0031 - 94) = Tk. 451.0031 (in million) respectively. The estimated change will be 144.08%, and 479.79% respectively. It may be a cause of substantial growth of pharmaceuticals industry in Bangladesh. Secondly, estimated operating profit of Square Pharmaceuticals Ltd is not largely depended on marketing cost. The root causes may be the operation of economy of scale of sales and presence of a very strong marketing channel. Thirdly, estimated operating profit of Central Pharmaceuticals Ltd and Pharma Aids Ltd are known to be negative. The reasonable cause may be newly setup marketing channel and large amount of fixed marketing cost incurred at that time.

Against this backdrop of evaluation of marketing cost with reference to revenue and profit, now an attempt is made to evaluate advertisement and promotion costs in the same angle. In this context table 7 below shows evaluation results thereof.

Table – 7: Regression and Correlation Analysis of advertisement & promotional cost and Revenue

$\bar{x}$	407.86
$\bar{y}$	5,046.2
Constant of Regression Equation = a	257.0670
Slope of Regression Equation = b	11.7421
Regression Equation	y = 257.0670 + 11.7421 x
Coefficient of Correlation = r	0.8632

The above table 7 reveals that, advertisement & promotional cost and revenue is strongly correlated (r = 0.8632). The relationship between advertisement & promotional cost and revenue is high. This relationship also implies that, 86.32% of revenue is affected by advertisement & promotional cost and remaining 13.68% is affected by other factor.

Against this backdrop an attempt is made in table 8 below to evaluate the impact of advertisement and promotional cost of revenue keeping the cost as it is.

Table – 8: Schedule showing the estimated sales revenue if the selected five companies incurred the same amount on Advertisement & Promotion in the subsequent year:

Companies	Average Advertisement and Promotional Cost (x)	Average Revenue (y)	Estimated Revenue $Y = a + bx$
GlaxoSmithKline Bangladesh Ltd.	899	5,688	10,813.2149
Ibn Sina Pharmaceuticals Industry Ltd.	66	1,991	1,032.0456
Square Pharmaceuticals Ltd.	1,070	17,068	12,821.1140
Central Pharmaceuticals Ltd.	3.6	378	299.3386
Pharma Aids Ltd.	0.7	106	265.2865

Influence of Advertisement and Promotional Cost on Revenue

The above table 8 reveals that, the relationship between advertisement & promotional cost and revenues is strongly correlated (r = 0.8632). The slope of the regression equation is b = 11.7421. It indicates that, if a company increases in Tk. 1 in advertisement & promotional cost, the sales revenue will increase by Tk. 11.7421. As a result, three types of dependence of revenue on advertisement & promotional cost are observed. Firstly, estimated revenue of GlaxoSmithKline Bangladesh Ltd is largely depended on advertisement & promotional costs. Because estimated revenue of GlaxoSmithKline Bangladesh Ltd. will increase by Tk. (10,813.2149 - 5,688) = Tk. 5,125.2149 (in million) as a direct influence of this cost. It is also seen that, this change will occur by 90.105%. Secondly, estimated revenues of Ibn Sina Pharmaceuticals Industry Ltd and Square Pharmaceuticals Ltd are not largely depended on advertisement & promotional cost. Basically, advertisement of pharmaceuticals industry is not found in the electronic and print media. Its advertisement basically depends on frequent visits of sales representatives to the hospitals, clinics and practicing doctors. Thirdly, estimated revenue of Central Pharmaceuticals Ltd and Pharma Aids Ltd are observed to be negative. Newly setup cost of advertisement & promotional channels and fixed advertisement & promotional cost incurred at the moment are known to be the principal causes for this situation.

In this connection a regression analysis was resorted to. Table 9 shows the picture.

Table – 9: Regression and Correlation Analysis of advertisement & promotional cost and Operating Profit

$\bar{x}$	407.8600
$\bar{y}$	882.6000
Constant of Regression Equation = a	- 54.9886
Slope of Regression Equation = b	2.2988
Regression Equation	y = - 54.9886 + 2.2988x
Coefficient of Correlation = r	0.7692

It is found from the above table 9 that advertisement & promotional cost and operating profit is strongly correlated (r = 0.7692). The relationship between advertisement & promotional cost and operating profit is high. This relationship also implies that, 76.92% of operating profit is affected by advertisement & promotional cost and remaining 23.08% is affected by other factor.

In this context, an attempt was made to evaluate estimated operating profit of sample firms on advertisement and promotional costs in same level with reference to five selected samples. Table 10 below shows the picture.

Table – 10: Schedule showing the estimated Operating Profit if the selected five companies incurred the same amount on Advertisement & Promotional cost in the subsequent year:

Companies	Average Advertisement and Promotional Cost (x)	Average Operating Profit (y)	Estimated Operating Profit Y = a + bx
GlaxoSmithKline Bangladesh Ltd.	8,99	467	2011.6326
Ibn Sina Pharmaceuticals Industry Ltd.	66	94	96.7322
Square Pharmaceuticals Ltd.	1,070	3,702	2,404.7274
Central Pharmaceuticals Ltd.	3.6	130	- 46.7192
Pharma Aids Ltd.	0.7	20	- 53.3794

Influence of Advertisement and Promotional Cost relating to Operating Profit:

It is revealed from the table 10 that the relationship between advertisement & promotional cost and operating profit is moderately correlated (r = 0.7692).which is less than such coefficient of correlation as found in case of marketing cost. The slope of the regression equation is, b = 2.2988. It indicates that, if a company increases Tk. 1 in advertisement & promotional cost, operating profit will increase by Tk. 2.2988. As a result, four types of dependence of operating profit on advertisement & promotional cost have been observed. Firstly, estimated operating profit of GlaxoSmithKline Bangladesh Ltd. is largely depended on advertisement & promotional cost. Because estimated operating profit of GlaxoSmithKline Bangladesh Ltd. will increase by Tk. (2,011.6326 - 467) = Tk. 1,544.6326 (in million). It is also seen that, the change will occur by 330.75%. Secondly, estimated operating profit of Ibnsina Pharmaceuticals Industry Ltd is insignificantly depended on advertisement & promotional cost. The estimated operating profit of Ibn Sina Pharmaceuticals Industry Ltd will increase by Tk. (96.7322 - 94) = Tk. 2.7322 (in million). It is also seen that change will occur by only 2.91 %. Thirdly, estimated operating profit of Square Pharmaceuticals Ltd is not largely depended on advertisement & promotional cost. The basic cause of this is the presence of large distribution channel. As a result, it regularly incurred huge fixed cost. Fourthly, estimated operating profits of Central Pharmaceuticals Ltd and Pharma Aids Ltd are known to be negative. It may be due to newly setup marketing channel and fixed advertisement & promotional cost incurred at that time.

It is admitted on all hands that sales volume and revenue of any enterprise are dependent on the combined efforts of a bundle of factors. This statistical measure of co – efficient of correlation (r = 0.9899) may contribute to promotion of sales and revenue of these pharmaceutical companies up to 98% to the maximum. Similar observations are realistic about other 3 co – efficient of correlation between (i) marketing cost and operating profit (r = 0.9448) (ii) advertisement & promotional cost and revenue (r = 0.8632), (iii) advertisement & promotional cost and operating profit (r = 0.7692).

13.0 Evaluation of the Findings

In this study, the relationship between marketing cost and revenue and marketing cost and operating profit are found to be very high, which are 0.9899 and 0.9448 respectively. The relationship between advertisement & promotional cost and revenue and advertisement and promotional cost and operating profit are also found very high, which are 0.8632 and 0.7692 respectively.

The dependence of sales revenues and operating profit of pharmaceuticals industry on marketing cost is represented by b = 6.4596 and b = 1.3802 respectively. It means that, if pharmaceuticals companies spend additional one taka on marketing cost, the company will generate revenue of Tk. 6.4596 and operating profit of Tk. 1.3802 respectively.

And dependence of sales revenues and operating profit of pharmaceuticals industry on advertisement and promotional cost are shown by b = 11.7421, b = 2.2988 respectively. It also means that, if pharmaceuticals companies incur additional one taka on advertisement& promotional cost, they will generate revenue of Tk. 11.7421 and operating profit of Tk. 2.2988 respectively.

Upon verification of the above data it was seen that, pharmaceuticals companies generate more revenue and operating profit through spending on advertisement & promotional cost. Because, the positive change in revenue on advertisement & promotional cost (11.7421) is greater than revenue on marketing cost (6.4596). This change (5.2825) in revenue can be attributable significantly to advertisement & promotional cost as its role is greater than that of marketing cost. And the change in operating profit due to advertisement and promotional cost (2.2988) is greater than operating profit on marketing cost (1.3802). This change (0.9186) in operating profit is attributable significantly to advertisement & promotional cost whose contribution is greater than that of marketing cost.

14.0 Conclusion

The marketing costs, which are incurred for persuasive communication that attempts to change or reinforce ones' prior attitude and are basically done not only to inform customers about products, rather than as a process to ease the availability of products, enhancing further to influence and persuades customers to purchase the product. All such related costs are called marketing costs and advertisement & promotional costs. The study is based on secondary data collected with reference to the marketing costs and advertisement & promotional costs and sales revenue and operating profit of 5 listed large and nation – wide marketing operational pharmaceuticals companies working in Bangladesh. The data and related information have been collected from annual reports and available other related information as available in their respective websites of pharmaceuticals companies. From the evaluation of the findings of the study, it is seen that, if the pharmaceutical industry incurs Tk. 1 more on marketing cost it may generate Tk. 6.4596 more of revenue and Tk. 1.3802 more of operating profit. And if the pharmaceutical industry incurs Tk. 1 more on advertisement & promotional cost, it may generate Tk. 11.7421

more of revenue and Tk. 2.2988 more of operating profit. It is also ascertained that, the pharmaceutical companies will be benefited by incurring Tk. 1 in advertisement & promotional cost than in marketing cost by Tk. 5.2825 in revenue and Tk. 0.9186 in operating profit. Through this process the Pharmaceutical industry has greatly improved their operation and strength in Bangladesh and such scope remain much for future. But the crux of the problem is that though it has favorable scenario, the interest of consumer is found neglected. Many people of Bangladesh cannot reach even some inexpensive pharmaceuticals and products of companies for comparatively high price, flaws relevant to little R&D facilities and distribution along with cost efficiency. Access to existing products could be improved by cost reduction along with facilitating differential pricing. It is even found that under conditions of rapidly changing demand in pharmaceuticals products, price-caps could be manipulated by using simulations. For example – a few dozen tablets of a heavily promoted brand of pain reliever sell for the same price as 100 tablets of less – promoted brand. It usually occurs for rural less educated consumers. Some educated rural consumers also face medicine problem due to lack of availability of required medicine. Sales representative of pharmaceuticals companies are reported under pressure from companies for enhancing sale through persuading people or doctors to buy or prescribe the medicine through different unethical means. Poor and disadvantaged rural consumers are also need to pay more prices for medicine due to long marketing distribution channel and some unnecessary distribution costs. In the context of public interest and social responsibility consideration specifically the pharmaceutical companies need to consider the purchasing power of lower – income consumer at the time of pricing. This warrant attempts and cut off and reduces some unnecessary advertisement & promotional cost such as physician sample, gift to doctor & clinic, etc.

References

A. **Reports:**

1. Annual Report of GlaxoSmithKline Bangladesh Ltd.(2014). Annual Report 2013. Retrieved www. Gsk.com.bd
2. Annual Report of GlaxoSmithKline Bangladesh Ltd. (2013).Annual Report 2012. Retrieved from www. Gsk.com.bd
3. Annual Report of IbnSina Pharmaceuticals Industry Ltd. (2014).Annual Report 2013. Retrieved from www. Ibnsinapharma.com
4. Annual Report of IbnSina Pharmaceuticals Industry Ltd. (2013).Annual Report

2012. Retrieved from www. Ibnsinapharma.com

5. Annual Report of Pharma Aids Ltd.(2014).Annual Report 2013 - 2014.Retrieved from www. pharmaaids.com
6. Annual Report of Pharma Aids Ltd.(2013).Annual Report 2012 - 2013.Retrieved from www. pharmaaids.com
7. Annual Report of Pharma Aids Ltd.(2012).Annual Report 2011 - 2012.Retrieved from www. pharmaaids.com
8. Annual Report of Square Pharmaceuticals Ltd. (2014).Annual Report 2013 - 2014. Retrieved from www. squarepharma.com.bd
9. Annual Report of Square Pharmaceuticals Ltd. (2013).Annual Report 2012 - 2013. Retrieved from www. squarepharma.com.bd
10. Annual Report of Square Pharmaceuticals Ltd. (2012).Annual Report 2011 - 2012. Retrieved from www. squarepharma.com.bd
11. Auditor's Report of Central Pharmaceuticals Ltd. (2014). Auditor's Report 2013 - 2014. Retrieved from www. cerntralphl.com
12. Auditor's Report of Central Pharmaceuticals Ltd. (2013). Auditor's Report 2012 - 2013. Retrieved from www. cerntralphl.com
13. Auditor's Report of Central Pharmaceuticals Ltd. (2012). Auditor's Report 2011 - 2012. Retrieved from www. cerntralphl.com

B. Books and Journals:

1. Dan H., Leonard S. S. (1984).Advertising and the Diffusion of New Products. Journal of Marketing Science(2).pp.- 1-17.
2. Elliot, C. (2001)."A Cointegration Analysis of Advertisement and Sales Data". Review of Industrial Organization. Vol. 18.pp.417-26.
3. Harvey, Mary, Innocent, Matthew (2012).Financial Ratio Analysis as a Determinant of Profitability in Nigerian Pharmaceutical Industry. Canadian Centre of Science and Education.
4. Engel, P. (1996).Budgeting and Finance (First Books for Business).McGraw-Hill.
5. Joshi A., Hanssens D.M. (2010). The Direct and Indirect Effects of Advertising Spending on Firm Value.Journal of Marketing.Vol. 74, pp. 20 – 32.

6. Kamber , T. (2002). "The Brand Managers Dilemma: Understanding How Advertising Expenditures Affect Sales growth during the recession". The Journal of Brand Management.Vol.10 (2).pp.106-120.

7. Kotler P., Armstrong G., Agnihotri P.Y., Haque E. U. (Edition 13). (2010). Principles of Marketing.P. 365. pp. 494 – 501.

8. Kremer M. (2002). "Pharmaceuticals and the Developing World" American EconomicAssociation. The Journal of Economic Perspectives. 16. Number 4. pp. 67- 90(24)

9. Morgenson, C. R. (2011).Dictionary of Money and Investing. The New York Times.

10. Nimalathasan, B. (2009).Profitability of Listed Pharmaceutical Companies in Bangladesh: an Inter and Intra Comparison of AMBEE and Ibn Sina Companies Ltd.

11. Pagan J., Sethi, S. and Soydemir, G.A. (2001). "The Impact of Promotion/Advertising Expenditures on Citrus Sales". Applied Economic Letters, Vol.8 (10), pp.659-63.

12. Raval, D. S. (2006). Analysis of Profitability in Pharmaceutical Industry. Saurastra University.

13. Scott B. M., Richard J. L. (1989). An Empirical Examination of the Structural Antecedents of Attitude-towards-the-Ad in an Advertising Pretesting Context. Journal of Marketing (53). PP. 48-65.

14. Shawon S. A. (2011). Research Report: Pharmaceuticals Industry of Bangladesh. IDLC Finance Limited.

15. Verdon, Walter A., Campell, McConeell R., Theodore, Roester W. (1968). "Advertising Expenditures as an Economic Stabilizer: 1945-64".Quarterly Review of Economics and Business. (spring). pp. 7-18.

Empowering students in EFL classroom: Literature Circle Approach

Mosammat Sabera Begum *

Abstract

This paper focuses on the definition and framework of Literature Circle by Harvey Daniels (1994) while concentrating on incorporating literature circles in EFL curricula. Literature Circle is one of the best methods to empower students of different skill levels in the same EFL class which at the same time promotes the development of oral, reading, listening, and writing skills. This research is intended to investigate the student-to-student interactions and classroom discourse which took place during Literature Circle discussions. The main concern of the research is on how different variables could affect the language development of EFL learners. The results showed that during the process, the students were highly motivated for reading which ultimately improved their interactive skills in English. The two important themes of Literature Circle are cooperative learning and collaborative work which would offer the potential to promote reading for enjoyment as well.

Key Words: EFL, Empower students, Literature Circle, Collaborative language learning, Classroom interaction, Literature Circle in EFL curricula.

BGC Trust University Journal
Vol. 03, December, 2016, pp. 111 - 124
© BGC Trust University Bangladesh
ISSN : 2073- 5448

* *Lecturer in English, Jalalabad College, Subhanighat, Sylhet*

Introduction

A challenge faced by all second language teachers is how to engage a class of students with a range of skill levels in an interactive learning activity that builds skills of speaking, listening, reading and writing. EFL students who learn English as a major study subject are not very familiar with critical ways of reading, questioning and analyzing texts. They are not accustomed to learning globally since the traditional education system places the highest premium on memorizing linguistic aspects of English which mostly focuses on grammar, vocabulary and reading comprehension. In this study, the term 'Literature Circle' in the EFL classroom refers to small groups of students-five or six in each group-reading same piece of literature to accomplish different tasks like preparing questions, finding vocabulary, identifying cultural items, determining some significant parts or making connections with real life or society. The members of the groups later share their thoughts and ideas with other members. Thus, according to DaLie (2001), the true intent of Literature Circle is to allow the students to practise and develop the skills and strategies of good readers. Mark Furr (2004) asserts in his research that Literature Circle works as magic to transform the students from passive, rather shy, reticent learners into eloquent ones who participate actively in group discussion and refer to the text in order to support their arguments and they do that in English. For the EFL learners reading aloud, discussing and responding to text will provide them the opportunities to practise the target language in a practical sense. The study of literature in the target language is the best approach to a total mastery of the language. Thus, this paper proposes incorporating Literature Circle in EFL curricula by introducing the framework of literature circles for EFL settings.

Background and Aims:

It is essential to understand the historical background of any issue while pursuing an in-depth research on the topic. Literature Circle has been a popular method of learning in US elementary and secondary L1 classroom. At first, about fifteen years ago, Harvey Daniels (2002), with a group of teachers and researchers began to document their uses of Literature Circle and decided to experiment with bringing the old tradition of 'book club' or 'reading group' into elementary and secondary classes. These researchers found that while an adult had been enjoying both reading and discussing books for years, the students when asked to read or study literature in a traditional setting, all the enjoyment, excitement and passion which were found in the adult reading group were gone. Fortunately, Daniels et al. (2002) group was helped by Oprah Winfrey later, as she hosted them in her show and simultaneously made literature popular in the US.

From several researches it is revealed that to most of the English language learners, reading is boring and difficult. Students do not find any interest in reading, especially when it is written in English. The main aim of Literature Circle is to make reading as well as three other skills in language learning easier and more enjoyable. Literature Circle is small groups of students who read specific section of a book or a piece of literature and perform the tasks according to the different roles of Literature Circle. The roles also keep rotating after each session. To help the students running the discussion smoothly in group, some role sheets are offered to the students. During the discussion, the students share their ideas, thoughts, exchange views and ideas with others about the text they have read. Literature Circle is the best example of collaborative learning and students-directed learning where the teacher works as a mere facilitator in the classroom. Wendy C. Kasten (1995) believes that Literature Circle promotes peer discussions, negotiation of ideas, and the expression of comprehension, which is the most common feature in Literature Circle. Literature Circle stimulates the social interaction among language learners and develop collaborative learning in the EFL classroom.

What is Literature Circle:

According to Harvey Daniels (2002), "Literature circles are small, temporary discussion groups who have chosen to read the same story, poem, article or book". Literature Circle provides a way for students to engage in critical thinking and reflection as they read, discuss and respond to books.

The ability to read and write is the key to success in learning and in academic performance of the students. Irrespective of subjects or topics, students' ability to read and articulate their thoughts are the end goal of all teachers. Due to the fact that students at various reading levels and with various interests can be grouped together for this activity, Literature Circle can be especially useful in inclusionary classrooms. Duncan (2012) also refers to literature circles as: reading circles, literature response groups, literacy circles, literature study circles, peer-led literature groups and book clubs.

Literature Circle is fun, based on student-centered classroom where students gather in a circle to collaboratively discuss what they have read and get insightful ideas. Mark Furr (2004) believes that literature circles are not only fun for the students but in some ways they work as magic! Literature Circle actually has the power to transform EFL students from reluctant, shy and reticent students into the students who deliberately speak up to support any argument or to express their opinion and they share that in English. As participating in groups naturally combine the skills of

reading, writing, speaking and listening, Literature Circle fulfills all these four essential criteria of language learning. Most importantly students find their voices in groups and they actively share their thoughts. According to Duncan (2012), "Students get an opportunity to choose the way they share their learning with others."

Here is a general understanding of Literature Circle, where it is clearly seen that the easiest way to understand what literature circles are is to examine what they are not.

Literature Circles are…..	**Literature Circles are not…..**
Reader response centered	Teacher and text centered
Groups formed by book choice	Teacher-assigned groups formed solely by ability
Structured for student independence, responsibility and ownership	Unstructured, uncontrolled "talk time" without accountability
Part of a balanced literacy program	The entire reading curriculum
Guided primarily by student insights and questions	Guided primarily by teacher or curriculum based questions
Intended as a context in which to apply reading and writing skills	Intended as a place to do skills work
Flexible and fluid: never look the same twice	Tied to a prescriptive "recipe"

From Getting started with Literature Circles by Katherine L. Schlick Noe & Nancy J. Johnson

Copyright:1999 Christopher-Gordon Publishers .Inc.

Framework of Literature Circle:

Harvey Daniels (2002) lists the eleven key ingredients for Literature Circle in his "Literature circles: Voice and Choice in Book Clubs and Reading Groups" which are necessary for implementing Literature Circle in EFL classroom. The lists of the key ingredients are as follows:

Literature Circle forms small, student reading groups which will contain most of the following features:

1. Students choose their own materials.
2. Small temporary groups are formed, based on book choice.
3. Different groups read different books.

4. When books are finished, readers share their views and opinions with their classmates, and then form new groups around new reading.
5. Groups meet on a regular, predictable schedule to discuss their reading.
6. Students use written or drawn notes to guide both their reading and their discussion.
7. Discussion topics come from the students.
8. Group meetings aim to be open, natural conversations about books, so personal connections, digressions and open-ended questions are welcomed.
9. The teacher serves as a facilitator, not a group member or instructor.
10. Evaluation is made by teacher's observation and students' self evaluation.
11. A spirit of playfulness and fun pervades a classroom.

To conduct successful Literature Circle in the EFL classroom, Mark Furr (2004) has replaced the first four of Daniels' Key Ingredients with the following:

1. Instructor selects materials appropriate for their student population.
2. Small temporary groups are formed, based on student choice or the instructor's discretion.
3. Different groups are usually reading the text.
4. When books are finished, readers may prepare a group project and/ or the instructor may provide additional information to "fill in some of the gaps" in student understanding- he/she describes this step back loading the instruction. After the group projects or additional instruction, new groups are formed, based on students' choice or the instructor's discretion.

While implementing Literature Circle in EFL class, as a teacher I have also found these changed suggestions more effective than Daniels' list. According to Mark Furr et al. (2004), most of the changes he has made from Daniels' model of Literature Circle concerns the instructor's need to select texts at an appropriate level for the students and to set a pace that is appropriate for EFL students. While Daniels (2002) insists that "students choose their own materials" and read at their own pace, EFL students need more guidance, not only with choosing text that is not overly difficult but they also need guidance in choosing materials based on their ability to use for discussion in English.

Why use Literature Circle:

First of all, literature circles are fun and students find it very enjoyable. Since it is not focused on lecture, students can interact with each other and can attain a deeper mastery over the material.

Secondly, Literature Circle can provide an exciting way to promote student engagement in extensive reading throughout a foreign language course, which is based on cooperative study and collaborative learning. It also offers the potential to promote reading for enjoyment. Kasten (1995) thinks that the practical outcomes of Literature Circle are that they promote peer discussions, negotiations for ideas and expression of comprehension which features are most common in Literature Circle.

Thirdly, Duncan (2012) believes that Literature circles can be used to reinforce listening, speaking, reading and writing skills in a supportive and collaborative setting. According to Aguerre (2006), literature circles encourage students to deepen their understanding of a chosen text as students are encouraged to discuss plots, specific language used and personal experiences and their relation to the text.

Fourthly, literature circles are powerful experiences for reluctant or struggling students. Grouping students together heterogeneously allows students with difficulties to learn from their peers. Learning is effected not only from the ideas that are shared but also from the literacy strategies that these students use through all of their stages of learning.

Finally, literature circles become a more valuable learning experience for students when they are fully student led since it empowers students in their learning and provides them with some autonomy in the classroom. As Aguerre (2006) said that this type of learning opportunity allows students to feel empowered and supported by their peers, particularly when they are assigned a specific role to play (which are outlined below) in the Literature Circle.

Different role sheets used in Literature Circle:

Literature circles are small reading groups of students who come together to read, discuss and analyze a piece of literature and divides the tasks among themselves in each group. These groups should be student-directed but at the same time the teacher needs to provide some tools in order to have fun and interesting and organized discussions. There are five basic roles for EFL students but the teacher has the options to incorporate more or to create new ones according to the skill levels of the students. These roles are known as role sheets. After each session, the

students would switch the roles so that by the end of literature circles unit, every student will have the chance to participate in each role.

The first role is called, the Discussion Director, whose job is to develop a list of questionnaires that the group might want to discuss about the text. Discussion director initiates the discussion and acts as a facilitator to keep the discussion in order. He/she opens the discussion with a few open- ended questions related to the text and then calls the other group members to share their findings or thoughts with the group. Therefore, it might be better to select an outgoing student as a leader for the first session so that the group may functions smoothly. The writer did follow this idea and it worked well for the easy transition to next meeting. Discussion director is also responsible for ensuring that all members participate in the discussion actively to speak, ask and to share their opinions.

The second role of Literature circle is Summarizer. It is suggested by many teachers that the summarizer should present the summary early in the discussion to remind everyone of the plot of the story. The summary should be a brief but complete and meaningful summary of the plot. It should be emphasized that the summarizer has to read the summary for not more than couple of minutes as he/she has to retell the story in his/her own words choosing only the most significant events in the text. The summary should not be copied from the narrative. If asked, the summarizer could repeat the summary to help others for the purpose of a better understanding of the plot. The nice thing about being a summarizer is that it makes the learner to read the story or the text a number of times in order to pick out the most important points to share with the group members.

The next role is Connector, the most interesting role, who has to find connections between the text and the world outside. This means connecting the reading to his/her own life, to happenings at school or in the community, to similar events at other times and places, to other people or problems that the connector is reminded of. The connector might perceive connections between the book and other writings on the same topic or by the same writer. So, the students not only get connected with the story, rather they become connected with each other in a very pleasant way. Thus, there is no right answers here- whatever the reading connects the reader is worth sharing! Of all roles, the role of the connector becomes the most personal in its focus.

The fourth role is called Vocabulary Enricher who has to look out for a few especially important words that are puzzling or unfamiliar and mark them in course of reading. Later he/she has to jot down their definitions, either from a dictionary or some other

sources and then share them with the other members of the group. They might also ask the questions such as, "What do you think___means in this situation?" The vocabulary enricher is not confined to defining new words but can also share the familiar words that stand out somehow in the reading.

Finally, there is the role of an Illustrator. The job of an Illustrator is to draw some kind of picture related to the reading. It can be a sketch, cartoon, diagram, or flow chart. He can draw a picture of something that is discussed specifically in the assigned book or something that the reading reminded him of or a picture that conveys any idea or feeling he got from the reading. By playing this role, sometimes the teacher might discover an artist among the students.

There are some more roles a teacher could implement in his/her class on the basis of grade levels and skills of the student. Such as, Literary Luminary, Travel Tracer, Questioner, Word Wizard, Passage Person and so on.

Above all, it is mandatory that the students finish their assigned reading prior to the discussion session to become well prepared for their particular role for the next class.

The facilitator can clarify the roles of Literature Circle using the hand out below:

Discussion Director	**Summarizer**	**Connector**	**Illustrator**	**Vocabulary Enricher**
Your job is to write down some questions that you think your group would want to talk about Record different question with: why? who? when? where? how? what if?	Your job is to read the whole text carefully and remind others about the plot. Also you can point out the main ideas of the text.	Your job is to find and record connections between the Book and the outside world. This means connecting the reading to: - Your own life - Other stories - Other people - Similar events at other times and places	Your job is to draw some kind of picture about the story that engaged you: · A character · The setting · An event · A surprise · A problem ·A prediction of what will happen next.	Your job is to look for special or unknown words in the text. Words that are: ·New/Different · Strange · Funny · Interesting · Important Find and record what the word means.

Source: Rogers & Leochko, (2002)

Methodology used in EFL Classroom:

This study is an empirical research on EFL classes which was undertaken as a study of the relation between student interaction and foreign language acquisition, to obtain results and to explore how literature circles facilitate foreign language acquisition through the stimulation of student interaction in EFL classes.

The research was conducted on students from two different age groups. First groups of students consist of 25 students of sixteen year old teenagers from grade eleven at a private high school in Sylhet, Bangladesh. Second groups of students were from different age ranges which were a group of 21 students of 18-22 years old young adults from a language learning institution in Bangladesh. Second groups of students were also preparing themselves for the standardized language tests such as IELTS, TOEFL and Life Skill examination.

This study entailed an in-depth analysis of EFL students in Literature Circle process. At the beginning of the session, the facilitator delivered some mini lessons of 10-15minutes which also demonstrated a quick version of Daniels' (1994) Literature Circle rules, different roles and Henry's (1995) reading strategies. Besides, Probst (1992) states that, setting the classroom is also important for the role of a teacher as a facilitator so that the classroom can build a cooperative rather than a competitive ambience.

First, each student in both groups was given a same story and a role sheet. Then after the mini lesson session they started working in Literature Circle groups while the teacher walked around the room listening to the group discussion. Throughout the session, it was evident that the students were enjoying the discussion by engaging deeply with the topic where the provided role sheets worked as stimulator. That is the magic of Literature Circle, the role sheets actually break the reading into smaller sections and empower students to focus closely on that assigned responsibility.

Although according to Nunan (1992), formal experiments are widely used to collect evidence on language learning and use, they are comparatively rare in genuine classrooms which have been constituted for teaching purposes, not for the purpose of data collection.

This research was intended to observe the interaction among students in EFL classrooms during the discussions in literature circles, which, Lemke (1985) thinks, involve the social use of language to enact regular activity structures and to share systems of meaning among the teachers and students. For this reason, a flexible

qualitative method, allowing greater adaptation of interaction between the researcher and the participants, was considered to be the best method for class observation which was followed by a semi-structured interviewing among such a small group of participants. By doing so the researcher would be able to ask more open-ended questions when necessary and the participants would be free to respond in their own words.

Thus, the methodology of the research was based on action research and qualitative reasoning, which in turn involves the study of the results derived from the semi-structured interviewing, whose groundwork is done according to the issues raised by the stimulated-recall sessions following the classroom observations on student interaction.

Limitations and Recommendations:

There are some drawbacks in implementing anything for the first time. There might be some lack of order and systematic performance as most often the first session might not go well or go slowly. But the teacher should not feel disappointed. There might be complexity to form the groups but after a mini lesson or after two or three sessions, literature circles move on smoothly. The main focus should be making the students understand this method clearly so that they can become their own teachers and can run the discussion by themselves. Literature Circle begins with mini lessons on how to participate in a discussion group and students were given role sheets to assist them in taking roles. With the evolving of group discussion, the role sheets should eventually be used only for redirecting the students if they lose the track. So, according to Daniels (1994), the main purpose of role sheets is to make the role sheets obsolete.

Assessment and Evaluation of Literature Circle:

Students' assessments can be done in several ways in literature circle method. For example,

- **Self assessment:** Students get involved in monitoring and recording their own level of response and engagement with the text.
- **Peer assessment:** Students can be empowered to assess their fellow group members performance.
- **Observations:** On-going teacher observation and active participation is group discussion is critical in assessing the progress of students both individually and in whole group.

- **Conferences:** Face-to-face conversation between teacher and student is also effective to assess student.
- **Portfolios:** Collection of student products can be assembled in a meaningful fashion so that it could be utilized for reflection, discussion and response to the text.
- **Student Artifacts:** Role sheets, response logs and other process material collected from the students during literature circle meetings can also be evaluated providing what Daniels (1994) states as "a rich source of insight" for the teachers to assess the students.
- The teacher can use Rubrics to assess the students more accurately. The following Rubrics can be used by the facilitator and peers for reviewing the outcome of literature circle:

Rubrics for Literature Circle

Skills	Group members					Points
	Jim	Sam	Rim	Zen	Tom	
Support and friendliness						
Cites passages						
Came prepared						
Start discussions						
Follow-up questions						
Encouragement						
Participation/sharing opinions						

Knowledge and Skills	Pre-level	Understood to some extend	Understood and used the strategy
Relevant to topic	Limited relevance	Relevance	Highly relevant
Personal connection	Relies on ideas and words of others	Evidence of personal connection	Strong personal connection
Collaborative work	Rarely works with group to contribute to success of group discussion	Works with group to contribute to success of group discussion	To a high degree works collaboratively with others to ensure success of the group discussion

Expression of ideas	Rarely expresses opinions and ideas confidently in groups	Expresses opinions and ideas confidently in groups	Consistently expresses opinions and ideas confidently in groups
Responding, listening, and contributing to discussions	Rarely responds, listens, or contributes in group situations	Responds, listens, or contributes in group situations	Consistently responds, listens, or contributes in group situations

Webpage Source: http://eworkshop.on.ca/edu/pdf/Mod37_lit_circles_rubric.pdf

© Queen's Printer for Ontario, 2006

Conclusion:

Although Literature Circle is quite a fresh idea in EFL teaching in Bangladesh, the methods of using literature circles to practise foreign language show encouraging results for both teenagers and young adults and prove more efficient compared to other conventional techniques in EFL classrooms. Literature Circle provides more specific guidance and direction for EFL learners to approach literature by rotating the discussion roles which also stimulates the social interaction among language learners. It is such a pleasure for the teachers to watch the students explaining, arguing, questioning, suggesting and to note points to support their ideas while conducting literature circles in the class. As the first and foremost goal of implementing Literature Circle was to make the reading and learning more enjoyable to the students, the outcome is encouraging. Literature Circle motivates the students to read more and write copiously for the group discussion and using English in conversation. Moreover, Literature Circle provides a way for the students to engage in critical thinking and reflection as they read, discuss and respond to books. Literature Circle enables students to discuss how their relationship represents the main character. They compare conflicts, give advice and share their own thoughts. That is a genuine interaction among students. Finally, teaching is not only about making the student learn, it is all about empowering the students to become inquisitive and to strive more for knowledge. Thus, using Literature Circle is an excellent strategy to make that happen.

References

- Aguerre, E. S. (2006). *Classroom literature circles for primary grades: grades K-2.* Greensboro, NC: Carson Dellalosa.

- Bedel, O. (2011). *Literature Circles in EFL: How they stimulate the social interaction.*
- Carter, R. & Long, M. N. 1991. *Teaching Literature.* New York: Longman
- DaLie, S. O. (2001). *Students Becoming Real Readers: Literature Circles in High School English Classes.* In B. O. Ericson, Teaching reading in high school English classes (pp. 84-100). Urbana: NCTE.
- Daniels. H. (1994). *Literature circle: Voice and Choice in the student-centered Classroom*. Pembroke publishers
- Daniels, H. (2002). *Literature Circles: Voice and Choice in Book Clubs and Reading Groups* (2nd Edition ed.). Portland, Maine: Stenhouse.
- Daniels, H. (2006). *What's the Next Big Thing with Literature Circles? Voices from the Middle,* 13(4), 10-15.
- Duncan, S. (2012). *Reading circles, novels and adult reading development*. London; New York: Continuum
- Furr, M. (2004). *Literature Circles for the EFL Classroom*. 2003 TESOL Arabia Conference Proceedings. Dubai: UAE.
- Furr, M. (2009). *Bookworms Club Reading Circles.* Oxford: OUP.
- Henry, J. (1995). *If not now: developmental readers in the college classroom*. Portsmouth, NH: Boynton-Cook
- Hsu, Jeng-yih Tim (2004) *Reading without teachers: Literature circles in an EFL classroom*. Cross-strait Conference on English Education. Chiayi, Taiwan.
- https://en.wikipedia.org/wiki/Literature_Circles_in_EFL. Accessed on August 19, 2016
- http://eworkshop.on.ca/edu/pdf/Mod37_lit_circles_rubric.pdf. Queen's Printer for Ontario, 2006. Accessed on March 13, 2016.
- Kasten, W. (1995). *Literature Circles for the Teaching of Literature-Based Reading.* In M. Radencich, & L. McKay, *Flexible Grouping for Literacy in the Elementary Grades* (pp. 66-80). Needham Heights, MA: Allyn and Bacon.
- Kim, H.-R. (2000). *Literature Circles in EFL Curricula - Establishing a Framework*. Gyeongsan: Kyungil University.
- Lemke, J. L. (1985). Using Language in the Classroom. Geelong, Australia: Deaking University Press

- Nunan, D. (1992). Research Methods in Language Learning. New York, NY: CUP.
- Probst, R. (1994). *Response and analysis: teaching literature in the junior and senior high school.* Portsmouth, NH: Heinemann
- Rogers, W., & Leochko, D. (2002). *Literature circles: tools and techniques to inspire reading groups.* Winnipeg: Portage and Main Press
- Schlick Noe, K. L., & Johnson, N. J. (1999). *Getting Started with Literature Circles.* Norwood, MA: Christopher-Gordon Publishers, Inc.

An Analysis of 10 Indicators of Grameen Bank's Micro-Credit in Alleviating Poverty-A Study on Chittagong Region

Md. Siraz Meah *

Abstract

Grameen Bank (GB) is one of the largest NGO working with the socio-economic upliftment of the poor section in the rural area of Bangladesh. The main focus on the present study is to analysis the 10 indicators of GB's micro-credit (MC) to declare any member free from poverty with reference to Chittagong region. It analyses the 10 indicators of GB's micro-credit that are statistically significant or not significant in alleviating poverty. Data were collected from 404 randomly selected samples out of the population size 1,73,608 of GB beneficiaries in Chittagong zone. The data are analyzed with the help of the Statistical Package of Social Science (SPSS 16.0 Version).The analysis reveals that the 06 indicators are statistically significant and remaining 04 indicators are not significant in alleviating poverty. So it is a crying need of GB to emphases more on the remaining 04 indicators in alleviating poverty to maintain its dairy (www. annual report of GB, 2003)..

Key Words: Grameen Bank (GB), the 10 indicators of GB's micro-credit, poverty alleviation.

BGC Trust University Journal
Vol. 03, December, 2016, pp. 125 - 138
© BGC Trust University Bangladesh
ISSN : 2073- 5448

* *Assistant Professor, Faculty of Business Administration, BGC Trust University Bangladesh*

1.0 Introduction

During the 18th and 19th centuries, micro-credit evolved as a kind of the informal banking for the poor of European countries. Informal finance and self-help have been at the base of micro-credit in Europe. The early history of microcredit in Ireland can be traced back to 18th century. Loans were approved on short–term basis and installments were scheduled on weekly basis. To enforce the repayment, monitoring process was used (Seibel, 2005).

In Latin America and South Asia, the microfinance has grown out of experiments, but the best-known start was in Bangladesh in 1976, following a widespread famine in 1974 and a hard-fought war of liberation in 1971 (Agion, and Morduch, 2003). Its origin can be traced back to Muhammad Yunus launched in 1976 a microcredit experiment to assist a group of poor, highly indebted households in Chittagong, Bangladesh. This experiment that was later to emerge as the Grameen Bank marked the beginning of the modern-day microcredit movement, which in the last few decades has blossomed into a global phenomenon. These phenomenal successes of microcredit in such a short time span have attracted global attention from policy makers, development economists, and social thinkers—culminating in the award of the Nobel Peace Prize for Muhammad Yunus and the Grameen Bank in 2006.

Micro-credit is a small amount of loan given to the poor to develop their standard of living. This small amount of loan can help people to come out the cycle of poverty by generating income. Defining micro-credit, it is a - "Financial service where small amounts of money (usually around $50-$150) are loaned to poor people for use as a capital to start or expand small businesses" (www.bangladesh-bank.org). Micro-credit, according to Otero (1999), is considered to be "the provision of financial services to low-income poor and very poor self-employed people". These financial services generally include savings and credit, but can also include other services such as insurance and payment services as revealed by Ledger wood (1999).

Poverty is a condition in which a person of a community is deprived from necessities for a minimum standard of living. Since poverty is understood in many senses, the basic essentials may be material resources such as food, safe drinking water and shelter, or they may be social resources such as access to information, education, health care, social status, political power, or the opportunity to develop meaningful connections with other people in society. Extreme poverty is the most severe state of poverty, where people cannot meet their basic needs for survival, such as food, water, clothing, shelter, sanitation, education and health care.

By considering these extreme needs of the rural poor people, Grameen Bank has declared 10 factors of micro-credit free from poverty (GB Diary, 2003).The factors are such as i) Tin shed house facility, ii) Sanitary latrine facility, iii) Pure drinking water, iv) Children's school going, v) payment of minimum TK.200 as installment, vi) No default loan for last 3 years, vii) Having necessary winter cloths, viii) Ability to have 3 meals daily, ix) Ability to bear necessary medical expenditure, and x) Average amount of TK.5000 at bank.

2.0 Literature review

Literature in micro-credit of GB in alleviating poverty is very large. However any research papers presenting 10 indicators of micro-credit of GB declared free from poverty is not found. But, many researchers selected some indicators among 10 indicators of micro-credit of GB in different research papers. In order to design this research, several papers which include at least any one of 10 indicators of GB are studied.

Bhuiyan et al., (2012) studied "Grameen Micro credit and poverty alleviation: A review of GB's performance on poverty alleviation in Bangladesh". He examined the GB's Micro-credit impact on poverty alleviation with respect to its member's income, consumption, health, children education and women empowerment. He found that GB's members had done well to reduce their vulnerability compared to non-members.

Begum et al., (2005) studied the role of GB in enhancing the socio-economic conditions of women. In this study, Grameen bank helped women with financial support with a provision to pay back loans with interest. After taking micro credit, most of the women developed their living standard to such a level to ensure better food, cloths, shelter, drinking pure tube-well water, taking help of doctor, and ensuring other necessary facilities for a modest living. The study also indicated that if the credit program was well taken care of, the entrepreneurs, utilizing bank loan will illuminate their lives with further economic solvency.

Shukran, and Rahman, (2011) explored the GB activities which assisted the enormously to develop the living standard of the poor and vulnerable people in Bangladesh. They also encouraged applying Grameen model in different countries. This paper was given the clear idea about micro credit loan, structure of Grameen Bank, networks, Grameen loan investment and its replication over the world to reducing the poverty. It also discussed to eradicate poverty with promoting good governance by Grameen Bank for socio-economic development of the country.

The main findings of the study titled "An evaluation of GB Project: A case study of Chittagong Zone" done by Harun, (1986) are as follows: a) GB has made positive beneficial effects in its operational areas in terms of income generation, production, and food security (consumption), b) GB has significant contribution on health care, children education, abolition of dowry etc., c) GB enhanced the self-dependence of the rural people through the productive utilization of their labor.

A study conducted by Zohir & Martin (2004) suggested that clients who join and stay in microcredit program have better economic condition than non-clients, suggesting that programs contribute to these improvements. Households who are involved in program are able to send more children to school for longer period and to make greater investments in their children's education (Litterfield et al., 2003).

Schreiner and Colombet, (2001) define micro-credit as an attempt to improve access to small deposits and small loans for poor households neglected by banks. This implies that micro-credit involves the poor people in getting financial services like savings, loans, insurance etc. enabling them to lead a descent living in both urban and rural settings who are unable to obtain such services from the formal financial sector.

3.0 Rationale of the study

Generally, in the developing countries like Bangladesh, the small-scale firms based on agriculture, poultry, Muri-making, Cane works, and fisheries need to have their own land, which few of them have. Most of the times, people who do not own land are deprived of getting loan from a formal commercial bank due to the lack of collaterals. In these cases, GB helps them to spread out their business by offering them different kinds of MC. But a variety of literature regarding microcredit in alleviating poverty reveals that there was not found significant research on this topic in the Chittagong region after determination of 10 indicators of microcredit of Grameen Bank to declare any member free from poverty.

Moreover, the researcher's social, political and educational background influenced him to do the research. The author has the same origin and has the common social, cultural, political and educational background because he was born in Chittagong, from where GB has launched first its MC program for alleviating rural poverty.

From the above-mentioned reasons, the author was interested to undertake the present study. Therefore, it is an intention of author to examine how far the GB borrowers have satisfied the 10 indicators of microcredit of Grameen Bank.

4.0 Objective of the study

The main objective of the study is to analysis the 10 factors of Grameen Bank's micro-credit in alleviating poverty. To accomplish the main objective, the following specific objectives have been covered:

i) To know the significant relationship between the 10 factors of Grameen Bank's micro-credit and poverty alleviation.

ii) To know the individual contribution of 10 factors of Grameen Bank's micro-credit in alleviating poverty.

iii) To give suggestions to the Grameen Bank authority to emphasize more if any insignificant factors among 10 indicators of its micro-credit in alleviating poverty.

5.0 Research Methodology

5.1 Population and sample size: The population of the study comprises the people who have been engaged in micro-credit activities for at least five years and live in Chittagong region, Bangladesh. The author chose the people with a long experience in micro-credit activities and they are well known, and understand much about the pros and cons about its activities. So they can reflect better to the questionnaire. The samples were selected randomly. The demographic characteristics of respondents are shown in detail in the following table no.01.

Table-01 : Demographic characteristics of respondents

Variables	Measuring Group	Frequency	Percentage (%)
Gender	Male	39	9.67
	Female	365	90.33
	Total	**404**	**100**
Age(Years)	Up to 25	6	1.48
	26-40	262	64.86
	40 and above	136	33.66
	Total	**404**	**100**
Education	Not at all (illiterate)	85	21.03
	1-5 years (up to primary)	166	41.09
	6-10 year (up to secondary)	123	30.45
	More than 10 years(above secondary)	30	7.43
	Total	**404**	**100**
Family size	3 and less	54	13.36
	4-5	150	37.13
	6 and above	200	49.51
	Total	**404**	**100**

Source: Field survey, 2013

The above table provides the information about the gender distribution, age, education, family size etc. of the respondents. It is shown that i) the maximum number of the respondents was women (90.33%) that verify to the fact that most of the beneficiaries of GB are female and women are poorer and more disadvantaged than men are; ii) it reveals that most of the borrowers are young & mid-aged (64.86%); iii) it is revealed that majority of the sample are literate (41.09%) but they have little (up to primary) educational experiences; iv) This family size of the majority of the respondents show the average family size in the country.

In determining the sample size, Roscoe's rule of Thumb (Sekaran, 2003) has been applied: i) a sample size (large than 30 and less than 500) ii) the size must be several times larger (10 times and more) for regression analysis to be considered. In the study, the sample size is 404 borrowers, which is taken out of 1, 73,608 borrowers of 72 branches in Chittagong Zone (www.GB annual report 2013), which was the study area of the author's M. Phil Program. The data collection procedure started from village of Chandanish where the author was born and has been living permanently, and continued to Anowara, Potiya, and Boalkhali in the month of September, October, November, and December, 2013.

5.2 Questionnaire design and Measurement Scaling: Based on the above literature review, a structural questionnaire was developed adopting 10 questions regarding analysis of 10 factors of Grameen Bank's micro-credit activities for the borrowers in alleviating poverty. At the end of question, a last and final question was included "Do you think that the 10 factors of Grameen Bank's micro-credit can alleviate your poverty?" The questionnaire comprised of two sections. Section "A" sought information from the borrowers on demographic questions that included: name, gender, age, educational experiences, number of family members, etc. Section "B" comprised of 10 factors of Grameen Bank's micro-credit activities for the borrowers in alleviating poverty. Except demographic questions, all other questions were asked on a 5 points Likert-type scaling, which was developed by Rensis Likert is widely used rating scale to measure the degree of agreement or disagreement with a series of statement (Malthotra, 2003). These points of the scale indicate the degree of satisfaction or agreement level of the household or a person after he or she has received loan from a micro-credit activities of Gameen Bank. Recording '1' & '2' represent (with '1' meaning strongly agree, and '2' meaning agree) agreement. The lower the score is, the greater the level of agreement. Similarly, recording '4' and '5' represent (with '4' meaning disagree and '5' meaning highly disagree) disagreement. The higher the score is the greater level of disagreement. Remaining '3' represents neither satisfied nor dissatisfied with the item.

5.3 Used in statistical system software package: In the research, Statistical Package for Social Science (SPSS) 16.0 version, Microsoft excels, and Windows (2007) as operating system have been used for data analysis. SPSS offers an integrated system of computer programs that are extremely easy. It is by far the most widely used one in social science research (Luck and Rubin, 1987).

6.0 Findings and discussion on the result

General Statistics of sample respondents included were mean, standard deviation and standard Error mean (details in appendix-01) in the analysis to get the exact picture of the GB borrowers' poverty alleviation in the area of Chittagong region. Mean, Standard Deviation and Total Observation Count (N) are the descriptive statistics that give the information of both the dependent variable (poverty alleviation) and independent variables. The total observation number is 404. The mean value of 10 indicators lies between 2 to 3 (except one indicator), which shows the view of average borrowers about the poverty alleviation, which is between neutral, and satisfaction.

At first, the authors have done simple correlation analysis to find if there exist any correlation between the 10 indicators and poverty alleviation. The authors have considered the 10 indicators as independent variables for Pearson's correlation analysis and found most of the factors are significant. The result of Pearson's correlation is given in details in appendix-2 (see appendices). In order to measure the significance of the independent variables on the dependent variable (poverty alleviation), and to find out the individual contribution of the 10 indicators, the authors have extended the analysis to multivariate analysis (Multiple regression). The model is as follows:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + e$$

Where, Y = Poverty alleviation, X_1= Tin shed house facility, X_2= Sanitary latrine facility, X_3 = Pure drinking water, X_4 = Children's school going, X_5 = payment of minimum TK.200 as installment, X_6 = No default loan for last 3 years, X_7 = Having necessary winter cloths, X_8 = Ability to have 3 meals daily, X_9 = Ability to bear necessary medical expenditure, X_{10} = Average amount of TK. 5000 at bank, and e = Error term and α is a constant (the intercept term) and β_1, β_2, β_3, β_4, β_5, β_6, β_7, β_8, β_9, β_{10}, are coefficient terms.

Table-2 : Model Summary (Regression analysis between the 10 indicators and Poverty alleviation)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.676[a]	.458	.444	.77078

Source: Field survey, 2013

a. Predictors: (Constant), Tin shed house facility, Sanitary latrine facility, Pure drinking water, Children's school going, payment of minimum TK.200 as installment, No default loan for last 3 years, Having necessary winter cloths, Ability to have 3 meals daily, Ability to bear necessary medical expenditure, Average amount of TK.5000 at bank.

The model summary table (Table 02) provides useful information about regression analysis. First, 'R' column is the correlation between the actually observed independent variables and the predicted dependent variable (predicted by the regression equation). 'R' is the square of R and is also known as the 'coefficient of determination'. It states the proportion (percentage) of the (sample) variable in the dependent variable that can be attributed to the independent variables.

In the study, the value of R-square for the model is 0.458. This means that 45.8 percent of the variation in poverty alleviation (dependent variable) among the respondents could be explained for the 10 independent variables by GB. In general, R square always increases as independent variables are added to a multiple regression model. To avoid overestimating the impact of adding an independent variable to the model, some researchers prefer to use the adjusted R-square value. The adjusted R square refers to the best estimate of R square for the population from which the sample was drawn. This makes it easy to compare the explanatory power of regression models with various numbers of independent variables. The adjusted R-square for the model is 0.444 that indicates, there is no overestimate between R-square and adjusted R-square with the model as the difference between R square and adjusted R square is insignificant (0.458-0.444). Finally, the 'standard error of estimate' indicates that, on average, observed entrepreneurial productivity deviate from the predicted regression line by a score of 0.77078.

Table-3 : Analysis of Variance (ANOVA)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	196.963	10	19.696	33.153	.000[a]
	Residual	233.480	393	.594		
	Total	430.443	403			

Source: Field survey, 2013

a. Predictors: (Constant), Tin shed house facility, Sanitary latrine facility, Pure drinking water, Children's school going, payment of minimum TK.200 as installment, No default loan for last 3 years, Having necessary winter cloths, Ability to have 3 meals daily, Ability to bear necessary medical expenditure, Average amount of TK.5000 at bank,

b. Dependent Variable: Poverty Alleviation

The overall regression results are shown in the ANOVA table (Table 03). The statistics of the table assesses the statistical significance of the overall regression models. Larger the F ratio, the more variance in the dependent variable is explained by the independent variables. The model is statistically significant (F ratio=33.153, probability level = 0.000). The probability level 0.000 means that the chances are almost zero (0.00), which the results of regression model are due to random events instead of an actual relationship.

In the regression Coefficients table (details in appendix-03), the column labeled "Unstandardized Coefficients" reveals the unstandardized regression coefficients. The t-test tells whether the regression coefficient is different enough from zero to be statistically significant at the level (0.000).

In the table, poverty alleviation of respondents is considered as dependent variable and Tin shed house facility, Sanitary latrine facility, Pure drinking water, Children's school going, Payment of minimum TK.200 as installment, No default loan for last 3 years, Having necessary winter cloths, Ability to have 3 meals daily, Ability to bear necessary medical expenditure, Average amount of TK.5000 at bank, are as independent variables. The Coefficients table investigates the independent variables that are significant predictors of poverty alleviation of respondents. In the significance column, the researcher has noticed that the following 06 indicators of micro-credit of GB are significant in alleviating poverty:

1. The indicator of Children school going-the beta coefficient is 0.200, and probability level is 0.00. It means that every time, Children's school going of the respondents increase by 1 unit, the poverty alleviation of the borrowers will increase on an average by 0.200 units,

2. The indicator of Payment of minimum TK.200 as installment-the beta coefficient is 0.085, and probability level is 0.082. It means that every time, Payment of minimum TK.200 as installment of the respondents increase by 1 unit, the poverty alleviation of the borrowers will increase on an average by 0.085 units,

3. The indicator of No default loan for last 3 years-the beta coefficient is 0.170, and probability level is 0.00. It means that every time, No default loan for last 3 years of the respondents increase by 1 unit, the poverty alleviation of the borrowers will increase on an average by 0.170 units,

4. The indicator of Ability to have 3 meals daily-the beta coefficient is 0.204, and probability level is 0.001. It means that every time, Ability to have 3 meals daily of the respondents increase by 1 unit, the poverty alleviation of the borrowers will increase on an average by 0.204 units,

5. The indicator of Ability to bear necessary medical expenditure-the beta coefficient is 0.258, and probability level is 0.00. It means that every time, Ability to bear necessary medical expenditure of the respondents increase by 1 unit, the poverty alleviation of the borrowers will increase on an average by 0.258 units,

6. The indicator of Average amount of TK.5000 at bank-the beta coefficient is 0.067, and probability level is 0.074. It means that every time, Average amount of TK.5000 at bank of the respondents increase by 1 unit, the poverty alleviation of the borrowers will increase on an average by 0.067 units.

On the other hand, remaining 04 indicators of micro-credit of GB are not significant in alleviating poverty.

7.0 Conclusion

In this study, the author has tried to find out whether the 10 indicators of GB's micro-credit to declare free from poverty is significant or not significant in the Chittagong region of Bangladesh. GB is the largest NGO of the country, which provides loans to the rural poor people who are asset-less and landless. It takes rigorous steps to reduce poverty from the rural areas of Bangladesh. It is credited with mentioning that the rural poor people are bankable in the country and has found success in the poverty alleviation program. In this study, the analysis reveals that the 06 indicators such as children's school going, payment of minimum TK.200 as installment, No default loan for last 3 years, ability to have 3 meals daily, ability to bear necessary medical expenditure, average amount of TK.5000 at bank are statistically significant. So, the Grameen Bank authority should maintain the significant indicators of MC and to be continued in the future in alleviating poverty continuously. On the other hand, the remaining 04 indicators such as Tin shed house facility, Sanitary latrine facility, Pure drinking water, Having necessary winter cloths, are insignificant in alleviating poverty. So it is a crying need of GB to emphases more on the remaining 04 indicators in alleviating poverty to maintain its dairy (www.GB annual report, 2003).

The current research is confined to only Chittagong region in Bangladesh. So it has some research gaps. Therefore, other researchers may take initiative to do new research on the topic titled: "An Analysis of 10 indicators of Grameen Bank's Micro-Credit in Alleviating Poverty-A Study of Bangladesh".

References

Agion, B. A. d.; Morduch, J. (2003). Microfinance, Where do we Stand?, the British Association for the Advancement of Science Meetings, University of Salford, UK, pp. 4

Bhuiyan, A. B.; Siwar, C.; Talib, B. A. (2012). Grameen Micro credit and poverty alleviation: A review of GB's performance on poverty alleviation in Bangladesh, International journal of sustainable society, 4 (3)

Begum et al. (2005). The role of Grameen Bank in enhancing the socioeconomic condition of women: A study on bazaar para at gomastapur, Journal of business Studies, xxvi (1), June

Harun, R. (1986). An evaluation of GB Project: A case study of Chittagong Zone, UGC, Dhaka, Banglaesh.

Ledgerwood, J. (1999). Microfinance Handbook: An Institutional and Financial Perspective. Washington: The World Bank.

Littlefield, E.; Morduch, J.; Mesbahuddin, S. H. (2003). Is Microfinance an Effective Strategy to Reach the Millennium Development Goals?, CGAP Focus Note.

Washington, DC: CGAP.

Likert, R. (1967). The method for constructing an attitude scale, In M. fishbein (Ed), Readings in attitude theory and measurement. New York: Wiley, pp 90-95.

Malthora, K. N. (2003). Marketing Research: An applied orientation, prentice hall

international, Inc. Upper Saddle River, New Jersey

Otero, M. (1999). Microfinance and the Poor, Journal of International Development, 5:65-72.

Seibel, H., D., (2005). Does history matter? The old and new World of Microfinance in Europe and Asia, An interdisciplinary workshop, Asia Research Institute, Department of Economics and Department of Sociology, National University of Singapore, pp. 1-2

Shukran, Md. K.; Rahman, F. (2011). A Grameen Bank Concept: Micro-credit and Poverty Alleviation Program in Bangladesh, International Conference on Emerging Trends in Computer and Image Processing (ICETCIP'2011) Bangkok Dec.,pp.47

Schreiner, M.; Colombet, H. H. (2001). From Urban to Rural: Lessons for Microfinance from Argentina. Development Policy Review, 19 (3): 339–354.

Sekaran, U. (2003). Research Methods for Business: A skill building approach, NY: John Wiley and sons Inc.

www.GB annual report, 2013

www.bangladeshbank.org.

www.GB annual report, 2003

Grameen Bank, Diary,2003

Appendices

Appendix-01: General statistics of the Respondents

	N	Mean	Std. Deviation	Std. Error Mean
Tin shed house facility	404	2.0198	.87966	.04376
Sanitary latrine facility	404	2.2748	.86925	.04325
Pure drinking water	404	2.2376	.91471	.04551
Children's school going	404	2.4950	.97740	.04863
payment of minimum tk200 as install	404	2.1683	.94325	.04693
No default loan for last 3 years	404	2.4777	1.06699	.05308
Having necessary winter cloths	404	2.1114	.85990	.04278
Ability to have 3 meals daily	404	2.2252	.88621	.04409
Ability to bear necessary medical exp	404	2.5792	1.29368	.06436
Average amount of tk 5000 at bank	404	3.0718	1.26110	.06274

Appendix-02: Correlation Matrix

		Tin shed house facility	Sanitary latrine facility	Pure drinking water	Children's school going	payment of minimum TK.200 as install	No default loan for last 3 years	Having necessary winter cloths	Ability to have 3 meals daily	Ability to bear necessary medical expenditure	Avg amount of TK.5000 at bank	Poverty Alleviation
Tin shed house facility	Pearson Correlation	1	.457	.500	.419	.292	.204	.319	.564	-.097	-.030	.340
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.000	.000	.051	.547	.000
	N	404	404	404	404	404	404	404	404	404	404	404
Sanitary latrine facility	Pearson Correlation	.457	1	.395	.409	.334	.249	.308	.541	-.122	-.072	.330
	Sig. (2-tailed)	.000		.000	.000	.000	.000	.000	.000	.014	.146	.000
	N	404	404	404	404	404	404	404	404	404	404	404
Pure drinking water	Pearson Correlation	.500	.395	1	.368	.359	.176	.345	.567	-.186	-.029	.308
	Sig. (2-tailed)	.000	.000		.000	.000	.000	.000	.000	.000	.561	.000
	N	404	404	404	404	404	404	404	404	404	404	404

Children's school going	Pearson Correlation	.419	.409	.368	1	.407	.401	.303	.573	-.002	.003	.493
	Sig. (2-tailed)	.000	.000	.000		.000	.000	.000	.000	.974	.953	.000
	N	404	404	404	404	404	404	404	404	404	404	404
Payment of minimum TK.200 as installment	Pearson Correlation	.292	.334	.359	.407	1	.465	.469	.575	.000	.008	.436
	Sig. (2-tailed)	.000	.000	.000	.000		.000	.000	.000	.987	.876	.000
	N	404	404	404	404	404	404	404	404	404	404	404
No default loan for last 3 years	Pearson Correlation	.204	.249	.176	.401	.465	1	.358	.453	.045	-.003	.444
	Sig. (2-tailed)	.000	.000	.000	.000	.000		.000	.000	.364	.950	.000
	N	404	404	404	404	404	404	404	404	404	404	404
Having necessary winter cloths	Pearson Correlation	.319	.308	.345	.303	.469	.358	1	.498	.027	-.040	.371
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000		.000	.594	.421	.000
	N	404	404	404	404	404	404	404	404	404	404	404
Ability to have 3 meals daily	Pearson Correlation	.564	.541	.567	.573	.575	.453	.498	1	-.045	.039	.542
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000		.369	.438	.000
	N	404	404	404	404	404	404	404	404	404	404	404
Ability to bear necessary medical expenditure	Pearson Correlation	-.097	-.122	-.186	-.002	.000	.045	.027	-.045	1	.065	.244
	Sig. (2-tailed)	.051	.014	.000	.974	.987	.364	.594	.369		.193	.000
	N	404	404	404	404	404	404	404	404	404	404	404
Average amount of TK.5000 at bank	Pearson Correlation	-.030	-.072	-.029	.003	.008	-.003	-.040	.039	.065	1	.084
	Sig. (2-tailed)	.547	.146	.561	.953	.876	.950	.421	.438	.193		.091
	N	404	404	404	404	404	404	404	404	404	404	404
Poverty Alleviation	Pearson Correlation	.340	.330	.308	.493	.436	.444	.371	.542	.244	.084	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.091	
	N	404	404	404	404	404	404	404	404	404	404	404

Source: Field survey, 2013

Appendix-03 : Coefficient

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.274	.185		-1.478	.140
	Tin shed house facility	.054	.057	.046	.958	.338
	Sanitary latrine facility	.054	.055	.045	.983	.326
	Pure drinking water	.053	.055	.047	.978	.329
	Children's school going	.212	.050	.200	4.229	.000
	payment of minimum tk200 as install	.093	.054	.085	1.743	.082
	No default loan for last 3 years	.165	.044	.170	3.794	.000
	Havin g necessary winter cloths	.070	.054	.059	1.298	.195
	Ability to have 3 meals daily	.238	.074	.204	3.230	.001
	Ability to bear necessay medical exp	.206	.031	.258	6.738	.000
	Average amount of tk 5000 at bank	.035	.020	.067	1.789	.074
a. Dependent Variable: Poverty Alleviation						

Source: Field survey, 2013

Dimensions of Organizational Justice and Job Satisfaction: An Empirical Study

Mita Mazumder * Soman Chakraborty **

Abstract

This study was an endeavour to investigate the relationships of distributive, procedural and interactional justice with Job satisfaction in Bangladeshi organizational culture. Data were collected from 131 executives working in different organizations in Chittagong. Respondents, who were selected through convenience sampling method, were asked to rate organizational justice and job satisfaction by completing the printed questionnaire. To measure organizational justice and job satisfaction of the executives, scales are adopted from the organizational justice scale developed by Niehoff and Moorman (1993), and job satisfaction scale developed by Ather and Nimalathasan (2006) respectively. To analyze the data and interpret the relationships among the variables, this study uses descriptive statistics, correlation, and regression analyses. An important implication of the study is that managers should take proper steps to ensure the organizational justice to ensure job satisfaction of the employees. Using convenience sampling technique is the significant limitation that might limit the generalizability of the results of this study. Future research directions are also discussed.

Key Words: Organizational justice, Distributive justice, procedural justice, interactional justice, job satisfaction.

BGC Trust University Journal
Vol. 03, December, 2016, pp. 139 - 160
© BGC Trust University Bangladesh
ISSN : 2073- 5448

* *Assistant Professor, Faculty of Business Administration, BGC Trust University Bangladesh*
** *Assistant Professor, Faculty of Business Administration, BGC Trust University Bangladesh*

1.0 Introduction

To consider the system approach of management, organization is a system of input and output where employees are the most valuable assets. Organizations cannot succeed without their personnel's efforts and commitment (Rad & Yarmohammadian, 2006). The organizational success greatly depends on the employees' performance; even though, employee's performance is greatly affected by many issues. It is found that organizations with more satisfied workers are more effective than that with less satisfied workers (Robbins, judge & Vohra, 2012). Moreover, job satisfaction and organizational commitment are extensively explored factors in the literature of management (Bodla & Danish, 2009; Bodla & Naeem, 2008a, 2008b; Parker et al, 2005; Allen & Meyer, 1990) that are the basics of employees' performance. Spector (1997) also stated that organizations have significant effects on the people who work for them and some of those effects are reflected in how people feel about their work. Successful organizations are also continuously putting great efforts to satisfy their employees for gaining sustainable competitive advantages in their respective industries. Diverse factors such as, employees' needs and desires, social relationships, style and quality of management, job design, compensation, working conditions, perceived long-term opportunities, and perceived opportunities elsewhere are considered as the determinants of job satisfaction (Moorhead & Griffin, 1999). However, organizations are rewarding employees for their contributions and trying to satisfy their employees through rewards, but employees' perceptions and attitudes play important role in determining the effectiveness of those rewards. Employees have a natural tendency of comparing 'what they get (outcomes)' with 'what they give (inputs)' in an organization. They may compare themselves to their friends, colleagues, or co-workers in other organizations or compare their present job with their past jobs that they have had (Robbins et al., 2012). Employees observe one another, judge one another, and make comparison (Newstrom, 2010). In addition, "most employees are concerned about more than just having their needs satisfied; they also want their reward system be fair" (Newstrom, 2010, p. 119). In essence, individual naturally seek equity, fairness, or 'organizational justice' at their work. The literature regarding organizational justice shows that justice perceptions have direct relationships to job satisfaction such that those individuals, who perceive that the procedures are fair, are more satisfied with their work environment (Colquitt, Conlon, Wesson, Porter, & Ng, 2001).

Organizational justice focuses on individual's perception of fairness and is

considered one of the core values that organizations desire (Reithel, Baltes, & Buddhavarapu, 2007). Researcher (Greenberg, 1990) reported that it is as important as a basic requirement for the effective functioning of organizations. An individual perception of justice is key element of organizational justice (Robbins, et al., 2012). The study of organizational justice perceptions has received great attention (Cropanzano & Greenberg, 1997). In the workplace employees appraise the outcomes based on this three components of justice. (Cropanzano, Byrne, Bobocel, & Rupp, 2001; Konovsky, 2000). Distributive justice is concerned with perceptions of fairness about organizational allocations and outcomes (Adam, 1965; Saunders, Thornhill, & Lewis, 2002); procedural justice refers to the perceived fairness of the processes used to determine organizational outcomes (Folger & Konovsky, 1989); while interactional justice focuses on employees' perceptions about the fairness of the interpersonal treatment received during implementation (Bies & Moag, 1986). Studies found that justice perceptions are related to significant employee job behavioural output (e.g. Dailey & Kirk, 1992; Folger & Konovsky, 1989; Martin & Bennett, 1996; McFarlin & Sweeney, 1992). On contrary, Job satisfaction is one of the most researched attitudes in the literature of industrial and organizational psychology, social psychology, and organizational behavior (Alotaibi, 2001; Parnell & Crandall, 2003). It is a pleasurable and positive emotional state caused by the appraisal of one's job or job experience (Locke, 1976). It has been defined also as "feelings or affective responses to facets of the (workplace) situation" (Smith, Kendall, & Hulin, 1969, p. 6). High job satisfaction leads to better job performance; while low job satisfaction results in high absenteeism, high turnover, low performance, and decreased productivity (Koys, 2001).

Different research identified that organizational justice is positively correlated to organizational commitment (Folger & Konovsky, 1989) and job satisfaction and work motivation (Cropanzano, et al., 2001; Moorman, 1991). Empirical support exists for each of these dimensions of justice perceptions of the employees, and found the relationship between each type of justice and individuals' attitudes and behavior (e.g., Cohen-Charash & Spector, 2001). Research found significant positive relations between distributive justice and job satisfaction (i.e., Brockner & Siegel, 1996, p. 391), procedural justice and job satisfaction (i.e., Masterson, Lewis, Goldman & Taylor 2000; Wesolowski & Mossholder, 1997), and interactional justice with job satisfaction (i. e., Masterson, et al., 2000).

In spite of these associations, there has been relatively little empirical research examining the relationships of three types of justice with job satisfaction in context

of Bangladesh. This research gap has induced the researchers to undertake the current study. It is expected that a better understanding of the proposed relationship, more specifically, in context of Bangladesh, can not only address the gap currently existing in the literature but can also enhance the body of knowledge from the academic perspective.

2.0 Objective of the Study:

The main research objective of the study concerns the associations of dimensions of organizational justice and employees' job satisfaction measured by the executives. In order to answer the main research objective, the current study sets three objectives:

1) To identify the relationship between distributive justice and job satisfaction perceived by the executives.

2) To examine the relationship between procedural justice and job satisfaction perceived by the executives.

3) To investigate the relationship between interactional justice and job satisfaction intentions perceived by the executives.

3.0 Literature Review

3.1 Organizational Justice

Organizational justice depicts the individual's or group's perception of the fairness of treatment received from an organization and their behavioural reactions to such perceptions (Greenberg, 1993). Robbins et al., (2012) stated that "employees perceive their organizations as just when they believe the outcomes they have received and the way they received them are fair (p. 212)." Of late, the study of organizational justice perceptions has received a great attention in the field of industrial-organizational psychology, human resource management, organization behavior, and other research areas (e.g. Blakely, Andrews & Moorman, 2005; Chou, Chou, Jiang, & Klein, 2013; Dusterhoff, Cunningham, & MacGregor, 2014; Elovainio, et. al. 2013; Gelens, Dries, Hofmans, & Pepermans, 2013; Masterson, et al., 2000; Moorman, 1991; Strom, Sears, & Kelly, 2014). The organizational justice construct has been conceptualized with three components: distributive, procedural, and interactional justice (Cropanzano, et al., 2001; Masterson, et al., 2000). Descriptions of these three justice types are as follows:

3.2 Distributive Justice

According to Mcshane and Glinow, (2005), Distributive justice is the perceived fairness in outcomes received relative to the contribution and the outcomes, and the contribution of others. It is concerned with perceptions of fairness about organizational allocations and outcomes (Adam, 1965; Saunders, et al., 2002). Perceptions of distributive justice are based largely on comparisons with others (Greenberg, 1987). At the work setting, employees are likely to use multiple referents of comparison (Tremblay & Roussel, 2001) including comparison to other fellows within the same organization, to employees occupying similar jobs in other organizations, and to employees performing similar jobs within the same organization. Distributive justice is concerned with the fairness of outcomes an employee receives such as pay and promotions (Moorman, 1991). Distributive justice in simple terms is one's beliefs that everyone should get what they deserve (Luthans, 2005).

3.3 Procedural Justice

Ding & Lin, (2006) state that Procedural justice mainly emphasized the procedures and techniques through which outcomes decision is made. It refers to the perceived fairness of the processes used to determine organizational outcomes (Colquitt, et al., 2001; Folger & Konovsky, 1989). Process control and explanations are considered as the key element of procedural justice. Process control is the opportunity to present one's point of view about desired outcomes to decision makers, while explanations are clear reasons that management give for the outcomes (Robbins, et al., 2012 p. 212). Decisions based on procedures that are perceived as fair are more likely to be accepted by those they affect, than decisions arising from procedures that are not perceived fair (Cropanzano & Greenberg, 1997). Leventhal, Karuza, and Fry (1980) identified six justice rules used by individuals in judging the fairness of procedures—accuracy, representativeness, bias suppression, consistency, ethicality, and correct ability.

3.4 Interactional Justice

Interactional justice refers to the interpersonal treatment employees receive from decision makers and the adequacy with which the formal decision-making procedures are explained (Greenberg, 1990). Perceptions of interactional justice result from supervisor trust-building behaviours such as "availability, competence, consistency, discreetness, fairness, integrity, loyalty, openness, promise fulfilment, receptivity, and overall trust" (Deluga, 1994, p. 317). Interactional justice has come to

be seen as consisting of two specific types of interpersonal treatment (e.g., Greenberg, 1990) namely, interpersonal and informational justice. Interpersonal justice refers to personal treatment such as politeness, dignity, and respect, while informational justice refers to the explanations provided about why certain procedures were followed (Colquitt, 2001). When people are not treated in fair manner (at least in their own eys), they retaliate (i.e. they may badmouthing a supervisor) (Skarlicki & Folger, 1997). Interactional justice is defined as an individual's perception of the degree to which s/he is treated with dignity, concern, and respect (Robbins, et al., 2012, p. 213).

4.0 Job Satisfaction

Job satisfaction is an important area of research because it is found correlated with enhanced job performance, positive work values, high levels of employee motivation, and lower rates of absenteeism, turnover and burnout (Begley & Czajka, 1993). The term 'job satisfaction' is defined by the researchers in different ways. Job satisfaction is an attitude towards work-related conditions, facets, or aspects of the job (Wiener, 1982). It refers to the positive attitudes or emotional dispositions people may gain from work or through aspects of work (Furnham, 1997). Locke (1976) defined job satisfaction as "a pleasurable or positive emotional state resulting from the appraisal of one's job or job experiences" (p. 1300). Moreover, Robbins, et al., (2012) define job satisfaction as "a positive feeling about one's job resulting from an evaluation of its characteristics" (p. 113).

Job satisfaction represents the product of an "interaction between employees and their work environment by gauging the congruence between what employees want from their job and what they feel they receive" (Wright & Kim, 2004.19). Locke (1976) presented a summary of job dimensions that has been established to contribute significantly to employees' job satisfaction. The particular dimensions represent characteristics associated with job satisfaction. The dimensions are work itself, pay, promotions, recognition, working conditions, benefits, supervision, and co-workers. It is assumed to influence the employees' opinion of "how interesting the work is, how well they are doing, and, in general, how much they enjoy doing it" (McCormick & Ilgen, 1985, p. 309). Spector (1997) lists three important features of job satisfaction. Firstly, organizations should be guided by human values. Such organizations will treat employees fairly and with respect. Secondly, the behavior of workers depending on their level of job satisfaction will affect the functioning and activities of the organization's business. Thirdly, job satisfaction may serve as indicators of organizational activities. It is closely linked to the employees' behavioural output in

the workplace. George and Jones (2002) list four factors that can affect level of satisfaction: (i) personality - the way a person consistently feels, thinks, and behaves; (ii) values, specifically, intrinsic vs. extrinsic values, which reflect a person's beliefs regarding results and how they should behave at work; (iii) work conditions - i.e., tasks, the people with whom the employee associates, physical conditions, and work environment; and (iv) social influence – the influence of other individuals or groups (colleagues, family, cultural environment, etc.) on the employee's attitudes and behavior. Moreover, various factors such as employees' needs and desire, social relationships, style and quality of management, job design, compensation, working conditions, perceived long-range opportunities, and perceived opportunities elsewhere are considered the determinants of job satisfaction (Byars & Rue, 1997; Moorhead & Griffin, 1999). A person may be relatively satisfied with one aspect of his or her job while dissatisfied with another aspect. Job satisfaction is an extent to which one feels positively or negatively about the intrinsic and/ or extrinsic aspects of one's job (Bhuian & Menguc, 2002; Hunt et al., 1985)

5.0 Development of Research Hypotheses

5.1 Distributive Justice and Job Satisfaction

Distributive justice mainly considered with the workers' perception in the fairness of outcomes such as monetary rewards obtained by the workers from the organization (Colquitt (2001). Employee want equity at their work for that they put their effort in an organization. Robbins, et al., (2012) stated, "Historically, equity theory focused on distributive justice, the employee's perceived fairness of the amount and allocation of rewards among individuals (p. 213). Adams (1965) suggested that when allocation outcomes do not meet this criterion, people would perceive inequity distress and attempt to behaviourally or cognitively restore equity. Robbins, et al., (2012) stated that distributive justice is most strongly related to satisfaction of the employees in organizations. Studies found that distributive justice perceptions are associated with pay raise satisfaction (Folger & Konovsky, 1989), and tend to be a strong predictor of job satisfaction (Martin & Bennett, 1996; McFarlin & Sweeney, 1992). In a study conducted by McFarlin and Sweeney (1992) showed that distributive justice was a more powerful predictor of job satisfaction than was procedural justice. Moreover, Tang and Sarsfield-Baldwin (1996) also found a relationship between distributive justice and personal-level job satisfaction. Based on the above discussions, it could be assumed that distributive justice should be positively related to job satisfactions in Bangladeshi culture too. Consequently, researchers have developed the first hypothesis as follows:

Hypothesis 1: There is a positive relationship between distributive justice and job satisfaction.

5.2 Procedural Justice and Job Satisfaction

Employees judge the equity of procedures by the amount of bias, number of relevant parties given voice in the decisions, the breadth and accuracy of information gathering, ethical standards applied, and the consistency and universality of decision implementation (Stecher & Rosse, 2005). Research has shown that procedural justice is more important than distributive justice in determining their evaluations of the parties or the institution that enacted the decision (Brockner & Siegel, 1996). Studies have also shown high correlations between procedural justice and job satisfaction (e.g., Mossholder, Bennett, & Martin, 1998; Wesolowski & Mossholder, 1997). Murphy and Tyler (2008) demonstrated that employees' perceptions of procedural justice were associated with more frequent positive emotions (i.e., happiness). DeCremer and Stouten (2005) found that participants in the high procedural justice condition exhibited stronger positive emotions than those participants in the low procedural justice condition. Moreover, procedural justice also found to be correlated to job satisfaction (Colquitt, et al., 2001). Based on the discussions above, the second hypothesis has been proposed as follows:

Hypothesis 2: There is a positive relationship between procedural justice and job satisfaction

5.3 Interactional Justice and Job Satisfaction

At work, employees naturally seek respect. They want to be treated with dignity and respect by their authority. Research demonstrated that interactional justice is significant for job candidates (Bies & Moag, 1986; Gilliland, 1995). Research found that the informational components are particularly important if there are unanticipated delays or unusual screening procedures involved in the process (Rynes, Bretz, & Gerhart, 1991). Individuals who perceive that they are receiving unfair treatment are more likely to feel angry, and dissatisfied (Eisenberger, Huntington, Hutchison, & Sowa, 1986). Judge, Scott, and Ilies (2006) found that interpersonal justice was negatively associated with hostility. The results of the study conducted by Chebat and Slusarczyk (2005) also demonstrated that fair interactions were more frequently associated with positive emotions. Masterson, Lewis, Goldman & Taylor (2000) showed procedural justice to be a stronger predictor of job satisfaction than interactional justice, even though both had

significant independent effects on job satisfaction of individuals. Based on the above discussions, it could be expected that interactions justice should be positively related to job satisfaction in Bangladeshi culture too. Hence, the final hypothesis has been developed as follows:

Hypothesis 3: There is a positive relationship between interactional justice and job satisfaction.

A hypothetical model was developed to exhibit the relationships among distributive justice, procedural justice, interactional justice and job satisfaction.

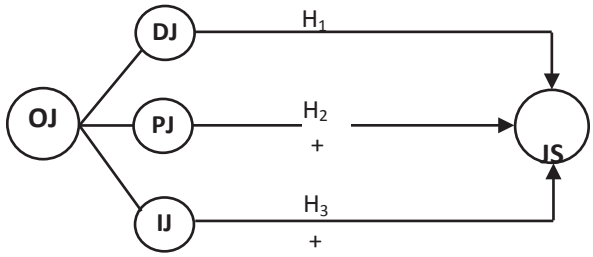


Figure 1: Hypothetical Model (Source: Field Study)

Note: OJ= organizational justice; DJ= distributive justice; PJ= procedural justice; IJ= interactional justice; JS= job satisfaction.

6.0 Research Methods

6.1 Participants

Executives, working at different organizations in Chittagong are considered as the population in this study. Data were collected from 131 executives who were working in public and private organizations in Chittagong. Executives were asked to rate organizational justice and their job satisfaction through printed questionnaire. The respondents were also requested to provide their demographic information (i.e. age, gender, tenure, educational background, organizational position (level), and organization type). All respondents were given full autonomy in this study. The organizations were classified into five categories, such as, manufacturing, financial, education, service, and others. The respondents were divided into three categories namely: higher-level, mid-level, and lower-level.

Table 1: Self evaluator biographic characteristics

Respondence's Biographic characteristics	Mean (in years)	SD (in years)	N	%
Respondents' age	32.7	5.1	----	----
Respondents' experience	5.13	3.2	----	----
Respondents' gender:				
Male	----	----	103	78.6
Female	-----	----	28	21.4
Respondents' position level:				
Top	----	----	19	14.5
Middle	----	----	94	71.8
Lower	----	----	18	13.7
Respondents' educational qualifications				
Bachelor Degree	----	----	21	16
Master's Degree	----	----	99	75.6
Others	----	----	11	8.4
Respondents' Sectors/Units				
Manufacturing	----	----	30	22.9
Education	----	----	27	20.61
Finance	----	----	41	31.3
Service	----	----	26	19.85
Others	----	----	7	5.34
Total	----	----	**131**	**100**

Respondents ranged in age from 26 to 51 years, with a mean of 32.7 (SD = 5.1) years. Among them 103 (78.6%) were male, while 28 (21.4%) were female. The average tenure was 5.13 (SD= 3.2) years in their current organizations. There were 19 (14.5%), 94 (71.8%), and 18 (13.7%) representation by the top, middle, and lower-level participants respectively. The respondents completed bachelor degrees were 21 (16%), master degrees 99 (75.6%), and other degrees 11 (8.4%). In terms of organizational units, 30 (22.9%) belonged to manufacturing, 27 (20.61%) to education, 41 (31.3%) to finance, 26 (19.85%) to services, and 7 (5.34%) to other industry.

6.2 Survey instruments

To measure organizational justice, and job satisfaction of the executives, self-rated printed questionnaire were used. All the survey measures used in this study were measured on 7-point Likert scale ranging from 7 (strongly agree) to 1 (strongly disagree). This study adopts the following measures to collect data from the participants.

6.3 Organizational Justice

To measure the organizational justice of the executives, the twenty-item scale was adopted from the organizational justice scale developed by Niehoff and Moorman (1993). Five items were related to distributive justice; while six items and nine items were related to procedural justice and interactional justice respectively. Sample items were "My work schedule is fair" (distributive justice), "To make job decisions, my general manager collects accurate and complete information" (procedural justice), and "When decisions are made about my job, the general manager treats me with respect and dignity" (interactional justice) etc. The reliability of organizational justice was 0.93, while the mean scores for distributive justice, procedural justice and interactional justice were 0.75, 0.84, and 0.89 respectively.

6.4 Job Satisfaction

To measure the job satisfaction of the respondents, an eleven-item scale adopted from the job satisfaction scale developed by Ather and Nimalathasan (2006). Sample items were 'I like the content of the work I do, 'I am happy to work with my peers. The reliability of the job satisfaction scale for the current study was 0.92.

7.0 Data collection procedure and analysis of data

The convenience sampling technique was used in this study for selecting the respondents. To collect data for this study, printed questionnaire with a cover letter were delivered to 200 executives working at different organizations in Chittagong. The participants were assured that all the information provided by them would be kept confidential and used only for research purpose. The executives participated voluntarily and took fifteen minutes on an average to complete the survey. Finally, 131 (65.5%) usable responses were received. Descriptive statistics, correlations, and regressions analyses were used to justify the associations among the studied variables. The SPSS 17.0 was used to analyze the data. Due to some constraints, it was not possible to collect an equal number of responses from the each organization.

8.0 Reliability of scales and validity of data

Reliability reflects the consistency of a set of item in measuring the study variables/concepts. It illustrates the individual differences concerning the amount of agreement or disagreement of the concepts or variables studies. Cronbach's alpha is most widely used method to measure the reliability of the scale (Malhotra, 2002; Cooper & Schinder, 2001). It may be mentioned that Cronbach's alpha value ranges from 0 to 1, but satisfactory value is required to be more than .60 for the scale to be reliable (Malhotra, 2002; Cronbach, 1951). However, Cronbach's alpha of the organizational justice, distributive justice, procedural justice, interactional justice, and job satisfaction scale for the current study were 0.93, 0.75, 0.84, 0.89, and 0.92 respectively. Hence, all these instruments were highly reliable for data collection.

The validity refers the extent to which differences in observed scales scores reflect true differences among objects on the characteristics being measured, rather than systematic or random error (Malhotra, 2002). In this study, authors considered only the criterion validity which denotes that criterion variables (i.e. demographic characteristics, attitudinal, and behavioral measures) were collected at the same time. Face and content validity were not essential because authors used the established survey instruments in this study.

9.0 Limitations

In spite of having diligent efforts, the study has suffered from some limitations which acted as a barrier to conduct the research. The most important limitation of this research is the sample size (N=131) which was small. The larger sample size will provide more confidence in the results and thereof, reliable generalization. The other limitation of this study was to use convenience samples that might limit the generalizability of the findings. A random sampling procedure could be the best alternative to overcome the barriers. More study should be conducted on DJ, PJ, IJ and JS besides the current study in context of Bangladesh. Presence of common variance problem cannot be ruled out since data on both independent and dependent variables. Moreover, this study was limited in its scope by concentration on organization justice in respect of only job satisfaction.

10.0 RESULTS

The mean (M), standard deviation (SD), and reliability calculated for the organizational justice, distributive justice, procedural justice, interactional justice, and job satisfaction are presented in Table 2. Correlations among the variables were also presented in Table 2.

Table 2: Means, Standard Deviations, and Reliabilities of and Correlations among Variables

Variables/ Components	M	SD	α	Correlations				
				1	2	3	4	5
1. OJ	5.02	1.0	.93	1				
2. JS	5.41	1.2	.92	.81**	1			
3. DJ	5.37	1.1	.75	.84**	.67**	1		
4. PJ	4.92	1.3	.84	.89**	.71**	.63**	1	
5. IJ	4.78	1.2	.89	.87**	.72**	.59**	.67**	1

** Significant at 0.01 level; * Significant at 0.05 level; N= 131; OJ = organizational justice; JS= job satisfaction; DJ= distributive justice; PJ= procedural justice; IJ= interactional justice.

Examination of the Table 2 shows that there is positive significant correlations ($r = 0.81$, $p < 0.01$) between organizational justice and job satisfaction. Significant positive correlations were also found between distributive justice and job satisfaction ($r = 0.67$, $p < 0.01$), procedural justice and job satisfaction ($r = 0.71$, $p < 0.01$), and interactional justice and job satisfaction ($r = 0.72$, $p < 0.01$). Thus, it indicates that all three hypotheses were supported by the results.

Table 3: Summary of Regression Analysis of Socio-Demographic Characteristics with distributive, procedural and interactional justice, and job satisfaction.

Covariates	Co-efficients (β)				S.E. (β)				Value of t-statistic				Value of R^2				Value of F –statistic			
	DJ	PJ	IJ	JS	DJ	PJ	IJ	JS	DJ	PJ	IJ	JS	DJ	PJ	IJ	JS	DJ	PJ	IJ	JS
Age	-.04	-.07	.04	-.04	.03	.04	.04	.04	-1.1	-1.7	1.0	-.96								
Gender	-.01	.17	.24	.05	.23	.28	.27	.26	-.01	.61	.88	.20								
Tenure	.06	.08	-.02	.05	.05	.06	.06	.06	1.2	1.3	-.29	.78	.02	.05	.04	.01	.44	1.2	.94	.33
Education	-.19	-.38	.02	-.15	.19	.24	.22	.22	-.95	-1.6	.10	-.67								
Position	-.01	.19	.28	.11	.19	.23	.21	.21	-.08	.83	1.3	.51								

** Significant at the 0.01 level; * Significant at 0.05 level; N= 131; DJ= distributive justice; PJ= procedural justice; IJ= interactional justice; JS= job satisfaction.

Review of the Table 3 demonstrates that only 2% , 5%, 4% and 1% of the variances in distributive justice, procedural justice, interactional justice and job satisfaction were explained by the socio-demographic characteristics (e.g. age, gender, tenure, education and position) respectively in which no one was found significant. It indicates that a larger portion of variance in distributive, procedural and interactional justice, and job satisfaction were unexplained. The presence of unexplained variance suggests that there might be other potential variables that account for variations in all the three organizational justice types and job satisfaction.

Table 4: Summary of Regression Analysis regarding distributive, procedural, and interactional justice with job satisfaction.

Predictors	Job Satisfaction				
	Co-efficient (β)	S.E. (β)	Value of t-statistic	Value of R^2	Value of F–statistic
DJ	.30	.08	3.80^{**}	.66	80.7^{**}
PJ	.27	.07	3.88^{**}		
IJ	.36	.07	5.05^{**}		

** Significant at the 0.01 level; * Significant at 0.05 level; N= 131; DJ= distributive justice; PJ= procedural justice; IJ= interactional justice.

Analysis of Table 4 indicates that about 66% of the variance in job satisfaction is explained by the three predictors or justice types (distributive, procedural and interactional justice) where all the t-values are also found significant. It suggests that distributive justice, procedural justice and interactional justice were accounted for significant increases in job satisfaction. Although a proportion of variances in job satisfaction are unexplained, it has been suggested that distributive justice, procedural justice and interactional justice are the significant predictors in explaining the job satisfaction perceived by the respondents.

11.0 Discussions

The present study intends to examine the relationships of distributive justice, procedural justice, and interactional justice with job satisfaction by the participants' perceptions.

The first purpose of this study was to explore the relationship between distributive justice and job satisfaction. Hypothesis 1 stated that there would be a positive relationship between distributive justice and job satisfaction measured by the

respondents' perception. The result ($r = 0.67$, $p < 0.01$) of the current study supported this contention. It indicates that individuals, who perceive that the distribution of reward is fair, are more satisfied with their job. This result of the current study also offers a support for the theoretical argument that distributive justice may be an important aspect in improving individual's job satisfaction.

The second purpose of the study was to investigate the relationship between procedural justice and job satisfaction. The relationship between procedural justice and job satisfaction was also found to be positive ($r = 0.71$, $p < 0.01$) perceived by the respondents. It shows that executives, who perceived that the procedures, rules, policies regarding the distribution of reward, and their explanations given to them were fair, were highly satisfied with their job. This tentative understanding is made based on the theoretical assumption that higher procedural justice may be a precursor of higher job satisfaction.

The final purpose of the study was to examine the relationship between interactional justice and job satisfaction. Hypothesis 3 stated that interactional justice will be positively related to job satisfaction measured by the respondents' perception. The result ($r = 0.72$, $p < 0.01$) of the current study also supported this assertion that who perceive that the interactional justice is fair, are more satisfied with their work environment. This tentative understanding is made based on the theoretical assumption that higher procedural justice may be a indicator of higher job satisfaction.

12.0 Implications for management

The outcome of this research is not only constant for this research area but also future researchers can corroborate the research findings This study provides valuable direction for the management of corporate world, policy makers, researchers and behavioral scientist who have growing awareness in ensuring equity in allocation of resources, fair distribution of responsibility and authority, treating employees with dignity and respect. Another significant implication of this study is that managers should lay emphasis on rules and policies practiced in their organization to increase job satisfaction of their employees. The reward and rules, policies, and regulations should be implemented in a fair way regarding employees. Organizations should also allow the employees to challenge or appeal job decisions made by the organizations. It should be ensured for better satisfaction that ultimate lead to better organizational success. Consequently, the current study is pertinent to practitioners as well as business leaders, as the findings may help them to identify highly satisfied executives who are able to facilitate their organizational goals. The

impacts of organizational justice and job satisfaction are significant issues in the field of Human Resources (HR) in advancing the strategic capability of organizations. Moreover, the results of this present study offer considerable implication to business leaders, HR practitioners, and certainly for effective management practices in today's business environment.

13.0 Future directions

In terms of future research directions, researchers should concentrate on larger sample size with variety of scales covering whole of Bangladesh. In this research subsequent studies should be attempted to investigate the relationships of distributive, procedural and interactional justice with job satisfaction in different industry and in different organizational levels separately and longitudinally. The research that examines the relationship among three types of justice and job satisfaction mediated by any other factors could produce more interesting results. Furthermore, research investigating the relationships of organizational justice with other dependent variables, such as, deviant workplace behaviour, social loafing, and job performance is warranted.

References:

Adams, J. (1963). Toward an understanding of inequity. Journal of Abnormal and Social Psychology, 67, 422-436.

Adams, J. S. (1965). Inequity in social exchange. In L. Berkowitz (Ed.). Advances in experimental social psychology (2, 267–299). New York: Academic Press.

Allen, N., & Meyer, J. (1990). "Organizational socialization tactics: a longitudinal analysis of links to newcomers' commitment and role orientation." The Academy of Management Journal, 33(4), pp.847-58.

Alotaibi, A. G. (2001). Antecedents of organizational citizenship behavior: A study of public personnel in Kuwait. Public Personnel Management, 30, 363-376.

Ather, S. M., & Nimlathasan, B. (2006). Association between Quality of Work life (QWL) and Job Satisfaction (JS): A study of Academic Professionals of Private Universities in Bangladesh. The Chittagong University Journal of Business Administration, 21, 9-23.

Begley, T., & Czajka, J. (1993). Panel analysis of the moderating effects of commitment on satisfaction, intent to quit and health following organisational change. Journal of Applied Psychology, 78, 552-556.

Bhuian, S. N., & Menguc, B. (2002). Evaluation of Job Characteristics, Organizational Commitment and Job Satisfaction in an Expatriate, Guest Worker, Sales Setting.

Journal of Personal Selling and Sales Management, 22, 1-12.

Bies, R. J., & Moag, J. S. (1986). Interactional justice: Communication criteria of fairness. In R. J. Lewicki, B. H. Sheppard, & M. H. Bazerman (Eds.), Research on Negotiation in Organizations (1, 43-55). Greenwich, CT: JAI Press Inc.

Blakely, G., Andrews, M., & Moorman, R. (2005). The moderating effects of equity sensitivity on the relationship between organizational justice and organizational citizenship behavior. Journal of Business Psychology, 20(2), 259-273.

Bodla, M. A., & Danish, R. Q. (2009). "Politics and workplace: an empirical examination of the relationship between perceived organizational politics and work performance". South Asian Journal of Management, 16(1), pp.44-62.

Bodla, M.A., & Naeem, B. (2008a). "What Satisfies Pharmaceutical Salesforce in Pakistan" The International Journal of Knowledge, Culture, & Change Management, 8.

Bodla, M.A., & Naeem, B. (2008b). "Elevance of Herzberg's Theory to Pharmaceutical Salesforce in Pakistan." The International Journal of Knowledge, Culture, & Change Management, 8.

Brockner, J., & Siegel, P. (1996). Understanding the interaction between procedural and distributive justice. In R. M. Kramer & T. R. Tyler (Eds.), Trust in organizations: Frontiers of theory and research (p. 390-413). Thousand Oaks: Sage Publications.

Byars, L. L., & Rue, L. W. (1997). Human resorce management. USA: Irwin/McGraw-Hill.

Chebat, J., & Slusarczyk, W. (2005). How emotions mediate the effects of perceived injustice on loyalty in service recover situations: An empirical study. Journal of Business Research, 58, 664–673.

Chou, Tzy-Yuan, Chou, T. Seng-cho, Jiang, J., & Klein, G. (2013). The organizational citizenship behavior of IS personnel: Does organizational justice matter? Information & Management. 50 (2-3), 105-111.

Cohen-Charash, Y. & Spector, P. (2001). The role of justice in organizations: A meta-analysis. Organizational Behavior and Human Decision Processes, 86(2), 278-321.

Colquitt, J. A. (2001). On the dimensionality of organizational justice: A construct validation of a measure. Journal of Applied Psychology, 86(3), 386-400.

Colquitt, J. A., Conlon, D. E., Wesson, M. J., Porter, C. O., & Ng., K. Y. (2001). Justice at the millennium: A meta-analytic review of 25 years of organizational justice research. Journal of Applied Psychology, 86, 425– 445.

Cooper, D., & Schindler, P. (2001). Business Research Methods. Sydney: McGraw-Hill.

Cronbach, L. (1951). Coefficient alpha and the internal structure of tests. Psychometrika, 6(3), 297-334.

Cropanzano, R., & Greenberg, J. (1997). Progress in Organizational Justice: Tunnelling through the maze. International Review of Industrial and Organizational Psychology, 12, 317-372.

Cropanzano, R., Byrne, Z., Bobocel, D. R., & Rupp, D. (2001). Moral virtues, fairness heuristics, social entities, and other denizens of organizational justice. Journal of Vocational Behavior, 58(2), 164-209.

Dailey, R. C., & Kirk, D. J. (1992). Distributive and procedural justice as antecedents of job dissatisfaction and intent to turnover. Human Relations, 45(3), 305-317.

DeCremer, D., & Stouten, J. (2005). When does giving voice or not matter? Procedural fairness effects as a function of closeness of reference points. Current Psychology, 24, 203–213.

Deluga R. J. (1994). Supervisor trust building, leader-member exchange and organizational citizenship behavior. Journal of Occupational and Organizational Psychology, 67(4), 315-26.

Dusterhoff, C., Cunningham, B.J., & MacGregor, N.J. (2014). The Effects of Performance Rating, Leader–Member Exchange, Perceived Utility, and Organizational Justice on Performance Appraisal Satisfaction: Applying a Moral Judgment Perspective. Journal of Business Ethics, 119 (2), 265-273.

Eisenberger, R., Huntington, R., Hutchinson, S., & Sowa, D. (1986), Perceived organizational support. Journal of Applied Psychology, 71, 500-507.

Elovainio, M., Linna, A., Virtanen, M., Oksanen, T., Kivimäki, M., Pentti, J., & Vahtera, J. (2013). Perceived organizational justice as a predictor of long-term sickness absence due to diagnosed mental disorders: Results from the prospective longitudinal Finnish Public Sector Study. Social Science & Medicine, 91, 39-47.

Folger, R., & Konovsky, M. A. (1989). Effects of procedural and distributive justice on reactions to pay raise decisions. Academy of Management Journal, 32(1), 115-130.

Furnham, A. (1997). The Psychology of Behaviour at Work. Hove: Psychology Press.

Gelens, J., Dries, N., Hofmans, J., & Pepermans, R. (2013). The role of perceived organizational justice in shaping the outcomes of talent management: A research agenda. Human Resource Management Review, 23, 341-353.

George, J. M., & Jones, G. R. (2002). Understanding and managing organization behavior. Upper Saddle River, NJ: Prentice Hall.

Gilliland, S. W. (1995). Justice from the applicant's perspective: Reactions to employee selection procedures. International Journal of Selection and Assessment, 3, 11–19.

Greenberg, J. (1987). A taxonomy of organizational justice theories. Academy of Management Review, 12(1), 9-22.

Greenberg, J. (1990). Organizational justice: Yesterday, today, and tomorrow. Journal of Management, 16, 399–432.

Greenberg, J. (1993). The social side of fairness: Interpersonal classes of organizational justice. In Cropanzano, R. (Ed.), Justice in the Workplace: Approaching Fairness in Human Resource Management, 79-103, Erlbaum, Hillsdale, NJ.

Hunt, S.D., Chonko, L.B., & Wood, V.R. (1985). Organizational commitment and marketing. Journal of Marketing, 49 (1), 112-126.

Judge, T. A., Scott, B. A., & Ilies, R. (2006). Hostility, job attitudes, and workplace deviance: Test of a multilevel model. Journal of Applied Psychology, 91, 126–138.

Konovsky, M. (2000). Understanding procedural justice and its impact on business organizations. Journal of Management, 26, 489–511.

Koys, D. J. (2001). The effects of employee satisfaction, organizational citizenship behavior, and turnover on organizational effectiveness: A unit-level, longitudinal study. Personnel Psychology, 54, 101-114.

Locke, E. A. (1976). The Nature and Causes of Job Satisfaction. In Dunnette, M.D. (Ed.), Handbook of the Industrial and Organizational Psychology. Chicago: Rand McNally. 1297-1343.

Luthans F. (2005). Cognitive Process of Organizational Behaviour: Organizational Behaviour. Singapore: McGraw-Hill.

Malhotra, N. K. (2002). Marketing Research: an applied orientation (3rd ed.). New Delhi: Pearson Education Asia.

Martin, C. L., & Bennett, N. (1996). The role of justice judgments in explaining the relationship between job satisfaction and organizational commitment. Group & Organizational Management, 21(1), 84-104.

Masterson, S. S., Lewis, K., Goldman, B. M., & Taylor, M. S. (2000). Integrating justice and social exchange: The differing effects of fair procedures and treatment on work relationships. Academy of Management Journal, 43, 738-748.

McShane, S., & Von Glinow, M. A. (2005). Organizational Behaviour, 6/E.

McCormick, E. J., & Ilgen, D. R. (1985). Industrial and Organisational Psychology (8th ed.). London: Allen & Unwin.

McFarlin, D. B., & Sweeney, P. D. (1992). Distributive and procedural justice as predictors of satisfaction with personal and organizational outcomes. Academy of Management Journal, 35(3), 626-637.

Moorhead, & G., Griffin, R. W. (1999). Organization behavior-Managing people and organizations. New Delhi: AITBS Publishers.

Moorman, R. H. (1991). Relationship between organizational justice and organizational citizenship behaviors: Do fairness perceptions influence employee citizenship? Journal of Applied Psychology, 76(6), 845-855.

Mossholder, K.W., Bennett, N., & Martin, C. L. (1998). A multilevel analysis of procedural justice context. Journal of Organizational Behavior, 19, 131-141.

Murphy, K., & Tyler, T. (2008). Procedural justice and compliance behaviour: The mediating role of emotions. European Journal of Social Psychology, 38, 652–668.

Newstrom, W. J. (2010). Organizational Behavior: Human Behavior at Work (12th ed.). Tata-McGraw-Hill.

Niehoff, B., & Moorman, R. H. (1993). Justice as a mediator of the relationship between methods of monitoring and organizational citizenship behavior. Academy of Management Journal, 36(3), 527-56.

Parker M, Slaughter J (2005)."Unions & management by stress", in Babson, S. (Eds), Lean Work: Empowerment and Exploitation in the Global Auto Industry"Wayne State University Press, Detroit, MI, pp.41-53

Parnell, J. A. & Crandall, W. (2003). Propensity for participative decision-making, job satisfaction, organizational commitment, organizational citizenship behavior, and intentions to leave among Egyptian managers. The Multinational Business Review, 11, 45-65.

Rad .A.M, Yarmohammadian M.H. (2006). A study of relationship between managers leadership style and employees job satisfaction. Leadership and Health Service. 19(2): xi – xxviii.

Reithel, S. M., Baltes, B. B., & Buddhavarapu, S. (2007). Cultural differences in distributive and procedural justice: Does a two-factor model fit for Hong Kong employees? International Journal of Cross Cultural Management, 7(1), 61-76.

Robbins, S., Judge, T., & Vohra, N. (2012). Organizational Behavior (14th ed). New Delhi: Pearson Prentice Hall of India.

Rynes, S. L., Bretz, R. D., & Gerhart, B. (1991). The importance of recruitment on job choice: A different way of looking. Personnel Psychology, 33, 529–542.

Saunders, M. N. K., Thornhill, A., & Lewis, P. (2002). Understanding employees' reactions to the management of change: an exploration through an organizational justice framework. Irish Journal of Management, 23(1), 85-108.

Skarlicki, D. P., & Folger, R. (1997). Retaliation in the Workplace: The Roles of Distributive, Procedural, and Interactional Justice. Journal of Applied Psychology, 82(3), 434-443.

Smith, P. C., Kendall, L. M., & Hulin, C. L. (1969). The Measurement of satisfaction in work and retirement. Chicago: Rand McNally.

Spector, P. E. (1997). Job satisfaction: Application, assessment, cause, and consequences. Thousand Oaks, CA: Sage Publications, Inc.

Stecher, M. D., & Rosse, J. G. (2005). The distributive side of interactional justice: The effects of interpersonal treatment on emotional arousal. Journal of Managerial Issues, 17(2), 229-46.

Strom, L.D., Sears, L.K, & Kelly, K.M. (2014). The Roles of Organizational Justice and Leadership Style in Predicting Engagement Among Employees. Journal of Leadership & Organizational Studies, 21(1), 71-82.

Tang, T. L. & Sarsfield-Baldwin, L.J. (1996). Distributive and Procedural Justice As Related to Satisfaction and Commitment. SAM Advanced Management Journal, 61, 25-31.

Tremblay, M., & Roussel, P. (2001). Modeling the role of organizational justice: Effects on satisfaction and unionization propensity of Canadian managers. International Journal of Human Resource Management, 12(5), 717-737.

Wesolowski, M. A., & Mossholder, K. W. (1997). Relational demography in supervisor subordinate dyads: Impact on subordinate job satisfaction, burnout, and perceived procedural justice. Journal of Organizational Behavior, 18, 351-362.

Wiener, Y. (1982). Commitment in organizations: a normative view. Academy of Management Review, 7(3), 418-28.

Wright, B. E., & Kim, S.(2004). Participation's influence on job satisfaction. Review of Public Personnel Administration, 24(1)18- 40.

Enhancing Quality Banking Service Rendering Skill Through Training and Development Programs: Executive Trainers' View

Mohd. Kamal Uddin * Syeda Sunjeeda Showkat **

Abstract

Banks play a key role for the economy of a country as a member of financial institution. Banks in both the private and public sectors, regardless of types or nature, agree that training and development is essential to the growth and prosperity of the business. After the training program, an evaluation is carried out to ascertain the effectiveness of the program in line with the need, which had been identified. Training practitioners and researchers, in the context of banking industry of Bangladesh, have not yet extensively studied the empirical and simultaneous evaluation of training effectiveness to the view point of executive trainers. This study is an attempt to fill this gap by analyzing the opinions and feedbacks of expert trainers who have extensive knowledge and experience in conducting training programs to the employees working in the service industry like bank organizations. As the service outcomes is qualitative by nature, expert trainers' view is another indirect technique of measuring the effectiveness of training and development programs a service oriented organization arranges. Primary data were gathered through a sample survey via face-to-face and email questionnaires to 82 executive trainers who were formerly and presently working as professional trainers / instructors of different training institutions, permanent or visiting professors of different public and private universities, mangers, deputy managers and FAVP, senior executive directors, and external and internal trainers of different private commercial banks of Bangladesh. They were conveniently chosen and contacted at their free time. The questionnaire was designed with some questions to fulfill the research requirements and involves a combination of both the open and close ended questions. The information gathered from different sources were represented using tabular diagrams and interpreted meaningfully. Finally, the study has developed a conclusion as well as tried to recommend some suggestions to accelerate the success of this area.

Key Words: Training & Development, Bank Employees, Executive Trainers

BGC Trust University Journal
Vol. 03, December, 2016, pp. 161- 180
© BGC Trust University Bangladesh
ISSN : 2073- 5448

* *Assistant Professor, Faculty of Business Administration, BGC Trust University Bangladesh*
** *Lecturer, Faculty of Business Administration, BGC Trust University Bangladesh*

1. Introduction

The banking sector of Bangladesh is well known as a principal financer of the country and playing a key role by contributing in the national economy. Banks play a key role for the economy of the country as a member of financial institution. In Bangladesh the banking industry is becoming more competitive than ever before, private and public sector banks are competing each other to perform well. The executives of the banks are now in the position to modify their traditional human resources practice into innovative human resources practices in order to meet the challenges from other competitive banks. Human resources are the most valuable assets of any organization, with the machines, materials and even the money; nothing gets done without man-power. The effectiveness and success of an organization, therefore, lie on the people who form and work within the organization.

The necessity of improved productivity in organization has become universally accepted and that it depends on efficient and effective training. It has further become necessary in view of advancement in modern world to invest in training. Thus, the role played by executive training and development can no longer be over-emphasized. However, the need for organizations to embark on training and development program for employees has become obvious. Training both physically, socially, intellectually and mentally are very essential in facilitating not only the level of productivity but also the development of personnel in any organization. Training and development aim at developing competences such as technical, human, conceptual and managerial for the furtherance of individual and organization growth. Employee training and development is a work activity that can make a very significant contribution to the overall effectiveness and profitability of an organization. Absence of these programs often manifests tripartite problems of incompetence, inefficiency and ineffectiveness. Training enhances the knowledge, skills and attitudes required by employees to perform adequately on a given task or job. It can take place in a number of ways, on the job or off the job; within the organization or outside the organization. A major challenge for many banks will be to develop the special competencies and skills for credit appraisal and risk management in an environment of deregulation and openness. The human resource development (HRD) department has to play a more proactive role in shaping the employees to fight out the challenges.

Organizations in both the private and public sectors, regardless of types or nature of organization, agree that training and development is essential to the growth and

development of the business. After the training and development programs, an evaluation is carried out to ascertain the effectiveness of the program in line with the need, which had been identified. Training practitioners and researchers, in the context of banking industry of Bangladesh, have not yet extensively studied the empirical and simultaneous evaluation of training effectiveness to the view point of executive trainers. This study is an attempt to fill this gap by analyzing the opinions and feedbacks of expert trainers who have extensive knowledge and experience in conducting training programs to the employees working in the service industry like bank organizations. This suggests that the authority of both public and private banks in Bangladesh should take the issues of training and development of employees on a priority basis since trained employees will assist the bank organization to cope with any changes in the service rendering strategies. It is important that training researchers and practitioners examine all aspects of the training process when conducting research on transfer of training and management would evaluate the training needs assessment in the banking sector with developed countries on a regular basis. Management must ensure that training and development programs are relevant for current and future employee performance on the job. Training and development programs must, therefore, be strategically planned. Further, management must ensure that there is a fair balance between financial and non-financial motivational efforts for the employees / trainees as well as for the expert trainers while designing, reviewing and implementing a training strategy.

2. Brief Literature and Theoretical Issues

A number of studies have investigated the training and development strategies for improving skill and knowledge transfer, with little or mixed success. Employee training and development is one of the most important functions of human resource management (HRM). Employee development consists of individual or employee and overall growth of the employee. When employees of the organization will develop the organization, it will be more flourished and, in turn the employee performance will be increased (Elena, 2000). Therefore, there is a direct relationship between employee development and employee performance. When employees will be more developed, they will be more satisfied with the job, more committed with the job and the performance will be increased. When employee performance will be increased, this will lead to the organizational effectiveness (Champathes, 2006). Debnath (2003) indicated that productivity of manpower in the banking sector of Bangladesh will have to be increased by proper training both on the job and off the job.

A trainer is one of the most important factors to make the training not only attractive but also effective to the trainees and organizations. Torres and Fairbanks (1996); Schaffer (2002); Keyton (2005); and Wageman (1997) pointed out roles as well as problems and prospects of trainers in training effectiveness. Without having feedback about training, the whole process of training will be incomplete and that identifies the need of training evaluation. Evaluation of training and development programs is normally used in a broad sense mean "any attempt to obtain information (feedback) on the effects of a training program; and to assess the value of the training in the light of the information" (Hamblin, 1974). A large number of text were published by Daniya and Jha (2011); Lewis and Thornwill (1994); Riech (1983); Van Dyk et al (1997); Sims (1993); King (2009) and Haywood (1992) showing different methods used in training evaluation and its importance in identifying training effectiveness. The purpose of evaluation helps organization to make decisions about future training activities and provides tool needed to assess the type of evaluation possible in a given situation (Saxena, 2012).

Effective training programs are systematic and continuous. In other words, training must be viewed as a long term process, not just an infrequent and/or haphazard event (Tannenbaum &Yukl, 1992; Wexley & Latham, 1991). Evaluation determines the effect of training at individual, departmental and organizational levels (Willis, 1998). Training programs that are consistent with employee and organizational goals and fit with the business strategy will attain the greater success than those that are not (Wexley & Latham, 1991). Assessments of employee and organizational needs as well as business strategies should be conducted and then used in selecting training methods and participants (Goldstein, 1991). Preferably, employees will be trained based on the results of assessments of their work. Though several approaches are used to evaluate training programs in organization but there is no one best way of evaluation, just as there is no best way to train employees. Training results can be best identified mainly on the organizational performance which is triggered by employee performance. As a service outcome is qualitative by nature, expert trainers' view is another indirect technique of measuring the effectiveness of training and development programs a service oriented organization arranges.

In modern literature, for enhancing training, technology based teaching-learning is highly emphasized. Trainers with extensive skill and knowledge, who are able to conduct good use of technology, often are less fearful and more confident about using technology in their classrooms (Browne & Ritchie, 1991). When an expert teacher provides the instruction, the teacher-learners also have a benchmark for

measuring their own progress. Modern staff development must do more than simply help instructors embrace technology; it must also anticipate the classroom change that will accompany its widespread use (Browne & Ritchie, 1991; Guhlin, 1996; Kinnaman, 1990; Persky, 1990; Stager, 1995). This notion of technology being separate and isolated needs to be significantly altered so that teachers understand how technology can support educational objectives (Boe, 1989). If educators are going to be convinced to change their practice by integrating technology into their teaching, they must see the relevance of technology to what they do in the classroom (Browne & Ritchie, 1991; Shelton & Jones, 1996). Persky (1990) noted that using technology is not easy and that learning how to effectively use technology in the context of the classroom does not happen overnight. The need to allot time for continual learning is echoed in studies outside of education, which suggest that providing workers with high technology on the job ultimately fails if employees don't receive adequate training and continuing it (Moursund, 1992).

A great deal of literature was found to define and identify specific characteristics and importance of training and development, training need assessment and training evaluation process. Some texts had also revealed a good number of literatures regarding the types of training provided and its effectiveness. Fisher et al., (1999); Carnevale et al, (1990); Brum (2007); Glance, Hogg & Huberman (1997); and Saxena (2012) focused on the importance on training both for the organization and employees through their writing.

3. Rationale of the Study

Every organization consists of both human resources and physical resources. Physical resources refer to materials, money and machines (Durai, 2010) and human resources refer to human factors of the organization. Effectiveness of an organization mostly depends upon the proper utilization of human resources as only they keep other resources active. The rationale behind choosing the topic of the study is to expose the difference between bookish knowledge and practical experience regarding training and development practices of an organization.

Despite the increasing effects on training of organizational employees by organizations, there is still limited literature on human resource development issues in developing countries (Debrah & Ofori, 2006) and increasing concerns from organizational customers towards low quality services in the industrial sector. It is further worth noting that while much is known about the economics of training in the developed world, studies of issues associated with training in less-developed countries are rarely found.

During the last two decades, banking industry has constantly been changing the face of the industry far beyond recognition; consequently, training of banking sector has increased to a greater extent. There are limited studies in the area of training in the commercial banking sector in Bangladesh. Technology has brought in substantial changes in banking in terms of customer services and new product innovations. Banking sector has to take hard decisions to gear up themselves in terms of human resources for today's highly competitive environment. On the other hand, private sector banks are more dynamic in adopting latest human resource practices. It is in this scenario that a study on assessing the effectiveness of training and development programs from the side of executive trainers with specific reference to Bangladesh may have a great appeal and urgently needed the authors of the paper feel.

Therefore, this research has become an important issue to both the researchers and the bankers to increase the efficiency of the employees in Bangladesh.

4. Objectives of the Study

In light of the above background, the main objective of the study is to examine and evaluate the effectiveness of training on employee performance to the view point of executive trainers from the selected sample banks located in Bangladesh.

Thus, the study has the following specific objectives to attain:

1. To evaluate the effectiveness of training on employee performance to the view point of executive trainers
2. To identify the extent of benefits gained by trainees in the training program.
3. To search a brief literature for clarifying the concept of training, its need assessment and the effectiveness to enhance employee service skill.
4. To know the existing training methods used and their ability to meet the training objectives.
5. To put forward some fruitful suggestions from the executive trainers for enhancing employees' performance skill in the banking sector.

5. Methodology

This research paper uses both the primary and secondary data. Primary data were gathered through a sample survey via face-to-face and email questionnaires to 82 executive trainers who were formerly and presently working as professional trainers / instructors of different training institutions, permanent or visiting professors of

different public and private universities, mangers, deputy managers and FAVP, senior executive directors, and external and internal trainers of different private commercial banks of Bangladesh. They are conveniently chosen and contacted at their free time. The questionnaire was designed with some questions to fulfill research requirements and involves a combination of both the open and close ended questions. Besides, structured and semi-structured interviews were conducted with the concerned trainers. As the banks follow great confidentiality in providing information, some of the trainer respondents show reluctance to disclose some information morally. The secondary data and information were collected from various sources like annual and semi-annual bank reports and publications, business news, journals and publications, magazines, internet etc. The information collected from the target respondents (trainers) were tabulated and interpreted meaningfully.

As an analytical tool, percentage - a very simple measurement technique, was used to compute the range of opinion of the respondents. This paper being descriptive by nature, requires the percentage computation to infer the tabulated data to the view point of actual phenomenon the authors observed.

6. Findings and Discussions

The information gathered from different sources were represented using tabular diagrams and interpreted meaningfully. As this is a descriptive research, this section presents a description of the opinions that were objectly made by the expert trainer respondents of the study.

1. How many training & development programs do you offer in this year?

a. More than 10

b. From 6 to 10

c. Below 5 training programs

Table-1: Number of Training Programs offered by the Executives Trainers

No. of Programs	Sample Size	Percentage
Above 10	50	60.98
From 6 to 10	21	25.61
Less than 5	11	13.41
Total	**82**	**100.00**

Source: Field survey, 2016

Inference: The above table shows that majority of the executive trainers (60.98%) have offered more than 10 training to the bank employees while 25.61% of the trainers have offered from 6 to 10 training programs once a year and only 11 respondents are found delivering less than 5 trainings. Hence, the executive trainers participating in this study have vast of experience and possess variety of skill and deliberation experience as most of them normally attend to offer more than 10 training programs in a year. So the information in this study provided by them will have a good level of acceptance and thus greater reliability.

2. How frequent / often do you conduct training?

Table-2: Frequencies of Training Undergone by Trainers

Trainings Held	Sample Size	Percentage
Monthly	6	7.32
Quarterly	12	14.63
Every six months	18	21.95
No specific schedule	46	56.10
Total	**82**	**100.00**

Source: Field survey, 2016

Inference: The above table shows that majority of the trainers (56.10%) offers training and development programs maintaining no specific schedules, 7.32% have conducted training once a month and 21.95% in every six months and the rest 14.63% in quarterly. It can be said that the commercial banks are quite reluctant to follow routinely specific schedule for conducting training and development programs and the trainers appear to deliver training when they are invited and the frequency of such invitation does not follow regularity.

3. What type of ongoing development programs have you offered in the last one year?

a. Workshop
b. Seminar
c. Conference
d. Teleconference
e. Video presentation
f. Online courses

Table-3: Methods of Training & Development Programs offered

Training Methods	Frequency	Percentage
Workshop	34	41.46
Seminar	22	26.83
Conference	20	24.39
Teleconference	02	2.44
Video presentation	04	4.88
Online courses	00	0.00
Total	**82**	**100.00**

Source: Field survey, 2016

Inference: The above table shows that majority of the trainers (41.46%) have joined in the workshop method of training to conduct seminars and conference are preferred respectively next to it. Teleconferencing and video conferencing have poor appeal to be chosen by trainers and no online course or remote learning programs are conducted in the said period of time, although those methods are needed for better ways of transferring job related skill and knowledge now a days.

4. How do you identify employees' training and development needs?

a. As per job requirement

b. Through performance evaluation

c. Staff review and development meeting

d. Identified by employees themselves

e. No specific reason identified

Table-4: Identifications of Training Needs

Training Methods	Frequency	Percentage
As per job requirement	34	41.46
Through performance evaluation	12	14.63
Staff review and development meeting	27	32.93
Identified by employees themselves	00	0.00
No specific reason identified	09	10.98
Total	**82**	**100.00**

Source: Field survey, 2016

Inference: It is found in the table above that majority of the trainers (41.46%) have expressed that trainees are interested to join training as a part of their job requirement and 32.93% of the respondents have opined that the employees for training are identified through staff review process and recommendations made by executive development meeting. 14.63% respondents commented in favor of formal procedure like performance evaluation. It is very interesting matter that a few respondents found no specific reasons for selecting trainees and none of the respondents found employees who identified training needs themselves. The authors of this paper think that an employee is quite capable of identifying own lacking in performing job but present employees themselves are not interested to participate in the training until it is made obligatory for them or set it preconditions for salary increment, promotions etc.

5. How well you think the need for ongoing training and skills development are being met?

a. Excellent
b. Good
c. Average
d. Not satisfactory

Table-5: How well the need for training and skills development are met

Range of Opinion	Frequency	Percentage
Excellent	22	26.83
Good	27	32.93
Average	33	40.24
Not satisfactory	00	0.00
Total	**82**	**100.00**

Source: Field survey, 2016

Inference: It is depicted in the above table that 40.24% of the respondents (executive trainers) think the need for ongoing training and skills development are being met on an average, one third of the respondents feel the requirements are well achieved and 26.83% have expressed that those are met excellently. There is none to feel dissatisfaction resulting from ongoing training and skills development programs as appeared in the table. Thus, the inference can be drawn that the training programs being quite capable to generate satisfaction among the trainee participants were effective.

6. If you wish to offer training related to executive development with a view to a ensuring a change of employee behavior, how confident are you that you would be capable:

a. Very confident

b. Fairly confident

c. Not at all confident

Table-6: Respondents' ranges of confidence on changing employees' Behavior positively after receiving training

Range of Opinion	Frequency	Percentage
Very confident	41	50.00
Fairly confident	41	50.00
Not at all confident	00	0.00
Total	**82**	**100.00**

Source: Field survey, 2016

Inference: While the executive trainers are asked whether they feel confident to bring positive changes among the participants after training is delivered, their responses as shown in the table appeared to be 50% very confident and 50% fairly confident and there is none without a range of confidence. Therefore the trainers bear a good level of confidence for creating a favorable attitude among the employees toward banking job performance.

7. What range of feedback on service improvement you received from trainee participants / trainee bank organizations after the completion of your training session?

a. Very Satisfactorily

b. Satisfactorily

c. Good

d. Bad

e. Very bad

Table-7: Range of feedback on service improvement executive trainers received

Range of Opinion	Frequency	Percentage
Very Satisfactorily	25	30.49
Satisfactorily	36	43.90
Good	21	25.61
Bad	00	0.00
Very bad	00	0.00
Total	**82**	**100.00**

Source: Field survey, 2016

Inference: It can be inferred from the above table that majority of the executive trainers (43.90%) received satisfactorily feedback and 30.49% got very satisfactorily feedback on the trainee participants' / trainee bank organizations' service improvement after the completion of the training period. This result indicates the effectiveness of training and supports the literature survey. Most of researchers including Colombo and Stanca (2008), Sepulveda (2005) and Konings and Vanormelingen (2009) showed that training is a fundamental and effective instrument in successful accomplishment of the firm's goals and objectives, resulting in higher productivity. Helliriegel et al.,(2001) state that training of employees in organization increases higher productivity through better job performance, more efficient use of human resources, goals and objectives more effectively met, reduced cost due to less labor turnover, reduced errors, reduced accidents and absenteeism, more capable, and mobile workforce and retention of the existing staff. According to this paper, inference can be drawn that the training courses the bankers received were quite capable to prepare them skilled to perform present job tasks assigned to them more efficiently.

8. Do you receive consultancy and support for your deliberation on training and development from your trainee participants?

a. Yes

b. No

If yes, is this:

i. Very useful

ii. Useful

iii. Not helpful

Table-8: Range of feedback on service improvement Executive Trainers received

Receive consultancy support?	Yes 62 (75.61%)		No 20(24.39%)	
	Frequency	Percentage	Frequency	Percentage
Very useful	43	69.35%	---	---
useful	19	30.65%	---	---
Not helpful	00	0.00%	---	---

Source: Field survey, 2016

Inference: While the executive trainers were asked whether they received consultancy and support for their deliberation on training and development from their trainee participants, 75.61% replied in the affirmative out of which 69.35% trainers had considered it very useful and the rest of the respondents had considered it merely useful.

9. Do you agree with the statement that there exists relevance between the training course content and the bank employees' present job responsibility?

Table-9: Opinion on the relevance between the training course content and the bank Employees' present job responsibility

Range of Opinion	Frequency	Percentage
Strongly Agree	60	73.17
Agree	22	26.83
No Response	00	0.00
Disagree	00	0.00
Strongly disagree	00	0.00
Total	**82**	**100.00**

Source: Field survey, 2016

Inference: The information stated in the above table shows that 26.83% of the sample trainer respondents agree and 73.17% of the sample respondents strongly agree with the statement that there exists relevance between the training course content and employees' existing job. From the statement, inference can be drawn that contents of the bankers' skill enhancement training courses are framed considering the necessity of their job requirement and work specifications.

10. Do you think that your banks provide sufficient training facilities to employees in relation to their work assignment?

Table-10: Training facilities provided by Banks

Range of Opinion	Frequency	Percentage
Strongly Agree	21	25.61
Agree	45	54.88
No Response	06	7.32
Disagree	10	12.19
Strongly disagree	00	0.00
Total	**82**	**100.00**

Source: Field survey, 2016

Inference: It can be inferred from the above table that majority of the executive trainers (54.88%) agreed and 25.61% strongly agreed that banks provide sufficient training facilities to employees in relation to their work assignment. Only 12.19% of the respondent executives disagreed with the statement. So, banks of modern age are now considering work based training for their employees' skill development.

11. Kindly let me know the range of your level of satisfaction with the extent to which the course prepared by you allowed the bankers to develop service rendering skills to perform current tasks more efficiently.

Table-11: Executives' satisfaction with the extent to which the course prepared to develop service rendering skills

Range of Opinion	Frequency	Percentage
Strongly Agree	60	73.17
Agree	16	19.51
No Response	06	7.32
Disagree	00	0.00
Strongly disagree	00	0.00
Total	**82**	**100.00**

Source: Field survey, 2016

Inference: It can be inferred from the above table that majority of the respondents (73.17%) strongly agreed and 19.51% of the respondents merely agreed with the statement that they feel satisfaction with the extent to which the course prepared allowed the bankers to develop service rendering skills to perform current tasks more efficiently. These data point out that the executive trainers possess a high level of satisfaction and greater level of confidence in developing employees' banking service rendering skill.

7. Limitations of the Study

To the best of knowledge of the researchers, very little study was conducted on this specific area, that's why there is a lack of guidance. Researchers were unable to collect enough information due to proper guidance, time shortage and funding constraints. Due to limited size of the sample, conclusions reached by this study may not be entirely applicable to whole banking sector. Moreover, the study did not gather enough evidence to conclude on the effectiveness of training on banking performance. The paper merely states the opinion of the trainers and other stakeholders such as trainee participants, training organizing authority, strategic decision makers and so on are excluded from this study. This study was based on effectiveness of training in the commercial banks, so information was designed on the basis of the specific area of HRM only.

As banks have a policy of secrecy and confidentiality in providing information, some of the trainer respondents show reluctance to disclose some information morally. A few respondents were hesitant to give details. There might be a sense of bias crept in answers given by the respondents. The study did not establish the relationship between the methods of delivering training and training effectiveness. Characteristics such as length of the training and quality of the training environment were not considered in the research and, finally, there is a need for triangulation methods to be applied in data collection to get a holistic view on training and development practices in banking sector.

8. Conclusion & Recommendations

The commercial banks had made a commendable progress in extending the frontiers of banking both geographically and functionally and, as a result, cover a wider area and much larger segment of population than ever before. Banking sectors today are forced to function in a world full of change and under various complications, and it is more important than ever to have the right employees at the right job with the right qualification and experience in order to survive the

surrounding competition. Since the workforce is getting more and more diverse, training is a 'must'. To conduct training effectively is critical for any organization to acknowledge the diversity of employees. The successful and prosperous future of an organization is dependent on its skilled, knowledgeable and well experienced workforce. That is why; training is a fundamental and effectual instrument in successful accomplishment of the bank's objectives. Training and development is the tonic employees need to enhance their performance and potentials that will, in turn, enhance organization effectiveness. Training not only improves them resourcefully, but also gives them a chance to learn their job virtually and perform it more competently hence increasing bank's overall performance and productivity.

However, several lack of importance is still found in this area. Therefore, in order to accelerate the success of this area, the following recommendations are made:

- Organization should take the issues of training and development of employees since trained employees will assist the organization to cope with any changes in the business environment.
- The feedback analysis of employees training and expert views would be compared with need assessment analysis on its importance basis.
- Modern training methods such as online training, overseas training and digital training program should follow for employees training through giving importance of needs assessment before training programs.
- If the effectiveness focus is on cost, banks should allocate a significant percentage of training budgets to ensure continuous and timely arranging training.
- Management must ensure that training and development programs are relevant for current and future employee performance on the job. Training and development programs must, therefore, be strategically planned.
- Remuneration and trainers recognition should be set properly. If trainers feel good about taking time from their schedules to acquire new skills, they must be provided incentives, remuneration, and recognition rather than road blocks (Kinnaman,1990). Studies in the business sector indicate that providing workers with highly developed technological training fails if the employees and trainers don't receive adequate incentives (Moursund, 1992). Guhlin (1996) and Stager (1995) have echoed this need in education to support and celebrate initiatives, in turn, recognizing trainers who demonstrate effort and commitment to educational computing.

- It would be beneficial to the overall development of employees in the banking sector of Bangladesh if the bank organization establish more of their own training institutes.

Every research makes an opportunity for further research. It is also true for our present research. Future researchers can work on effectiveness of training, need for post and pre-training test, evaluation of different training methods etc. based on this study.

References

Boe, T. (1989). The next step for educators and the technology industry: Investing in teachers. *Educational Technology, 29*(3), 39-44.

Browne, D.L., & Ritchie, D.C. (1991). Cognitive apprenticeship: A model of staff development for implementing technology in schools. *Contemporary Education, 63*(1), 28-33.

Brum, S. (2007). What Impact does Training have on Employee Commitment and Employee Turnover. University of Rhode Island, 2007, 1.

Carnevale, A.P., Gainer, L.J. & Meltzer, A.S. (1990). Workplace basics: The Essential Skills that Employers Want. Jossey-Bass, San-Francisco.

Champathes, M. R. (2006). Coaching for performance improvement: The coach model. *Development and Learning in Organizations,* 20, (2).17-18.

Colombo, E. & Stanca, L. (2008). The Impact of Training on Productivity: Evidence from a Large Panel of Firms, Available at SSRN (4). 211-214

Daniya Sunita & Jha Ajeya (2011). Review of Training Evaluation. International Journal of Computer Science and Communication, 2(1) 11-16.

Debnath, R. M (2003), *Bank and legal environment* (1st Ed.), Dhaka: Nabajuga Prokashani.

Debrah, Y. A. & Ofori, G. (2006). Human Resource Development of Professionals in an Emerging Economy: the Case of the Tanzanian Construction Industry. International Journal of Human Resource Management 17 (3) 440 – 463.

Durai, P. (2010). Human Resource Management. Pearson Education, New Delhi, India, 1.

Elena P. A. (2000). Employee development through self-development in three retail banks. *Journal of Personnel Review,* 29 (4) 491-508.

Fisher, Cynthia D., Schoenfeldt, Lyle F. & Shaw, James B. (1999). Human Resource Management. Houghton Mifflin, Boston, 389.

Glance, N.S., Hogg, T., & Huberman, B.A. (1997). Training and Turnover in the Evolution of Organizations. Organization Science, 8(1), 84-96.

Goldstein I. L. (1991) Training in work organizations. In M. D. Dunnette & L. M. Hough (Eds.), *Handbook of industrial and organizationalpsychologists* Press, Palo Alto CA: Consulting Psychologists Press, 507-619

Guhlin, M. (1996). Stage a well designed saturday session and they will come! *Technology Connection,* 3(3), 13-14.

Hamblin, A.C. (1974). Evaluation and Control of Training. Maidenhead: McGraw-Hill.

Harvey, J., & Purnell, S. (1995, March). *Technology and teacher professional development*. Report Prepared for the Office of Educational Technology, U.S. Department of Education. Santa Monica, CA: Rand Corporation

Haywood, K. M. (1992). Effective training: Toward a Strategic Approach. Cornell Hotel and Restaurant Administration Quarterly, 33(4), 43-52.

Hawkins, J., & MacMillan, K. (1993). So what are teachers doing with this stuff? Electronic Learning, 13(2), 26.

Hellriegel, D., Slocum, Jr. J. W. and Woodman, R.W (2001) Organisational Behavior: 9th Ed. Ohio: South-Western College Publishing

Keyton, J. (2005). Communication & Organizational Culture: A Key to Understanding Work Experiences. Thousand Oaks, CA: Sage.

King, Fiona C. (2009). Cost Effective Training and Development Programs in the Hotel Industry during a Recessionary Period. University of Nevada, Las Vegas.

Kinnaman, D.E. (1990). Staff development: How to build your winning team. *Technology and Learning,* 11(2), 34

Konings, J. &Vanormelingen, S. (2009). The Impact of training on Productivity and Wages: Firm Level Evidence, Discussion paper No. 244, Available at SSRN.

Lewis P. & Thornhill A. (1994). The Evaluation of Training: An Organizational Culture Approach. Journal of European Industrial Training, 18 (8), 25 – 32.

Moursund, D. (1992). Empowering teachers. *The Computing Teacher, 20*(4), 6.

Persky, S.E. (1990). What contributes to teacher development in technology.

Educational Technology, 30(4), 34-38.

Riech A.H. (1983). Why I Teach. Chron. Higher Educ., 9, 27 – 31

Saxena. Kumar A. (2012). Evaluating the Training and Development Programs in the Corporate Sector: Literature Review and Research Agenda. Retrieved from http://lotus.edu.in/publication/index.php?option=com_content&view=article&id=83: evaluatingthe- training-and-development-programmes-in-the-corporate-sector-literature-review-andr & catid=36:hr&Itemid=60

Schaffer, R. H. (2002). High-Impact Consulting: How Clients and Consultants can Work Together to Achieve Extraordinary Results. San Francisco: Jossey-Bass.

Sepulveda, F. (2005). Training and Productivity: Evidence for US Manufacturing Industries, Available at SSRN.

Shelton, M., & Jones, M. (1996). Staff development that works! A tale of four T's. *NASSP Bulletin,* 80(582), 99-105.

Sims, R.R. (1993). Evaluating Public Sector Training Programs. Public Personnel Management, 22 (4), 591 – 616.

Stager, G.S. (1995). Laptop schools lead the way in professional development. *Educational Leadership,* 53(2), 78-81.

Tannenbaum S. L. & Yukl G. (1992). "Training and development in work organizations", *Annual Review of Psychology,* 2(2), 399-441

Torres, C. & Fairbanks, D. Teambuilding. (1996). The ASTD trainer's sourcebook. New York: McGraw-Hill.

Van Dyk P. S., Nel P.S., Loedolff P.V.Z., & Haasbroek, G.D. (1997). Training Management. Johannesburg: Thomson.

Wageman, R. (1997). Critical Success Factors for Creating Superb Self-Managing Teams. Organizational Dynamics, Summer, 49-60.

Wexley K. N. & Latham G. P. (1991). "Developing and training human resources in organizations (2nd ed.), *New York: Harper Collins.*

Wills M. (1998). Managing the Training Process: Putting the Basics into Practice. Journal of European Training. 18 (6), 4-28.

Quality Education and Private Universities: Challenges and Strategies in Bangladesh

Dhiman Barua * Dr. Md. Sarwar Uddin **

Abstract

Private education sector is growing rapidly in Bangladesh over the past few years. The ineluctable forces of globalization in this new millennium make this growth path more complex and challenging. The issue of quality is getting more important for achieving the goal of education particularly in higher education. This paper is mainly attempted to detect the quality measures of private universities in Bangladesh. A study was conducted to analyze the teachers' and students' evaluation on education quality of private higher education sectors in Bangladesh. The sample was taken on a random basis from eight private universities of both Dhaka and Chittagong cities. A total number of 180 respondents were taken as sample for the study. Five points likert scale type questionnaire was used to collect the opinion of the respondents. The results revealed that faculty members' quality, students' quality, infrastructure, research activity, evaluation system, academic schedule, curriculum and teaching, cost and support facility, administrative support and extra-curricular activities are associated with the education quality of private universities. The study recommends that the top management should consider the mentioned factors in policy making for ensuring quality education.

Key Words: Quality, quality dimension, private university

BGC Trust University Journal
Vol. 03, December, 2016, pp. 181 - 198
© BGC Trust University Bangladesh
ISSN : 2073- 5448

* *Lecturer, Faculty of Business Administration, BGC Trust University Bangladesh*
E-mail: dhimanbarua@yahoo.com

** *Associate Professor & Coordinator, Faculty of Business Administration, BGC Trust University Bangladesh*
E-mail: sarwaredu@gmail.com

1. Introduction

The development of a nation depends on a large extent on the nature and standard of higher education. The key aims of higher education are to generate new knowledge, explore research works on different social and development issues, anticipate the needs of the economy and prepare highly skilled workers (Ahmmed et al., 2010). The role of higher education is not limited within fostering the economic development of nations and providing opportunities for individuals, it extends also to promotion of cultural diversity, political democracy and trade.

In Bangladesh, higher education indicates education at the tertiary level beyond higher secondary level provided by the universities and the under-graduate and post-graduate colleges. There are five types of higher education available in our country in addition with vocational and madrasha education. These are- general education, science and technology and engineering education, medical education, agricultural education and distance education (Monem and Baniamin, 2010).

The growth of enrolment at the secondary level and large number of output from higher secondary examination put a pressure on admission in the higher educational institutions. In the 1990s, the government of Bangladesh felt the importance of setting up private universities because a large number of prospective students could not get admission to the public universities for very limited number of seats. For spreading the opportunity of higher education among large number of students Private University Act, 1992 was passed on 9th August in 1992.

University Grants Commission (UGC) as the apex body of the government for higher education is responsible for maintaining standard and quality in all the public and private universities in Bangladesh. The primary objectives of UGC are to supervise, maintain, promote and coordinate university education. Private universities need to receive approval from UGC to operate and award degrees.

Private universities provide opportunity to receive international level education without going abroad on market demand meeting subjects. Violation free campus, faculty members' quality, proper maintenance of academic calendar, teachers' cooperation, updated curriculum, regular class, campus location and different modern facilities are connected with students' satisfaction and attract them towards private universities (Huda et al. 2010). But, a large number of private universities have failed to meet the fundamental requirements of infrastructure facilities, fulltime qualified teachers, research facility, teaching friendly environment, rich library, sufficient administrative support and other related facilities to ensure

quality education (UGC 2007). Business motive, financial mismanagement, poor governance, improper policy seriously affect the quality of private universities in Bangladesh (Rauf et al., 2015).

No doubt, private universities in Bangladesh have contributed responding the social demand for higher education by absorbing a good number of students who otherwise could not have received university degrees. But the major issue in higher education of private universities is the quality or the degree of excellence. The present study focuses on the quality management of private universities and some related issues.

2. Literature Review

There are some studies on customers' perception of quality in higher education, quality assurance, challenges and improvement. Different scholars identified different factors to assess the quality of higher education. Very few research works separately focused on the quality management of private universities in Bangladesh. Ashraf et al. (2009) studied on quality education management of private universities in Bangladesh and identified faculty credentials, academic calendar, campus facilities, research facilities, and cost of education as the key factors that are likely to affect the quality of higher education. They also mentioned that private universities in Bangladesh charges unreasonable higher cost for quality education. Sharma (2011) stated that the standard of education of universities relies on some determinants- a) standard of students b) standard of teachers c) education system d) education facility e) research facilities. Lamanga (2002) emphasized on the quality of teaching and research, meeting demand of labor market and equity as the major variables to evaluate the education quality of private universities in Bangladesh. Abbasi et al. (2011) used ten major constructs i.e. teaching, administrative support, class room facility, transportation, library, lab facility, accommodation, medical, sports, religious facility to measure quality education. Hafiz (2005) selected six major factors to measure the quality of higher education, like- general information on higher education institutes, revenues, expenditures, personnel, education production and research and technology production. Habibullah et al. (2012) mentioned that quality of education depends on management, teaching quality, teaching method, infrastructure, update curriculum, quality of faculty members, quality of intake etc. Hoque et al . (2013) surveyed on private business schools and identified that faculty credentials, student selection system, campus facilities, evaluation system, research environment, market orientation, corporate attachment, leadership of university are involved with the

quality of business education.

Satisfaction of students is an important issue to understand the inventiveness, acceptance and accuracy of an educational system and greater satisfaction results greater level of students grooming their skill, knowledge development and higher effort to study (Sultan and Wang, 2012). Students judge the quality of institution in respect of tangibility (infrastructure and teachers), reliability, responsiveness (teaching style) and management of the institute and these factors have direct bearing on the education quality and satisfaction level of students (Navarro et al. 2005). Faruky et al. (2012) studied on the students' satisfaction of private universities and revealed that faculty credential is the most influential factor associated with the students' satisfaction. Haque et al. (2011) analyzed that teaching and learning friendly classroom, facilities for curricular and extra-curricular activities, lab facility are highly associated with students' satisfaction at tertiary education.

Universities can assure quality in higher education through updating teaching, learning and assessment methods, designing and renewing curriculum periodically, increasing administrative and educational facilities, improving knowledge and skill of faculty (Aminuzzaman, 2007). Monem and Baniamin (2010) states that proper student teacher relationship, modern teaching methods, commitment and devotion of teachers and students, academic calendar maintenance are important for improving the quality of higher education. Naser (2010) proposed some factors with specific parameter for higher education quality assurance, such as- purpose and objective, facility, student service, infrastructure, research culture, library etc. Andaleeb (2003) examined that teaching quality, methods, content, peer quality, direct facilities, indirect facilities and political climate are the major issues for the development of higher education in Bangladesh.

The problem of governance covering management, policies and practices is the greatest challenge to ensure quality at higher education in Bangladesh (Rabbani and Chowdhury, 2014). Masum (2008) evaluated some challenging issues like: access, equity, efficiency and politicization of higher education institution of Bangladesh and provided policy recommendation. Rouf et al. (2015) observed that level of education quality vary from institution to institution and beyond some universities most of the private universities depend on part time teachers, poor infrastructure, insufficient lab and library facility, without service rule. Majumder et al. (2012) sated that faculty members' training and research facility as well as motivation is low in the universities of Bangladesh. Memorization approach is followed in the higher education system rather than students' critical thinking or

analytical skill development. Masum (2008) in his book "Higher Education Governance in Bangladesh" emphasized on qualified full time faculty members and mentioned that 80 percent of faculty members of private universities should be full time.

Jamal (2002) explored the role of private universities in human resource development. The aim of the study was to analyze the effectiveness of private universities in promoting quality higher education in Bangladesh and their contribution to human resource development (HRD) in the country. He argued that despite many shortcomings, private universities provide a global flavor to their students. Salahuddin et al. (2008) detected that quality of education, fee structure, payment system, physical environment are the key factors for selecting private universities.

3. Objectives of the Study

i. To know the quality and quality dimensions in Higher Education.

ii. To assess the quality evaluation factors of private universities in Bangladesh.

iii. To recommend some suggestions for ensuring quality education.

4. Research Methodology

In this study, fifty three (53) variables were identified under ten dimensional factors through literature review and brain storming sessions with students and teachers of private universities to understand the quality of higher education institutions. Eight private universities from Dhaka and Chittagong (Dhaka-5, Chittagong-3) have been selected by using random sampling technique to conduct the study. A likert scale type questionnaire (from 1- strongly disagree to 5-strongly agree) was developed to collect the opinion of the respondents. Direct personal interview technique is used to collect the data during March to June, 2016. Data were collected from 180 respondents from the selected private universities. Among them, 80 respondents were teachers and 100 respondents were students, out of which 55 students have been taken from bachelor and the rest from graduate level. 62 percent respondents were from private universities of Dhaka region and 38 percent from Chittagong region. The respondents were evenly split between male and female. For the analysis of data, SPSS software has been used. A sophisticated method of statistics – factor analysis using varimax rotation has been used to analyze the collected data. The analysis has subjected the initial factor matrices to varimax rotation procedures (Kaiser, 1958). Varimax rotated factors matrix provides vertical common factors. The

data adequacy was tested by Kaiser-Meyer-Olkin (KMO) and the Barlett's test of Sphercity for using factor analysis. Besides primary data, secondary data have been used. Secondary data have been collected from journals, published books, government publications, magazines, web pages etc.

5. Quality and Quality Dimension in Higher Education

Quality in Higher Education has become a primary agenda of the countries worldwide. In the context marked by expansion of higher education and globalization of economic activities, education has become a national concern in developing countries with an international dimension. To cope with this changing context, developing countries have been pressurized to ensure and assure quality of higher education at a nationally comparable and internationally acceptable standard.

The term 'quality' in higher education is an ambiguous and controversial concept. Experts define quality of higher education differently from different point of views. Quality of education can be understood as a set of elements that constitute the input, process and output of the education system and provide services that completely satisfy both internal and external strategic constituencies by meeting their explicit and implicit expectations (Cheng and Tam, 1997). Quality can be defined in terms of perfection, excellence and value of money, fitness for purpose or transformation (Harvey, 2005). From academic perspective, quality is a way of describing how well the learning opportunities and support facilities are available for helping the students to reach their destination. British Quality Assurance Agency (QAA) defined academic quality as "A comprehensive term referring to how and how well, institutions manage teaching and learning opportunities to help students progress and succeed.

Customers' evaluation of the service quality of education is considered as an integral part of overall quality management. Five dimensional model (SERVQUAL) is used to assess the service quality of higher education. Five dimensions for quality are:

a) Tangibles – Infrastructure facilities, technology, service materials and personnel associated with the service delivery.

b) Reliability – Accuracy and dependability on the knowledge gathered, skill developed.

c) Responsiveness – Intention to respond the problems of customers for meeting

their demand.

d) Assurance – Customers' confidence and belief on the institution and the service received.

e) Empathy – Concentration and interest of institution to the customers.

There are five different approaches in viewing quality that are used in higher education. (Delor, 1996). These are;

1. Quality as exception (high Standards),
2. Quality as perfection or consistency (Zero defects),
3. Quality as fitness for purpose,
4. Quality as value for money,
5. Quality as transformation of the participant.

In higher education, teachers are the key agent to convert the raw students into skilled, knowledgeable and responsible generation. Faruky et al. (2012) identified faculty credentials as the most important factor in the quality management of private universities.

Teachers' academic record including foreign degree, teaching experience, professional commitment, research intention, participation in workshop and seminar at home and abroad, students care and counseling are some important variables to assess the quality of faculty members. Ethical and moral behavior of teachers guide the students to shape their personality and develop a sense of humanity. A tertiary institution is only as good as the quality of its teaching staff—they are the heart of the institution who produce its graduates, its research products, and its service to the institution, community and nation. (Materu, 2007).

University education is effected by its baseline i.e. quality of intake. Students need to have the capability to receive higher education in order to face the competitive world and market demand. Students' academic record, knowledge in English and IT, regularity to study are the common indicators of students' quality. In Bangladesh, quality of students in public universities is better than private universities due to high competition among the brilliant students in admission test where many private universities do not conduct admission test to select the intake. (Majumder et al., 2012)

Own campus, modern classroom, library, computer lab, internet and canteen facility, hostel, dormitory and other related facilities are essential for quality education.

Private universities have modern teaching materials, WIFI campuses, air conditioned classrooms, good campus location to attract students. Unfortunately many private universities are running their operations in rented buildings.

Many prospect students prefer private university over public university due to proper maintenance of academic calendar including registration, exam, result publication, class schedule (Huda et al., 2010). Private universities follow updated curriculum and offer market demand meeting subjects rather than versatile range of courses as offered by public universities. Proper student-teacher ratio, faculty members' satisfaction, assessment system are very commonly used variables to evaluate education quality.

Creation of teaching and learning environment is vital as it has a direct bearing on the academic setting.

Research facility for teachers as well as students is important ingredient to generate knowledge and knowledge based society. The key task of university is to generate and disseminate knowledge and combine theoretical and practical learnings. Research is the most vital issue for making analytical, conceptual and specialized skill (Rabbani et al. 2014). Private universities have limited focus on creating a research culture. Support or incentive from university administration for pedagogical research or initiatives is treated as a major assistance to quality improvement. University administration should value the problems of students and teachers as their highest priority and respond positively for improving quality.

Success measure of higher education is not only limited to academic achievements measured by grades, but also to overall achievements– such as communication, leadership, responsiveness, moral and ethical behavior, analytical skill, personality development and other similar qualities.

6. Private Universities in Bangladesh: The Present Scenario

In the developed countries, private universities play a vital role in the growth of education, research and knowledge along with public universities. The public universities are the main stream of higher education in our country. Due to limitations and inadequacies of public education system, the need for establishing private universities attracted attention. After passing Private University Act. of 1992, the higher education of Bangladesh obtained a new dimension. During the period of last 25 years, the number of private universities exceeded the number of public universities. Today, 82 private universities are functioning in the country though 3 more private universities got permission from University Grants Commission (UGC)

but still haven't started their academic activities. (UGC Annual Report, 2016)

Table 1: Number of Students in all Private Universities from Year 2007 to 2015

Year	Number of Universities	Total Students	Increase / Decrease	Increase / Decrease (%)
2007	51	1,70,505	+46238	+37
2008	51	1,82,641	+12136	+07
2009	51	2,00,939	+18298	+10
2010	51	2,20,752	+19813	+9.86
2011	52	2,80,822	+60070	+27.21
2012	60	3,14,640	+33818	+12.04
2013	78	3,28,736	+14096	+4.48
2014	80	3,30,730	+1994	+0.61
2015	*85	3,50,130	+19400	+5.87

Source: UGC Annual Report, 2016

The growth of private universities is represented in Table-1. According to the annual report 2016 of UGC, the total number of students of private universities in 2015 was 3,50,130 which was 5.87 percent more than 2014. In the last nine years, highest 37 percent students increased in 2007. But the rate decreased to 7 percent in 2008. There is an upward change in the number of students at each year which indicates a positive intention of students toward private universities. Almost 2.1 times students increased from 2007 to 2015. In 2015, the total number of male students of private universities was 2,55,750 and the rest 94,380 was female students, that is 73.04 percent of total students was male and 26.96 percent was female. The proportion was very much similar in 2014 and 2013. In 2015, 36.20 percent of total students was in business administration, 37.21 percent in science, medical, engineering and agriculture science, 2.78 percent in pharmacy, 22.05 percent in arts, social science and law and 1.76 percent in certificate and diploma courses. The number of students admitted to different private universities in 2015 was 1,20,842, out of which 89,709 at undergraduate level, 28,181 at graduate level and 2,952 at different certificate and diploma courses. The total number of teachers of private universities in 2015 was 15,058 having student teacher ratio of 1:23.

7. Data Analysis and Findings

For using factor analysis, the data adequacy was tested by Kaiser-Meyer-Olkin (KMO) and the Barlett's test of Sphercity. KMO measures of sampling adequacy is an index used to examine the appropriateness of factor analysis. High values (between 0.5 and 1) indicates factor analysis is appropriate. The greater the value, the higher the data adequacy of the sample study. In table: 2, KMO indicator 0.781 shows that the data is adequate near to 1. The Barlett's test of Sphercity significantly indicated high correlation among the variable showing that the appropriate chi-square statistics is 652.431 with 325 degree of freedom, 5% level of significant. The Barlett's test of Sphercity indicates that significant is valued perfectly because of significance $p<0.5$. So, factor analysis was proved to be an appropriate choice for the study.

Table 2: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.781
Bartlett's Test of Sphericity	
Approx. Chi-Square	652.431
df	325
Significance	.000

Table 3: Total Variance Explained

Component	Initial Eigen values			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.097	29.938	29.938	8.097	29.938	29.938	5.701	16.906	16.906
2	5.362	15.005	44.943	5.362	15.005	44.943	4.892	13.319	30.225
3	4.428	10.355	55.298	4.428	10.355	55.298	4.314	12.196	42.421
4	2.803	7.289	62.587	2.803	7.289	62.587	3.564	10.140	52.561
5	2.350	6.434	69.021	2.350	6.434	69.021	3.188	8.914	61.475
6	2.058	5.883	74.904	2.058	5.883	74.904	2.807	7.806	69.281
7	1.984	5.144	80.048	1.984	5.144	80.048	2.578	6.975	76.256
8	1.722	4.249	84.297	1.722	4.249	84.297	2.013	5.764	82.020
9	1.305	3.019	87.316	1.305	3.019	87.316	1.530	4.195	86.215
10	1.001	2.398	89.714	1.001	2.398	89.714	1.049	3.499	89.714

Source: Field survey

A principal component factor analysis was conducted on 53 variables related to the quality education of private universities. This analysis yielded 10 factors solution that explained 89.714% of the variance (table: 3). that is 10.286% variation could be explained by other factors, which were not included in the study. The principal component factor analysis with rotated factor loadings presented in table: 4.

Extraction Method: Principle Component Analysis

Table 4: Rotated Factor Matrix for Quality Education

variable	Factor-1	Factor-2	Factor-3	Factor-4	Factor-5	Factor-6	Factor-7	Factor-8	Factor-9	Factor-10
V1	.72									
V4	.76									
V5	.69									
V13	.71									
V20	.67									
V22	.73									
V2		.78								
V3		.72								
V6		.67								
V7		.61								
V21		.69								
V8			.80							
V9			.73							
V28			.71							
V29			.63							
V30			.68							
V37			.62							
V38			.70							
V14				.72						
V15				.75						
V16				.69						
V39				.71						
V40				.67						
V10					.71					
V26					.68					
V27					.69					
V34					.70					
V35					.67					
V45					.65					
V31						.74				
V47						.72				
V48						.69				
V32							.75			
V33							.73			
V36							.70			
V41							.68			
V46							.71			
V49							.65			

V50							.64			
V17								.78		
V18								.69		
V24								.75		
V25								.64		
V42								.67		
V11									.71	
V12									.72	
V19									.63	
V43									.62	
V44									.70	
V23										.68
V51										.74
V52										.71
V53										.69
Eigen Value	8.097	5.362	4.428	2.803	2.350	2.058	1.198	1.722	1.305	1.001
Variance	29.938 %	15.005 %	10.355 %	7.289 %	6.434 %	5.883 %	5.144 %	4.249 %	3.019 %	2.398 %

Source: Field survey

The first factor "faculty members' quality" is the most important one which accounting for the largest proportion of the variance (29.938%). The initial eigen value of this factor is 8.097. This most important factor consists of six variables, namely- Academic record of faculty members (V1), Teaching experience and skill (V4), Communication skill of faculty members (V5), Research activity of faculty members (V13), Commitment and devotion of faculty members (V20), Moral character of faculty members (V22). The factor loading points of these variables are considerably higher than .60. Hence the top management of private universities should be more concerned about these variables for increasing the education quality.

The second most important factor is the "students' quality". The variables included in this factor are: Academic record of students (V2), Proper admission test (V3), Presentation and communication skill of students (V6), Knowledge in English and IT (V7), Students' commitment to study (V21). This factor accounts for 15.005% of the variance. The loading of the variables of this factor are .78, .72, .67, .61, .69 respectively which shows the importance of the variables to measure the quality of education. Many private universities don't take any admission test to select students. Quality education cannot be ensured before ensuring the quality of students.

The third most important factor is the infrastructure, which explains 10.355% of the variation of education quality. This factor includes Well-structured own campus (V8), Sufficient modern classroom (V9), Library, computer lab and internet facility (V28), Canteen facility (V29), Transport facility (V30), Location and natural environment

(V37), Hostel and dormitory facility (38). The factor loading points of these variables are higher than .60. Thus the infrastructure facility is an important measure to understand the education quality of private universities.

The next most important factor is the "research facility". The variables included in this factor are: Research facility to students (V14), Research facility to teachers (V15), Teachers' training facility (V16), Publication facility (V39), Research motivation (V40).This factor accounts for 7.289% of the variance. Since the research facility is still low in private universities in Bangladesh, the policy should focus on it for ensuring quality in higher education.

The fifth important factor is the "students' evaluation system", which accounts for 6.434% of the variance and broadly covers- Standard question and marking system (V10), Assignment and presentation (V26), Case study and VIVA (V27), Fairness and transparency (V34), Online result publication (V35), Performance evaluation of teachers (V45).The loading of the variables of this factor are .71, .68, .69, .70, .67, .65 respectively which shows the importance of the variables to understand the quality of education.

Sixth factor is named as "academic schedule "which accounts for 5.883% of the variance of education quality. Proper academic schedule (V31), Strictly maintenance of schedule (V47), Recovery provision (V48) are the variables under this factor and the factor loading points of these variables are also higher than .60.

The next most important factor is the "curriculum and teaching". The variables included in this factor are: Update and standard curriculum (V32), Market demand meeting subjects (V33), Student- teacher ratio (V36), Teachers' support and care (V41), Teachers' turnover rate (V46), Number of full time teachers (V49), Teachers' exchange program (V50).This factor accounts for 5.144% of the variance.

Eighth factor is named as "cost and support facility "which accounts for 4.249% of the variance of education quality. Tuition fee (V17), Flexible payment system (V18), Scholarship and waiver (V24), Seminar and workshop (V25), Job fair and placement (V42).The factor loading points of these variables are higher than .60. Thus the cost and support facility is an important measure to understand the education quality of private universities.

The next factor is the "administrative service", which accounts for 3.019% of the variance and broadly covers - Quick response from administration (V11), Administrative friendliness (V12), Modern information system (V19), Quality improvement support (V43), Foreign affiliation (V44).

The last factor is the "extra-curricular activities" which accounts for 2.398% of the variance and broadly covers -Publication of newsletter and magazine (V23), Arranging sports and cultural program (V51), Participation in social welfare activities (52), Students inner merit development facility (V53).The factor loading points of these variables are also higher than .60. Thus the policy makers should focus on increasing extra-curricular activities to ensure education quality of private universities in Bangladesh.

8. Strategies

In the light of literature review and empirical investigation, some strategies may be recommended by the study in order to ensure quality education in private universities of Bangladesh.

i. Quality education rests on the quality of freshers. Thus, private universities should arrange fair admission test for ensuring the quality of intake students.

ii. Affordable and reasonable tuition fee should be charged and more scholarship and waiver facility should be provided to make the education available for all.

iii. Teachers and students should be given better research facility to improve their knowledge and skill.

iv. Private universities should have well-structured permanent campus having hostel, dormitory and transport facilities to make the education easier and to ensure quality education.

v. Profit maximization motive of private investors in education has been minimizing the social responsibility objective of education including quality. Owners of private universities should not consider education from business perspective.

vi. Practical, creative and case study based teaching and evaluation system should be promoted.

vii. Administration should be responsive and supportive to ensure teaching and learning friendly environment for quality education.

viii. Extra-curricular activities including sports, culture, and social welfare should be enhanced to ensure students' inner development.

9. Conclusion

In the context of massive expansion of the country's secondary and higher education, a high demand has been created in the tertiary level. Establishment of private universities released the public universities from the pressure of large scale

admission seekers for the limited number of seats. The Private University Act. 1992 mentioned that the main objective of private universities is to meet the growing demand of the higher education and to create skilled manpower for the economic development of the country. Though private universities are contributing much in higher education in Bangladesh but the quality of education is still in the rudimentary stage. This study has shed the light on the dimensions perceived by teachers and students as associated with education quality. These dimensions are faculty members' quality, students' quality, infrastructure, research activity, evaluation system, academic schedule, curriculum and teaching, cost and support facility, administrative support and extra-curricular activities. This study concludes that the issues considered here should be addressed more carefully by the policy makers of private universities to ensure the quality of education in Bangladesh.

10. Limitations and Future Research

This study spawns a number of limitations and potential specific directions for future research. The size of the sample is small. The research would have been more reliable if a greater size of the sample had been used. The respondents were selected from only eight private universities of two cities. It could be more realistic if the respondents were selected from a large number of private universities of different cities. Sometimes cost of education is considered as a signal of quality of private universities that has not been focused in this study. Limitations also included time and cost constraints. It was difficult to gather all the members of the focus group together at one venue, non serious attitude of people towards questionnaire filling. It is highly recommended future research to address all these concerns as much as possible.

References

Abbasi, M. N. et al. (2011). "A Study on Student Satisfaction in Pakistani Universities: the case of BahauddinZakariya University, Pakistan", Asian Social Science, Vol. 7, No. 7, PP. 209-220.

Ahmed, I. et al. (2010). "Does Service Quality Affect Students' Performance? Evidence from Institute of Higher Learning". African journal of business management, Vol. 4, No.12.

Aminuzzaman, S. (2007). "Overview of quality assurance in the context of Bangladesh", Paper presented in a workshop organized by American International University Bangladesh, Dhaka, Bangladesh.

Andaleeb, S. S. (2003). "Rejuvenating the Nation's Higher Education System",

Proceeding of the workshop organized by International University of Business Agriculture and Technology, Dhaka, Bangladesh.

Ashraf, M. A., Ibrahim, Y. andJoarder, M. H. R. (2009). "Quality Education Management at Private Universities In Bangladesh: An Exploratory Study",Jurnal Pendidikdan Pendidikan, Jil. 24, PP. 17–32.

Cheng, Y. C. and Tam, W. M. (1997). "Multi-models of Quality in Education, Quality Assurance in Education".

Delors, J. and et al. (1996). "Learning the Treasure within, Report to UNESCO of the International Commission on Education for the Twenty-first Century. Paris: UNESCO.

Faruky, K. N. B., Uddin, M. A. and Hossain, T. (2012). "Students' Satisfaction: A Study among Private University Students of Bangladesh", World Journal of Social Sciences, Vol. 2, No. 4, PP. 138-149.

Habibulah, M.,Rouf, M.A. and Rana, M. (2012)."Perception ofFactors Affecting the Quality of Higher Education: A Study on Selected Private Universities of Bangladesh", InternationalJournal of Information, Business and Management, Vol. 4, No. 2, PP. 02-12.

Hafiz, G. A. S. (2005). Quality Assurance in Conventional Private Universities of Bangladesh: Problems and Prospects. Social Science Review, 1(2).

Haque, H. M. J., Das, D. and Farzana, R.(2011). "Satisfaction of student services in tertiary level: perspective Bangladesh", European Journal of Social Sciences, Vol.19, No.2.

Harvey, L. ("A History and Critique of Quality and Evaluation in the UK", Quality Assurance in Education. Vol. 13, No. 4, PP. 263-276.

Hoque, N. et al. (2013). "Quality of Education in Bangladesh: A survey on Private Business Schools". Information and Knowledge Management, Vol. 3, No. 5, PP.117-126.

Huda, SSM, S. et al. (2010). "The State of Private Universities in Bangladesh: An Evaluation of Students Perception", Information Management and Business Review Vol. 1, No. 1, PP. 16-27.

Jamal, S. A. N. M. (2002)."Role of Private Universities in Human Resource Development", Retrieved February 24,2009, from http: //www.international.ac.ukresources/role%20of%20private%20universities%20in% 2 0human%20 resource%20development %20in%20bangladesh.pdf.

Lamanga, C. Z. (2002). "Strategic view of the development of Higher Education:

Bangladesh", AIUB perspective. Dhaka: A1 Publication.

Masum, M. (2008) "Higher Education in Bangladesh: Problems and Policies", Journal of the World Universities Forum, Volume 1, No. 5.

Materu, P. (2007)."Higher Education Quality Assurance in Sub-Saharan Africa Status, Challenges, Opportunities, and Promising Practices", World Bank Working Paper No.124, Africa RegionHuman Development Department.

Mazumder, Q.H., Karim, M.R. and Bhuiyan, S.I. (2012). "Higher Education Quality Improvement in Bangladesh",Paper no: AC2012-5127, 119th ASEE Annual Conference, June 10-13, 2012.

Monem, M. and Baniamin, H. M. (2010). "Higher Education in Bangladesh: Status, Issues and Prospects", Pakistan Journal of Social Sciences, Vol. 30, No. 2, PP. 293-305.

Naser, M. A. (2010). "Education quality of private universities in Bangladesh: faculty resources and infrastructure perspective", viewed on 16th may, http: //mppg-nsu.org/attachments/119_Nasr_edu.pdfNichols, H. J. 1985, 'Black college student satisfaction as a measure of effectiveness of higher education', Unpublished doctoral dissertation, Kent State University, Kent, Ohio.

Navarro, M. M., Iglesias M. P. and Torres, P. R. (2005a). "A new management element of universities: satisfaction with the courses offered",International Journal of EducationManagement, Vol. 19, No. 6, PP.505-526.

Rabbani, G. and Chowdhury, S. (2014). "Quality of Higher Education in Bangladesh: Governance Framework and Quality Issues",Beykent University Journal of Sciences, vol. 7, No. 1, PP. 78- 91.

Rouf, M. A., Habibullah, M. and Islam, M. A. (2015). "Opinion on the Higher Education of Private Universities in Bangladesh", International Journal of Education and Information Technology, Vol. 1, No. 3, PP. 80-86.

Salauddin, M., Islam, R., and Akbar, D.(2008). "How Can We Increase the Quality of Private Schools in Bangladesh from the Perspective of Students and Managers?" International Journal of ManagementPerspective,Vol. 2,No. 1, PP.1-17.

Sarma,B.(2011). "Private Universities in Bangladesh",Blitz Comprehensive Tabloid Weekly, viewed May 14 2012, www.weeklyblitz.net/1633/private-universities-in-bangladesh.

Sultan,P. and Wong,H.Y., (2012), Service quality in a higher education context: an integratedmodel, Asia Pacific Journal of Marketing and Logistics, Vol. 24 No. 5, pp. 755-784, Emerald Group Publishing Limited.

University Grants Commission (UGC) of Bangladesh, Annual Report: 2007.

University Grants Commission (UGC) of Bangladesh, Annual Report: 2013.

University Grants Commission (UGC) of Bangladesh, Annual Report: 2016.

Annexure: 1. List of variables

V1	Academic record of faculty members	V28	Library, computer lab and internet facility
V2	Academic record of students	V29	Canteen facility
V3	Proper admission test	V30	Transport facility
V4	Teaching experience and skill	V31	Proper academic schedule
V5	Communication skill of faculty members	V32	Update and standard curriculum
V6	Presentation and communication skill of students	V33	Market demand meeting subjects
V7	Students' knowledge in English and IT	V34	Fairness and transparency
V8	Well-structured own campus	V35	Online result publication
V9	Sufficient modern classroom	V36	Student- teacher ratio
V10	Standard question and marking system	V37	Location and natural environment
V11	Quick response from administration	V38	Hostel and dormitory facility
V12	Administrative friendliness	V39	Publication facility
V13	Research activity of faculty members	V40	Research motivation
V14	Research facility to students	V41	Teachers' support and care
V15	Research facility to teachers	V42	Job fair and placement
V16	Teachers' training facility	V43	Quality improvement support
V17	Tuition fee	V44	Foreign affiliation
V18	Flexible payment system	V45	Performance evaluation of teachers
V19	Modern information system	V46	Teachers' turnover rate.
V20	Commitment and devotion of faculty members	V47	Strictly maintenance of schedule
V21	Students' Commitment to study	V48	Recovery provision
V22	Moral character of faculty members	V49	Number of fulltime teachers
V23	Publication of newsletter and magazine	V50	Teachers' exchange program
V24	Scholarship and waiver	V51	Arranging sports and cultural program
V25	Seminar and workshop	V52	Participation in social welfare activities
V26	Assignment and presentation	V53	Students inner merit development facility
V27	Case study and VIVA		

Employees' Perception towards Herzberg's Hygiene Factors at Private Commercial Banks of Bangladesh: An Empirical Study

Mohd. Kamal Uddin *

Abstract

Banking sector is a prime mover in the economic development of a country. Bangladesh is a third world country with an under developed banking system, especially in terms of the customer care and services provided by the public sector banks. Private sector banks have made a notable progress in extending the frontiers of banking both geographically and functionally and, consequently, cover a wider area and much larger segment of population than ever before. This paper studies employees' perception towards Herzberg's hygiene factors at private commercial banks of Bangladesh and provides a view of the current evidence of such a relationship. The sample includes some conveniently chosen private banks from various location mainly urban areas of Bangladesh with a minimum of 120 employees for the last financial year. Virtually all banking services are concentrated in urban areas. The questionnaire was developed by using a five point Likert scale. In this study, some statistical measures such as Mean, Proportion Analysis and Z-test are used to examine employee's perceptions. The primary and secondary data collected from different sources have been interpreted meaningfully. The study depicts that bank employees perceive most of the hygiene factors negatively such as company policy and administration, supervision, personal life, job security and other working conditions but hold good perception toward the three factors like remuneration, relationship with Peers and subordinates. All job factors exercised in the private commercial banks of Bangladesh do not satisfy the employees equally. The paper concludes with recommendations for future research by applying different levels of analysis on exploring the motivational practices on employee performance for the betterment of the quality of banking services rendered.

Key Words: Employee Motivation, Hygiene Factors, Bank Employees, Private Commercial Banks

BGC Trust University Journal
Vol. 03, December, 2016, pp. 9 - 34
© BGC Trust University Bangladesh
ISSN : 2073- 5448

* *Assistant Professor, Faculty of Business Administration, BGC Trust University Bangladesh*

1.0 Introduction

Economic development of a country requires a well-organized, smooth, easy to reach and efficient saving-investment process. Banks play a vital role in the development process of the country through financing industrial sector, local and foreign trade, and allocation of funds to various self-employment and off-firm employment concerns. In the investment arena of the country, banks play an important role by mobilizing people's savings into the form of deposits. Bank organizations try to offer high quality services, maximize customers (both the depositors and the loners) loyalty, gain higher market share, higher profitability, and finally customer satisfaction which are the ultimate goal of any business. In competitive and unpredictable phenomena, organizations try to keep and enhance their place. In service rendering business such as banking sector, employees have significant effect on organizational performance. The effort and contribution of employees is a key competitive advantage and is crucial to the success of the firm (Bent & Freathy, 1997). Organizations strongly desire job satisfaction from their employees (Oshagbemi, 2003). Due to important role of human resource on organization performance, they try to keep employees satisfied. Companies spend millions of dollars every year recruiting, training and compensating their personnel in an effort to inspire them to perform well and thus increase company profits (Susan, 2003). An unmotivated workforce could lead to high supervision costs, high absenteeism, and high turnover rates. Breed and Breda (1997) indicated that job satisfaction may affect absenteeism, complaints, and labor unrest. Therefore, it is understood that satisfied workers will be much more productive and be retained within the organization for a longer period, in contrast to displeased workers who will be less useful and who will have a greater tendency to quit their jobs (Crossman, 2003). More importantly, satisfied workers not only perform better but also provide better service to customers, which could result in improving customer satisfaction. According to Dawson (2005), employee satisfaction is associated with positive employee behavior. It is undeniable that satisfied workers generate customers who are satisfied and loyal.

A healthy banking system depends on the efficient performance of sound executives. Success of a bank, being a service oriented organization, depends on the employees' performance, efficiency, honesty, diligence and integrity. Under Herzberg's (1966) theory, workers who are satisfied with both motivation and hygiene factors would be top performers, and those who are dissatisfied with both factors would be poor performers. The paper is a theoretical exploration of literature and methodology for an empirical study intended to enrich the existing stock of

knowledge for motivation of people involved in banking profession based on the Herzberg's theory. The empirical study will identify specific motivational factors that should be incorporated into the human resource practices of the bank organization which in turn would, assuming other factors are constant, enhance the employees' ability to render quality services.

2.0 Background and Rationale of the Study

In 1968, Behling, Labowitz, and Kosmo reviewed the controversy surrounding Herzberg's duality theory and the more conventional uni-scalar approach to measuring satisfaction. The debate began with the publication of Herzberg's book The Motivation to Work (1959), in which interviews with 200 engineers and accountants were outlined. Subjects were asked to describe 'any kind of story you like - either a time when you felt exceptionally good or a time when you felt exceptionally bad about your job'. Over the course of twelve investigations in similar organizations, Herzberg classified the work dimensions into motivators and hygiene factors. Motivators were the satisfying events described in his study and other events pointed as hygiene factors and he noticed that they were primarily disruptions in the external work context, while the motivators dealt with internal states of mind.

Although a handful number of studies have been done in the banking sector in Bangladesh on motivating bank employees, those are lacking the inclusion of application and conceptualization of early motivation theories, let alone Herzberg's theory. It is from this conclusion that the study using Herzberg's theory on motivation has been proposed for identifying hygiene elements and measuring level of employees' perception towards these elements in the private sector banks of Bangladesh.

The author of the paper agrees with Smerek and Peterson (2007), who stated, "Testing a theory is not always an appropriate means to determine its value." A theory that stands the test of time, integrates itself into basic points of view about managing people, and continues to provide ideas for new generations of scholars is a theory that has proven its value. Herzberg's two-factor theory of job satisfaction belongs to this category. Findings of this study will identify critical factors of motivation and recommend them for inclusion in motivation enhancement strategies. The study will also contribute to the body of research knowledge in employee motivation of banking sector in a developing country like Bangladesh through validation of Herzberg's two factor theory of Motivation.

3.0 Literature Review

Frederick Herzberg (1959) explained 'Two Factor Theory' also known as 'Motivator Hygiene Theory' which attempts to explain satisfaction in the workplace. Theoretically, Gawel (1997) opined that Herzberg's two factor theory of motivation of employees is constructed on a two-dimensional set of factors affecting employees' attitudes to work. The first set of factors consists of hygiene factors such as company policies, supervision, relationship with peers and subordinates, job security, personal life, working conditions, and salary. According to the theory, the absence of hygiene factors can create job dissatisfaction, but their presence does not motivate or create satisfaction. This is contrasted with a second set of factors Herzberg called motivators which enrich an employee's job. These are termed strong determinants of job satisfaction and include: recognition, work itself, responsibility, growth and advancement. These motivators (satisfiers) are associated with long-term positive effects in job performance while the hygiene factors (dis-satisfiers) consistently produce only short-term changes in job attitudes and performance, which quickly fall back to its previous level (Loiseau, 2011). Herzberg's two-factor theory is widely renowned as a practical approach towards motivating employees. Motivating factors are those aspects of the job that make people want to perform, and provide people with satisfaction. These motivating factors are considered to be intrinsic to the work carried out. Schemerhorn (1993) asserts that Herzberg's two-factor theory is a useful reminder that there are two important aspects of all jobs: what people do in terms of job tasks (job content), and the work setting in which they do it (job context).

The two-factor theory was tested by many other researchers, who showed very different results. Some research has shown that some of the factors declared by Herzberg (1966) as hygiene factors are actually motivators. Extensive commentary has emerged about how to distinguish between hygiene factors and motivators. While some factors have proved to fall clearly in one of the two categories, other factors, particularly salary, have proven to be ambiguous as to whether they are motivators or a hygiene factors. The results of Herzberg's theory can vary if the test is conducted in different environment / industries and in different times. The differences are due to the intensity of the labor requirement and the duration of employment (Nave, 1968).

Namuddu (2008) applied Herzberg's two factor theory to understand the performance of Sebagala and Sons, a private supplier of electric equipment in Uganda. With a purposive sample of 60 respondents, she focused her study on

salary, company policy, career development, and causes of higher turnover rate. Her study revealed that most employees would leave due to job insecurity and if offered better pay elsewhere.

Kwasi and Amoako (2011) justified, through exploratory literature, for application of Herzberg's theory in Ghana context given relevancy of hygiene and motivation factors and Africa in general to employment conditions. The paper calls for re-assessment of the thinking that workers rate motivators higher than hygiene factors which forms part of the proposed study.

The two-factor theory was also tested among construction workers in Bangkok (Ogunlana & Chang, 1998). The study did not provide support for the theory, but it was hypothesized that the conflicting results were due to the lower placement of Thailand's construction workers on Maslow's hierarchy of needs. Because survival was still a basic need of these workers, they were not able to desire self-actualization and place value on Herzberg's motivators (Ogunlana & Chang, 1998).

Chien (2013) tested the validity of Herzberg's two factor theory and found it to be plausible for studying job satisfaction among employees in a Chinese chemical fiber company. He proposed to management areas of improvement as workforce planning, succession planning and clarity of performance standards.

Organizations that desire to improve their customer satisfaction must be concerned about internal issues related to employees' satisfaction and view their employees as customer too (Harter et al., 2002; Wangenheim et al., 2007). Satisfied employees would produce superior performance in optimal time which leads to increase profits. Farrell and Stamm (1988) draw the conclusion that high employee satisfaction will reduce the happening of the absenteeism, accident, and employee stress, improve employee satisfaction with life and thus increase productivity and profits. Employees' job satisfaction in organizations and institutions has given close attention by researchers since mid-twentieth century after the emergence of Maslow's theory of Need Hierarchy in 1943. Literature in this area is filled with various analytical studies (Ajayi, 1998; Chimanikire et al., 2007; Williams, 1998).

The theory, however, provides a satisfactory framework for studying motivation. Therefore efforts to validate the theory should be continued in respect of other similar organizations in an effort to improve employee motivation and job satisfaction.

4.0 Research Gap Explored

On the basis of the above discussion, the author of this paper explores a significant research gap which clarifies the essence of the objectives of the study. Although a number of researches are undertaken on this significant issue based on Frederick Herzberg's 'Two Factor Theory' in the world, Bangladesh clearly lacks behind and suffers from the scarcity of empirical studies on it. Hence, there is a need to conduct more research addressing the hygiene and motivational factors. The author also finds another research gap in the banking sector as it is having no fruitful study on the hygiene issues of its executives to the view point of the application and conceptualization of early motivation theories, let alone Herzberg's theory. The above literature survey finds the application of Herzberg's theory in Ghana context given relevancy of hygiene and motivation factors and Africa in general to employment conditions, in Uganda on a private supplier company of electric equipment, in Bangkok among construction workers, in China on a Chemical fiber company for studying employees' job satisfaction. But Banking sector remains maiden and away from in-depth research in the dimensions of Herzberg's hygiene factors to the view point of its human resources on which present paper focuses.

5.0 Objectives of the Study

The main objective of this paper is to study employees' perception on the Herzberg's hygiene factors at private commercial banks of Bangladesh and provides a view of the current evidence of such a relationship. To that end, the specific objectives are:

1. To provide a brief discussion on Frederick Herzberg's 'Two Factor Theory' in the literature.

2. To focus the dimensions of Herzberg's hygiene factors to the view point of bank executives.

3. To test the significance of each of the factors upon which bank employees opined.

4. To examine the dissatisfied variables in the workplace which usually affect employees' level of satisfaction.

5. To put forward some suggestions for improving bank employees' level of perception.

6.0 Methodology

The target population of this study is employees serving as a banker of different private banks in Bangladesh. The sample includes some conveniently chosen 15

private commercial banks located preferably in the Chittagong urban areas with a minimum of 120 employees for the last financial year. Virtually all banking services are concentrated in urban areas. A self administered questionnaire in a 5-point scale has been used in the survey because it is considered as most appropriate tool to gather information about viewpoints of respondents (Morgan et al., 1995). The questionnaires consisted of a set of Likert-type scales multiple-choice items (Rodeghier, 1996). In the measurement, scale, 1 indicates strongly disagree and 5 indicates strongly agree. In considering the respondents' freedom of choice, subjective explanations of the numbers between the bipolar scales were not provided. In this study, some statistical measures such as Mean, Proportion Analysis and Z-test are used to examine employee's perceptions. The primary and secondary data collected from different sources have been interpreted meaningfully.

7.0 Limitations of the Study

The findings obtained from the questionnaire administered in this study are limited by the perceptions and opinions of the respondents. It is assumed that the respondents have answered the questions correctly and honestly. Studies on motivation using Herzberg's theory have cautioned on generalization of findings and recommend application of the theory in other environments as motivation differs in workplaces and under different environments. Like any study, design of current study is subject to some other general shortcomings. This study exclusively used questionnaire to poll level of employees' perceptions in the private banks by considering only eight facets of Herzberg's hygiene or dissatisfied dimensions. There are many other factors those are not considered in this study due to the shortage of time and funding constraints.

Scope of the study has been confined to the branches of chosen private banks located in the district of Chittagong only. Due to limited size of the sample size, conclusions reached by this survey may not be entirely applicable to whole banking sector. Some respondents were not aware of certain aspects of hygiene issues. A few respondents felt hesitation and seem to be quite reluctant to provide details. There might be a sense of bias crept in answers given by the respondents.

Herzberg's theory itself has some of the limitations those are criticized in the literature. Several criticisms of them are: a) the theory appears to be bound to the critical incident method; b) the theory confuses events causing feelings of satisfaction and dissatisfaction with the agent that caused the event to happen; c) the reliability of the data could have been negatively impacted by ego-defensiveness on the part of the employee; d) factors overlapped as sources of

satisfaction and dissatisfaction; e) the value of the factors differed as a function of the occupational level of the employee; and f) the theory avoids the part played by individual differences among employees (Gaziel, 1986). On the other hand, Herzberg was highly criticized by psychologists who said he had investigated a narrow range of jobs, and used only one measure of job attitudes (Ewen, 1964). Researchers also argued that Herzberg was uncovering people making themselves "look good" by attributing positive events to internal factors and negative experiences to external events (Vroom, 1964).

Despite the criticisms, Herzberg's Theory is valid and is widely accepted because of its theoretical and practical simplicity and has been endorsed by most researchers (Idris & Wan, 2012; Malik & Naeem, 2012).

8.0 Hypothesis Development

In order to evaluate the level of perceptions of the bank employees regarding the dis-satisfiers provided Frederick Herzberg in his 'Motivator Hygiene Theory', the following hypotheses are formulated:

H1: The private banking sector employees bear a positive view with the existing Company Policy and Administration

H2: The private banking sector employees have a positive perception on the current Supervisory activities

H3: The private banking sector employees have a positive perception with the current level of Pay

H4: The private banking sector employees bear an affirmative view on the Relationship with Peers / Colleagues

H5: The private banking sector employees bear an affirmative view on their Personal life

H6: The private banking sector employees have a positive perception on the Relationship with Subordinates

H7: The private banking sector employees have a positive perception on the Work conditions

H8: The private banking sector employees have a positive perception with the Personal and Job Security

9.0 Data Analysis and Findings

H1: The Private Banking sector Employees bear a positive view with the existing Company Policy and Administration

This hypothesis indicates that employees have an affirmative perception on the existing Company Policy and Administration. Table below shows that at 5 percent level of significance in the two tailed test, table value of 1.96 is less than calculated value (Z =9.23). So, the null hypothesis is rejected and hence, inference can be made that employees do not have positive perception with the prevailing organizational policy and company administration system of their banks.

H2: The Private Banking sectors Employees have a positive perception on the current Supervisory activities

This hypothesis indicates that banking sector Employees have a positive perception on the current Supervisory activities. Table below shows that at 5 percent level of significance in the two tailed test, table value of 1.96 is less than calculated value (Z = 8.47). So, the null hypothesis is rejected and hence, we conclude that employees perceive negatively on the current mode of supervisory functioning of their banks.

H3: The Private Banking sectors Employees have a positive perception with the current level of Pay

It is assumed from this hypothesis that employees have a positive perception with the current level of Pay or Remuneration Banks offer. Table below states that at 5 percent level of significance in the two tailed test, table value of 1.96 is greater than the calculated value (Z = 0.23). So, the null hypothesis is accepted and hence, inference can be made that bank employees have a positive perception with the current level of remuneration.

Herzberg's Hygiene Factors	No. of Respondents	Mean	Standard Deviation	Standard Error	Z Value (Calculated)
Company Policy and Administration	120	3.01	0.91	0.13	9.23
Supervision	120	2.30	1.06	0.12	8.47
Pay	120	2.99	0.98	0.12	0.23
Relationship with Peers	120	3.02	1.01	0.12	0.26
Personal life	120	2.60	1.08	0.11	5.37
Relationship with Subordinates	120	3.07	1.02	0.12	0.45
Work conditions	120	3.15	0.99	0.11	8.37
Job Security	120	3.03	0.96	0.14	6.27

H4: The Private Banking sector Employees bear an affirmative view on the Relationship with Peers / Colleagues

It is assumed from this hypothesis that employees bear an affirmative view on the Relationship with Peers / Colleagues. Table above shows that at 5 percent level of significance in the two tailed test, table value of 1.96 is greater than the calculated value (Z =0.26). So, the null hypothesis is accepted and hence, we conclude that bank employees have a positive perception towards the Relationship with Peers / Colleagues.

H5: The Private Banking sector Employees bear an affirmative view on their Personal life

This hypothesis indicates that banking sector Employees bear an affirmative view on their Personal life. Table above shows that at 5 percent level of significance in the two tailed test, table value of 1.96 is less than calculated value (Z =5.37). So, the null hypothesis is rejected and hence, we conclude that employees are in the difficult mood to have a work-life balance as they experience excessive job pressure and have little time to pay attention to their personal and family life.

H6: The Private Banking sectors Employees have a positive perception on the Relationship with Subordinates

It is assumed from this hypothesis that employees hold a positive perception on the relationship with subordinates. Table above shows that at 5 percent level of significance in the two tailed test, table value of 1.96 is greater than the calculated value (Z =0.45). So, the null hypothesis is accepted and hence, it can be inferred that bank job holders maintain a good relationship with their subordinates and they think such a fair relationship comply with smooth functioning.

H7: The Private Banking sectors Employees have a positive perception on the Work conditions

It is assumed from this hypothesis that banking sector employees have a positive perception on the existing work conditions. Table above shows that at 5 percent level of significance in the two tailed test, table value of 1.96 is less than calculated value (Z =8.37). So, the null hypothesis is rejected and therefore, it can be inferred that bank executives feel unfavorable work terms and conditions being confined to observe the hard and fast duties and responsibilities.

H8: The Private Banking sectors Employees have a positive perception with the Personal and Job Security

This hypothesis indicates that banking sector employees have a positive perception with the Personal and Job Security. Table above shows that at 5 percent level of significance in the two tailed test, table value of 1.96 is less than calculated value (Z = 6.27). So, the null hypothesis is rejected and therefore, we conclude that bank executives feel insecurity in the context of the job and personal matter.

10.0 Directions for Future Research

Given the scarcity of empirical studies on the commercial banking sector of Bangladesh, there is a need to conduct more research addressing the hygiene and motivational issues of bank executives. In addition, this study incorporates only the private sector. Hence, future research may include both the private and public sector banks and provide a comparison between the two notable sectors. Although quantitative research is used in this study, it is believed that qualitative research would be beneficial in enhancing our perceptions of how bank executives are motivated. Hence, it is recommended to use qualitative methods beside quantitative methods in future researches to get more accurate results. Further, there are many other factors that can be considered to determine employees' perceptions toward job which can be added to expand the study in future.

It also must be noted that the paper focuses only on Herzberg's theory. It is suggested that future research would be based on other theories of job satisfaction and explore other factors of motivations such as feedback, leadership styles, employee commitment, employee empowerment and employee confidence etc., to see whether they could result in any increased variance in perception and satisfaction towards banking profession. In addition, the research questions developed for this study could be expanded to include the influence of other motivational practices and environmental factors on corporate banking performance.

11.0 Conclusion and Recommendations

In Bangladesh, the banking industry becoming more competitive than ever, private and public sector banks are competing each other to perform well. The executives of the banks are now in the position to modify their traditional human resources practice into innovative human resources practices in order to meet the challenges from other competitive banks. Herzberg's motivation-hygiene theory has received widespread attention because of its having a practical approach toward motivating employees. In 1959, Herzberg published his analysis of the feelings of 200 engineers and accountants from over nine companies in the United States. Herzberg

perceived motivational and hygiene factors to be separated into two dimensions affecting separate aspects of job satisfaction. This belief differed from the traditional approach of viewing job satisfaction and dissatisfaction as opposite ends of the same continuum (Herzberg, 1966). Hygiene factors prevent dissatisfaction but they do not lead to satisfaction. They are necessary only to avoid bad feelings at work. On the other hand, motivators are the real factors that motivate employees at work.

The results found in this paper reveal that only three of the eight factors are well perceived by the bank employee respondents and those are Pay, Relationship with Peers and Relationship with Subordinates. Contrary to the finding of Herzberg (1966), the analysis finds that the strongest motivation factors with the highest level on job satisfaction in the private banking sector are the Pay, Relationship with Peers and Subordinates which are treated hygiene factors in the 'Two Factor' theory.

Corporate banking sector Companies nowadays is forced to function in a world full of change and under various complications, and it is more important than ever to have the right employees at the right job with the right qualification and experience in order to survive the surrounding competition. Improved job performances of the employee will add value to the organization itself and to the employee's productivity. A highly motivated employee invests his / her best hard work in carrying out each and every aspect of his duties and responsibilities. Banking sectors need to radically change company policies and the system of Administration for motivation of employees and to ensure employees' positive perception that would match the key strategic goals of the bank organization. Banks should take these issues with a high importance.

HR practices can be potentially used to chalk out employees' career paths by ensuring the proper career counseling. The components of an organizational reward system, such as money, fringe benefits, and promotion, must be desired by the employees; that is, they must be positively valiant in the employees' ranking of preferences. Moreover, because job security has long been one of the most hygiene aspects of private sector bank organizations, this factor should be handled in such a way that would establish an affirmative appeal among the employees. Private sector banks need to introduce special schemes related to pension, gratuity, retirement, and other related benefits to enhance the employee's sense of security. These banks need to build upon an open and developmental climate, where employees have been given more autonomy and chance to participate in the decision-making process and where there is less of a hierarchical and formal relationship between supervisors and subordinates along with a favorable company policy and

administration. The decision making authority is highly hereby recommended to ensure that there is a fair balance between the financial and non-financial motivational efforts while designing, reviewing and implementing a strategy.

Furthermore, the present study attempts to enrich the existing knowledge base in the area of job satisfaction in the banking sector, as there have been very few studies within the Bangladesh context that have studied bank employees' perceptions of job satisfaction.

References

Ajayi, B. F. (1998). The effect of budget on sports programmed implementation of Kwara State Sports Council. Unpublished M. Ed. Dissertation. University of Ibadan, Ibadan.

Behling, O., Labovitz, G., and Kosmo, R. (1968). The Herzberg controversy: A critical reappraisal. Academy of Management Journal 11(1): 99–108.

Bent, R., & Freathy, P. (1997). Motivating the employee in the independent retail sector. Journal of Retailing and Consumer Services, 4(3), 201–208.

Breed, M., & Breda, V. (1997). The relationship between employee motivation and job satisfaction. Management, 34(1), 54–63.

Chien, J. (2013). World Academy of Sciences, Engineering and Technology 78 2013 pp 1433-1438

Chimanikire, P., Mutandwa, E., Gadzirayi, C., Muzondo, N., & Mutandwa, B. (2007). Factors affecting job satisfaction among academic professionals in tertiary institutions in Zimbabwe. African Journal of Business Management, 1(6), 166-175.

Crossman, A. (2003). The relationships of age and length of service with job satisfaction: An examination of hotel employees in Thailand. Managerial Psychology, 18, 745–758.

Dawson, B. (2005). Motivation leaders to better results. Journal of Rubber and Plastics, 37, 11–15.

Ewen, R. (1964). Some determinants of job satisfaction: A study of the generality of Herzberg's theory. *Journal of Applied Psychology* 48(3): 161–163.

F. Herzberg, B.Mausner and B. B. Snyderman: The Motivation to Work (2nd Ed.). New York (1959).

Farrell, D., & Stamm, C. L. (1988). Meta-analysis of the correlates of employee absence.

Human Relations, 41(3), 211-227.

Gawel, J. E. (1997). Herzberg's theory of Motivation and Maslow's hierarchy of needs. Practical Assessment, Research & Evaluation, 5(11) 1997. Retrieved March 3, 2014 from www.mymaster.com.au/files..upload/20120724

Gaziel, H. (1986). Correlates of job satisfaction: A study of the two factor theory in an educational setting. The Journal of Psychology, 120(6), 613-626.

Harter, J. K., Schmidt, F. L., & Hayes, T. L. (2002). Business-unit-level relationship between employee satisfaction, employee engagement, and business outcomes: A meta-analysis. Journal of Applied Psychology, 87(2), 268.

Herzberg, F., Mausner, B., and Snyderman, B. B. (1959). The Motivation to Work (2nd edn). John Wiley & Sons, New York.

Herzberg, F. (1966). Work and the nature of man. Cleveland, OH: World Publishing Company.

Idris, A. A., & Wan, F. (2012). Does Motivational factor influence organizational commitment and effectiveness? A review of Literature E.3 Journal of Business Management and Economics Vol3 (1).Pp 001-009 ISSN 2141-7482.

Kwasi, D., & Amoako, K. G. (2011). Application of Fredrick's Two-Factor theory in assessing and understanding employee motivation at work, a Ghanaian Perspective. European Journal of Business and Management ISSN 2222-1905. Vol. 3, No. 9, 2011.

Lindner, J., R. (1998). Understanding Employee Motivation. Journal of Extension. June 1998/Vol.36 (3) ISSN 1077-5315. Retrieved from http://www.joe.org

Loiseau, J.W. (2011). Herzberg's Theory of Motivation. Retrieved December 3, 2014 from http://www.managementstudyguide.com

Malik, M.E., & Naeem, B. (2012). Towards Understanding Controversy on Herzberg's Motivation. Journal of Basic and Applied Scientific Research 2(11), 11939-11941. ISSN 2090-4304.

Maslow, A. H. (1943). A theory of human motivation. Psychological review, 50(4), 370-396.

Morgan, R., McDonagh, P. and Ryan, T. (1995)„Employee Job Satisfaction: an Empirical Assessment of Marketing Managers as an Occupationally Homogeneous Group , Journal of Managerial Psychology, 10(2): 10–17.

Namuddu, S. S. (2008). The relevance of Herzberg's Theory of Motivation in

Understanding Organizational Performance in Uganda. (MA dissertation), Makerere University, Kampala, Uganda.

Nave, J. H. (1968). Construction personnel management. Journal of Construction Division, 94, 95–105.

Ogunlana, S. & Chang, W. (1998). Worker motivation on selected construction sites in Bangkok, Thailand. Engineering, Construction and Architectural Management, 5(1), 68-81.

Oshagbemi, T. (2003). Personal correlates of job satisfaction: empirical evidence from UK universities. International Journal of Social Economics, 30(12), 1210-1232.

Rodeghier, M., (1996). Survey with Confidence. SPSS Inc.

Schermerhorn, J.R. (1993). Management for productivity (4th ed.). Canada: John Wiley & Sons, Inc.

Smerek, R. & Peterson, M. (2007). Examining Herzberg's theory: Improving job satisfaction among non-academic employees at a university. Research in Higher Education, 48(2), 229-250.

Susan, J. (2003). Motivation and reward. Problems of Post-Communism, 50, 44.

Vroom, V. H. (1964). Work and Motivation, Wiley, New York.

Wangenheim, F., Evanschitzky, H., & Wunderlich, M. (2007). Does the employee-customer satisfaction link hold for all employee groups? Journal of Business Research, 60(7), 690-697.

Williams, T. (1998). Job satisfaction in teams. International Journal of Human Resource Management, 9(5), 782-799.