

Quantification of Different drug substances in Pharmaceutical Formulations by Analytical HPLC

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ABSTRACT

The present study was conducted to develop and validate an analytical procedure for the determination of Busulfan, Bendamustine Hydrochloride and Clofarabine in Pharmaceutical Formulations. The analytical test attributes and evaluated as per the guidelines of ICH Q2 (R1). The method was validated for the determination of Assay in finished products of Busulfan, Bendamustine Hydrochloride and Clofarabine and the method validation parameters were evaluated for the analytical test attribute Busulfan, Bendamustine Hydrochloride and Clofarabine meets the acceptance criteria. The results obtained were within the specified limits and the samples were analyzed for test item concentration by High Performance Liquid Chromatography.

Keywords: Busulfan, Bendamustine Hydrochloride and Clofarabine, Validating the Assay, High Performance Liquid Chromatography, ICH Q2 (R1)

INTRODUCTION

In order to promote a good public health; validation of analytical procedures is done to ensure quality, safety and efficacy of therapeutic drugs used for public health. It's very important to determine the content of Active Pharmaceutical Ingredient or drug content in the presence of recipients, Impurities or various inert substances that originate from raw materials, key starting materials, intermediates, by products, manufacturing process steps, impurities that are formed during drug recipient interactions, degradation impurities etc but not limited to. The validation of analytical procedures is done in order to assure that drug formulations are prepared in a most efficient and cost effective manner.

Busulfan is an antineoplastic agent with a cell-cycle nonspecific alkylating action (unlike that of the nitrogen mustards) that has a selective depressant action on the bone marrow. In small doses, it depresses granulocytopenia and to a lesser extent thrombocytopenia, but has little effect on lymphocytes. With larger doses, severe bone-marrow depression eventually

ensues [1-4]. Intravenous administration of busulfan to rats for 1 year was reported to induce a variety of tumours in male rats, but the experiments could not be evaluated due to incomplete reporting [5-6].

Busulfan tablets on the market are available only in much smaller doses than those necessary for HCT conditioning [7], as the oral busulfan formulation was originally intended for the CML population [8-10]. Busulfan utilization has undergone dramatic progress in hematopoietic cell transplant (HCT) since its initial approval in 1954 [11]. Busulfan is an alkylating agent originally used in chronic myelogenous leukemia (CML), but it has progressively been recognized as a potent myeloablative agent in preparative regimens for hematopoietic cell transplantation (HCT) [12-13]. Busulfan-containing regimens have been widely accepted as a standard of care, and represent the most frequently used myeloablative regimens prior to HCT [14-15].

Bendamustine hydrochloride is a nitrogen mustard alkylating agent, structurally related to chlorambucil, which has been elaborated in 1962 in the former German Democratic

Republic, and since its very clinical introduction in 1969 has been used exclusively in this country up until the reunion of Germany [16-18]. Bendamustine hydrochloride is among the first rationally designed alkylating drugs, whose structure comprises three pharmacophore moieties: the bis-2-chloroethylamine alkylating group, a benzimidazole ring serving as a purine base mimic (suggesting possible antimetabolite effects), and a butyric acid side chain to increase water solubility [19-21]. The rapid degradation of the drug in serum and the extensive liver metabolism impair its cytotoxic action within a short period of time, necessitating application of relatively high doses [22].

Bendamustine bearing the name Treanda is a chemotherapeutic medication used in the treatment of chronic lymphocytic leukemia, multiple myeloma, and non-Hodgkin's lymphoma. Bendamustine is a white, water soluble microcrystalline powder with amphoteric properties. It acts as an alkylating agent causing intra-strand and inter-strand cross-links between DNA bases. After intravenous infusion it is extensively metabolized in the liver by cytochrome p450 [23-27].

Clofarabine is a purine nucleoside analog indicated for treatment of relapsed or refractory acute lymphoblastic leukemia (ALL) in children [28]. The drug is also increasingly used, outside of its Food and Drug Administration (FDA) approved indication, for treatment of relapsed or refractory acute myeloid leukemia (AML) in adults [29]. It acts by inhibiting DNA synthesis, the enzyme ribonucleotidoreductase and repair and activation of mitochondrial repair processes [30]. We recently observed a case of acute kidney injury (AKI) associated with clofarabine treatment. We conducted a review of the literature and utilized the Food and Drug Administration Adverse Event Reporting System (FAERS) [31] to identify spontaneous reporting of renal adverse events with this drug.

Clofarabine administered intraperitoneally had significant activity against a wide variety of human tumor xenografts implanted subcutaneously in athymic nude or severe combined immune deficiency mice [32]. Moderate to excellent sensitivity to tumour

growth delays were seen in all eight human colon tumours, three out of four human renal tumours, all four non-small-cell lung tumours, and all three prostate tumours. This spectrum of widespread anticancer activity has been confirmed by other investigators in human tumour xenograft models in mice [33]. The anticancer activity of clofarabine was dose- and schedule-dependent, and greater antitumour activity was associated with more frequent administration [34]. Clofarabine is a second generation purine nucleoside analog with antineoplastic activity. Clofarabine is phosphorylated intracellularly to the cytotoxic active 5'-triphosphate metabolite, which inhibits the enzymatic activities of ribonucleotidoreductase and DNA polymerase, resulting in inhibition of DNA repair and synthesis of DNA and RNA [35-37].

ICH- international council for harmonization of technical requirements for pharmaceuticals for human use (ICH) is unique in bringing together the regulatory authorities and pharmaceutical industry to discuss scientific and technical aspects of drug registration. Q2 (R1) Validation of analytical procedures of methodology is document presents a discussion of the characteristics for consideration during the validation of the analytical procedures included as part of registration applications submitted within the EC, Japan and USA. This document does not necessarily seek to cover the testing that may be required for registration in, or export to, other areas of the world. Furthermore, this text presentation serves as a collection of terms, and their definitions, and is not intended to provide direction on how to accomplish validation. These terms and definitions are meant to bridge the differences that often exist between various compendia and regulators of the EC, Japan and USA. The objective of the analytical procedure should be clearly understood since this will govern the validation characteristics which need to be evaluated. Typical validation characteristics which should be considered are Accuracy, Precision, Repeatability, Intermediate Precision, Specificity, Detection Limit, Quantization Limit, Linearity, Range [38-39].

EXPERIMENTAL PROCEDURE

solution, Filter compatibility and System Suitability

METHOD VALIDATION

The method for determination of different drug substances were validated in terms of precision (System precision and Method precision), (Interference, Linearity), Stability of Analyte in

RESULTS – Overall Summary of Validation of Busulfan

Validation Parameters	Acceptance Criteria	Results	
Precision	➤ The relative standard deviation for Busulfan peak area from five replicate injection of standard solution should be not more than 2.0%	Component name Busulfan	% RSD 0.3%
	The relative standard deviation of assay results obtained from six sample preparations should not be more than 2.0%	Busulfan	0.1%
Specificity	Interference No Interference should be observed at the retention time of Busulfan peak in the chromatograms obtained from the diluent, Blank and placebo.	There is no interference is observed at the retention time of Busulfan peak in the chromatogram obtained from the diluent, Blank and placebo.	

Validation Parameters	Acceptance Criteria	Results			
		Drug Product (FP)			
➤ Calculate the % degradation against as such test preparation for each condition, in any of one condition degradation should be achieved between 5.0% to 20.0%. ➤ Each degradation sample, purity angle should be less than the purity threshold for Busulfan peak.		Array of Stress	% degradation	Purity Angle	Purity threshold
		As Such (Unstressed)	-	0.681	19.281
		Acid degradation	2.2	0.793	17.890
		Alkali degradation	8.6	0.796	18.528
		Oxidation degradation	2.2	1.069	66.090
		UV degradation	Not degraded	0.690	18.648
		Thermal degradation	2.6	0.678	19.149
		Neutral degradation	1.7	0.747	18.585
Linearity	➤ Correlation coefficient should not be less than 0.999	Busulfan			
		Correlation coefficient (R)		0.999	

	for Busulfan.	slope of regression line	66205		
	➤ Report the slope of regression line.	Y-intercept of regression line	104381		
	➤ Report the Y-intercept of regression line. ➤ Y-intercept bias at 100 % level should be between ± 5.0 % for Busulfan.	Y-intercept bias at 100% level	3.0		
Intermediate Precision	➤ The relative standard deviation results obtained from six sample preparations should not be more than 2.0% ➤ The cumulative %RSD of method precision and intermediate precision results obtained from twelve sample preparations (6 method precision and 6 intermediate precision) should not be more than 2.0%.	Precision	Intermediate Precision		
		0.1%	0.6%		
		0.4%			
Validation Parameters	Acceptance Criteria	Results			
Accuracy	➤ Recovery at each level and overall average recovery of assay results should be between 98.0% and 102.0% ➤ The RSD at each level and overall RSD of % recovery should not be more than 5.0%	Accuracy Level	Average Recovery %	%RSD	
		50 %	99.2	0.3	
		100 %	100.2	0.2	
		150 %	100.5	0.3	
		Overall Recovery %	100.0 %		
		Overall % RSD	0.6 %		
Robustness	System suitability criteria defined in test procedure should meet in each condition. ➤ The Tailing factor for Busulfan should be NMT 2.0. ➤ The relative standard deviation for Busulfan peak from five replicate injections	Condition	Busulfan		
			% RSD	Tailing factor	Theoretical plates
		As such (For Flow, Temperature, Organic composition, Derivatisation temperature, Derivatisation Time)	0.3	1.0	16290

of standard solution should be NMT 2.0 %. The theoretical plates for Busulfan peak in standard solution should be not less than 2000.	Flow rate:1.3 mL/min	0.2	1.0	20283
	Flow rate:1.7 mL/min	0.3	1.0	19156
	Column oven temperature: 23°C	0.3	1.0	20075
	Column oven temperature: 27°C	0.1	1.0	20145
	Low organic composition(637 mL)	0.1	1.0	19366
	High organic composition(663 mL)	0.1	1.0	20976
	Derivatisation temperature: 50° C	0.7	1.0	19952
	Derivatisation temperature: 70° C	0.2	1.0	19793
	Derivatisation time: 10 min	0.4	1.0	20008
	Derivatisation time: 30 min	0.1	1.0	19837

Overall Summary of Validation Results of Bendamustine

Validation Parameters	Acceptance Criteria	Results			
Precision	System precision The relative standard deviation for Bendamustine peak from five replicate injections of standard solution should be not more than 2.0%.	Component name	% RSD		
		Bendamustine	0.6		
	Method Precision The RSD of results obtained from six sample preparations should not be more than 2.0%	Strength	% RSD		
		25 mg/ vial	0.5		
	100 mg/ vial	0.4			
Specificity	Specificity by interference study There should be no interference at the retention time of Bendamustine peak in the Chromatograms obtained from the diluent and the placebo solutions.	No interference observed at the retention time of Bendamustine peak in the chromatogram of blank, placebo and Known impurities			
		Drug Product (FP)			
	Specificity Forced degradation study Calculate the % degradation against	Array of Stress	% degradation	Purity Angle	Purity Threshold

Validation Parameters	Acceptance Criteria	Results			
	<p>as such test preparation for each condition, in any of one condition degradation should be achieved between 5.0% to 20.0%.</p> <p>Each degradation sample, purity angle should be less than the purity threshold for Bendamustinepeak.</p>	As Such (Unstressed)	NA	0.107	0.218
		Acid degradation	5.5	0.113	0.215
		Alkali degradation	12.5	0.112	0.228
		Peroxide degradation	0.6	0.106	0.218
		Photolytic degradation	0.4	0.101	0.225
		Thermal degradation	1.3	0.115	0.231

Validation Parameters	Acceptance Criteria	Results		
Linearity	<ul style="list-style-type: none"> Correlation coefficient should not be less than 0.999 for Bendamustine Hydrochloride. Report the slope of regression line. Report the Y-intercept of regression line. Y-intercept bias at 100 % level should be between ± 5.0 % for Bendamustine Hydrochloride. 	Bendamustine Hydrochloride		
		Correlation coefficient	0.9999	
		Slope of regression line	27800	
		Y-intercept of regression line	7930.9	
		Y-intercept bias at 100% level	0.6	
Intermediate Precision	<ul style="list-style-type: none"> The relative standard deviation of results obtained from six sample preparations should not be more than 2.0% The cumulative relative standard deviation of method precision and intermediate precision results obtained from twelve sample (6 methods precision and 6 intermediate precision) preparations should not be more than 2.0%. 	% RSD	Cumulative % RSD	
		0.6	0.5	
Accuracy	<p>% Recovery at each level and overall % recovery should be between 98.0 and 102.0 for BendamustineHCl.</p> <p>The %RSD at each level and overall recovery should not be more than 2.0.</p>	Accuracy Level	Average %	%RSD
		50 %	100.5	0.1
		100 %	99.4	0.9
		150 %	99.1	0.3
		Overall Recovery %	99.7	
		Overall % RSD	0.8	
Range	NA	Based on the Linearity, Method precision and Accuracy data Range of the method is 50 to 150% of test concentration		

Validation Parameters	Acceptance Criteria	Results			
Robustness	<ul style="list-style-type: none"> ➤ The Tailing factor for Bendamustine peak from first injection of standard solution should be not more than 2.0. ➤ Theoretical Plates for Bendamustine peak from first injection of standard solution should be not less than 2000. ➤ The relative standard deviation for Bendamustine peak from five replicate injections of standard solution should be not more than 2.0%. 	Condition	Bendamustine		
			Tailin g	Theoret ical	% RS
		Flow rate 1.3 mL/min	1.2	5598	0.2
		Flow rate 1.7 mL/min	1.1	4842	0.2
		Column oven temperature 23°C	1.2	4999	0.5
		Column oven temperature 27°C	1.2	5314	0.1
		Mobile phase composition (68:32)	1.2	5603	0.8
Mobile Phase composition (72:28)	1.2	4568	0.2		
Stability of analyte solution	<ul style="list-style-type: none"> ➤ % Difference of BendamustineHCl assay obtained from standard solution at each time point should not be more than ± 2.0 from the initial assay. ➤ % Difference of BendamustineHCl assay obtained from sample solution at each time point should not be more than ± 2.0 from the initial assay. 	% Difference of Assay			
		Time Interval	Standard Solution at		
			RT	2-8°C	
		Initial	NA	NA	
		24 hrs.	-0.3	1.2	
		48 hrs.	-1.2	1.3	
		% Difference of Assay			
		Time Interval	Sample Solution at		
			RT	2-8°C	
		Initial	NA	NA	
24 hrs.	-1.5	0.8			
48 hrs.	-1.2	-0.7			
Filter	% Difference of BendamustineHCl	% Difference of Assay			

Validation Parameters	Acceptance Criteria	Results			
variability	assay obtained from unfiltered sample solution and filtered sample solutions should not be more than ± 2.0 .	PVDF filter		Nylon filter	
		1.0		0.9	
System suitability overall summary	The Tailing factor for Bendamustine peak from first injection of standard solution should be not more than 2.0. Theoretical Plates for Bendamustine peak from first injection of standard solution should be not less than 2000. The relative standard deviation for Bendamustine peak from five replicate injections of standard solution should be not more than 2.0%.	Bendamustine			
		Parameter	Minimum	Maximum	Average
		Tailing factor	1.1	1.2	1.2
		Theoretical plates	3922	5603	4960
		% RSD	0.1	0.7	0.4

Overall Summary of Validation Results of Clofarabine

Validation Parameters	Acceptance Criteria	Results	
Precision	1.1 System precision The RSD of results obtained from six standard NMT 2.0%	Component name	% RSD
		Clofarabine	0.02%
	1.2 Method Precision The relative standard deviation results obtained from six sample preparations should not be more than 2.0%	Component name	% RSD
		Clofarabine	0.08%

Validation Parameters	Acceptance Criteria	Results	
Specificity	2.1 <u>No interference from diluent, placebo and known impurities</u> No Interference should be observed at the retention time of Clofarabine peak in chromatograms obtained from the diluent, placebo and the impurities	There is no interference is observed at the retention time of Clofarabine peak in the chromatogram obtained from the diluent, placebo and known impurities.	
	2.2 Forced degradation study a. Calculate the % degradation against as such test preparation for each condition in any one of condition degradation should be achieved between 5.0% to 20.0%. b. For each degradation sample, purity angle should less	Drug Product (FP)	
		As Such (Unstressed)	0.0
		Acid degradation	-1.2
		Alkali degradation	8.0

	than the purity threshold for Clofarabine peak.	Peroxide degradation	-1.5
		UV degradation	-0.3
		Thermal degradation	-0.5

Validation Parameters	Acceptance Criteria	Results	
Linearity	a. Correlation coefficient should not be less than 0.999	Clofarabine	
	b. Report the slope of regression line	Correlation coefficient	1.000
	c. Report the Y-intercept of regression line	slope of regression line	72366.0
	d. Y-intercept at 100% level should be between $\pm 5.0\%$	Y-intercept of regression line	26262.5
		Y-intercept bias at 100% level	0.6

Validation Parameters	Acceptance Criteria	Results
Intermediate Precision	The cumulative %RSD of method precision and intermediate precision results obtained from twelve sample preparations should not be more than 2.0%.	0.42%

Validation Parameters	Acceptance Criteria	Results		
Accuracy	% Recovery at each level and overall % recovery should be between 95.0% and 105.0% for Clofarabine. The %RSD at each level and overall %RSD of %recovery should not be more than 3.0%.	Accuracy Level	Average % Recovery	%RSD
		50 %	100.1	0.2
		100 %	100.0	0.1
		150 %	98.8	0.1
		Overall Recovery %	99.6	
		Overall % RSD	0.6	

Validation Parameters	Acceptance Criteria	Results	
Robustness	System suitability criteria defined in test	Condition	Clofarabine

s	<p>procedure should meet in each condition.</p> <p>1. The Tailing factor for Clofarabine should be NMT 2.0</p> <p>2. The relative standard deviation for Clofarabine peak from five replicate injections of standard solution should be NMT 2.0 %.</p> <p>3. The Theoretical plates for Clofarabine peak in standard in standard solution should be not less than 3000.</p>		% RSD	Tailing factor	Theoretical plates
		Flow rate:0.8 mL/min	0.05	1.1	6243
		Flow rate:1.2 mL/min	0.02	1.0	3940
		Column oven temperature: 38°C	0.03	1.1	4914
		Column oven temperature: 40°C	0.08	1.1	4875
		Low organic composition (142.5 mL)	0.02	1.1	5489
		High organic composition (157.5 mL)	0.04	1.1	4545

Validation Parameters	Acceptance Criteria	Results		
Stability of analyte in solution	% Difference of Clofarabine peak area obtained from standard solution at each time point should not be more than ± 2.0 from the initial area.	% Difference of area		
		Time Interval	Standard Solution	
			RT	2-8°C
		Initial	0.0	0.0
		24 hrs.	0.37	0.24
	48 hrs.	0.37	0.42	
	% Difference of Clofarabine peak area obtained from sample solution at each time point should not be more than ± 2.0 from the initial area.	% Difference of area		
		Time Interval	Sample Solution	
			RT	2-8°C
		Initial	0.0	0.0
24 hrs.		0.25	0.38	
48 hrs.		0.30	0.06	
Standard solution is stable up to 48Hours and sample solution is stable up to 48Hours at room temperature and 2-8°C for Clofarabine peak.				

Validation Parameters	Acceptance Criteria	Results			
System suitability	System suitability criteria should meet during overall validation studies, otherwise needs to be justified. Report	System suitability criteria	Minimum	Maximum	Average

Validation Parameters	Acceptance Criteria	Results			
<p>minimum, maximum and average values of system suitability parameters.</p> <p>➤ The Tailing factor for Clofarabine should be NMT 2.0</p> <p>➤ The relative standard deviation for Clofarabine peak from five replicate injections of standard solution should be NMT 2.0 %.</p> <p>➤ The Theoretical plates for Clofarabine peak in standard in standard solution should be not less than 3000.</p>	% RSD	0.02	0.08	0.03	
	Tailing factor	1.0	1.1	1.1	
	Theoretical plates	3940	6243	5078	

Pharmaceutical Press. Available at: <http://www.medicinescomplete.com/mc/>, 2008.

Final Conclusion:

A simple isocratic HPLC method is developed for the determination of Busulfan, Bendamustine Hydrochloride and Clofarabine in pharmaceutical formulations. The result meets the acceptance criteria and found comparable, indicates that the method is precision (System precision and Method precision), (Interference, Linearity), Stability of Analyte in solution, Filter compatibility and System Suitability with respect to analyst, day to day, column to column and equipment to equipment for its intended use. Therefore the method can be used for routine analysis in quality control. The analytical test attributes and evaluated as per the guidelines of ICH Q2 (R1).

References:

- [1] McEvoy GK, editor. American Hospital Formulary Service Drug Information. Bethesda, MD: American Society of Health-System Pharmacists, 2007.
- [2] Royal Pharmaceutical Society of Great Britain. British National Formulary, 54. London: BMJ Publishing Group Ltd./RPS Publishing, 2007.
- [3] Sweetman SC, editor. Martindale: The Complete Drug Reference. London:

- [4] Thomson Healthcare., Physicians' Desk Reference, 62nd ed. Montvale, NJ: Thomson, 2008.
- [5] Schmähl D., Experimental investigations with anticancer drugs for carcinogenicity with special reference to immune depression. Recent Results Cancer Res, 1975, 52, 18–28. PMID:1234999.
- [6] IARC., Overall Evaluations of Carcinogenicity: An Updating of IARC Monographs Volumes 1 to 42. IARC MonogrEvalCarcinog Risks Hum Suppl, 1987a, 7: 137–139.
- [7] Glaxo Smith Kline LLC., Myleran: Package Insert and Label Information. Feucht Germany, 2011.
- [8] Haddow A, Timmis GM., Myleran in chronic myeloid leukaemia Chemical constitution and biological action. The Lancet, 1953, 261: 207-208.
- [9] Galton DAG., Myleran in Chronic Myeloid Leukemia Results of Treatment. The Lancet, 1953, 261: 208-213.
- [10] Haut A, Altman SJ, Cartwright GE, Wintrobe MM., The use of myleran in the treatment of chronic myelocytic leukemia. AMA Archives of Internal Medicine, 1955, 96: 451-462.
- [11] US Food and Drug Administration Myleran New Drug Application (NDA): 009386. FDA Approved Drug Products, 1954.

- [12] Tutschka PJ, Copelan EA, Klein JP., Bone marrow transplantation for leukemia following a new busulfan and cyclophosphamide regimen. *Blood*, 1987, 70:1382-1388.
- [13] Thomas ED, Clift RA, Fefer A, Appelbaum FR, Beatty P, et al., Marrow transplantation for the treatment of chronic myelogenous leukemia. *Annals of Internal Medicine*, 1986, 104: 155-163.
- [14] Palmer J, McCune JS, Perales MA, Marks D, Bubalo J, et al., Personalizing busulfan-based conditioning: considerations from the American society for blood and marrow transplantation practice guidelines committee. *Biology of Blood and Marrow Transplantation*, 2016, 22: 1915-1925.
- [15] Pasquini MC, Le-Rademacher J, Zhu X, Artz A, DiPersio J, et al., Intravenous busulfan-based myeloablative conditioning regimens prior to hematopoietic cell transplantation for hematologic malignancies. *Biology of Blood and Marrow Transplantation*, 2016, 22: 1424-1430.
- [16] Balfour, J. A., K. L. Goa. Bendamustine. *Drugs*, 2001, 61, 631-640.
- [17] Cheson, B. D., M. J. Rummel. Bendamustine: rebirth of an old drug. *J. Clin. Oncol.*, 2009, 27, 1492-1501.
- [18] Reck, M., B. Haering, G. Koschel, E. Kaukel, J. von Pawel, U. Gatzemeier. Chemotherapie des fortgeschrittenen nicht-kleinzelligen und kleinzelligen Bronchialkarzinoms mit Bendamustin—Eine Phase-II-Studie. *Pneumologie*, 1998, 52, 570-573.
- [19] Avendaño, C., J.C. Menéndez, in: *Medicinal Chemistry of Anticancer Drugs*, Amsterdam, Elsevier, 2008, 139-176.
- [20] Gandhi, V. Metabolism and mechanisms of action of bendamustine: rationales for combination therapies. *Semin. Oncol.* 2002, 29, 4-11.
- [21] Leoni, L. M., J. A. Hartley. Mechanism of action: the unique pattern of bendamustine-induced cytotoxicity. *Semin. Hematol.* 2011, 48, 12-23.
- [22] Preiss, R., R. Sohr, M. Matthias, B. Brockmann, H. Huller. Untersuchungen zur Pharmakokinetik von Bendamustin (Cytostasan) am Menschen. *Pharmazie*, 1985, 40, 782-784.
- [23] Dubbelman AC, Rosing H, Darwish M, D'Andrea D, Bond M, et al. Pharmacokinetics and excretion of bendamustine in patients with relapsed or refractory malignancy. *Drugs R D* 2013, 13, 17-28.
- [24] Neil O, Maryadele J., *The Merck index: an encyclopedia of chemicals, drugs, and biologicals.* Merck Research Laboratories, Whitehouse Station, NJ, Merck., 2006.
- [25] Friedberg JW, Cohen P, Chen L, Sue Robinson K, Forero-Torres A, et al. Bendamustine in Patients With Rituximab-Refractory Indolent and Transformed Non-Hodgkin's Lymphoma: Results From a Phase II Multicenter, Single-Agent Study. *J Clinical Oncology.*, 2008, 26, 204-210.
- [26] Lissitchkov T, Arnaudov G, Peytchev D, Merkle KH., Phase-I/II study to evaluate dose limiting toxicity, maximum tolerated dose, and tolerability of bendamustine HCl in pre-treated patients with Bchronic lymphocytic leukaemia (Binet stages B and C) requiring therapy. *Journal of Cancer Research and Clinical Oncology.*, 2006, 132, 99-104.
- [27] Teichert J, Sohr R, Baumann F, Hennig L, Merkle K, et al. Synthesis and characterization of some new phase ii metabolites of the alkylator bendamustine and their identification in human bile, urine, and plasma from patients with cholangiocarcinoma. *Drug Metabolism and Disposition.* 2005, 33, 984-992.
- [28] <http://www.clofar.com/#/media/Files/Clofar/prescribinginformation.pdf> (accessed 23 January 2013).
- [29] Ghanem H, Kantarjian H, Ohanian M, et al. The role of clofarabine in acute myeloid leukemia. *Leuk Lymphoma* 2013; 54(4): 688–698.
- [30] Zhenchuk A, Lotfi K, Juliusson G, et al. Mechanisms of anti-cancer action and pharmacology of clofarabine. *Biochem Pharmacol* 2009; 78: 1351–1359.
- [31] <http://www.fda.gov/Drugs/GuidanceComplianceRegulatoryInformation/Surveillance/AdverseDrugEffects/default.htm> (accessed 23 January 2013).

- [32] Waud, W. R., Schmid, S. M., Montgomery, J. A. & Secrist, J. A., III. Preclinical antitumor activity of 2-chloro-9-(2-deoxy-2-fluoro- β -Darabinofuranosyl)adenine (Cl-F-ara-A). *Nucleosides Nucleotides Nucleic Acids*, 2000, 19, 447–460.
- [33] Takahashi, T., Kanazawa, J., Akinaga, S., Tamaoki, T. & Okabe, M. Antitumor activity of 2-chloro-9-(2-deoxy-2-fluoro- β -D-arabinofuranosyl) adenine, a novel deoxyadenosine analog, against human colon tumor xenografts by oral administration. *Cancer Chemother. Pharmacol.* 1999, 43, 233–240.
- [34] Stephenson, K. et al. Correlation between frequency of administration and efficacy of clofarabine in the H460 human non-small cell lung tumor xenograft model. *Proc. Am. Assoc. Cancer Res.* 2003, 44, A814.
- [35] DeGennaro LJ, Raetz E., Acute Lymphoblastic Leukemia, 2014.
- [36] Venkata NR, Jalandhar D, Gnanadey G, Bandari R, Manoi P., Development of supercritical Fluid (Carbon dioxide) based ultra-performance convergence chromatographic stability indicating assay method for determination of clofarabine in injection. *Analytical methods*, 2013, 5: 7008-7013.
- [37] Takahia Y, Yamauchi T, Rie N, Takanori U., Determination of Clofarabine triphosphate concentration in leukemia cell using sensitive, isocratic High Performance Liquid Chromatography. *Anticancer research*, 2011, 31: 2863-2867.
- [38] Andrew Teasdale, David Elder, Raymond W Nims, ICH Quality Guidelines: An Implementation Guide, ISBN: 978-1-118-97111-6, 2017.
- [39] Khagga Bhavyasri, Kaitha Manisha Vishnumurthy, Dammu Rambabu, and Mogili Sumakanth, ICH guidelines – “Q” series (quality guidelines), *GSC Biological and Pharmaceutical Sciences*, 2019, 06(03), 089–106.

Method Development of an Analytical Procedure for the Determination of Clofarabine in Pharmaceutical Formulations

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Abstract

A novel, simple and economic high performance liquid chromatography (HPLC) method has been developed for the estimation of Clofarabine in bulk and tablet dosage form with greater precision and accuracy. The method was validated as per ICH guidelines. Validation studies demonstrated that the proposed HPLC method is simple, specific, rapid, reliable and reproducible. Hence the proposed method can be applied for the routine quality control analysis of Clofarabine in bulk and tablet dosage forms. All the components of the system are controlled using SCL-10Avp System Controller. Data acquisition was done using LC Solutions software.

Key words: clofarabine, RP-HPLC, method development, validation, ICH guidelines

Introduction

For many years, the Southern Research Institute has had a programme, supported by the US National Cancer Institute, searching for new nucleoside anticancer drugs. In the early 1980s, two adenine-containing nucleosides, now known as fludarabine (Fludara; Berlex Oncology) and cladribine (Leustatin; Ortho Biotech) were in clinical trials. At the time, it was not clear whether either drug would gain approval by the FDA because some concerns were raised during preclinical and clinical development of these agents. Both drugs were susceptible to glycosidic bond cleavage with fludarabine subject to some phosphorylase cleavage and cladribine subject to both hydrolytic and enzymatic cleavage [1].

Clofarabine administered intraperitoneally had significant activity against a wide variety of human tumour xenografts implanted subcutaneously in athymic nude or severe combined immune deficiency mice [2]. Moderate to excellent sensitivity to tumour growth delays were seen in all eight human colon tumours, three out of four human renal tumours, all four non-small-cell lung tumours, and all three prostate tumours. This spectrum of widespread anticancer activity has been confirmed by other investigators in human tumour xenograft models in mice [3]. The anticancer activity of clofarabine was dose- and schedule-dependent, and greater antitumour activity was associated with more frequent administration [4]. Clofarabine is a second generation purine nucleoside analog with antineoplastic activity. Clofarabine is phosphorylated intracellularly to the cytotoxic active 5'-triphosphate metabolite, which

inhibits the enzymatic activities of ribonucleotide reductase and DNA polymerase, resulting in inhibition of DNA repair and synthesis of DNA and RNA [5-7].

Acute leukaemia is the most common paediatric cancer, with acute lymphoblastic leukaemia (ALL) and acute myelogenous leukemia (AML) being the two most common types. In the United States alone, ~2,000 children are diagnosed each year with ALL and 500 with AML [8]. Successful treatment of paediatric ALL and AML involves intensive, multi-cyclic therapy with multiple drugs that have various mechanisms of action and dosing regimens [9-10]. Such intense, cyclic treatment regimens with many different agents have reported a projected 5-year disease-free survival of 70% for paediatric patients with ALL and a complete response (CR) rate of 90% in certain forms of childhood acute leukaemia [11].

In this regard and view of the need for a suitable analytical HPLC method for routine analysis of Clofarabine in formulations. Attempts were made to develop simple, precise and accurate analytical methods for estimation of Clofarabine and extend it for their determination in formulation.

Aim and Objective

The aim of the method is to develop an analytical procedure for the determination of Clofarabine in Pharmaceutical Formulations. The analytical procedure for determination of Assay in finished product of Clofarabine Injection, 1mg/mL is an In-House procedure.

The method shall be validated for the following parameters:

- A) **Error! Reference source not found.**
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- B) **Error! Reference source not found.**
- Interference
 - **Error! Reference source not found.**
 - Linearity
- C) **Error! Reference source not found.**
- D) **Error! Reference source not found.**
- E) **Error! Reference source not found.**
- F) Stability of Analyte in solution
- G) Filter compatibility.

System Suitability **Error! Reference source not found.**

Method of Preparation

Instrumentation, Chromatographic Conditions & Method:

The Chromatographic system consisted of a Shimadzu Class VP Binary pump LC-10ATvp, SIL-10ADvp Auto sampler, CTO-10Avp Column Temperature Oven, SPD-10Avp UV-Visible Detector. All the components of the system are controlled using SCL-10Avp System Controller. Data acquisition was done using LC Solutions software.

The mobile phase consisted of 85:15 (v/v) of buffer solution and acetonitrile operated on isocratic mode. The flow rate is 1.0 ml/min. Chromatographic Estimation of Clofarabine was performed on Inertsil ODS-2 (150 x 4.6) mm, 5µm column. The wavelength of detection is 263 nm. The injection volume is 25µL.

Chromatographic conditions

A High Performance liquid chromatography equipped with UV detector and an auto sampler or its equivalent

Column	:	Inertsil ODS-2 (150 x 4.6) mm, 5µm
Detection wavelength	:	263 nm
Flow rate	:	1.0 mL / min
Injection volume	:	25µL
Run time	:	10 min
Column temperature	:	40°C
Sample cooling rack	:	25°C

Standards

Clofarabine working standard.

Preparation of Buffer Solution

Dilute 1.0 mL of Glacial acetic acid in 1000 mL of water and mix.

Preparation of Mobile phase

Mix buffer solution and acetonitrile in 85:15 (v/v) portion, sonicate well.

Preparation of Diluents

Methanol 0.9% sodium chloride

Preparation of 0.9% Sodium Chloride Solution

Weigh and transfer accurately 0.9 g of sodium chloride into 100 mL volumetric flask dissolve and make up to the volume with water.

Preparation of Blank

Dilute 1.0 mL of methanol in 10 mL volumetric flask and make up to the mark with 0.9 % sodium chloride solution.

Preparation of Standard Solution

Weigh and transfer about 30 mg of Clofarabine standard in a 50 mL volumetric flask. Add about 10 mL of methanol and sonicate to dissolve. Make up to the volume with methanol and mix well. Transfer 5 mL of above solution in to 50 mL volumetric flask, dilute and make up to the volume with 0.9% sodium chloride solution.

Note: Standard solutions are stable up to 48 hrs at both room temperature and 2-8°C.

Preparation of Test Solution

Transfer 3.0 mL of sample solution into 50 mL volumetric flask. Add 5.0 mL methanol and 30 ml of 0.9% sodium chloride and mix well. Dilute up to the mark with 0.9% sodium chloride solution.

Note: Test solutions are stable up to 48 hrs at both room temperature and 2-8°C.

Procedure

Separately inject each solution into the chromatographic system in the following order.

Blank injection	-	Single
Standard solution injections	-	Five
Test solution	-	Two injections
Standard solution bracketing	-	Single injection

Results and Discussion

Experimental:

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Intermediate precision expresses within-laboratories variations such as different days, different analysts, different columns, different equipment's etc. Ruggedness incorporates the concept described under the terms "Intermediate Precision" as defined in USP <1225>.

Intermediate precision is established by doing same exercise as system and method precision by different analyst on different day using different column and different equipment. The same Lot/Batch of standard and sample were used within the laboratory. The results of Intermediate Precision are tabulated in below table. Comparison of Method Precision and Intermediate Precision result is summarized in the table below.

Results of Intermediate Precision (Sample Solution)

Sample #	% Assay
1	101.1
2	101.1
3	101.1
4	101.1
5	100.2
6	100.2
Mean	101.1
% RSD	0.05

Comparison of Method Precision and Intermediate Precision Results

Parameter	Method Precision	Intermediate Precision
Analyst	Analyst 1	Analyst 2
HPLC ID.	EP-QCI-012	EP-QCI-013
Column ID.	HPLCC-008	HPLCC-009
Comparison of Method Precision and Intermediate precision		
Sample #	% Assay of Clofarabine	
	Method Precision	Intermediate Precision
1	101.9	101.1
2	101.9	101.1
3	101.9	101.1
4	101.9	101.1
5	101.9	101.2
6	102.1	101.2
Mean	101.9	101.1
% RSD	0.02	0.05
Overall Mean (12 samples)	101.5	
Cumulative % RSD (12 samples)	0.42	

Acceptance Criteria:

1. The relative standard deviation of results obtained from six sample preparations should not be more than 2.0%
2. The cumulative relative standard deviation of method precision and intermediate precision results obtained from twelve sample (6 methods precision and 6 intermediate precision) preparations should not be more than 2.0%.

Conclusion:

The result meets the acceptance criteria and found comparable, indicates that the method is precise and rugged with respect to analyst to analyst, day to day, column to column and equipment to equipment for its intended use.

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The robustness of an analytical procedure is a measure of its capacity to remain unaffected by small, but deliberate variations in method parameters and provides an indication of its reliability during normal usage. Robustness study is performed by analyzing the standard at different conditions. The results obtained with altered conditions are compared against results obtained under normal chromatographic conditions.

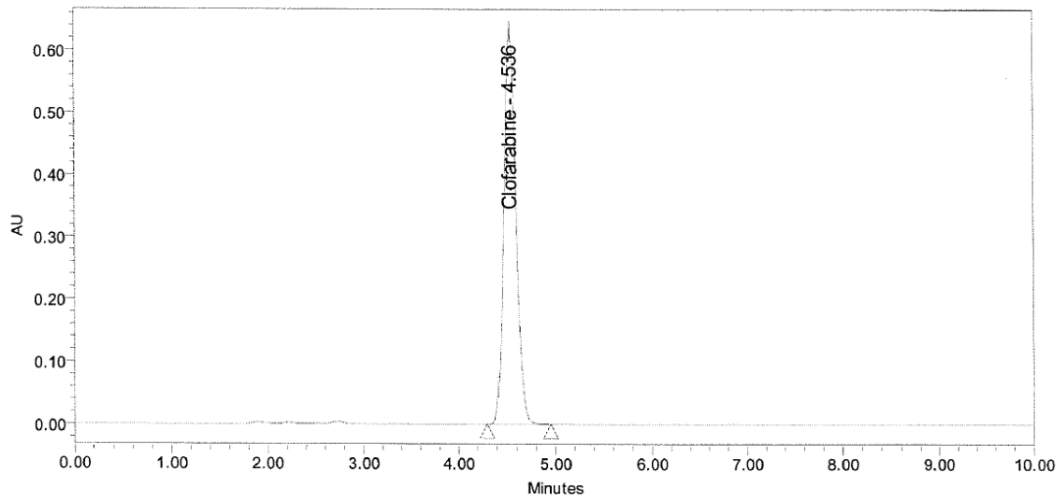
Variation in Flow Rate (± 0.2 mL/min.)

The standard was carried out by varying the flow rate of mobile phase to 0.8 mL/min. and 1.2 mL/min. in place of actual flow rate 1.0 mL/min. The results are summarized in the below table. Typical chromatogram of Robustness for variation in flow rate (0.8 mL/min and 1.2 mL/min) is exhibited below.

Results of robustness -Variation in flow rate for Clofarabine

Injection #	Flow Rate 0.8 mL/min.	Actual Flow Rate 1.0 mL/min.	Flow Rate 1.2 mL/min.
1	5449522	4365531	3613880
2	5448777	4366135	3612625
3	5451470	4366853	3613455
4	5444058	4364875	3613092
5	5449326	4366851	3614659
Mean	5448631	4366049	3613542
% RSD	0.05	0.02	0.02
Tailing factor	1.1	1.1	1.0
Theoretical plates	6243	4943	3940

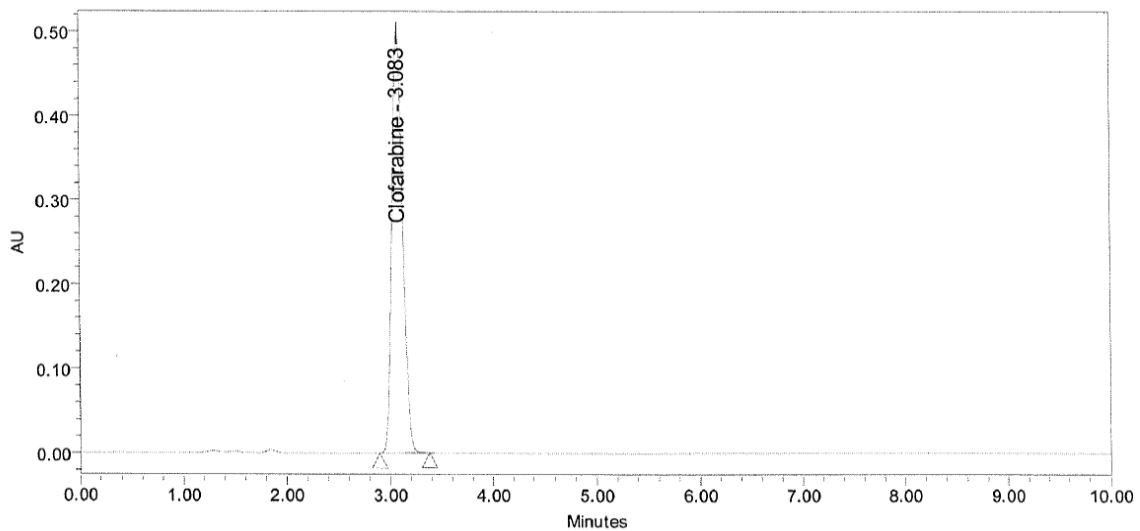
Chromatogram of Robustness for variation in flow rate (0.8 mL/min)



Peak Results

Name	RT	Area	% Area	Height (μV)	USP Plate Count	USP Tailing	Int Type
1 Clofarabine	4.536	5449522	100.00	633436	6296	1.1	BB

Chromatogram of Robustness for variation in flow rate (1.2 mL/min)



Peak Results

Name	RT	Area	% Area	Height (μV)	USP Plate Count	USP Tailing	Int Type
1 Clofarabine	3.083	3613880	100.00	497328	3911	1.0	BB

Variation in Column Oven Temperature (± 2°C)

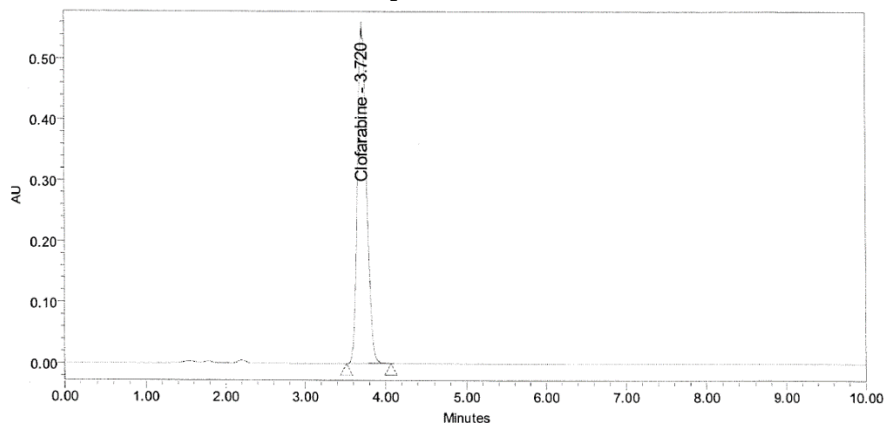
The standard was carried out by varying the column oven temperature of 38°C and 42°C in place of actual column oven temperature 40°C. The results are summarized in the below table. Chromatogram of Robustness

for variation in Column Oven Temperature (38°C and 42°C) is exhibited below.

Results of Robustness-Variation in Column oven Temperature for Clofarabine

Injection #	Column Oven Temperature 38°C	Actual Column Oven Temperature 40°C	Column Oven Temperature 42°C
1	4356727	4365531	4354231
2	4357687	4366135	4357138
3	4359938	4366853	4354543
4	4357320	4364875	4352076
5	4358888	4366851	4361549
Mean	4358112	4366049	4401322
% RSD	0.03	0.02	0.08
Tailing factor	1.1	1.1	1.1
Theoretical plates	4914	4943	4875

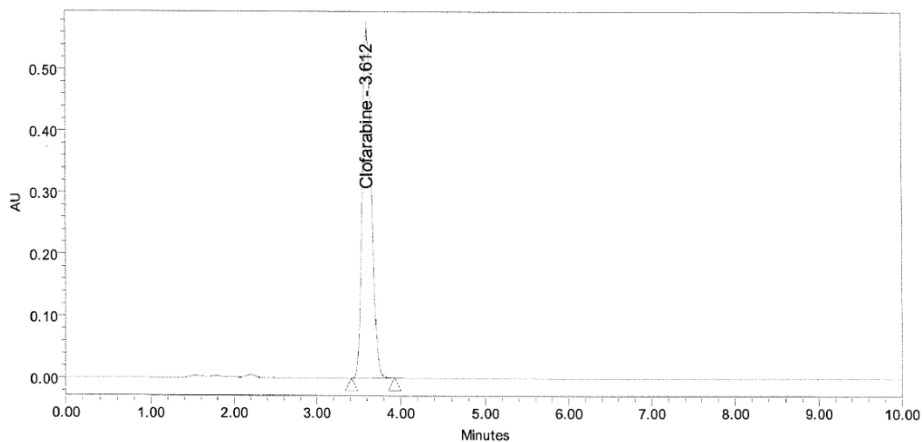
Chromatogram of Robustness for variation in Column Oven Temperature (38°C)



Peak Results

Name	RT	Area	% Area	Height (µV)	USP Plate Count	USP Tailing	Int Type
1 Clofarabine	3.720	4356727	100.00	549731	4911	1.1	BB

Chromatogram of Robustness for variation in Column Oven Temperature (42°C)



Peak Results

Name	RT	Area	% Area	Height (µV)	USP Plate Count	USP Tailing	Int Type
1 Clofarabine	3.612	4354231	100.00	566163	4948	1.1	BB

Variation in Organic composition (142.5 and 157.5)

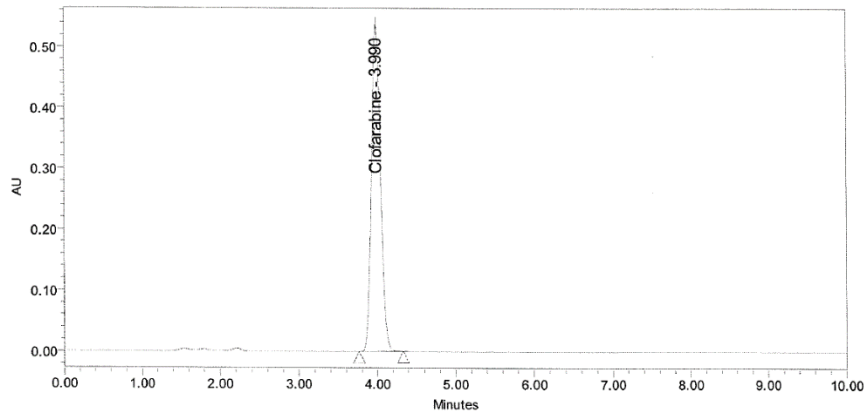
The standard was carried out by varying the Organic composition 142.5 mL and 157.5 mL in place of actual the 150mL. The results are summarized in the below table. Chromatogram of Robustness for

variation in the Organic composition (142.5 mL and 157.5 mL) is exhibited below.

Results of Robustness-Variation in pH of Buffer for Clofarabine

Injection #	Low Organic composition 142.5 mL	Actual Organic composition 150 mL	High Organic composition 157.5 mL
1	4360826	4365531	4363298
2	4359986	4366135	4360568
3	4362608	4366853	4359309
4	4360929	4364875	4360570
5	4361818	4366851	4358112
Mean	4361234	4366049	4360371
% RSD	0.02	0.02	0.04
Tailing factor	1.1	1.1	1.1
Theoretical plates	5489	4943	4545

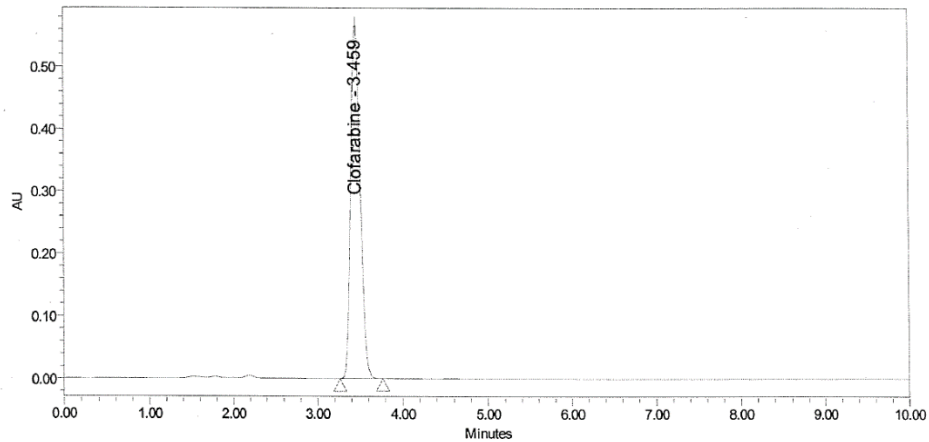
Chromatogram of Robustness for variation in organic composition of mobile phase (Low organic).



Peak Results

	Name	RT	Area	% Area	Height (μV)	USP Plate Count	USP Tailing	Int Type
1	Clofarabine	3.990	4360826	100.00	539588	5489	1.1	BB

Chromatogram of Robustness for variation in organic composition of mobile phase (High organic).



Peak Results

	Name	RT	Area	% Area	Height (μV)	USP Plate Count	USP Tailing	Int Type
1	Clofarabine	3.459	4363298	100.00	569667	4611	1.1	BB

Acceptance Criteria:

The System suitability defined in test procedure should meet in each condition.

- The Tailing factor for Clofarabine should be NMT 2.0.
- The relative standard deviation for Clofarabine peak from five replicate injections of standard solution should be NMT 2.0 %.

- The theoretical plates for Clofarabine peak in standard solution should be not less than 3000.

System suitability of overall validation study

The System suitability is an integral part of analytical procedure. The tests are based on the concept that the equipment, analytical operations and samples to be analyzed constitute an integral system that can be evaluated as such. The system suitability results are tabulated in the below Table.

System Suitability of Overall Validation Study

Parameter		Tailing Factor	Theoretical plates
System Suitability/ System Precision	0.02	1.1	4943
Specificity by diluent, placebo and known impurities	0.02	1.1	4943
Specificity by Forced degradation	0.02	1.1	4983
Specificity by Forced degradation (Alkali)	0.03	1.1	5047
Specificity by Forced degradation (UV)	0.02	1.1	4983
Linearity	0.02	1.1	4943
Method Precision	0.02	1.1	4943
Intermediate Precision	0.04	1.1	6303
Accuracy (Recovery)	0.02	1.1	4943
Robustness-Flow rate: 0.8mL/minute	0.05	1.1	6243
Robustness-Flow rate: 1.2mL/minute	0.02	1.0	3940
Robustness-Column oven temperature: 38°C	0.03	1.1	4914
Robustness-Column oven temperature: 42°C	0.08	1.1	4875
Robustness-Low organic composition(142.5 mL)	0.02	1.1	5489
Robustness-High organic composition(157.5 mL)	0.04	1.1	4545
Stability of Analyte in Solution (Initial)	0.02	1.1	4943
Stability of Analyte in Solution (24 Hours)	0.02	1.1	4943
Stability of Analyte in Solution (48 Hours)	0.02	1.1	5489
Minimum	0.02	1.0	3940
Maximum	0.08	1.1	6243
Average	0.03	1.1	5078

Conclusion

The analytical procedure for Assay is validated and found suitable for its intended use and it meets the acceptance criteria for:

Specificity:

No Interference should be observed at the retention time of peak in the chromatograms obtained from the diluent and the placebo solution.

Forced Degradation:

The method is specific and stability indicating for its intended use.

Linearity:

The analytical procedure is linear within the concentration range from 50 % to 150 % (30.24µg/mL to 90.72µg/mL) for Clofarabine peak.

Intermediate Precision:

The method is precise and rugged with respect to analyst to analyst, day to day, column to column and equipment to equipment for its intended use.

Accuracy:

The analytical test procedure is accurate for its intended use.

Robustness:

The test method is robust enough as demonstrated by altering the Flow rate, Column oven temperature and Organic composition.

Stability of analyte in solution:

The Standard solution is stable up to 48 hours and sample solution is stable up to 48 hours at room temperature and 2-8°C for Clofarabine peak.

The data for each validation characteristic described in this report meets the acceptance criteria with respect to Specificity, Forced degradation, Stability of analyte in solution, Linearity, Precision, Intermediate Precision, Accuracy and Robustness.

The validation results reveal that the analytical procedure is suitable for determination of Assay in ClofarabineInjection, 1mg/mL. The method is stability indicating for determination of Assay of Clofarabine in ClofarabineInjection, 1mg/mL.

References

1. Lindemalm S, Liliemark J, Juliusson J, Larsson R. & Albertioni F. (2004). Cytotoxicity and pharmacokinetics of cladribine metabolite, 2-chloroadenine, in patients with leukemia. *Cancer Lett.* 210:171-177.
2. Waud, W. R., Schmid, S. M., Montgomery, J. A. & Secrist, J. A. (2000). Antitumor activity of 2-chloro-9-(2-deoxy-2-fluoro-β-D-arabinofuranosyl) adenine (Cl-F-ara-A). *Nucleosides Nucleotides Nucleic Acids.* 19:447-460.
3. Takahashi T, Kanazawa J, Akinaga S, Tamaoki T & Okabe M. (1999). Antitumor activity of 2-chloro-9-(2-deoxy-2-fluoro-β-D-arabinofuranosyl) adenine, a novel deoxyadenosine analog, against human colon tumor xenografts by oral administration. *Cancer Chemother. Pharmacol.* 43:233-240.
4. Stephenson, K. et al. (2003). Correlation between frequency of administration and efficacy of clofarabine in the H460 human non-small cell lung tumor xenograft model. *Proc. Am. Assoc. Cancer Res.* 44.
5. DeGennaro LJ, Raetz E. (2014). Acute Lymphoblastic Leukemia.
6. Venkata NR, Jalandhar D, Gnanadey G, Bandari R, Manoi P. (2013). Development of supercritical Fluid (Carbon dioxide) based ultra-performance convergence chromatographic stability indicating assay method for determination of clofarabine in injection. *Analytical methods.* 5:7008-7013.
7. Takahia Y, Yamauchi T, Rie N, Takanori U (2011). Determination of Clofarabine triphosphate concentration in leukemia cell using ³²P. *Anal. Biochem.* 414:186-191.
8. Pui C. H. (1995). Childhood leukemias. *N. Engl. J. Med.* 332:1618-1630.
9. Nachman J. B. et al. (1998). Augmented post-induction therapy for children with high-risk acute lymphoblastic leukemia and a slow response to initial therapy. *N. Engl. J. Med.* 338, 1663-1671.
10. Nachman J. et al. (1997). Augmented Berlin–Frankfurt–Munster therapy abrogates the adverse prognostic significance of slow early response to induction chemotherapy for children and adolescents with acute lymphoblastic leukemia and unfavorable presenting features: a report from the Children’s Cancer Group. *J. Clin. Oncol.* 15:2222-2230.
11. Kersey J. H. (1997). Fifty years of studies of the biology and therapy of childhood leukemia. *Blood.* 90:4243-4251.



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The Otherness of Motherhood in the Selected Novels of Buchi Emecheta

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ABSTRACT

This paper focuses on the role of women, especially the role of a mother during the pains of daughters. Deliberately or unknowingly mother often causes their female children deep scars in their lives and they remain perpetually. In consequence for that behavior, a girl child suffers at the hands of mother like figure, directly responsible for the upbringing, the protagonist metes out to her own girl child. The earlier African novels describe mother as Supreme Being and root of African culture, but in reality, the situations of women and mother like being are entirely different. The author brings out the hidden truth and exposes it to the world. The male authors focus on the positive aspects of motherhood and highlight the character of mother as a symbol of sacrifice and fertility. It is always shown as the mother character as an embodiment of all good qualities. However, Emecheta a careful observer of her culture and also a spectator of other cultures narrated the otherness of motherhood in her novels. In her earlier novels, she primarily focused on two aspects that is the otherness of motherhood and the oppressive elements of patriarchal society. This paper focuses on the otherness of motherhood in the novels of Buchi Emecheta.

Keywords: Motherhood, Patriarchal Society, Feminism, Otherness

INTRODUCTION

In the recent decades, the feministic perspective emerged as a strong movement and posed a multi angle ideology. The ideology of feminism is attributed to the globalization of the world, and changes

occurred in various countries. The modern concept of feminism addresses the role of women in conservative and liberal societies. The feministic theory advocates that women are oppressed in various angles even though society is graceful and advanced. The major theme of Emecheta is women itself. She sees women in socio-cultural angles and economical perspectives. She also observes in her novels how such perspectives influence women and causes pain perpetually. In her novels, women suffer from other women, maybe they are the mother of the protagonist or women of other cultures or the same ethnic groups. In the novels of Buchi Emecheta mother figures are shown as they never understand their daughters to share the love that is vital between mother and daughter.

“Words said that she died not blessing me”¹

In Emecheta’s life also the same type of conditions occurred. Emecheta believed that her mother never understood her. In her writings, the same kind of relationship occurs between women. After reading the Autobiography “*Head Above Water*”, the reader does not surprise why she portrays such a relationship between mother and daughter. Emecheta deeply indulged with such themes and effectively depicted the vicious nature of women among them. The theme of maternal oppression of the girl child is a recurrent theme in her novels. A different phenomenon exists in Africa where women oppress their own kind, and suffer their

daughters in the name of gender. The oppression of females begins in the home itself and it is continuing long lastingly. Another novelist Flora Nwapa, also makes same kind of observation

“the oppression of the woman starts in the home” (James 1990, P.113)²

In the African Culture begetting a male progeny is more important to prove as a woman. If a woman is barren or get one female child are almost equal. In the African literature, a recurrent theme would be a woman gives preference and oppresses her own sex in preference of male child. The autobiographical novel, *Second Class Citizen* depicts maternal oppression of female children in their homes. In the family a woman does not allow equal opportunities to girl and boy child. The kind of oppression causes unhappiness among girl children. A mother thwarts her children's opportunities deliberately if she belongs to the same gender. Adah's mother has no belief of female education and she does not care about Adah's education, before her brother, who is younger than Adah. The unhappiness of Adah is caused by her mother's opinion that Adah's mother is not willing to send her girl child and help her in domestic chores rather than being educated. Adah boldly walks into school. She does not care about her father canning, but she says about her mother behaviour

“Pa would be alright: he would probably cane her, you know just a few strokes - six or so, not much but Ma would not cane, she would smack and smack, and then nag and nag all day long.”³

Adah identified her opposite gender that is her mother is her oppressor, due to the bad relationship prevailed between them. Adah's mother often complains that she is not at all cooperative. In the words of Adah

“would lie, just for the joy of lying; she took secret joy in disobeying her mother” (SCC, P.9)

Adah expresses the psychological oppression of her mother in a casual manner, as it is a common behavior in the African society. After her father's sudden demise, Adah's fortunes are reached to the lowest ebb, because her mother became her controller and she takes every decision for her. After acquainted all the situations Adah learns that her education is the only emancipator in her life. Adah's mother unwillingly agrees to send her school further because she fetches more bride price and the amount can be utilized for her boy's education. Adah's mother always says that old men take more care of their women rather than youngsters.

“...because only they could afford the high bride - price' Ma was asking” (SCC, P.20).

Adah discovers that her mother is asking a big bride price so that money could be used to train her son, who not at all interested in education. The old people only fetch the bride price that Adah's mother is demanding. Adah's mother not only oppressed her domestically but also not allowing Adah to choose her husband among young people of her age. Surprisingly, the influence of her mother fell upon. After begetting child, she also considers preferring sons to daughters. When Vicky, fell ill and admitted at the hospital, nurse asks if the boy was her only son? His illness has affected her and Adah replies

“... there was another, but she was only a girl” (SCC, P.68)

As if girls are not children and if they were ill, they are suppose to die just like that. This kind of attitude keeps on wondering people why women, especially mothers continue to despise their own kind even when they are the victims of such attitude.

In the *Joys of Motherhood*, many instances depict women as being the oppressors of their female progeny. The otherness of Motherhood is close theme of Emecheta, has highlighted in this novel.

Nnu Ego does not want to educate her daughters because

“...will have to leave and help me in running the house and in my trade”.⁴

The opinion of Nnu Ego clearly reflects the typical mindset of African mothers. One of the twin daughters of Nnu Ego, grumbles at the chores given to her and her twin sister Kehinde, replies that “The boys can help too” (P.175), but Nnu Ego replies in the typical African mother style

“They have to go to their lesson, Taiwo; and stop moaning. You are a girl, you know” (JM, P.175)

These type of incidents make girls so unhappy and curse their fate that they are born in a society where they want only boys, except at the time of their marriage. The reply of Taiwo again perplexes the reader-

“I know that mother, you remind us all the time” (JM, P.175)

The girls of new Africa are fed up with such kind mother’s treatment that she is not a boy, cannot enjoy the privileges but make hard work to end the meets. The treatment of mother keeps the girls in perpetual unhappiness. Emecheta always makes a note in her novels about the relationship of Ibusan mothers and daughters. Emecheta sarcastically passes a remark through the character of Iyawo Itsekiri,

“You Ibus, is there nothing on this earth that you won’t sell to make money? You would even sell your children if it were possible.” (JM, P.175)

Callously Nnu Ego speaks “I do not intend to selling my children. But I wouldn’t mind sending the girls somewhere to learn a trade if I would be given some money for their services”

“The money I’d get from them would help me in looking after others. Children sent away like that usually learn something, you know, good trade as well.” (JM, P.No.175)

The word “Others” is nothing but boys. It is clearly implied that mothers are ready to oppress and daughters to inhumane and degrading circumstances, in order to maintain patriarchal society. The pathetic aspect is women who are subjected to inhuman treatment; again continue the same condition for their daughters.

In ‘The Bride Price’, Emecheta concentrates on the lack of bond between mother and daughter, as existed between daughter and father. Aku-nna is willing to get more bride price for her and make her father proud. But she

“... knew that there was a kind of bond between her and her father which did not exist between her and her mother”⁵

Again this lack of bond between mother and daughter is the consequence of all the oppressions that the girl child undergoes in the home of her mother. During the time progresses, the lack of relationship between mother and daughter leads to lie and betrayal. Due to Aku-nna’s father’s demise, her mother and other property acquired by her father was possessed by Okonkwo, her ambitious uncle. Aku-nna and her mother shifted to Ibusa, where her mother quickly adopted to the place. Ma Blackie, Aku-nna’s mother is eager to get a handsome bride price for her daughter to maintain her newly born son. But Aku-nna falls in love with an Osu, called Chike. As an outcaste, the entire family of Aku-nna rejected Chike. But Aku-nna firmly believed that her happiness lied in marrying Chike. Aku-nna started hating her mother when she is silent in such important situation of her daughter’s life.

“...she was beginning to hate her mother for being so passive about it all” (BP, P.120).

Ma Blackie also cursed her child, cried aloud and swore her to die, as she bring disaster to the grace of family. This really devastated the spirits of Aku-nna and began to think that one’s mother could ever become one’s friend. Her mother is ready to use Chike as a ferry to pull through difficult

period and not ready to accept him as her son-in-law. This sudden onset of thinking brought bitterness in the mind of Aku-nna. Thus, maternal oppression is an important factor in the life of a girl's child.

Girls began to either hate her mother or mother like character or adopt the same kind of behavior in their lives. Women by nature are not passive and they need certain push from their parents that too from their mother. These three novels lay emphasis on the culture of Africa, and how a girl is ill-treated in the hands of their mother or mother like figure. In the age coming ceremonies mothers allow their daughter to be oppressed from patriarchal members. Male members may tease them with their brutal activities, and words. Certain times they touch their private parts also. This kind of behavior took in circular format. The women who become mothers in later parts of their lives think that the situation is common and has to adopt the behavior in patriarchal societies. Women are great helpers of themselves. Only a few writers like Emecheta, and Flora N'wapa reflected such insights in their writings.

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REFERENCES

1. Acholonu, Catherine O. *Africa, the New Frontier: Towards a Truly Global Literary Theory for the 21st Century*. Owerri, Nigeria: AFA, 2002
2. Acholonu, Catherine Obianuju. *Motherism: the Afrocentric Alternative to Feminism*. Owerri, Nigeria: Afa Publications, 1995.
3. Emecheta, Buchi. *Head Above Water*, London: Flemingo edition, Fontana Paperbacks, 1986.
4. Emecheta, Buchi. *Second Class Citizen*, London: Allison and Busby, 1974; New York: George Braziller, 1975.
5. Emecheta, Buchi. *The Bride Price*, London: Allison and Busby; New York: George Braziller, 1976
6. Emecheta, Buchi. *The Joys of Motherhood*, London: Allison and Busby; New York: George Braziller, 1979
7. Frank, Katherine. 'The Death of a Slave Girl: African Womahood in the novels of Buchi Emecheta.', *World Literature Written in English*. Vol.2, No.3, 1982.
8. James, Adeola. "Review of an Introduction to the African Novel by Eustace Palmer." *African Literatures Today*. Vol.7, 1975.
9. Okome O. Obituary: Buchi Emecheta (1944-2017). *The Journal of Commonwealth Literature*. 2017;52(2):401-408.
10. Ward, Cynthia. "What They Told Buchi Emecheta: Oral Subjectivity and the Joys of 'Otherhood'". *PMLA* Vol.105, 1990, Pp.83-97.

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Teaching Reading Strategies: Importance In Improving Students' Reading Comprehension With An Emphasis On Reading Fluency And Accuracy

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Abstract

The present methods for teaching reading comprehension focus on the products of comprehension rather than the processes of comprehension. The learners are often provided with inadequate opportunities to practice reading in English. It is of concern that while teaching reading in a class, teachers give fewer tasks related to fluency or accuracy. There exists a strong correlation between fluency and reading comprehension. Oral reading fluency and accuracy have a remarkable effect on reading comprehension performance. For high levels of reading achievement, automaticity of decoding fluency is highly essential. To develop this automaticity, teachers need to take time and listen to students read aloud and assess their progress and encourage thoughtful use of language to enhance the comprehension of the students.

Keywords: reading, reading strategies, reading comprehension, fluency, accuracy

Introduction

Problems in learning and teaching English as a Second Language relate to both learners and teachers. The teaching methods are partly responsible for this. It is common for most teachers to teach language using the lecture method, focusing on grammatical rules instead of language use. Ellis (2003) believes teaching language from context and meaning is much more productive. Another drawback to this lecture method is that learners find it monotonous and boring. They are demotivated because they are passive listeners, and this leads to limited input

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into the learning process. This leads to other difficulties. Many ESL learners cannot use English effectively in their communication because learning a language flourishes most when they are provided with opportunities to communicate in real-life situations. Accordingly, teachers need to abandon the traditional teaching method and replace it with communicative language teaching (Lochana and Deb, 2006).

Current methods for teaching reading comprehension favour the products of comprehension compared to the processes of comprehension. Two skills are particularly important to teach for enhancing the process of comprehension – monitoring and processing skills. Monitoring skills are those which help the learner to monitor continuing processing for possible comprehension failure. In case of any such failure, remedial steps can be taken to rectify their skills. Comprehension failures can occur at various levels – words, sentences, relations between sentences and also relations between larger units. Processing skills involve using clues in the text to generate, evaluate, and revise hypotheses about current and future events in the text. The teacher should first model these skills and then use the Think Aloud Protocol (TAP) in teaching these skills to the learners.

Al Yousef (2005) viewed reading as an "interactive" process between the reader and the text, which leads to automaticity. In this process, the reader interacts with the text to elicit the meaning using both linguistic knowledge (through bottom-up processing) and schematic knowledge (through top-down processing).

What is the importance of reading fluency?

According to Hudson et al. 2000, fluent reading consists of three important elements: accurate reading of the text at a conversational pace with appropriate expression (prosody). A fact is that a fluent reader can maintain this performance for long periods of time, even with no practice, and can generalise across texts. He can also read effortlessly in a smooth manner and does not get easily distracted. There exists a positive correlation between reading comprehension and reading fluency, and this becomes a compelling reason for efforts to be taken to train the learners to become fluent readers (Allington, 1983; Johns, 1993; Samuels, 1988; Schreiber, 1980).

Every aspect of fluency is connected to text comprehension. Accurate word reading is necessary for the reader to have access to the author's intended meaning. This aspect shows that inaccurate word reading may lead to misinterpretations of the text. Perfetti's (1977, 1985) verbal efficiency model suggested that weak automaticity in word reading or a laborious and

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slow word reading will hinder the interpretation of the text. Perfetti elaborated this explanation to propose that slow word reading is also exhausting because it uses working memory and, therefore, forestalls the individual from thinking about the text while reading. Slow word reading blocks working memory with the processing of word-level reading so as to prevent understanding at the content level. Thus, as a means to enhance reading comprehension, both a rapid reading of high-frequency words and rapid decoding of texts is essential for typical reading development (Fuchs et al., 2001; Kuhn & Stahl, 2000; Meyer & Felton, 1999).

Zutell and Rasinski (1991) opine that while assessing reading fluency, teachers need to listen to the students while they read aloud so that the teachers can make judgements about the progress of reading fluency. The observation should be systematic observation to help assess students' progress and also to determine instructional needs. The teachers should take care to observe every critical aspect of fluency: rate, word-reading accuracy, and prosody.

What roles should teachers play in reading fluency?

With the changing scenario in the teaching and learning fields, the teacher roles need to be defined with the focus on improving communicative competence.

Breen and Candlin, 1980 posit that the teacher should take on the role of a facilitator to facilitate the communicative process among all participants in the classroom and the various tasks and texts. Here, the teacher takes the back seat and gives guidance and advice only when necessary. The teacher should also act as an interdependent participant within the learning-teaching group. The teacher must continually seek potential and actively share the responsibility for learning and teaching with the students. The teacher must realise that any unnecessary intervention may prevent the learners from becoming genuinely involved in the tasks and thus retard the development of their communicative skills. However, this does not suggest that the teacher should be passive. Instead, the teacher should develop students' potential through external direction and help learners develop their distinctive qualities.

Second, the teacher should have a passion for learning, a desire and an aptitude to continue discovering new knowledge for her learners to emulate. The teacher should always be updated with the latest developments in learners' areas of specialisation.

Third, the teachers also need to be creative and innovative in integrating learners' teaching with thinking and learning processes. The teacher must provide learners with more

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opportunities for expression and a healthy environment where creativity can thrive. The learners must be encouraged to express their thoughts freely and also to question so that their minds become inquisitive, leading to a better learning experience.

What should the teachers equip themselves with for better teaching?

The teachers must know the basics of linguistics, psychology, sociology, anthropology, education, and so on to be able to exhibit the target language with enough accuracy. In addition to these, the teacher is also expected to know various teaching methodologies, the basic principles of testing, and the correct ways to research. The teacher ought to realise that it is mandatory for him/her to adopt different methods when dealing with different texts and when faced with students with different levels of English proficiency.

Should a teacher attach equal importance to accuracy and fluency?

As mentioned already, both accuracy and fluency are so closely related that they cannot be separated. Skehan (1998) feels that because the attention span of the learners is limited, there could be trade-off effects between accuracy and fluency. That is, when attention is paid to fluency, accuracy suffers and vice versa. Therefore, attaching equal importance to both fluency and accuracy is a must.

Accuracy tasks encourage thoughtful use of language, and fluency tasks encourage free expression. When assigning accuracy and fluency tasks, the teacher has to bear in mind the following:

- For one thing, when assigning tasks, the tasks should be relevant to the knowledge with which the learner is familiar because tasks based on information well known to the learners allow them to be more fluent in their performance.
- For another, the teacher should give the learners adequate planning time. It has been suggested that prior to conducting a task, the teacher should give the learners more planning time. This helps learners produce more fluent and complex language (Patanasorn, 2010).

How Do Teachers Measure Fluency?

Fillmore (1979) defines fluency as “(T)he ability to talk in coherent, reasoned and semantically dense sentences, showing a mastery of the semantic (meaning in language) and syntactic resources of the language.” Therefore, the easiest way to measure fluency, as in most skills, is to select a repeatable action and count the number of times a person can complete that action in a fixed time period. Precision Teaching (Binder, 1988; Binder and Watkins, 1990), an

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educational methodology, has identified scopes of count per-minute performance describing fluency for hundreds of academic skills.

How can a Teacher help Learners achieve fluency?

Practice is the key ingredient to any fluency-based program. Just as any skill can be perfected with constant and rigorous practice, so too does fluency. The development of reading fluency is likened to the development of other psychomotor skills, such as playing tennis, stating that both skills are strengthened with practice (Huey, 1908). But sad to say, many teachers do not realise this basic principle of skill growth. It is important for the teachers who understand the value of practice to focus on the right kind of practice to produce the largest gains rather than on practice routines that are boring, painful, and ultimately ineffective. Many fluency-based educators (Starlin, 1971; Haughton, 1972) found that attaining fluency on smaller “chunks” of a larger performance is easier than focussing on attaining mastery over the whole at once.

What Correlation exists between reading fluency and reading comprehension?

The National Assessment of Educational Progress in Reading (Pinnell, et al., 1995) clearly established the correlation between fluency and reading comprehension through large-scale analysis of data from a study. Forty-four per cent of the participants were found to be diffluent when they were made to read grade-level texts that they had silently read earlier. The study also exhibited a significant, positive relationship between oral reading fluency and reading comprehension performance.

What methods can be employed to enhance reading fluency?

The following is a discussion of some methods that can be employed to enhance reading fluency:

Modelled Reading

One way to strengthen fluency is for teachers to model to learners by reading aloud (Dowhower, 1987; Hoffman, 1987; Smith, 1979). This reading aloud process needs to be supplemented with procedures which actually engross the learners' interaction with the text. It must be borne in mind that reading aloud providesthem with a model of how to pace their reading in connected text and how to infuse expression. Computer modelled or taped reading is also a viable way to provide fluency support. While it differs from study to study whether the learners followed along in their text copies, specialists recommend this as a way to engage the learners in the text earlier than their reading it on their own.

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Repeated Reading of Familiar Text

Repeated oral reading or rereading a text is perhaps the most often documented approach to improving fluency (National Reading Panel, 2000; Rashotte and Torgesen, 1985). It has been connected to improved outcomes for young learners (O'Shea, Sindelar, and O'Shea, 1987) as well as college-going students (Carver and Hoffman, 1981). According to Huey (1908), "Repetition progressively frees the mind from attention to details and makes facile the total act, shortens the time and reduces the extent to which consciousness must concern itself with the process" (104). It is evident from that that repetition improves the processing of units, words and connected text cognitively and allows the reader to think about the meaning of the text. This, in turn, results in increased comprehension.

Chunking Texts

Another very popular approach to fluency building is by providing struggling readers with texts in which meaningful groups or words or phrases are evolved for the reader as a method for improving comprehension and fluency (Cromer, 1970; Young and Bowers, 1995). Research reveals that different amounts of text presented in repeated reading do not necessarily seem to change the outcome. However, controlling the amount of text presented to the learners may be beneficial for those who are experiencing problems in reading accuracy since it may compel them to focus on the words for a longer period of time (Cohen, 1988).

Word Reading Practice

Based on the previously offered theoretical description of fluency and on Ehri's stage model of reading, the significance of individual word reading automaticity likely has practical overtones for fluency building. In studies where teachers had the learners practice reading lists of words that they would later come across in connected texts consistently led to increased fluency (Fleisher, Jenkins, and Pany, 1979-80; Levy, Abello, and Lysynchuk, 1997). However, it is essential to note that there was no concomitant increase in comprehension.

Conclusion

In conclusion, the teachers should conscientiously try to shift their attention from emphasising the accuracy of students' oral presentations to developing their ability to express themselves both accurately and fluently in English. For this to happen, the teachers can employ multiple means, such as combining the grammar-translation method and communicative approach and equipping themselves with the latest trends. They should also shift their roles as facilitators and attach equal importance to both accuracy and fluency tasks.

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References

- Al Yousef, Hesham Suleiman. "Teaching Reading Comprehension to ESL/EFL Learners." *The Reading Matrix*, vol. 5, no. 2, September 2005.
- Allington, R. L. "Fluency: The Neglected Reading Goal." *The Reading Teacher*, vol. 36, 1983, pp. 556–561.
- Binder, C. "Precision teaching: Measuring and attaining exemplary academic achievement." *Youth Policy*, vol. 10, no. 7, 1988, pp. 12-15.
- Binder, C., and Watkins, C. L. "Precision teaching and direct instruction: Measurably superior instructional technology in schools." *Performance Improvement Quarterly*, vol. 3, no. 4, 1990, pp. 74-96.
- Breen, M. and C. Candlin. "The essentials of a communicative curriculum for language teaching." *Applied Linguistics*, vol. 1, no. 2, 1980, pp. 89–112.
- Carver, R. P., & Hoffman, J. V. "The effect of practice through repeated reading on gain in reading ability using a computer-based instructional system." *Reading Research Quarterly*, vol. 16, 1981, pp. 374–390.
- Cohen, A. L. *An evaluation of the effectiveness of two methods for providing computer-assisted repeated reading training to reading disabled students*. Unpublished doctoral dissertation, Florida State University, Tallahassee, 1988.
- Cromer, W. "The difference model: A new explanation for some reading difficulties." *Journal of Educational Psychology*, vol. 61, 1970, pp. 471-483.
- Dowhower, S. L. "Effects of repeated reading on second-grade transitional readers' fluency and comprehension." *Reading Research Quarterly*, vol. 22, 1987, pp. 389-406.
- Ellis, R. *Task-based Language Learning and Teaching*. Oxford: Oxford University Press. 2003.
- Fillmore, C. J. "On Fluency." *Individual Differences in Language Ability and Language Behavior*, edited by C. J. Fillmore, D. Kempler, and W. S. J. Wang, New York: Academic Press, 1979, pp. 85–101.
- Fleisher, L. S., et al. "Effects on poor readers' comprehension of training in rapid decoding." *Reading Research Quarterly*, vol. 15, 1979-80, pp. 30-48.
- Fuchs, L. S., Fuchs, D., Hosp, M. K., and Jenkins, J. R. "Oral reading fluency as an indicator of reading competence: A theoretical, empirical, and historical analysis." *Scientific Studies of Reading*, vol. 5, 2001, pp. 239– 256.
- Haughton, E. C. "Define your act and set your fluency goals in personal, social, and academic areas." *Special Education in Canada*, vol. 48, no. 2, 1972, pp. 10-11.

RESEARCH ARTICLE

- Hoffman, J. V. "Rethinking the role of oral reading in basal instruction." *Elementary School Journal*, vol. 87, 1987, pp. 367–374.
- Hudson, R. F., Mercer, C. D., Lane, H. B. *Exploring fluency: A paradigmatic overview*. Unpublished manuscript. University of Florida, Gainesville. 2000.
- Huey, E. B. *The psychology and pedagogy of reading*. Cambridge, MA: MIT Press, 1908.
- Johns, J. L. *Informal Reading Inventories*. DeKalb, IL: Communitel, 1993.
- Kuhn, M. R., and Stahl, S. A. *Fluency: A review of developmental and remedial practices (Technical Report No. 2-008)*. Ann Arbor: University of Michigan, Center for the Improvement of Early Reading Achievement, 2000.
- Levy, B. L., Abello, B., & Lysynchuk, L. "Transfer from word training to reading in context: Gains in reading fluency and comprehension." *Learning Disability Quarterly*, vol. 20, 1997, pp. 173-188.
- Lochana, M. and Deb, G. "Task-based teaching: learning English without tears." *Asian EFL Journal*, vol. 8, no. 3, 2006, pp. 140-154.
- Meyer, M. S., and Felton, R. H. "Repeated reading to enhance fluency: Old approaches and new direction." *Annals of Dyslexia*, vol. 49, 1999, pp. 283–306.
- National Reading Panel. *Teaching Children to Read*. Washington, DC: National Institutes of Health, 2000.
- O’Shea, L. J., Sindelar, P. T., and O’Shea, D. J. "The effects of repeated readings and attentional cues on the reading fluency and comprehension of learning disabled readers." *Learning Disabilities Research*, vol. 2, 1987, pp. 103–109.
- Patanasorn C. *Effect of procedural content and task repetition on accuracy and fluency in an EFL context*. Unpublished doctoral dissertation, Northern Arizona University, AZ, USA, 2010.
- Perfetti, C. A. "Language comprehension and fast decoding: Some psycholinguistic prerequisites for skilled reading comprehension." *Cognition, curriculum, and comprehension*, edited by J. T. Guthrie, Newark, DE: International Reading Association, 1977, pp. 20–41.
- Perfetti, C. A. *Reading Ability*. New York: Oxford University Press, 1985.
- Pinnell, G. S., et al. *Listening to children read aloud*. Washington, DC: Office of Educational Research and Improvement, U. S. Department of Education. 1995.
- Rashotte, C. A., and Torgesen, J. K. "Repeated reading and reading fluency in learning disabled children." *Reading Research Quarterly*, vol. 20, 1985, pp. 180–188.

RESEARCH ARTICLE

- Samuels, S. J. "Decoding and automaticity: Helping poor readers become automatic at word recognition." *The Reading Teacher*, vol. 41, 1988, pp. 756–760.
- Schreiber, P. A. "On the acquisition of reading fluency." *Journal of Reading Behavior*, vol. 7, 1980, pp. 177–186.
- Skehan, P. *A cognitive approach to language learning*. Oxford: Oxford University Press. 1998.
- Smith, D. D. "The improvement of children's oral reading through the use of teacher modelling." *Journal of Learning Disabilities*, vol. 12, 1979, pp. 172–175.
- Starlin, C. "Evaluating progress toward reading proficiency." *Learning disorders: Vol. 4. Reading*, edited by B. Bateman, Seattle, WA: Special Child Publications, 1971, pp. 389-465.
- Young, A., and Bowers, P. G. "Individual differences and text difficulty determinants of reading fluency and expressiveness." *Journal of Experimental Child Psychology*, vol. 60, 1995, pp. 428–454.
- Zutell, J., and Rasinski, T. V. "Training teachers to attend to their students' reading fluency." *Theory into Practice*, vol. 30, 1991, pp. 211–217.

Preference for Mode of Learning for Knowledge and Skills by Professional Management Students During the COVID-19 Pandemic Period

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Abstract

Learning of skill and knowledge are differentiated and acknowledged as the outcomes of education. The COVID-19 pandemic phase has disturbed the teaching in classroom, curriculum and academic calendar of educational institutes across the world. Blended learning is an integration of offline and online approaches of sharing subject resources online after classroom learning. Students pursuing professional management course at the university campus and a reputed private college were considered for sample selection. Only those sample respondents with attendance for both modes of learning were considered. The whole population of 360 was invited to participate in the survey, and 294 student participants' responses were shortlisted for analysis. The instrument was standardized after conducting a pilot study. Descriptive tools, correlation, regression and ANOVA were applied for analysis. The learning in classroom shows strong preference with all the variables having a positive opinion. Furthermore, preference for classroom learning had not changed during the COVID-19 pandemic phase. The classroom learning variables were significant with the COVID-19 effect except for flexibility. The learning of skills with labs or workplace place exposure was preferred over skill learning with an online demonstration. In future, educational institutes should focus on training faculty in the techniques and delivery of online learning, implementing changes in the curriculum that are suitable for online mode of teaching and employing emerging information and communication technologies.

Keywords

Professional management education, learning during COVID-19, blended learning, online skill learning, classroom learning

JEL Classification: I230

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Introduction

Traditional learning in the classroom setting is adjudged as the best approach for disseminating, learning or upgradation of knowledge. Difference between skill learning and knowledge is acknowledged and recognized as the outcome of education. The COVID-19 pandemic phase has disturbed the teaching in classroom, curriculum and academic calendar of educational institutes across the world. In the present situation, infectious coronavirus has spread across the borders infecting a vast population. Due to this grave situation, the Government of India has announced lockdown in the country ceasing all types of activities. The academic syllabus is incomplete with pending semester-end exams. Inabilities of present-day classroom teaching are exposed during the pandemic. The students' academic cycle is disturbed with psychological stress building up for the parents and the society. Final semester students are the most affected with a drop in employment opportunities and insufficient exposure to practical skill-enhancing experience. Learning lacunae have developed within the student community on account of the prolonged duration of the current COVID-19 pandemic (Soland et al., 2020). Education institutes are worst hit with prolonged lockdown with no immediate chance of reopening. In this context, experimenting with online classes has started to initiate academic learning.

The changes in delivery mechanism of education on account of information technology innovations and applications have enabled for virtual certification and reach the last mile learner. However, disruption in curriculum and mitigation of its impact with the application of information technology is yet to give conclusive evidence. The acceptance of online tool as pedagogy for curriculum by regular students is a gap with insufficient literature. Acceptance for online classes by the regular students' community during the period of necessity due to pandemic conditions is to be examined in detail. Cognitive and motor learning are differentiated as knowledge and skill application ability. The learning of skill and its application in online mode is a problem and the skill acquisition ability is impaired. Professional and science courses require learning of skill, and skill acquisition in online mode is a research problem yet to be addressed. The present study investigates students' preference for online or offline classes due to the disruption caused in classroom mode of learning during the COVID-19 pandemic.

Literature Review

The information and communication (ICT) technology advancement with New Age emerging technology has revolutionized the communication system (Singh et al., 2011). The advancement in connectivity with convergence technology has enabled the transfer of data and videos with synchronous speed. Live video transfer via a movable device has made communication durable, flexible and reachable (El Khaled & Mcheick, 2019). The New Age technology in the form of artificial intelligence, virtual reality, augmented reality, big data analytics, etc. has enabled online learning or supported classroom learning with gadgets (Venkat Rao, 2019). Educational technology is the application of technological tools for education and learning for academic improvement (Rhonda et al., 2016). Online learning is generally applied for distance education or continuing education streams. The research evidence has supported its acceptance for learning by working category of employees (Abrami et al., 2011). The coronavirus pandemic has disrupted the traditional education system; the teaching tools for online classes are applied for learning on students enrolled for the classroom education system. The option for classroom teaching in the face of coronavirus pandemic has opened doors for searching for alternatives to complete the curricular requirements for awarding the degree. The sudden shift in the mode of learning of regular education

enrolled students has given the researcher an opportunity to investigate many questions related to the feasibility of learning. The issues of infrastructure, pedagogy suitability and psychological state of the students are interesting aspects to be addressed. Legitimacy of online classes for regular students is another issue for the regulatory authorities to provide clarity.

Previous studies are focused on comparing the two modes of learning, but the environment or the circumstances are different. Regular students are exposed to technology-based learning with little or no infrastructure support. The concept of blended learning with the composition of both online and classroom learning is in practice in some high-end institutes (Richardson et al., 2000). Daniel Chen et al. (2009) have concluded with evidence that the students who use Internet and online technology in their learning tend to score higher in the traditional student engagement measures.

Zhang et al. (2004) conducted a study to compare classroom teaching and an interactive e-learning platform. The pre-course and post-course test analyses of both the modes suggest that the e-learning group were satisfied with the flexible learning process. Online teaching has limited scope for effective teaching strategies with several collaborative activities such as discussion boards, instructor presence, and various instructional methods (Frazer et al., 2017).

Darlene Christopher (2014) has suggested the planning, rehearsal, execution and post mortem (PREP) model ensures learner value, engagement for online learning and the deployment of office tools for effective learning. Oliver et al. (2011) conducted experimental or quasi-experimental research on classroom learning and found the teacher has no control over the behaviour of the students. The course-wise differentiation in results suggests e-learning is not effective in all the courses (Daniel Chen et al., 2009). However, the difference in the satisfaction level for both types of learning is not significant (Zhang et al., 2004). Learning a skill is a psychomotor activity, whereas knowledge may be transferred through education. The study by Bhatt and Chauhan (2020) on traditional classroom mode of learning during the COVID-19 lockdown period finds that students' active involvement or participation in e-learning has impaired their psychomotor domain development. Higher education builds cognitive qualities along with psychomotor abilities (El-Sayed & El-Sayed, 2012; Yatimah, 2020). Skill is the ability to do an activity whereas knowledge is memory retention (Zaghloul, 2001).

In their study, Richardson et al. (2000) have favoured online and blended learning with the need for pedagogical changes. Blended learning is an integration of offline and online approach of sharing subject resources online after classroom learning (Rooney, 2003). Alammery et al. (2014) identified five different blended learning components.

- **Face-to-face instructor-led:** Students attend a class where an instructor presents materials with little opportunity for interaction, hands-on learning or practice (Moore, 1989).
- **Face-to-face collaboration:** An educational approach that encourages students to work together in class, for example, discussion groups, pair programming and problem-based instruction (Moore, 1989).
- **Online instructor-led:** Instruction delivered online with an instructor who sets the pace and offers interaction, for example, webcasts and virtual classrooms (Goyal & Tambe, 2015)
- **Online collaboration:** An educational approach that encourages students to work together online, for example, online learning communities and online peer review (Vandana & Alexander, 2019).
- **Online self-paced:** An educational approach that allows students to study at their own pace, from their location and in their own time, for example, online reading and watching videos (Moore, 1989).

Lewis and Sugai (1999) proved with evidence the effectiveness of classroom learning in preventive and control behaviour of the students with rules and routines (Colvin et al., 1993). Classroom learning moulds discipline, ethics and values. The ethos for life will help in building the character, attitude and behaviour of the students. The above-mentioned studies uphold the notion that education institute plays a significant role in preparing disciplined, enlightened and ethical future citizens. Online learning and classroom learning differ on various parameters such as curriculum preparation (Pellegrino & Hilton, 2012), grading and assignment completion, teacher availability, facilitating class discussions and learning outcomes (Means et al., 2010). The difference in outcome of each of the parameters needs intensive investigation. Earlier application of technology for certification learning was primarily meant for distance education teaching, e-learning resources for distance learners and regular learners and online certificate courses.

Online learning is accepted for the following advantages: flexibility in using recorded lessons, online engagement and better personal feedback (Patidar & Rajendra Kumar, 2015). Classroom learning has the following advantages: the teacher can interact with students in real time. The teacher can judge the mood of the class and motivate the students with human touch and personal care. The size of the class is limited and the name of every participant along with their psychology is known to the teacher. The teacher can apply different styles of teaching to make the students learn. The classroom teacher can conduct personal counselling or mentoring to understand learning habits of the students. The teacher can exhibit direct control without physical liability. In the case of online learning, the physical liability is felt, the teacher-student relation is anonymous and the surveillance is artificial with technology devices (Ni, 2013).

Methodology

This descriptive study is conducted to evaluate the students' preference for learning through two modes, that is, online and classroom, for learning of knowledge and skill. Furthermore, we investigate the impact of a sudden change in the mode of learning among professional management students in the COVID-19 pandemic situation. The study was conducted during the lockdown which was implemented on account of SARS virus pandemic in 2020 (popularly COVID-19). The prevailing situation has provided an opportunity for research on students' preference for learning mode. Containment zones are places which are shut down completely on account of the high incidence of infection. The null and alternative hypotheses framed for the study are based on the discussion in the literature review.

H₀₁: Learning of skill has no dependence on learning in the classroom compared to learning online.

H_{A1}: Learning of skill has dependence on learning in the classroom compared to learning online.

H₀₂: The students have no preference for learning online during the COVID-19 pandemic situation.

H_{A2}: The students have preference for learning online during the COVID-19 pandemic situation.

The student participants are exposed to classroom learning before lockdown and online learning after lockdown on the same subject and skill acquisition with learning by doing. The same set of students exposed to both learning modes in a professional management course are considered for the study. Students pursuing professional management course at the university campus and a reputed private college are considered for sample selection. Only those sample respondents who had attended both modes of learning alone are considered. The whole population of 360 is invited to participate in the survey, and 294 student participants' responses are shortlisted for analysis. The questionnaire is standardized after conducting a pilot study on a sample of 30 and is finalized with 55 questions after

removing 4 inconsistent questions. The questionnaire is circulated on Google form link. Analysis of the data is conducted using the SPSS package. The percentage, mean, standard deviation and variations are calculated for examining the characteristics of the student respondents; ANOVA for equivalence of preferences; correlation for independence of variables; and regression for estimating learning of the skill. The standardized questionnaire with 55 items, measured with Cronbach's alpha coefficient, has a reliability of 0.91. The questionnaire is accepted as Cronbach's reliability coefficient is above 0.70 which is within acceptable limits (Cortina, 1993).

Results

Descriptive Analysis

The student participants' response to the preference for classroom learning and online learning is codified and statistical significance is discussed, as shown in Table 1. The descriptive profile of the participants in the survey is discussed further. The participants from private college (50.7 per cent) and university college (49.3%) pursuing different courses are included.

The local status indicates locals from Visakhapatnam (58.5%) are in majority with 89.2% from the state of Andhra Pradesh. Based on the grade of native place, the spread in descending order is city (44.6%), village (28.6%) and town (26.9%). Non-locals prefer to stay in hostels (10.9%) or rented rooms (17.0%).

The effect of the pandemic on the students whose place of residence is in the containment zone is evaluated. Some of the student participants are residing in the containment zone (22.8%), but none of the total participants is infected with the coronavirus. However, some of them were quarantined (15.6%) as contact suspects. The student participants who are most severely affected (56.1%) due to coronavirus are those pursuing their final semester and semester-end exam with incomplete syllabus. The internship or laboratory training is short terminated or incomplete in the majority of the cases. The first-year students are affected for non-completion of semester-end exams but otherwise they have some leeway space for adjustments in the next year. Table 2 presents the data on the effect of coronavirus.

Table 1. Descriptive Statistics of Local Status

	Percentage	Mean	SD	Variance
Local	58.5	1.41	0.494	0.244
Non-local	41.5			
Private	50.7	1.49	0.501	0.251
University colleges	49.3			
Andhra Pradesh	89.1	1.11	0.312	0.097
Other states	10.9			
City	44.6			
Town	26.9	1.84	0.842	0.708
Village	28.6			
Day scholar	72.1			
Hostel	10.9	1.45	0.768	0.590
Rented room	17.0			

Source: The authors.

Table 2. Status of Effect of Coronavirus on Student Participants

Coronavirus Infection	Quarantined	Living in Containment Zone	Coronavirus Pandemic's Effect on Learning Activities
None	15.6	22.8	100.0

Source: The authors.

The feasibility of creating a virtual classroom or conducting online classes is based on the availability of Internet connectivity, speed and connecting platform (see Table 3). The percentage of student participants with mobile-based connectivity is 50.0% and without any type of connectivity is 4.4%. The possession of a mobile or laptop will not enable a seamless virtual classroom. The problem-free availability of Internet connectivity is important for enabling virtual online services. Problems such as signal phase disturbance (68%), shared mobile (10.9%) and low speed (84.3%) are described by the participants. The device ownership of mobile (61.6%) was overshadowed by a lack of connectivity and low speed in the majority of the participants. The ownership of a laptop, a pc or a tab is comparatively lower (18.7%) for conducting full phased online classes.

The preference of a platform for online learning was tested among the participants. Google (18.7%) was the most preferred platform followed by WebEx, YouTube and Zoom. Zoom was least preferred for the advisory of the Government on its usage in conference meetings. The platforms are paid services beyond a certain usage limit. PowerPoint (48.6%) is the most preferred mode for online presentation for the participant students. This expression mode is preferred for its concise and systematic presentation. The mixture of all MS Office tools for presentation is preferred by the student participants for online classes.

The concept of Smart Class has already caught the attention of the majority of student participants. A combination of information technology tools and traditional teaching aids is applied for teacher-based learning in classroom teaching. The classroom strategy with modern ICT aids is prevalent in learning with modern aids. The modern classroom strategy is defined as a smart classroom with an overhead projector operating with computer software. MS Office tools are applied for a better learning outcome. The student participants are aware of smart classes conducted with overhead projectors with a physical presence in the seminar hall or classroom. PowerPoint is the most popular model for classroom presentation for majority of the student participants (25.3%). The student participants claim majority (83.7%) of the classes are conducted with blackboard chalk teaching. The other modes applied for classroom learning are projector-aided (6.1%), video (7.5%) and all modes in different proportion (2.7%).

Skill Transfer and Mode of Learning

The skill learning with online and offline is evaluated based on the experience with two modes of learning. Online learning with augmented reality or virtual reality is validated (see Table 4) as useful (10.5%), whereas application of artificial intelligence tools for skill learning was also agreed to be good (21.1%). Offline physical workplace or laboratory is the favoured method (68.4%) for skill learning for the student participants. The student participants are attending massive online courses (MOOC) in different combination of subjects. The percentage of enrolment of the student participants is 47.3%, but the rating for learning in online mode is medium to low.

The responses to the learning of skills at workplace or laboratory as interns with the online learning of skills on comparison presents a different preference. The rating of workplace learning is between high

Table 3. Descriptive Statistics of Online Infrastructure

		Percentage	Min–Max	Mean	SD	Variance
Connectivity	Internet	7.1	1–7	4.05	2.265	5.130
	Mobile	32.7				
	Fibre cable	1.0				
	Local cable	1.7				
	Internet and mobile	50.0				
	Mobile and fibre	3.1				
	No connectivity	4.4				
Device you own	No	17.7	1–4	2.07	0.738	0.544
	Mobile phone	61.6				
	Laptop/Tab/PC/Smartphone	18.7				
	Own all devices	2.0				
Speed	Limited	44.2	1–3	1.71	0.720	0.519
	Medium	40.1				
	High	15.6				
Web platform	You Tube	11.9	1–5	3.55	1.499	2.248
	WebEx	18.0				
	Google	18.7				
	Zoom	5.4				
	Other	45.9				
Presentation	PowerPoint	48.6	1–4	2.95	1.928	3.717
	MS Word	1.7				
	Video display	7.5				
	All Types	42.2				
Problem	No device	10.9	1–3	2.57	.681	.464
	No Internet	21.1				
	No connectivity	68.0				

Source: The authors.

Table 4. Descriptive Statistics of Online Class Experience

		Percentage	Min–Max	Mean	SD	Variance
Better interaction for skill learning	Augmented reality or virtual reality	10.5	1–3	2.58	0.676	0.456
	With artificial intelligence	21.1				
	Physical workplace or labs	68.1				
Attend MOOC class	Yes	47.3	1–2	1.53	0.500	0.250
	No	52.7				
Learning with MOOC	Low	15.8	1–5	3.04	1.116	1.245
	Low medium	5.8				
	Medium high	43.2				
	High	28.8				
	Extremely high	6.5				
Learning of skills at workplace/lab	Low	4.4	1–5	3.80	1.158	1.342
	Low medium	11.2				
	Medium high	18.7				
	High	31.3				
	Extremely high	34.4				

(Table 4 continued)

(Table 4 continued)

		Percentage	Min–Max	Mean	SD	Variance
Learning of skills at online demos	Low	12.9	1–5	2.71	1.023	1.047
	Low medium	26.2				
	Medium high	40.5				
	High	13.9				
	Extremely high	4.8				
Learning in the classroom	Low	8.6	1–5	3.84	1.179	1.391
	Low medium	5.0				
	Medium high	15.1				
	High	30.2				
	Extremely high	41				
Learning online	Low	14.4	1–5	2.76	1.004	1.008
	Low medium	14.4				
	Medium high	48.9				
	High	18.0				
	Extremely high	4.3				

Source: The authors.

and extremely high. The student participants give more preference to workplace learning for skills acquisition. Furthermore, clarification on learning of skills with online demos was a choice with a rating of medium low. The result predicts that in case of skill acquisition, learners have a lower preference for learning with video demonstration.

Preference for Online and Classroom Learning

Table 5 presents the means, standard deviation and variance of the statements on classroom and online learning. The student participants' preference for mode of learning is evaluated with mean values and percentage difference in mean values. The preference for classroom learning over online learning is predominant in student participants (18.78%). The 12 statements in the questionnaire were uniformly rated higher for classroom learning than for online learning. The distractions are high in online learning in comparison to classroom learning (−4.16%). Taking notes (32.53%) and practicality (32.5%) are higher in classroom learning compared with other statements. The ability statement on coping with speed is preferred for classroom learning with a higher rating (22.47%). The trainer has time to correct the flow of knowledge dissemination by adjusting to the phase of the learning of the students. In online classes, the phase of speed is not under the control of the trainer or learner on account of time specifications. Clarification of doubt is restricted in the online classroom compared with offline classroom (25.74%). The learner and teacher have better live interaction with a physical presence to clear doubts.

The research outcome substantiates that clarifications of doubts is more meaningful with a physical presence. The scope of knowledge gaining was limited in the online classroom in comparison with the offline classroom. The percentage difference in means (15.78%) is more marginal for knowledge gaining in the classroom. The scope for giving examples in the classroom has more leeway adjusting to the mood of the class. The online classroom has no such liberty on account of a more formalized environment. The mean percentage difference (15.41%) is in favour of classroom learning.

Table 5. Online Learning Versus Classroom Learning Relation Dimension Wide

	Value Min–Max	Online Learning			Classroom Learning			Percentage Difference in Means
		Mean	SD	Variance	Mean	SD	Variance	
Rationality (R)								
Discipline	1–5	2.75	1.321	1.745	3.26	1.264	1.598	18.54
Clarity	1–5	2.64	1.177	1.385	3.30	1.230	1.513	25
Coping with Speed	1–5	2.67	1.169	1.367	3.27	1.228	1.508	22.47
		2.68			3.28			21.96
Learning and skill acquisition (LS)								
Knowledge Gaining	1–5	2.85	1.256	1.577	3.30	1.279	1.637	15.78
Examples	1–5	2.79	1.188	1.411	3.22	1.353	1.830	15.41
Practicality	1–5	2.49	1.176	1.384	3.30	1.219	1.487	32.53
Taking notes	1–5	2.40	1.215	1.476	3.18	1.329	1.766	32.5
Clarification of doubt	1–5	2.68	1.301	1.693	3.37	1.286	1.653	25.74
		2.64			3.27			23.92
Psychological State (P)								
Attention	1–5	2.68	1.269	1.609	3.15	1.315	1.729	17.53
Distractions	1–5	2.64	1.387	1.924	2.53	1.316	1.731	–4.16
Mindfulness	1–5	2.62	1.153	1.330	3.09	1.284	1.648	17.93
Confidence in application of knowledge	1–5	2.63	1.097	1.202	3.23	1.186	1.407	22.81
Motivation generated	1–5	2.68	1.174	1.379	3.21	1.218	1.482	19.77
		2.65			3.04			14.79
Flexibility (F)								
Flexibility of study location	1–5	3.03	1.332	1.774	2.69	1.294	1.674	–11.22
Flexibility of class timing	1–5	2.76	1.215	1.476	3.04	1.376	1.892	10.14
		2.89			2.86			–1.03

Source: The authors.

The practicality in learning is in favour of classroom learning with percentage mean difference of 32.53. The evidence of student participants favouring classroom for practicality is surprising. The attention to the lecture in the class is more with the percentage difference in mean of 17.53%. The distractions are high in case of an online class in comparison with the classroom (–4.16%). Physical monitoring acts as the control in the classroom. Mindfulness is the concentration of the mind on the topic taught in the class. The word ‘mindfulness’ is different from attention; attention is alertness towards the teachers’ instructions, whereas mindfulness is actual mental presence on the topic. Mindfulness at the classroom was more compared to online classroom with a percentage mean difference of 17.93. Confidence in application of knowledge has more preference in classroom learning compared to online learning. The confidence is a state of mind with an inner feeling of ‘can apply what is learned’. Confidence is a measure which pushes a person towards the goal-directed activity. Confidence in the application of knowledge learnt is in favour of classroom learning with the percentage difference of the mean of 22.81. The preferable choice for knowledge acquisition and confidence of application is classroom learning.

The motivation generated in classroom learning is comparably high with a percentage difference of the mean of 19.77%. The difference in means of motivation generated in classroom learning (3.21) and online classroom learning (2.68) presents the psychological state of mind of the learner. Discipline in classroom behaviour is comparatively more in the physical classroom than the online classroom (18.54%).

Flexibility is examined under two statements: the flexibility of location and flexibility of class timings. Flexibility of location for learning is favourable for online learning than for classroom learning with a percentage of difference of the mean of -11.22%. As regards timings, online learning is preferred over classroom learning with a percentage difference of means of 10.14. The outcome is surprising; the researchers have decided to know the reason for such a response. Personal interviews were conducted with selected 30 student participants based on their availability to understand the reasons behind their preference for online learning concerning timings.

Online learning requires presence of Internet connectivity at the time fixed for the class. The recorded versions are placed in the net, but interaction is not possible. The recorded version confines the students to hearing with ears and thrill of the live class is lost. The reasons quoted by the student participants are baffling. The question on recorded version was initially discarded on account of inconsistent responses, but later, further personal interviews were conducted and the responses were included. The responses will be useful for understanding the mindset of the present generation of students.

Local Status and Learning Mode

The local status is assessed for equivalence of the preference of the student participants for the variables of both online and classroom learning (see Table 6). The local status and online learning are significant with all the four variables: rationality ($p = 0.000$), learning and skills ($p = 0.000$), psychological state ($p = 0.000$) and flexibility ($p = 0.000$). Local status and classroom learning are significant for flexibility ($p = 0.000$), learning and skill ($p = 0.017$) and psychological state ($p = 0.021$). Local status does not have equal preference for all the variables of online learning, whereas for classroom, only three variables do not have equivalence.

Table 6. Local Status Equivalence in Relation to Online Learning and Classroom Learning

	Online					Classroom					
	SS	df	MS	F	Sig.	SS	df	MS	F	Sig.	
R	321.4	1	321.4	33.6	0.000	R	43.0	1	43.0	3.4	0.064
	2789.4	292	9.5				3641.7	292	12.4		
	3110.8	293					3684.8	293			
LS	693.5	1	693.5	24.6	0.000	LS	209.9	1	209.9	5.7	0.017
	8231.6	292	28.1				10722.1	292	36.7		
	8925.1	293					10932.0	293			
P	701.1	1	701.1	32.6	0.000	P	163.6	1	163.6	5.4	0.021
	6268.2	292	21.4				8814.9	292	30.1		
	6969.3	293					8978.5	293			
F	123.2	1	123.2	23.3	0.000	F	86.8	1	86.8	13.0	0.000
	1543.5	292	5.2				1936.6	292	6.6		
	1666.7	293					2023.5	293			

Source: The authors.

Table 7. Connectivity and Learning Mode Equivalence in Relation with Online Learning and Classroom Learning

	Online					Classroom					
	SS	df	MS	F	Sig.	SS	df	MS	F	Sig.	
R	192.0	6	32.0	3.148	0.005	R	291.3	6	48.5	4.107	0.001
	2918.8	287	10.1				3393.4	287	11.8		
	3110.8	293					3684.8	293			
LS	709.0	6	118.1	4.128	0.001	LS	713.4	6	118.9	3.340	0.003
	8216.0	287	28.6				10218.6	287	35.6		
	8925.1	293					10932.0	293			
P	527.5	6	87.9	3.918	0.001	P	501.0	6	83.5	2.827	0.011
	6441.7	287	22.4				8477.5	287	29.5		
	6969.3	293					8978.5	293			
F	99.2	6	16.5	3.027	0.007	F	66.0	6	11.0	1.615	0.143
	1567.5	287	5.4				1957.4	287	6.8		
	1666.7	293					2023.5	293			

Source: The authors.

Connectivity and Learning Mode

The connectivity equivalence of preference is assessed for online learning and classroom learning (see Table 7). The variables of online learning with significant values are rationality ($p = 0.005$), learning and skill ($p = 0.001$), psychological state ($p = 0.001$) and flexibility ($p = 0.007$). The classroom learning variable with the equivalence of preference is flexibility ($p = 0.143$), whereas the other three variables, that is, rationality ($p = 0.001$), psychological state ($p = 0.011$) and learning and skill ($p = 0.003$), are significant with a variation of mean values.

Coronavirus Effect and Learning Mode

The coronavirus effect on online learning variables is evaluated with ANOVA (see Table 8). The online learning variables are not significant with coronavirus effect and the variance of means is present in the relation. The classroom learning variables are significant with the coronavirus effect except for flexibility. The variation of means is present in the other three variables, that is, rationality ($p = 0.003$), learning and skill ($p = 0.002$) and psychological state ($p = 0.004$).

Containment and Learning Mode

The student participant's preference for online learning in comparison with classroom learning is evaluated by considering equivalence of preference. The ANOVA results are presented in Table 9; the four variables of classroom learning are significant, suggesting equivalence of preference for classroom learning. In case of learning of skills through online, there are wider variations in the preference of the other three variables. The result suggests in the case of online learning, the learning of skills is evident but there are variations in perceptions.

Table 8. Coronavirus Effect Equivalence in Relation with Online Learning and Classroom Learning

	Online						Classroom				
	SS	df	MS	F	Sig.		SS	df	MS	F	Sig.
R	43.9	2	21.9	2.085	0.126	R	148.4	2	74.2	6.109	0.003
	3066.9	291	10.5				3536.3	291	12.1		
	3110.8	293					3684.8	293			
LS	53.0	2	26.5	0.870	0.420	LS	443.1	2	221.5	6.147	0.002
	8872.0	291	30.4				10488.8	291	36.0		
	8925.1	293					10932.0	293			
P	64.5	2	32.2	1.360	0.258	P	335.8	2	167.9	5.654	0.004
	6904.8	291	23.7				8642.6	291	29.7		
	6969.3	293					8978.5	293			
F	.669	2	0.335	0.058	0.943	F	5.3	2	2.6	.385	0.681
	1666.0	291	5.7				2018.1	291	6.9		
	1666.7	293					2023.5	293			

Source: The authors.

Table 9. Containment Status Equivalence in Relation with Online Learning and Classroom Learning

	Online						Classroom				
	SS	df	MS	F	Sig.		SS	df	MS	F	Sig.
R	40.7	1	40.7	3.873	0.050	R	97.8	1	97.8	7.966	0.005
	3070.1	292	10.5				3586.9	292	12.2		
	3110.8	293					3684.8	293			
LS	187.7	1	187.7	6.275	0.013	LS	231.2	1	231.2	6.311	0.013
	8737.4	292	29.9				10700.7	292	36.6		
	8925.1	293					10932.0	293			
P	72.2	1	72.2	3.059	0.081	P	307.9	1	307.9	10.371	0.001
	6897.1	292	23.6				8670.6	292	29.6		
	6969.3	293					8978.5	293			
F	0.468	1	0.468	0.082	0.775	F	83.6	1	83.6	12.593	0.000
	1666.2	292	5.7				1939.8	292	6.6		
	1666.7	293					2023.5	293			

Source: The authors.

Regression Model of Mode of Learning

Table 10 presents the collinearity of the variables. The variables are independent with values ranging from 0.036 to 0.935 and the diagonal matrix is unity. The online learning variables such as rationality, learning and skill, and flexibility and other variables such as learning of skill, learning online, learning of skills at workplace/lab and learning of skills at online demos are also showing significant values at 5% level. The independence of the variables is established since none of the values is unity other than the same variables. However, some of the variables of online learning have a higher affinity towards unity.

The regression equation model is constructed with dependent variable as Learning Online and other dimensions Rationality, Learning and Skill, Psychological State and Flexibility as independent variables. The model is fit as the *F*-test is significant for the values (see Table 11). Therefore, the working regression equation is framed.

Table 10. Correlations Matrix

	Rationality Online	LS Online	Psychological State Online	Flexi Online	Learning in Class room	Learning Online	Learning of Skills at workplace/ Lab	Learning of Skills at Online Demos
Rationality online	1							
Learning of skills online	0.935**	1						
Psychological state online	0.866**	0.855**	1					
Flexi online	0.776**	0.779**	0.790**	1				
Learning of skill	0.222**	0.170**	0.063	0.098	1			
Learning online	0.460**	0.476**	0.509**	0.492**	-0.058	1		
Learning of skills at workplace/lab	0.183**	0.143*	0.008	0.076	0.831**	0.106	1	
Learning of skills at online demos	0.398**	0.406**	0.531**	0.373**	-0.036	0.755**	0.019	1

Source: The authors.

Note: *Denotes significance at 1%, **Denotes significance at 5%.

Table 11. Fitness of the Equation

	Sum of Squares	df	Mean Square	F	Sig.
Regression	83.831	4	20.958	28.637	0.000
Residual	211.502	289	0.732		
Total	295.333	293			

Source: The authors.

The beta value of the equation is 1.346 with an explanation of 27.4%. The standard error is estimated at 0.855. The beta values with standardized coefficients are shown in Table 12. Rationality and learning and skills are not significant and ignored.

The regression model for leaning online with significant values only is

$$\text{Learning online} = 1.346 + (0.307) \text{ psychological} + (0.228) \text{ flexibility} + 0.855.$$

The rationality for leaning online is showing reverse value compared with other independent values. The psychological state variable with beta value (0.307) is impacting maximum.

The skill learning is practical as the component is more intangible and needs to be learnt by doing. Therefore, the researcher estimated the extent of learning of skill with both learning at workplace/lab and learning of skill through online demonstrations. The collinear matrix shows the learning of skill online, learning of skills at workplace/lab and learning of skill variables are independent. The regression model is constructed and evaluated for its fitness with F-test. The F-value is significant, suggesting the model is fit (see Table 13).

The regression equation is framed with the learning of skill as the dependent variable and learning of skill at workplace/lab and learning of skill with online demos as independent variables. The beta values (0.745) and explanatory values (Adj. R²: 0.707) are estimated. Learning of skill with online demos is not

Table 12. Beta Values

	Unstandardized Coefficients		Standardized Coefficients		t	Sig.
	B	Std. Error	Beta	Std. Error		
(Constant)	1.346	0.145			9.250	0.000
Rationality	-0.040	0.047	-0.131	0.152	-0.863	0.389
LS	0.029	0.027	0.159	0.147	1.078	0.282
Psychological	0.063	0.022	0.307	0.109	2.812	0.005
Flexi	0.096	0.036	0.228	0.086	2.645	0.009

Source: The authors.

Note: $R = 0.533$, $R^2 = 0.284$, adj. $R^2 = 0.274$ and std. error of the estimate = 0.855.

Table 13. Fitness of the Equation

	Sum of Squares	df	Mean Square	F	Sig.
Regression	223.519	2	111.759	347.722	0.000
Residual	91.922	286	0.321		
Total	315.440	288			

Source: The authors.

Table 14. Beta Values

	Unstandardized Coefficients		Standardized Coefficients		t	Sig.
	B	SE	Beta	SE		
(Constant)	0.746	0.158			4.712	0.000
Learning Skill at Work/Lab	0.857	0.033	0.842	0.032	26.367	0.000
Learning of Skill with Online Demos	-0.053	0.037	-0.045	0.032	-1.418	0.157

Source: The authors.

Note: $R = 0.842$, $R^2 = 0.709$, adj. $R^2 = 0.707$ and std. error of the estimate = 0.567.

significant (see Table 14), with negative direction and therefore ignored. The model equation is fitted with the variable as given below.

$$\text{Learning of skill online} = 0.746 + (0.842) \text{ learning skill at work/lab} + 0.567$$

The two null hypotheses are rejected, and the alternatives are accepted.

Discussion

The perception difference of students towards classroom and online learning is evident. Classroom learning shows strong preference with all the variables having a positive preference except for flexibility. Coping with speed and clarity are identified as two differential areas. Coping with speed may be minimized by the trainer either by speeding up or slowing down the narration of lecture. Classroom learning

gives an opportunity for the students to question during the lecture for clarity in the concepts. There are benefits of classroom teaching that cannot be replaced by online teaching.

The major aspects in the case of the online teaching or learning are that it offers flexibility to students (Kavitha, 2018) to catch up with the classes at their own free time. The traditional mode of education is strictly time-based on the schedules. Online learning requires connectivity with a device. The device ownership is good with the connectivity of mobile, fibre or local cable (84.6%). However, low speed or signal loss is identified as a major drawback for seamless connectivity, which is a requirement for online learning.

Local status and place of residence have a preference for both classroom and online learning. Non-locals and those staying in rented accommodation or hostels have more preference for online learning. For those staying in a containment zone and for those in quarantine, preference for classroom learning is more. This observation is important, as their immobility has not changed their preference for online classes.

The alternative hypothesis H_{A2} has been accepted since flexibility one of the variables has preference during the period. However, the preference for the classroom has not changed during the coronavirus effect phase. The general agreement on flexibility for online learning is present. Online learning enables recording the classes, which may be heard at leisure. The classroom learning variables are significant with the coronavirus effect except for flexibility. The other parameters such as rationality, learning and skill and psychological state scored more for the classroom. Online learning has more impact on psychological state and flexibility. The outcome of the analysis is based on students pursuing higher education professional courses, and their preference for more classroom learning is an interesting outcome.

The alternative hypothesis H_{1A} has been accepted since workplace is preferred for learning skills rather than classroom. The learning of skill at labs or workplace place exposure is preferred over skill learning with an online demonstration. The findings support Buhat-Mendoza et al.'s (2014) conclusion that learning by doing rather than observing over the online demos is not viewed as real time. The online real-time work exposure will optimize skill learning. The outcomes of the study are as follows: learning of skill is not possible, and the reason behind skill acquisition is psychomotor ability (Simpson, 1966) which needs practice.

Implications

The implications of the study for the educational institutes are as follows: knowledge can be imparted through online mode, but for learning skills, online learning is not preferred method. Professional courses are skill-oriented and they require introduction of skill-based gaming apps to address skill learning requirements in online mode. The learning of skill or knowledge in workplace or classroom is much superior to online mode. However, knowledge and critical operational techniques may be imparted in online mode with interactive systems. Virtual and augmented reality need to be applied for learning skills in online learning. The virtual and augmented reality have features that enable instructional learning through QR tags. The bundle of learning modes with both online and offline choice, popularly known as blended learning is the best approach in the present situation. The appropriate ratios of offline and online learning are 75% and 25%, respectively. The training and development for faculty in technical education is emphasized in the research works of Paposia and Kumar (2019). Educational institutes should focus on training faculty in techniques and delivery of online learning, implementing curriculum changes suitable to online and employing emerging ICT technologies.

Conclusion

The professional management courses need blended learning for acquiring skill and knowledge. The evidence for preference for classroom learning even during the crisis by the regular students for classroom learning is to be noticed. The blended learning of classroom supplemented with online learning is the best option supports Bernard et al. (2014). The learning of skills with online may use virtual and augmented reality to enhance learning. Online learning with a digital platform is supplementary but not the ultimate. The study is conducted after a sudden disruption in curricular activities on account of COVID-19 pandemic. The necessary infrastructure for online learning is not in place or insufficient, and the educational institutes are caught in new normal environment. This sudden change in the mode of learning with total online classes is a new normal and resisted. Another limitation, that is, the urban and rural readiness with connectivity and availability of devices with the students, is not adequately covered in this research work. The above two limitations are to be evaluated in the post-COVID-19 environment in future studies.

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Declaration of Conflicting Interests

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References

- Abrami, P. C., Bernard, R. M., Bures, E. M., Borokhovski, E., & Tamim, R. (2011). Interaction in distance education and online learning: Using evidence and theory to improve practice. *Journal of Computing in Higher Education*, 23(2–3), 82–103.
- Alammary, A., Sheard, J., & Carbone, A. (2014). Blended learning in higher education: Three different design approaches. *Australasian Journal of Educational Technology*, 30(4), 440–454.
- Bernard, R. M., Borokhovski, E., Schmid, R. F., Tamim, R. M., & Abrami, P. C. (2014). A meta-analysis of blended learning and technology use in higher education: From the general to the applied. *Journal of Computing in Higher Education*, 26(1), 87–122.
- Bhatt, A., & Chauhan, S. (2020). Covid-19: Impact on education with reference to classroom teaching–learning process. *International Journal of Current Research*, 12(06), 11851–11853.
- Buhat-Mendoza, D. G., Mendoza, J. N. B., Tiana, C. T., & Fabella, E. L. (2014). Correlation of the academic and clinical performance of Libyan nursing students. *Journal of Nursing Education and Practice*, 4(11), 82–90.
- Christopher, D. (2014). *The successful virtual classroom: How to design and facilitate interactive and engaging live online learning*. AMACOM.
- Colvin, G., Kameenui, E. J., & Sugai, G. (1993). Reconceptualizing behaviour management and school-wide discipline in general education. *Education and Treatment of Children*, 16, 361–381.
- Cortina, J. M. (1993). What is coefficient alpha? An examination of theory and applications. *Journal of Applied Psychology*, 78(1), 98–104.
- Daniel Chen, P. (2009, April 13–17). *Engaging online learners: A quantitative study of postsecondary student engagement in the online learning environment*. Paper presented at the Annual Meeting of the American Educational Research Association, San Diego.

- EL Khaled, Z., & Mcheick, H. (2019). Case studies of communications systems during harsh environments: A review of approaches, weaknesses, and limitations to improve quality of service. *International Journal of Distributed Sensor Networks*, 15(2), 155014771982996.
- El-Sayed, M., & El-Sayed, J. (2012). Importance of psychomotor development for innovation and creativity. *International Journal of Process Education*, 4(1), 89–94.
- Frazer, C., Sullivan, D. H., Weatherspoon, D., & Hussey, L. (2017, February, 1–6). *Faculty perceptions of online teaching effectiveness and indicators of quality*. Hindawi Nursing Research and Practice.
- Goyal, E., & Tambe, S. (2015). Effectiveness of Moodle-enabled blended learning in private Indian Business School teaching NICHE programs. *The Online Journal of New Horizons in Education*, 5(2), 14–22.
- Kavitha, W. J. (2018, November). A study on the student experiences in blended learning environments. *International Journal of Recent Technology and Engineering*, 7(4S), 183–186.
- Lewis, T. J., & Sugai, G. (1999). Effective behaviour support: A systems approach to proactive schoolwide management. *Focus on Exceptional Children*, 31, 1–24.
- Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2010). Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies. U.S. Department of Education Office of Planning, Evaluation, and Policy Development Policy and Program Studies Service. <https://www2.ed.gov/rschstat/eval/tech/evidence-based-practices/finalreport.pdf>
- Moore, M. G. (1989). Three types of interaction. *American Journal of Distance Education*, 3(2), 1–6.
- Ni, A. Y. (2013). Comparing the effectiveness of classroom and online learning: Teaching research methods. *Journal of Public Affairs Education*, 19(2), 199–215.
- National Education Policy. (2020). Government of India.
- Paposa, K. K., & Kumar, Y. M. (2019). Impact of training and development practices on job satisfaction: A study on faculty members of Technical Education Institutes. *Management and Labour Studies*, 44(3), 248–262.
- Patidar, N., & Rajendra Kumar, M. (2015, July–September). Utilization and need of e-Learning content amongst students of Higher Learning Institutions in India. *International Journal of Social Science and Humanities Research*, 3(3), 170–174.
- Pellegrino, J. W., & Hilton, M. L. (2012). *Education for life and work: Developing transferable knowledge and skills in the twenty-first century*. National Academies Press.
- Rhonda, R., Michael, M., & Landra, R. (2016). *Facilitating learning*. Association for Educational Communications and Technology. <https://htirtayasa.files.wordpress.com/2010/09/facilitating-learning-rhonda-robinson-northern-illinois-university-michael-molenda-indiana-university.pdf>
- Richardson, J. W., Hollis, E., Pritchard, M., & Novosel-Lingat, J. E. M. (2000). Shifting teaching and learning in online learning spaces: An investigation of a faculty online teaching and learning initiative. *Online Learning*, 24(1), 67–91. <https://doi.org/10.24059/olj.v24i1.1629>
- Rooney, J. E. (2003). Blended learning opportunities to enhance educational programming and meetings. *Association Management*, 55, 26–32.
- Oliver, R. M., Wehby, J. H., & Reschly, D. J. (2011). Teachers classroom management practices: Effects on disruptive or aggressive student behaviour. *Campbell Systematic Reviews*. <https://doi.org/10.4073/csr.2011.4>
- Simpson, E. J. (1966). *The classification of educational objectives, psychomotor domain*. ERIC Clearinghouse.
- Singh, A. K., Jain, R., & Patidar, N. (2011, September). Need, awareness and utilization of open courseware technology in Institutions of Higher Learning in India. *Journal of School of Pedagogical Sciences*, IX(1), 1–14.
- Soland, J., Kuhfeld, M., Tarasawa, B., Johnson, A., Ruzek, E., & Liu, J. (2020). The impact of Covid-19 on student achievement and what it may mean for educators. <https://www.brookings.edu/blog/brown-center-chalkboard/2020/05/27/the-impact-of-covid-19-on-student-achievement-and-what-it-may-mean-for-educators/>
- The Editor. (2020, July 30). We must walk tightrope between online and offline learning. *The Indian Express*, Thursday. <https://indianexpress.com/article/opinion/columns/India-lockdown-corona-virus-virusvirus-online-classes-e-learning-virtual-schools-6463946/>
- Vandana, S., & Alexander, T. (2019). How many ways can we define online learning (1988–2018). *American Journal of Distance Education*, 33(4), 269–306.

- Venkat Rao, G. (2018, July–December). The emerging fourth gender – Robot in new technology human resource management environment. *Indian Journal of Training and Development*, 48(2), 65–68.
- Yatimah, D. (2020). Implementation of psychomotor assessment on life skills learning program package. *Humanities & Social Sciences Reviews*, 8(1), 171–176.
- Zaghloul, A. R. M. (2001). *Assessment of lab work: A three-domain model; cognitive, affective, and Psychomotor*. Proceedings of the 2001 American Society for Engineering Education Annual Conference & Exposition, American Society for Engineering Education, New Mexico.
- Zhang, D., Zhao, J. L., Zhou, L., & Nunamaker Jr, J. F. (2004). Can e-Learning replace classroom learning? *Communication ACM*, 47(5), 75–79.

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Original Research Article

An estimate of awareness skill level in financial instruments among management students

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ABSTRACT

The financial literacy is the requisite for development and growth of the economy. The pedagogy for the delivery of financial knowledge in Indian management schools is both with e-technology and traditional methods. The financial instrument is a contract that gives rise to a financial asset of one entity and a financial liability or equity instrument of another entity.

The awareness of financial instruments and skill to invest in these instruments is awareness skill. The study is designed to estimate the awareness skill level of financial instrument of management students'. The research design formulated for the study is descriptive with a sample of 131 (10 percent of the sample) drawn randomly from students of post graduate level pursuing professional management courses. The schedule with 24 items is administered and the results are analyzed with percentages and ANOVA.

The first null hypothesis of low awareness skill is accepted and other two null hypotheses are rejected. There is a significant variation of awareness skill level of financial instruments with focus on gender and specialization. The awareness skill level is confined to fixed deposits and recurring deposits.

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1. Introduction

The financial literacy is the requisite for development and growth of the economy. The savings add to the gross national savings. The finance as a subject of management is relevant to understanding the functioning of the business. The pedagogy for the delivery of financial knowledge in Indian management schools is both with e-technology and traditional methods. The learning of the theoretical issues of financial management happens at the undergraduate and graduate levels. The financial instruments are the products for saving and commercial transactions in business and domestic activities. The awareness skill of financial instruments is important for decision making at the individual and organizational level.¹

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The saving habits of India have grown from 7.9 percent in 1954 to 30.5 percent in 2018. The world average gross saving rate in 2017 is 25.33 percent with China at highest (World Bank National Accounts Data, 2018). The Global Financial Market Literacy Survey in 2012 has ranked India at 23rd position within 28 member countries (Visa Global Financial Literacy Barometer, 2012). Presently, India is preoccupied with highest youth population in the world and skilling in domain knowledge is a major concern. The knowledge is power for development of the society. The youth is the most valuable segment and demographic dividend for the development of the country (UNDP, 2018). The financial awareness skill skills of the youth are the propeller for growth. The investment in the management education to enhance the knowledge of the student population will direct to balanced growth (Annmaria Lusardi and Olivia S. Mitchell, 2014). The

role of financial awareness skill skills has become more important to manage these personal spending and savings. The financial planning is an integral part of an individual's life. The work-life span ratio of an individual is one of the determinants of financial status. The financial awareness skills an integral part of human life (Lusardi A, 2015).²

The learning outcome is a measure of the effective teaching and learning ability of the students. The present problem of learning deficiency is a prefecture to be addressed by the management schools. The measuring of learning is difficult on account of deficiencies and difference in abilities of the students. The factors influencing the personal learning capabilities differ on delivery, region, language, psychology and biological issues. The learning poverty is measure of demonstrated skill of financial awareness skill and is linked to poverty alleviation (World Bank Report, 2019). The learning of financial issues is essential for management students.³

The earlier studies of Furnham and Argyle (1998) presents male are more risk takers than females in financial issues and active in financial transactions (Furnham, 1999). The financial knowledge, credit card ownership and spending pattern of students are examined by Hayhoe, Leach and Turner (1999) and established linkage with saving as low. The factors examined in the study are financial behaviors, financial self-efficacy, and financial knowledge. The saving culture increases with financial awareness skill (Danes, Huddleston-Casas, & Boyce, 1999). Agarwal Sumit, et al, (2011) survey finds low knowledge level on financial instruments but expressed interest in savings for retirement. The study by Pritchard, Myers, & Cassidy(1989) on the spending and saving habits of the students in United States have found the financial knowledge of savers and necessity spenders are more than discretionary spenders. The socio-economic background of the family is a determinant of financial knowledge.⁴

Varcoe, Martin, Devitto, & Go (2005) have found a linkage of higher financial knowledge in students with financial curriculum in the course. Peng et al., (2007) research study finds the finance courses develop saving habits at the college level. The course on financial skills increases the use of cash to credit for better financial control (Jobst, Vicki, 2009).⁵

The Securities Exchange Board of India is entrusted with the task of promoting financial learning and inclusion in the curriculum of the Indian education with participation from Universities. The unclaimed dividends and penalties paid by Corporate Firms are utilized by SEBI for promotion of financial learning.⁶

In India, the students from financial backward households are concerned of financial issues and accord priority in financial learning (Dewan, Goel, & Malhotra, 2013; Firmansyah, 2014).The financial discipline is low among college students with more spending and

less investment (Balint & Horvathne,2013) and higher debt(Anya Kamenetz,2006).The financial learning will improve with reinforcement technique and lower poverty is the outcome (Rodriguez & Saavedra, 2015).⁷⁻¹⁴

2. Financial Instruments

The financial instrument is a contract that gives rise to a financial asset of one entity and a financial liability or equity instrument of another entity (Indian Accounting Standards, 2015). The financial instrument is derived from a financial object capable of transaction with monetary value and is a legal contract. The exchange value may be with added interest or premium linked to market demand and supply for such product.¹⁵⁻²⁴

The financial instruments transactions in India are under the regulated control of Securities Exchange of India, Commodities Exchange of India, Reserve Bank of India and Ministry of Finance. The approved financial instruments in circulation are

Equities: The equities are tradable instruments with ownership rights. The equities are tradable at equity stock exchanges. The Securities Exchange Board of India is responsible for regulating the equity market.

Derivatives: Derived from the underlying asset value of the product. The financial contracts are protection from price fluctuations. The equity shares or asset classes may be converted into derivative.

Bonds and Debts: The bonds are class of instruments classified as debt. The debt instruments carry financial value with interest and are tradable instruments.

Mutual Funds: The fund formed with the contribution of group of investors in units. The proceeds from the fund are invested in tradable financial instruments for monetary gains. The profits are distributed to the unit holders on proportionate basis.

Fixed and Term Deposits: The fixed and term deposits are offered by banks, post office and corporate companies. These deposits based on interest withdrawal are classified into cumulative schemes or interest withdrawal schemes. The deposit is made in lump sum.

Recurring Deposits: These deposits are for a time period with part contribution in equal installments. The equal installments are deposited either daily or weekly or fortnightly or monthly or quarterly or half yearly or yearly.

Gold Based Funds: The gold asset value is converted into units and operates as a tradable instrument. The value of the instruments is calculated on the open market price of gold and premium for future value.

Commodities: The commodities are financial instruments with monetary value and derived from a commodity. The monetary value is based on market demand and supply of the commodity. The commodities may be agro-products or minerals.

The curriculum of management courses includes the basics and complex issues of financial management. The knowledge of common financial instruments is judged by their skill to manage the portfolio of bank deposits, post offices saving deposits and other financial instruments.

3. Present Study

The awareness skill of financial instruments is defined for the purpose of this study as awareness of financial instruments and skill to invest in these instruments. The study is designed to

1. - estimate the awareness skill level of the financial instruments within the students pursuing the management courses
2. - estimate the difference in awareness skill level of students' gender wise and domain specialization wise.

4. Hypothesis

1. H_{01} : The awareness skill level of the students of management courses on financial instruments is low
2. H_{02} : There is no gender wise difference of awareness skill level on financial instruments within the students of management course
3. H_{03} : There is no domain specialization wise difference of awareness skill level on financial instruments within the students of management course

5. Materials and Methods

The study is aimed at examining the financial awareness skill of selected financial instruments. The socio-demographic and specialization are also considered for evaluation of financial awareness skill. The students pursuing management courses only are included in the study.

The research design formulated for the study is descriptive with the sample drawn from students of post graduate level pursuing professional management courses. The sample of 131 is drawn randomly from 1360 students of management course population in Visakhapatnam. The sample is 10 percent of the population with five schedules discarded. The standardized instrument with 24 questions with 80 items is adopted after conducting pilot study on 30 management students and rejecting inconsistent questions. The percentage and means are calculated for analysis and the relationship is tested with One Way Analysis of Variations.

The test result of Cronbach's Alpha test is (Alpha Coefficient = 0.7299; post standardized alpha coefficient = 0.8371) within the acceptable limits (≥ 0.6). The questionnaire is standardized by discarding some items with low individual alpha coefficient value.

6. Results and Discussion

The awareness skill of the financial instruments is tested and analyzed across the selected sample. The result presents (Table 1; Table 2) awareness skill of males is more than females on bank FD and RD's.

The analysis presents more male students are aware about Banks, NBFC, Post Office and Corporate Debt instruments for saving than females. The awareness skill on Non-banking Financial Corporation and their instruments is low (39 percent) and female awareness skill is very low (7.8 percent). In the Banking category 84 percent (male 64.1 percent; female 19.8 percent) are aware of FD whereas for RD the awareness skill level is 54.2 percent (male 38.9 percent; female 15.3 percent). The post office schemes awareness skill for Kishan Vikas Patra is 33.6 percent (male 23.7 percent; female 9.9 percent) and for recurring and fixed deposit scheme are 29 percent (male 20.6 percent ; female 8.4 percent) and 35.9 percent (male 25.2 percent; female 10.7 percent) respectively. The Corporate debt schemes presents a dismal picture, the awareness skill level for Corporate FD (Table 1) is 19.1 percent (male 13.7 percent; female 5.3 percent) and for collective investment scheme is 18.3 percent (male 13.7 percent; female 4.6 percent).

The gender based response of students on awareness skill on Housing Finance Companies (Table 3) is miserably low (4.5 percent) for female and for male group is better (20.6 percent). The awareness skill of stock market instruments is higher for males (29.3 percent) than females (12.25 percent). The abysmally low awareness skill among females is presented in the Table 3. The futures and forward market and its instruments awareness skill are low (23.7 percent). The mutual fund market awareness skill is better (35.66) compared to stock market instruments. The gender based comparison is skewed in favor of male for stock market and mutual fund. The awareness skill of Mutual Fund, SIP Mutual Fund and Gold Fund units for male category are 25.2 percent, 32.1 percent and 26.7 percent respectively whereas for female category are 8.4 percent, 8.4 percent and 6.1 percent respectively.

The data on awareness skill of commodity market and its instruments (Table 4) presents, males (14.9 percent) have comparatively better awareness skill than females (6.45 percent). However, the awareness skill level is very low for both male and females. The awareness skill level for commodity futures and commodity options for males is 16.8 percent and 13.0 percent whereas for females is 5.3 percent and 2.3 percent respectively. The awareness skill of Forward Market Instruments and Trade Instruments for males is 9.2 percent and 35.1 percent whereas for females is 3.8 percent and 8.4 percent respectively. The pension instruments awareness skill is abysmally low for females (8.4 percent) than for males (22.9 percent). The chit fund and real estate awareness skill levels are 42.0 percent and 35.1 percent respectively. The student's specialization wise

Table 1: Gender wise bank, NBFC and corporate instruments awareness skill

	Banks		NBFC		Corporate	Collective Investment Scheme
	FD	RD	FD	RD	FD	
Male	64.1	38.9	23.7	15.3	13.7	13.7
Female	19.8	15.3	11.5	7.6	5.3	4.6
Total	84.0	54.2	35.1	22.9	19.1	18.3

Table 2: Gender wise post office instruments awareness skill

	Post Office Scheme		
	KVP	RD	FD
Male	23.7	20.6	25.2
Female	9.9	8.4	10.7
Total	33.6	29.0	35.9

Table 3: Gender wise awareness skill of other financial instruments

	Housing FC	Equity	Debenture	Mutual Fund	Futures	Forwards	Options	SIP Mutual Fund	Gold Fund Units
Male	20.6	29.7	29.0	25.2	25	11.5	16.0	32.1	26.7
Female	4.6	13.0	11.5	8.4	8.6	5.4	4.6	8.4	6.1
Total	25.2	42.7	40.5	33.6	33.6	16.9	20.6	40.5	32.8

Table 4: Gender wise awareness skill level of commodity and other financial instruments

Gender	Commodity Future	Forward Market Instruments	Commodity Options	Trade Instrument	Unit Instrument	Pension Instrument	Chit Fund	Real Estate
Male	16.8	9.2	13.0	35.1	26.0	22.9	33.6	26.7
Female	5.3	3.8	2.3	8.4	6.8	8.4	8.4	8.4
Total	22.1	13.0	15.3	43.5	32.8	31.3	42.0	35.1

Table 5: Domain specialization wise awareness skill level of financial instruments

	Bank FD	Bank RD	NBFC FD	NBFC RD	Corporate FD	Collective Investment Scheme	KVP	PO RD	PO FD	Total
Finance	64.1	45.8	27.5	17.6	13.7	13.7	27.5	26.0	25.2	25.5
Other Domains	19.8	8.4	7.6	5.3	5.4	4.6	6.1	3.1	10.7	7.8
Total	84.0	54.2	35.1	22.9	19.1	18.3	33.6	29.1	35.9	33.3

Table 6: Domain specialization wise awareness skill level of financial instruments

Domain Specialization	Equity	Debenture	Mutual Fund	Futures	Forwards	Options	SIP Mutual	Gold Fund	Total Percent
Finance	37.4	33.6	28.3	27.5	15.4	18.3	33.6	26.0	27.15
Other Domains	5.3	6.9	5.3	6.1	1.5	2.3	6.9	6.9	5.15
Total	42.7	40.5	33.6	33.6	16.9	20.6	40.5	32.8	32.30

Table 7: Domain specialization wise awareness skill level of commodity and other financial instruments

Domain Specialization	Commodity Future	Forward Market Instrument (Currency)	Commodity Options	Trade Instrument	Unit Instrument	Pension Instruments	Chit Fund	Real Estate
Finance	17.6	13.0	14.5	32.8	26.7	24.4	32.8	29.0
Other Domains	4.6	1.2	0.8	10.7	6.1	6.9	9.2	6.1
Total	22.1	14.2	15.3	43.5	32.8	31.3	42.0	35.1

Table 8: ANOVA between gender and awareness skill of financial instruments

		SS	df	MS	F	Sig.			SS	df	MS	F	Sig.
Bank FD	B G	2.831	1	2.831			Forwards	B G	.410	1	.410	2.939	.089
	WG	17.605	129	.136	.207	.650		WG	17.86	128	.140		
	Total	17.634	130					Total	18.27	129			
Bank RD	BG	1.196	1	1.196			Options	B G	.438	1	.438	2.691	.103
	W G	31.323	129	.243	4.925	.028		WG	20.99	129	.163		
	Total	32.519	130					Total	21.43	130			
NBFC FD	B G	1.234	1	1.234			SIP Mutual	B G	.426	1	.426	1.763	.187
	WG	29.835	129	.231	.053	.818		WG	31.13	129	.241		
	Total	29.847	130					Total	31.55	130			
NBFC RD	B G	7.281	1	7.281			Gold Fund	B G	3.104	1	3.104	.139	.710
	WG	23.129	129	.179	.004	.949		WG	28.85	129	.224		
	Total	23.130	130					Total	28.88	130			
Corporate FD	B G	7.026	1	7.026			Commodity Future	B G	1.778	1	1.778	.102	.750
	WG	20.159	129	.156	.450	.504		WG	22.56	129	.175		
	Total	20.229	130					Total	22.58	130			
Collective Invst. Scheme	B G	1.097	1	1.097			Forward Market	B G	.655	1	.655	5.979	.016
	WG	19.592	129	.152	.072	.789		WG	14.13	129	.110		
	Total	19.603	130					Total	14.79	130			
KVP	B G	.186	1	.186			Commodity Options	B G	.554	1	.554	4.361	.039
	WG	29.035	129	.225	.828	.365		WG	16.39	129	.127		
	Total	29.221	130					Total	16.94	130			
PO RD	BG	.956	1	.956			Trade Instrument	B G	3.874	1	3.874	.155	.694
	W G	26.021	129	.202	4.739	.031		WG	32.16	129	.249		
	Total	26.977	130					Total	32.19	130			
PO FD	BG	.453	1	.453			Unit Insurance	B G	.148	1	.148	.662	.417
	W G	29.684	129	.230	1.968	.163		WG	28.73	129	.223		
	Total	30.137	130					Total	28.88	130			
Equity	B G	1.467	1	1.467			Pension Ins	B G	6.553	1	6.553	.030	.863
	WG	30.594	129	.237	6.184	.014		WG	28.16	129	.218		
	Total	32.061	130					Total	28.16	130			
Debenture	B G	.426	1	.426			Chit Fund	B G	1.533	1	1.533	.062	.804
	WG	31.132	129	.241	1.763	.187		WG	31.89	129	.247		
	Total	31.557	130					Total	31.90	130			
Mutual Fund	B G	.409	1	.409			Real Estate	B G	.278	1	.278	1.211	.273
	WG	28.812	129	.223	1.832	.178		WG	29.57	129	.229		
	Total	29.221	130					Total	29.84	130			
Futures	B G	.186	1	.186									
	WG	29.035	129	.225	.828	.365							
	Total	29.221	130										

analysis presents the awareness skill level of students with Finance domain is higher than Other Domains (Table 5). The finance domain students' awareness skill for Bank FD is higher than FD's of NBFC (35.1 percent), PO (35.9 percent) and Corporate (19.1 percent). Further, for RD Bank Instruments awareness skill level is higher than RD's of NBFC (22.9 percent) and PO (29.1 percent). The awareness skill of Collective Investment Scheme within Finance and Other Domains is 13.7 percent and 4.6 percent respectively. The awareness skill of the financial instruments for Finance and Other Domains specialization students are 25.5 percent and 7.8 percent respectively.

The results (Table 6) on market operated instruments' presents Finance specialization students to the extent of

27.15 percent are aware of equity (37.4 percent) ,debenture (33.6 percent) ,mutual fund (28.3 percent),futures (27.5 percent), currency forwards (15.4 percent), oercent) and gold fund units (26.0 percent). The awareness skill of financial instruments from Other Domains is 5.15 percent. The terms Commodity Future, Forward Market Instruments, Commodity Options, Trade Instruments, Unit Instruments, Pension Instruments, Chit Fund and Real Estate (Table 7) is having high learning deficiency on awareness skill with 76.15 (100-23.85) percent. The awareness skill of finance students for trade instruments is 32.8 percent whereas for students from Other Domain areas are 10.7 percent. The financial awareness skill level for Other Domain areas of specialization with respect to exchange tradable instruments

Table 9: ANOVA between specialization domain and awareness skill of financial instruments

		SS	df	MS	F	Sig.			SS	df	MS	F	Sig.
Bank FD	B G	.028	1	.028			Forwards	B G	.410	1	.410		
	WG	17.605	129	.136	.207	.650		WG	17.867	128	.140	2.939	.089
	Total	17.634	130					Total	18.277	129			
Bank RD	BG	1.196	1	1.196			Options	BG	.438	1	.438		
	W G	31.323	129	.243	4.925	.028		W G	20.997	129	.163	2.691	.103
	Total	32.519	130					Total	21.435	130			
NBFC FD	B G	.012	1	.012			SIP	B G	.426	1	.426		
	WG	29.835	129	.231	.053	.818		WG	31.132	129	.241	1.763	.187
	Total	29.847	130					Total	31.557	130			
NBFC RD	B G	.001	1	.001			Gold Fund	B G	.031	1	.031		
	WG	23.129	129	.179	.004	.949		WG	28.854	129	.224	.139	.710
	Total	23.130	130					Total	28.885	130			
Corporate FD	B G	.070	1	.070			Commodity Future	B G	.018	1	.018		
	WG	20.159	129	.156	.450	.504		WG	22.562	129	.175	.102	.750
	Total	20.229	130					Total	22.580	130			
Collective Investment Schemes	B G	.011	1	.011			Forward Market (Currency)	B G	.655	1	.655		
	WG	19.592	129	.152	.072	.789		WG	14.139	129	.110	5.979	.016
	Total	19.603	130					Total	14.794	130			
PO RD	B G	.956	1	.956			Commodity Options	B G	.554	1	.554		
	WG	26.021	129	.202	4.739	.031		WG	16.392	129	.127	4.361	.039
	Total	26.977	130					Total	16.947	130			
PO FD	BG	.453	1	.453			Trade Instrument	BG	.039	1	.039		
	W G	29.684	129	.230	1.968	.163		W G	32.160	129	.249	.155	.694
	Total	30.137	130					Total	32.198	130			
Equity	BG	1.467	1	1.467			Unit Insurance	BG	.148	1	.148		
	W G	30.594	129	.237	6.184	.014		W G	28.738	129	.223	.662	.417
	Total	32.061	130					Total	28.885	130			
Debenture	B G	.426	1	.426			Pension Insurance	B G	.007	1	.007		
	WG	31.132	129	.241	1.763	.187		WG	28.161	129	.218	.030	.863
	Total	31.557	130					Total	28.168	130			
Mutual Fund	B G	.409	1	.409			Chit Fund	B G	.015	1	.015		
	WG	28.812	129	.223	1.832	.178		WG	31.893	129	.247	.062	.804
	Total	29.221	130					Total	31.908	130			
Futures	B G	.186	1	.186			Real Estate	B G	.278	1	.278		
	WG	29.035	129	.225	.828	.365		WG	29.570	129	.229	1.211	.273
	Total	29.221	130					Total	29.847	130			

of commodities, urrency, mutual units and pension units is very low (5.05 percent). The awareness skill level of operation of Chit Fund and Real Estate instruments for finance and Other Domains are 30.9 percent and 7.65 percent respectively. The combined awareness skill of exchange tradable instruments of commodities, currency, mutual units and pension units is 26.33 percent and for Chit Fund and Real Estate is 38.55 percent.

The One Way ANOVA results (Table 8) present significant variations between Gender and awareness skill of the financial issues connected with each of the financial instruments. The gender is significant at 10 percent with Recurring Deposits of Bank and Post Office, Equity, Commodity Futures and Options and Forward Market (Currency). The trend of awareness skill across the above financial issues presents variations. The domain

specialization and the awareness skill level (Table 9) of the students have significant variations at 10 percent level for recurring deposits of Banks and Post Office, Equity, Equity forwards, Forward Market (Currency) and Commodity Options.

The first null hypotheses i.e. H_{01} : The awareness skill level of the students of management courses on financial instruments is low, framed for the study is accepted, since the awareness skill level is less than 32.8 percent. The other two null hypotheses H_{02} and H_{03} are rejected, there is a significant variation of awareness skill level of financial instruments with focus on gender and specialization. The awareness skill level is confined to fixed deposits and recurring deposits.

7. Conclusion

The financial awareness skill of the management students from different domain specializations is observed in the study. The operational definition of awareness skill level is the knowledge and ability to invest independently. The students of management courses across the domain specialization is lacking in the financial skills on the key financial instruments. Furnham and Argyle (1998) findings on gender variations in awareness are supported by this study and adds awareness skill is low. The new generation is dependent on elder family members for basic business or day to day financial issues. Therefore, the awareness skill level with ability to make investment decisions is very low.

The skill orientation in the course curriculum is the cause for low awareness skill level. The management courses need to be revised to meet with the life or work skill expectancies. The employable skills for financial domain students require attention of the education policy makers.

8. Source of Funding

None.

9. Conflict of Interest

None.

References

- Sumit A, Gene A, Itzhak BD, Souphala C, Douglas E. Financial Counseling, Financial Literacy, and Household Decisionmaking. *Pension Res Council WP*. 2011;44:181–205.
- Lusardi A, Mitchell OS. The Economic Importance of Financial Literacy: Theory and Evidence. *Journal of Economic Literature*. 2014;52(1):5–44.
- Kamenetz A. Generation Debt; 2006. Available from: <http://www.anyakamenez.net/books/generation-debt/>.
- Balint A, Horvathne AK. Saving habits of Hungarian college students. *Eur Sci J*. 2013;9(34):1857–7881.
- Birari A, Patil U. Spending & Saving Habits of Youth in the City of Aurangabad. *SIJ Trans on Ind, Fin Business Manag (IFBM)*. 2014;2(3):1–8.
- Companies (Indian Accounting Standards) Rules, 2015. Accounting Standards Board; 2013. Available from: <https://www.mca.gov.in/content/mca/global/en/acts-rules/ebooks/accounting-standards.html>.
- Cravener G. The impact of personal finance education delivered in high school and college courses. *J Fam Econ Issues*. 2007;28(2):265–84. doi:10.1007/s10834-007-9058-7.
- Danes SM, Casas CH, Boyce L. Financial Planning Curriculum for Teens: Impact Evaluation. *J Fin Counseling Plan*. 1999;10(1):1–39.
- Dewan A, Goel DR, Malhotra R. Student's perception regarding student financing (a case study of Palwal and Faridabad district of Haryana). *Int J Soc Sci & Interdiscip Res*. 2013;2(7):97–103.
- Firmansyah D. The influence of family backgrounds toward student's saving behavior: A survey of college students in Jabodetabek. *Int J Sci Res Pub*. 2014;4(1):1–6.
- Furnham A. The saving and spending habits of young people. *J Econ Psychol*. 1999;20(6):677–97.
- Furnham A, Argyle. The psychology of money; 1998. p. 252.
- Hayhoe CR, Leach L, Turner PR. Discriminating the Number of Credit Cards Held by College Students Using Credit and Money Attitudes. *J Econ Psychol*. 2016;20(6):643–56.
- Jobst VJ. The 800 Pound Gorilla in the Room": Changing College Students' Spending and Saving Habits; 2009. p. 1–32.
- Lusardi A. Financial literacy: Do people know the ABCs of finance. *J Public Understanding Sci*. 2015;24(3):260–71. doi:10.1177/0963662514564516.
- Peng TM, Fox AJJ, Bartholomae S, Cravener G, Martina TC, Ae P. The impact of personal finance education delivered in high school and college courses. *Jo Fam Econ Issues*. 2007;28(2):265–84.
- Pritchard ME, Myers BK, Cassidy DJ. Factors associated with adolescent saving and spending patterns. *Adolescence*. 1989;24(95):711–23.
- Report on Learning Poverty-2019; 2021. Available from: <https://www.worldbank.org/en/topic/education/brief/what-is-learning-poverty>.
- Rodriguez C, Saavedra JE. Nudging Youth to Develop Savings Habits: Experimental Evidence Using SMS Messages. Cesr-Schaeffer working paper series. *Adolescence*. 2015;4(1):2015–2033.
- India Lags in Financial Literacy with Women and Young People Most at Risk. Visa 2012 Global Financial Literacy Barometer; 2012. Available from: <https://www.businesswireindia.com/india-lags-in-financial-literacy-with-women-and-young-people-most-at-risk-visa-2012-global-financial-literacy-barometer-31541.html>.
- Programme UND. National Human Development Report- Planning the Opportunities for a Youthful Population; 2018. doi:<https://doi.org/10.18356/28cccb7e-en>.
- Papers UB. Economic Survey 2015-16. 2016; Available from: <https://www.indiabudget.gov.in/budget2016-2017/survey.asp>.
- Varcoe K, Martin A, Devitto Z, Go C. Using a Financial Education Curriculum for Teens. *J Fin Counseling Plan*. 2005;16(1):9.
- Gross Domestic Savings-China. 2018; Available from: <https://data.worldbank.org/indicator/NY.GDS.TOTL.ZS?locations=CN>[accessed].

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Analysis of Education, Training and Job Placement in Improving Employee Performance

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ABSTRACT: The purpose of this study is to analyze how much influence the level of education, training, and job placement has on improving employee performance at the Agency for Personnel and Human Resources Development (BKPSDM) Lubuklinggau City, South Sumatra, Indonesia with a population of 70 respondents who are employees of the BKPSDM and elements of the Infectorate Lubuklinggau City. This research is quantitative research with statistical analysis using SPSS version 23 with a multiple linear regression approach to test the hypothesis and test the coefficient of determination. The results showed that simultaneously the level of education, training, and job placement had a positive and significant impact on improving employee performance, but partially job placement had a dominant influence on improving employee performance, with work placements that matched the competencies possessed by employees through education and training will affect improving the performance of the employee concerned, it is recommended that the Employment and Human Resources Development Agency of Lubuklinggau City continue to maintain employees who are following their competencies, and continuously develop the level of education and training of employees.

Keywords: Education, Training, Job placement and performance



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INTRODUCTION

Human resources are a very important thing in relation to a government agency or organization, because the success or failure of a government institution is influenced by whether or not the human resources are owned, therefore the selection of human resources to fill organizational needs must match the qualifications needed to fill job vacancies at the organization in question (Mandey & Lengkong, 2015; Tordera et al., 2020). Efforts to develop human resources include education and training for both formal and non-formal educators according to the opinion that education and training are the forerunners of human resource development (Miranto et al., 2019; Zhou, 2021). One of the efforts to improve employee performance is through education and training, while the opinion is that education and training is a theoretical process to improve the

skills and morals of employees, people who have received education and training tends to work more skillfully than employees ([Hasibuan, 2014](#); [Piwowar-Sulej, 2021](#)), who do not receive education and training ([Kazakovs et al., 2015](#); [Sutrisno, 2013](#)). Education and knowledge helps employees to understand the knowledge and skills practically and apply it in their work. If an employee is placed according to his expertise, the employee will be more enthusiastic in carrying out tasks that have an impact on increasing the employee's performance ([Asadullah et al., 2021](#); [Yuliana et al., 2015](#)). Improving performance it is necessary to increase employee competence through education and training in accordance with their main duties and functions in work ([Bisht & Mahajan, 2021](#); [Situmorang et al., 2020](#)). The level of competence possessed by employees and is appropriate in work placements has an effect on improving performance, while competence according to is an employee's ability to carry out tasks or work on the basis of knowledge and skills ([Tamara et al., 2021](#)). Skills possessed, furthermore suggests that employee education and training has an effect on the performance of the employees themselves ([Turere, 2013](#)).

Education is an indicator that reflects a person's ability to complete his work ([Moses, 2012](#)). Meanwhile training is the development of human resources specifically designed to develop knowledge, skills, competencies, attitudes and behaviors in order to improve employees performance ([Wirawan, 2015](#)). Training is a learning process that mainly focuses on gaining knowledge, improving skills, identifying rules or improving attitudes or behavior to improve employee performance ([Ahmad & Manzoor, 2017](#)). Training is a systematic process to improve knowledge and skills attitudes that lead to increased employee performance ([Elnaga & Imran, 2013](#)). Education and training is an effort to develop human resources, especially to develop intellectual abilities and human personality ([Gomes, 2013](#)). Education and training is an effort to maintain and improve the professionalism of employees ([Sulistiyani & Rosidah, 2013](#)). The method used by organizations to maintain, and empower public employees in the organization and at the same time is to increase skills of employees which can ultimately improve employee performance ([Wicaksono, 2016](#)).

Training is the assignment of a person to a position in accordance with the expertise and skills they have ([Mangkunegara, 2017](#)). What about the effect of job placement on employee performance that employee job placement has a positive effect on improving performance ([Montolalu et al., 2016](#)). Job placement is the placement of a person into the right job position, this is focused on the suitability and matching between the knowledge and abilities of employees with the characteristics of their work ([Mathis & Jackson, 2016](#)). Furthermore job placement is one of the functions of the employee. The most important thing in human resource management is whether or not a person is in a certain position depends on the work placement, if the placement function is not carried out, it will automatically have a fatal impact on the achievement of organizational goals ([Gomes, 2013](#)). Work placement is a process of assigning tasks and jobs to employees who pass the selection to be carried out based on their responsibilities and authority and are able to overcome the risks of their workload ([Ardana et al., 2014](#)). Good employee work placements should be maintained so that there are efforts to improve the performance of the employee in question ([Aldy, 2020](#)). Work placement has a relationship with the competencies possessed by employees in an effort to improve performance ([Lussy, 2018](#)). There is a relationship in employee job placement with employee satisfaction levels ([Devi et al., 2016](#)). In the placement of employees should look at the period of service, rank and class, education and experience of the employee concerned ([Silaban & Rifai, 2017](#)). Work placements

that are not in accordance with the competence of employees will affect the work stress (Mansur et al., 2017; McLarty et al., 2021). While the performance itself according to that performance is the level of achievement of a person or employee in an organization that can increase productivity (Avery et al., 2015; Muvariz, 2019).

The Employment and Human Resources Development Agency of Lubulinggau City has the main task and function of assisting the Mayor in the field of fostering and developing human resources supported by human resources with the level of competence as shown in the table below:

Table 1 BKPSDM Employee Data of Lubuklinggau City Based on Education Level in 2017 –2020

Years	Level of education				Number of Employees
	Postgraduate	Undergraduate	Diploma	High School	
			3		
2107	19	29	1	9	58
2018	19	26	1	10	56
2019	16	23	1	10	50
2020	16	21	0	10	47

Source: BKPSDM of Lubuklinggau City

Table 1 Lubuklinggau City of BKPSDM office employees based on education level between 2017–2020 shows that from 2017 to 2020 the number of employees who have Post graduate, Undergraduate and Diploma 3 education levels has decreased while at the high school education level experienced a static average, the level of education of employees does not affect performance but the level of training affects employee performance improvement.

Table 2. Data for BKPSDM Employees of Lubuklinggau City by Class Level in 2017 –2020

Year	Class Level				Number of Employees
	IV	III	II	I	
2017	8	43	7	0	58
2018	9	41	6	0	56
2019	6	38	6	0	50
2020	6	35	6	0	47

Source : BKPSDM of Lubuklinggau City

Table 2 shows data for BKPSDM office employees of Lubuklinggau City based on class level between 2017–2020 showing that from 2017 to 220 the number of employees who have class IV, III and II levels has decreased. While at the level of group I there is a vacancy. According to Government Regulation Number 99 of 2000 concerning the rank of Civil Servants, it is stated that for civil servants, it is a position that shows the level of a civil servant in a series of staffing structures and is used as a basis for salary..

Table 3. Types of Education and Training followed by BKPSDM Employees of Lubuklinggau City in 2017-2020

Year	Number of Employees	Number of Training Participants	Type of training	Place
2017	58	2	PIM IV	Lubuklinggau
2018	56	25	PIM II,III and IV	Lb Linggau and in Palembang
2019	50	18	PIM III and IV	Lubuklinggau
2020	47	13	PIM III and IV	Lubukliggau

Source : BKPSD of Lubuklinggau City

Table 3 shows the type of training that BKPSDM employees participated in Lubuklinggau City between 2017-2020 shows that in 2017 of the 58 employees who attended the training, only 2 employees with level IV leadership training were held in Lubuklinggau City. In 2018 of the 56 employees who attended the training, only 25 employees with the type of leadership training at level II, III and IV, in 2019 of the 50 employees who attended the training only 18 employees with the type of leadership training level III and level IV. In 2020, of the 47 employees who participated in the training, only 13 employees with the type of leadership training at level III and level IV were carried out in Lubuklinggau City. Educational competence and work experience within the scope of BKPSM Lubuklinggau City greatly influence in carrying out the duties and positions assigned to each employee. An employee who is placed at the BKPSDM office in Lubuklinggau City as an employee, of course he must have education and work experience first in order to help himself in carrying out the tasks assigned to him.

Table 4. Results Achieved by BKPSDM Employees of Lubuklinggau City in 2017 –2020

Year	Number of Employees	Number of Training Participants	Results achieved after attending the Training (%)
2017	58	2	3,40 %
2018	56	25	44,64 %
2019	50	18	36,00 %
2020	47	13	27,65 %

Source: BKPSDM of Lubuklinggau City

Table 4 shows the results achieved by BKPSDM employees in the city of Lubuklinggau between 2017–2020, it shown that the number of employees participating in the training is different. In 2017 of the total 58 employees, only 2 people participated in the training and the results achieved after participating in the training were 3.40%. In 2018 of the 56 employees, only 25 people participated in the training and the results achieved after participating in the training were 44.64%. In 2019 out of 50 employees, only 18 people participated in the training and the results achieved after participating in the training were 36.00%. in the following year in 2020 of the total 47 employees, only 13 people participated in the training and the results achieved after participating in the training also increased, namely 27.65%.

As a regional apparatus that manages personnel, BKPSDM has the task of achieving performance targets in the field of apparatus resource management development. The main

indicator of the success of the development of human resource management in Indonesia is the Achievement of the Professionalism Index. This is in accordance with the Regulation of the Minister of State Apparatus Empowerment and Bureaucratic Reform of the Republic of Indonesia Number 38 of 2018 concerning the Measurement of the Professionalism Index of the State Civil Apparatus and the Regulation of the State Civil Service Agency Number 8 of 2019 concerning Guidelines for Procedures and Implementation of the Measurement of the Professionalism Index of the State Civil Apparatus. The index indicators are qualification, competence, discipline and performance. The following presents the achievements of the ASN professionalism index in Lubuklinggau City:

Table 5 Level of Achievement of the ASN Professional Index of Lubuklinggau City in 2020

No	ASN Professionalism Index	ASN Professionalism Index Achievements	Ideal Achievement of ASN Professionalism Index
1	Quality	13,28	25,0
2	Competence	10,48	40,0
3	Discipline	5,0	5,0
4	Performance	25,0	30,0
	Total	53,76	100

From these data it appears that the achievement of the State Civil Apparatus (ASN) professionalism index of the Lubuklinggau City Government of 53.76 is still low. Apart from the ASN professionalism index indicator, BKPSDM's performance achievement is also measured by the system merit index. Based on the calculation of the system merit index in the SIPINTER application, the State Civil Apparatus Commission, the achievement of the Lubuklinggau City Government is 192.5. This achievement is included in the low category.

The low performance achievement of BKPSDM is suspected to be caused by the lack of ASN personnel at BKPSDM which can be seen from the results of the Lubuklinggau City BKPSDM Workload analysis, therefore it is necessary to empower civil servants and optimize their placement so that the performance target of BKPSDM of the City is achieved.

Based on the conceptual framework, several research hypotheses were prepared to be tested. The hypothesis is as follows:

1. It is presumed that the level of education held has a positive influence on employee performance at the BKPSDM of Lubuklinggau City
2. It is presumed that the training (Diklat) held has a negative effect on employee performance at the BKPSDM of Lubuklinggau City
3. It is presumed that the work placements held have a negative effect on the performance of employees at the BKPSDM of Lubuklinggau City
4. It is presumed that the level of education, training (Diklat) and work placements that are held together have a negative effect on employee performance at the BKPSDM of Lubuklinggau City

METHOD

This research method is descriptive associative, descriptive research is the simplest research compared to other research, in research it does nothing to the object under study associative research is research whose purpose is to analyze the relationship between two or more variables (Arikunto, 2013; Hamilton & Finley, 2020). Sample selection using cluster sampling, namely the sampling technique by selecting from a small unit group, with a sample of 70 people and data collection techniques using questionnaires compiled using a Likert scale with a score of 1 to 5 and to ensure that the instruments used in This research can be trusted, then two tests must be carried out, namely the validity test and the reliability test (Hamilton & Finley, 2019; Sugiyono, 2019). At the stage of analyzing the data on the influence of Education, Training and Work Placement on Employee Performance, descriptive analysis and inductive analysis were carried out, including normality test, multicollinearity test, heteroscedasticity test and multiple linear regression analysis, for hypothesis testing data used F test, t-test and coefficient of determination test (R^2)

RESULTS AND DISCUSSION

1. Validity and Reliability Test

Test instrument validity is used to measure whether the questionnaire is valid or not, where a questionnaire is said to be valid if the question or statement is able to reveal something that will be measured by the questionnaire. The validity test criteria is if $r\text{-count} > r\text{-table}$ (0.312) then the instrument/question item is declared valid, on the contrary if $r\text{-count} < r\text{-table}$ then the question/item is declared invalid, so it must be removed or replaced by the validity test results which can be seen [there is a table below:

Table 6. Test the validity of the variables Education, Training, Job placement and performance

Variable	Statement	Valid	Item Invalid
Education Level	10	10	0
Training	10	10	0
Job placement	10	10	0
Performance	10	10	0

Sources processed by researchers 2020

Table 7 Reliability Test of Education, Training, Job Placement and Performance variables

Reliability test is used to test the consistency or stability of the score of a research instrument on the same respondent, and is given at different times. The criteria to determine whether the instrument is reliable or not, namely if the value of Cronbach's Alpha is 0.6, the instrument is declared reliable. On the other hand, if Cronbach's Alpha value is 0.6 then the instrument is declared unreliable. The results of the reliability test can be seen in Table 7 below:

Table 7. Reliability Test Result

Variable	Cronbach's Alpha	Description
Employee competence	.921	Reliable
Work commitment	.979	Reliable
Work motivation	.901	Reliable
Performance	.974	Reliable

Sources processed by Researchers 2020

From the table above, it can be seen that all questions are valid and reliable, so all questions are included in the next analysis.

2. Classic assumption test

The purpose of classical assumption testing is to provide certainty that the regression equation obtained has accuracy in estimation, is unbiased, and is consistent, before conducting regression analysis, the classical assumption test is first carried out, including normality test, linearity test, heteroscedasticity test, and multicollinearity test.

1. Normality Test

Normality test to test whether in a regression model, the dependent variable, and the independent variable, or both have a normal distribution or not. A good regression model is to have a normal distribution or close to normal. To detect the normal regression model or not, it can be seen from the Normal P-P Plot. If the data spreads around the diagonal line and follows the direction of the diagonal line, then the regression model fulfills the assumption of normality. If not, or the data is spread far from the diagonal line, then the regression model does not meet the assumption of normality. The results of the normality test can be seen from Figure 1

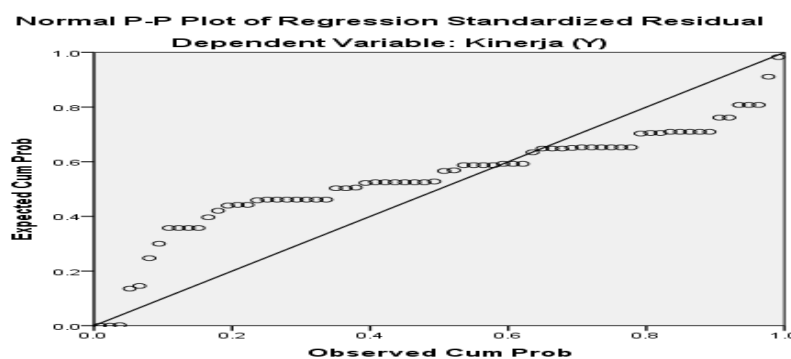


Figure 1. Normal P-P Plot

From Figure 1, it can be seen that the dots spread around the diagonal line and their distribution follows the direction of the diagonal line. So the regression model is feasible to use for predicting performance variables based on input from independent variables.

2. Linearity Test

Linearity testing is carried out to find out whether the model being proven is a linear model or not. The result of this linearity test is information on whether the empirical model should be linear, quadratic or cubic. To detect whether the model should use a linear equation or not, it is used by graphical analysis methods and statistical methods. Statistical methods that can be used to perform linearity testing are the Durbin-Watson Test, Ramsey Test, LM Test and MWD Test. The linearity test aims to determine whether two variables have a linear relationship or not significantly. This test is usually used as a prerequisite in correlation analysis or linear regression. Testing on SPSS using the Test for Linearity with a significance level is 0.05. Two variables are said to have a linear relationship if the significance (Linearity) is less than 0.05.

Table 11 Testing the linearity between X1, X2,X3 and Y

Variable	Significances
Linearity Variable X1	.285
Linearity Variable X2	.196
Linearity Variable X3	.317

Source: Primary data, processed. 2021

Based on table 11, the results of linearity testing show that Education (X1) Training (X2) job placement (X3) has a linear relationship with performance (Y). Sig value <0.05

3. Heteroscedasticity Test

Heteroscedasticity test aims to test whether in the regression model there is an inequality of variance from the residuals of one observation to another observation. If the variance of the residuals from one observation to another observation remains, it is called Homoscedasticity, while if it is different it is called Heteroscedasticity. A good regression model does not have heteroscedasticity problems.

To see whether there is a heteroscedasticity problem, it can be detected by the presence or absence of a certain pattern on the scatter plot graph, if there is a certain pattern, such as dots that form a regular pattern (wavy, widened then narrowed) then heteroscedasticity has occurred. Meanwhile, if there is no clear pattern, and the points spread above and below the number 0 and the Y axis, then there is no heteroscedasticity. The results of the heteroscedasticity test can be seen in Figure 2

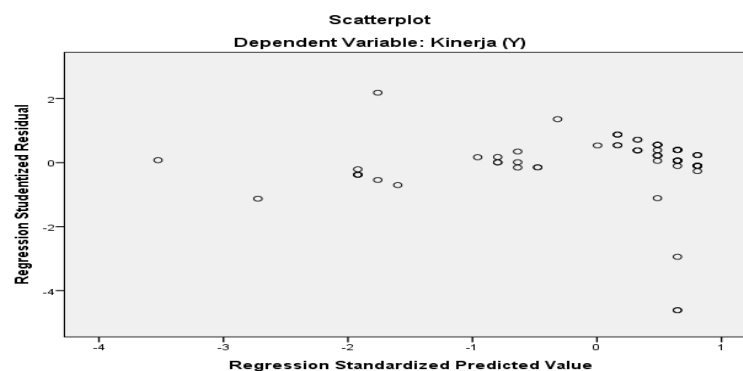


Figure 2. Scatter plot

4. Multicollinearity Test

Multicollinearity testing aims to test whether the regression model found a correlation between the independent variables. A good regression model should not have a correlation between independent variables. A good regression model should not have a correlation between the independent variables. To detect the presence of multicollinearity, it can be seen with the value of VIF (Variance Inflation Factor) and Tolerance. The multicolline-free regression equations are: Having a VIF value not exceeding 10 and having a tolerance number close to 1. For the results of the multicollinearity test, it can be seen from table 1 below.

Table 12 Multicollinearity Test

No	Variabel	Collinearity statistics	
		Tolerance	VIF
1	Education (X1)	.384	2.603
2	Training (X2)	.980	1.020
3	Job placement (X3)	.389	2.572

Source: Primary data, processed. (used by year)

Table 12 shows that the tolerance value is close to 1 and the VIF value for the two independent variables does not exceed 10, so there is no multicollinearity problem.

5. Multiple Linear Regression Analysis

In this regression analysis the backward method is used, where in this method in the initial test, all independent variables were included in the test and then removed one by one if they did not meet the t significance value below 0.05. The resulting output table will show the process/steps when these variables are removed, each row will be equipped with a number indicating the steps/processes carried out. In the discussion of this chapter, it will only be discussed in the last row/last process in each table, this is intended because in each last row is the result of the last test which is a variable that has a significance value of t below 0.05.

Hypothesis test: 1

Hypothesis 1 reads: It is suspected that the level of education held has a positive influence on employee performance at the BKPSDM of Lubuklingau City. The hypothesis is then tested using the t test. The results of these tests are as follows:

Table 13 Hypothesis testing 1

Model	Unstandardized		Standardized	t	S ig.
	Coefficients		Coefficients		
	B	Std. Error	Beta		
(Constant)	.114	.737		.155	.877
Education (X1)	.928	.160	.576	5.816	.000

Result: $1,995 \leq 5.816$, Decision= Rejected H_0

Based on the test, the decisions taken are reject H_0 so it was concluded that the level of education held had a positive influence on employee performance at the BKPSDM of Lubuklingau City.

Hypothesis test 2

Hypothesis 2 reads: Presumed education and traing (Diklat) that is held has a negative effect on employee performance at the BKPSDM of Lubulinggau City. The hypothesis is then tested using the t test. The results of these tests are as follows:

Tabel 14 Pengujian hipotesis 2

Model	Unstandardized		Standardized	t	S ig.
	Coefficients		Coefficients		
	B	Std. Error	Beta		

(Constant)	4.18	.68	6.134	.
6	2		000	
Training(X2)	.041	.14	.034	.278
	6			781
(Constant)	4.37	.10	43.082	.
4	2		000	

Result: $1,995 \geq 0,278$, Decision= Accepted H_0

Based on the test, the decision taken was to accept H_0 so it was concluded that it was suspected that the training (Training) held did not have a negative effect on employee performance at the BKPSDM of Lubulinggau City.

Hypothesis test 3

Hypothesis 3 reads: Presumed that the work placement system organized has a negative effect on employee performance at the BKPSDM of Lubulinggau City. The hypothesis is then tested using the t test. The results of these tests are as follows:

Table 15 Hypothesis test3

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.04	.53		.080	.
2	1				937
Job placement (X3)	.96	.11	.707	8.236	.
3	7				000

Result: $1,995 \leq 8,236$, Decision= Rejected H_0

Based on the test, the decision taken was to reject H_0 so it was concluded that the work placements held had a non-positive influence on employee performance at the BKPSDM of Lubulinggau City.

Hypothesis test 4

Hypothesis 7 reads: Presumed that the level of education, training and work placements that are held together have a positive influence on employee performance at the BKPSDM of Lubulinggau City. The hypothesis is then tested using the F test test. The results of the test are as follows:

Table 14 Hypothesis test 4

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	24.866	1	24.866	67.834	.000 ^d
Residual	24.927	68	.367		
Total	49.794	69			

Result: $3,31 \leq 67,834$, Decision= Rejected H_0

Result of Analysis of the Coefficient of Determination (Adjusted R²)

Table 15. Results of Analysis of the Coefficient of Determination (Adjusted R²)

Model Summary				
Model	R	Square	Adjusted R Square	Std. Error of the Estimate
1	.864 ^a	.746	.754	1,877

Sources processed by researchers 2020

Based on Table 15, above the R² (R Square) figure is 0.746 or (74,5 %). This shows that there is strong influence by the education variable, training variable and work placement variable on performance at the Agency for Personnel and Human Resources Development (BKPSDM_ because it is 74,5 %. While the remaining 25,5 % is explained or influenced by other variables which are not researched

Based on the test, the decision taken was to reject H₀ so it was concluded that the level of education, training and work placements that were held together gave a positive influence on the performance of employees at the BKPSDM of Lubulinggau City.

CONCLUSION

Based on the results of data processing that has been carried out, it can be concluded that this study proves empirically about

1. Education level has an effect on increasing employee performance at the Agency for Personnel and Human Resources Development of Lubuklinggau City
2. Training has no effect on improving employee performance at the Agency for Personnel and Human Resources Development of Lubuklinggau City
3. Work Placement has an effect on increasing employee performance at the Agency for Personnel and Human Resources Development of Lubuklinggau City.
4. The level of education, training and work placement together to improve the performance of employees at the Employment and Human Resources Development Agency of Lubuklinggau City

Based on the conclusion, the research suggestion is that there must be an effort to increase the level of education at the Agency for Personnel and Human Resources Development of Lubuklinggau City because it affects performance. There should be an increase in training at the Agency for Personnel and Human Resources Development of Lubuklinggau City because it does not affect performance. Maintaining work placement efforts at the Agency for Personnel and Human Resources Development of Lubuklinggau City because it affects performance.

REFERENCES

- Ahmad, I., & Manzoor, S. R. (2017). Effect of Teamwork, Employee Empowerment and Training on Employee Performance. *International Journal of Academic Research in Business and Social Sciences*, 7(11). <https://doi.org/10.6007/IJARBS/v7-i11/3472>
- Aldy, H. L. N. (2020). Pengaruh Penempatan Kerja Terhadap Kinerja Karyawan pada Yayasan

- Hanifa Islamic School. *Jurnal Ekonomi Efektif*, 2(2).
<https://doi.org/10.32493/JEE.v2i2.4157>
- Ardana, I. K., Mujiati, N. W., & Utama, I. W. M. (2014). *Manajemen Sumber Daya Manusia* (2nd ed.). Graha Ilmu. <https://opac.perpusnas.go.id/DetailOpac.aspx?id=1177812>
- Arikunto, S. (2013). *Prosedur Penelitian: Suatu Pendekatan Praktik* (8th ed.). Rineka Cipta.
<https://opac.perpusnas.go.id/DetailOpac.aspx?id=217760>
- Asadullah, M. A., Ul Haq, M. Z., Wahba, K., Hashmi, S., Kim, H. (Markham), & Hwang, J. (2021). Gender differences and employee performance: Evidence from the restaurant industry. *Journal of Hospitality and Tourism Management*, 48, 248–255.
<https://doi.org/10.1016/j.jhtm.2021.06.015>
- Avery, R. E., Smillie, L. D., & Fife-Schaw, C. R. (2015). Employee achievement orientations and personality as predictors of job satisfaction facets. *Personality and Individual Differences*, 76, 56–61. <https://doi.org/10.1016/j.paid.2014.11.037>
- Bisht, N. S., & Mahajan, A. (2021). Shared stressors and core self-evaluations: A trait activation perspective on employee performance. *Journal of Business Research*, 131, 103–111.
<https://doi.org/10.1016/j.jbusres.2021.03.053>
- Devi, C. R., Susilo, E. A., & Ratri, A. M. (2016). Pengaruh Penempatan dan Kepuasan Kerja Terhadap Kinerja Karyawan. *Jurnal Bisnis Dan Manajemen Universitas Merdeka Malang*, 3(2), 129–141. <https://doi.org/https://doi.org/10.26905/jbm.v3i2.416>
- Elnaga, A., & Imran, A. (2013). The Effect of Training on Employee Performance. *International Journal of Recent Technology and Engineering*, 5(4), 137–147.
<https://www.iiste.org/Journals/index.php/EJBM/article/view/4475>
- Gomes, F. C. (2013). *Manajemen Sumber Daya Manusia* (3rd ed.). Andi Publisher.
<https://library.unismuh.ac.id/opac/detail-opac?id=1383>
- Hamilton, A. B., & Finley, E. P. (2019). Qualitative methods in implementation research: An introduction. *Psychiatry Research*, 280, 112516.
<https://doi.org/10.1016/j.psychres.2019.112516>
- Hamilton, A. B., & Finley, E. P. (2020). Reprint of: Qualitative methods in implementation research: An introduction. *Psychiatry Research*, 283, 112629.
<https://doi.org/10.1016/j.psychres.2019.112629>
- Hasibuan, M. S. P. (2014). *Manajemen Sumber Daya Manusia* (12th ed.). Bumi Aksara.
<https://opac.perpusnas.go.id/DetailOpac.aspx?id=576827>
- Kazakovs, M., Verdina, A., & Arhipova, I. (2015). Automation of Human Resources Development Planning. *Procedia Computer Science*, 77, 234–239.
<https://doi.org/10.1016/j.procs.2015.12.379>
- Lussy, K. (2018). Pengaruh Penempatan dan Kompetensi Karyawan Terhadap Kinerja Karyawan Pada Perusahaan Daerah Panca Karya Ambon Bagian Transportasi Laut. *JURNAL MANEKSI*, 7(1), 26. <https://doi.org/10.31959/jm.v7i1.88>
- Mandey, M. A., & Lengkong, V. P. . (2015). Pengaruh Kompensasi, Gaya Kepemimpinan, dan Lingkungan Kerja Terhadap Kinerja Pegawai (Studi Pada Fakultas Ekonomi dan Bisnis Universitas Sam Ratulangi Manado). *Jurnal EMBA: Jurnal Riset Ekonomi, Manajemen, Bisnis Dan Akuntansi*, 5(3), 1383–1394.
<https://doi.org/https://doi.org/10.35794/emba.3.3.2015.10422>
- Mangkunegara, A. P. (2017). *Manajemen Sumber Daya Manusia Perusahaan* (14th ed.). Remaja

- Rosdakarya. <https://opac.perpusnas.go.id/DetailOpac.aspx?id=243023>
- Mansur, Mattalatta, & Baharuddin, D. (2017). Pengaruh Penempatan Kerja dan Stres Kerja Terhadap Kinerja Pegawai Pada Dinas Kependudukan Catatan Sipil Tenaga Kerja dan Transmigrasi Kabupaten Soppeng. *Jurnal Mirai Management*, 2(2), 338–358. <https://doi.org/https://doi.org/10.37531/mirai.v2i2.61>
- Mathis, R. L., & Jackson, J. H. (2016). *Manajemen Sumber Daya Manusia* (D. Angelica (ed.); 12th ed.). Salemba Empat. <https://pustakaaceh.perpusnas.go.id/detail-opac?id=23371>
- McLarty, B. D., Muldoon, J., Quade, M., & King, R. A. (2021). Your boss is the problem and solution: How supervisor-induced hindrance stressors and LMX influence employee job neglect and subsequent performance. *Journal of Business Research*, 130, 308–317. <https://doi.org/10.1016/j.jbusres.2021.03.032>
- Miranto, A., Sulistiyanti, S. R., & Arinto Setyawan, F. X. (2019). Adaptive Background Subtraction for Monitoring System. *2019 International Conference on Information and Communications Technology (ICOLACT)*, 153–156. <https://doi.org/10.1109/ICOIACT46704.2019.8938501>
- Montolalu, R., Kawet, L., & Nelwan, O. (2016). Pengaruh Kepribadian, Orientasi Kerja dan Penempatan Pegawai Terhadap Kinerja Pegawai Pada Dinas Kebudayaan dan Pariwisata Provinsi Sulawesi Utara. *Jurnal EMBA: Jurnal Riset Ekonomi, Manajemen, Bisnis Dan Akuntansi*, 4(1), 1318–1329. <https://doi.org/https://doi.org/10.35794/emba.4.1.2016.12342>
- Moses, M. (2012). Analisis Pengaruh Pendidikan, Pelatihan, dan Pengalaman Kerja terhadap Produktivitas Kerja Pegawai Dinas Pertambangan dan Energi Provinsi Papua. *Jurnal Media Riset Bisnis Dan Manajemen*, 12(1), 18–36. <https://www.neliti.com/publications/52443/analisis-pengaruh-pendidikan-pelatihan-dan-pengalaman-kerja-terhadap-produktivitas>
- Muvariz, F. R. (2019). Analisis Aspek Keadilan dari Pemberhentian Tidak Dengan Hormat Sebagai Pegawai Negeri Sipil di Indonesia. *Jurnal Legislasi Indonesia*, 16(2), 190–202. <https://doi.org/https://doi.org/10.54629/jli.v16i2.446>
- Piowar-Sulej, K. (2021). Human resources development as an element of sustainable HRM – with the focus on production engineers. *Journal of Cleaner Production*, 278, 124008. <https://doi.org/10.1016/j.jclepro.2020.124008>
- Silaban, S. M., & Rifai, A. (2017). Analisis Kesesuaian Penempatan Pegawai Pada Dinas Kependudukan dan Pencatatan Sipil Kota Pekanbaru. *Jurnal Administrasi Publik PUBLIKA*, 3(1), 135–153. <https://journal.uir.ac.id/index.php/JIAP/article/download/1742/1070>
- Situmorang, D. O., Marnisah, L., & Zamzam, F. (2020). Pengaruh Pendidikan, Pelatihan, dan Penempatan Kerja Terhadap Kinerja Karyawan Division Operation 2 PT. Semen Baturaja (Persero) Tbk. *Jurnal Media Wabana Ekonomika*, 17(3), 242. <https://doi.org/10.31851/jmwe.v17i3.4849>
- Sugiyono. (2019). *Metode Penelitian Kuantitatif Kualitatif dan R&D* (I). Alfabeta. <https://cvalfabeta.com/product/metode-penelitian-kuantitatif-kualitatif-dan-rd-mpkk/>
- Sulistiyani, A. T., & Rosidah. (2013). *Manajemen sumber daya manusia: konsep, teori dan pengembangan dalam konteks organisasi publik* (2nd ed.). Graha Ilmu. <https://opac.perpusnas.go.id/DetailOpac.aspx?id=410877>
- Sutrisno, E. (2013). *Manajemen Sumber Daya Manusia* (2nd ed.). Kencana Prenada Media. <https://doi.org/https://doi.org/IOS3145.slims-16869>

- Tamara, C. V.D., Johanes, A. W., Marlina, L., & Hendra, K. A. (2021). Analisis Jabatan Dalam Penempatan Pegawai di Biro Pemerintahan dan Otonomi Daerah Sekretariat Provinsi Sulawesi Utara. *Jurnal MSDA (Manajemen Sumber Daya Aparatur)*, 9(2), 128–141.
<https://doi.org/10.33701/jmsda.v9i2.2079>
- Tordera, N., Peiró, J. M., Ayala, Y., Villajos, E., & Truxillo, D. (2020). The lagged influence of organizations' human resources practices on employees' career sustainability: The moderating role of age. *Journal of Vocational Behavior*, 120, 103444.
<https://doi.org/10.1016/j.jvb.2020.103444>
- Turere, V. N. (2013). Pengaruh Pendidikan dan Pelatihan Terhadap Peningkatan Kinerja Karyawan Pada Balai Pelatihan Teknis Pertanian Kalasey. *Jurnal EMBA: Jurnal Riset Ekonomi, Manajemen, Bisnis Dan Akuntansi*, 1(3), 10–19.
<https://doi.org/https://doi.org/10.35794/emba.1.3.2013.1368>
- Wicaksono, Y. S. (2016). Pengaruh Pelatihan dan Pengembangan Sumber Daya Manusia dalam Rangka Meningkatkan Semangat Kerja dan Kinerja Karyawan (Studi di SKM Unit V PT. Gudang Garam, Tbk Kediri). *Jurnal Bisnis Dan Manajemen*, 3(1), 31–39.
<https://doi.org/https://doi.org/10.26905/jbm.v3i1.71>
- Wirawan. (2015). *Manajemen Sumber Daya Manusia Indonesia* (1st ed.). RajaGrafindo Persada.
<https://www.rajagrafindo.co.id/produk/manajemen-sumber-daya-manusia-indonesia/>
- Yuliana, I., Djumadi, & Paranoan, B. (2015). Penempatan Pegawai Dalam Meningkatkan Kinerja Di Lingkungan Kerja Badan Pengelolaan Keuangan Dan Aset Daerah Kota Samarinda. *Jurnal Administrative Reform*, 3(4), 428–440.
<https://doi.org/http://dx.doi.org/10.52239/jar.v3i4.582>
- Zhou, D. (2021). Role of green data center in human resources development model. *Sustainable Computing: Informatics and Systems*, 30, 100492.
<https://doi.org/10.1016/j.suscom.2020.100492>

Poverty Alleviation -Role of Micro Credit on Women Empowerment

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ABSTRACT

The State Government is consciously making an effort to support DWCRA groups by providing Revolving Fund/Matching grant under various programs. In the early 1980's the government of India launched the Development of Women and Children in Rural Area (DWCRA) program under the integrated Rural Development which has played a prominent role for alleviation of poverty. Microcredit is the grant of small loans to groups of poor people especially women, for the purpose of investing in self-employment programs. In the present paper the study is conducted by reviewing various studies related to the different roles played by the DWCRA for developing the women and children in rural areas. This study has concluded that the DWCRA program was successful.

KEYWORDS: *DWCRA, Rural areas, Alleviation.*

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I. INTRODUCTION:

Poverty has always remained a critical social problem. The status of women depicts the social, economic and mental condition in a nation. Women have been regarded as a symbol of spirituality in our scriptures. Yet, they have been treated badly and unequally to men. Women of today are empowered, and are also gaining advancements and success in each and every field. The status of women freedom depends on economic conditions even more than political. If a woman is not economically free and self-earning she will have to depend on her husband or someone else, and dependents are never free. In order to solve this kind of problems there are different micro and macro level strategies are being used by government agencies and NGOs for poverty alleviation of women as a way to empower them.

The DWCRA program was not very successful in the rest of the country; it was successful in Andhra Pradesh. The case gives an overview of the DWCRA program in Andhra Pradesh, and its impact on the lives of rural women there. It also discusses the role played by the government in the success of the DWCRA program in the state and explores the role of the corporate in rural development programs. In addition to implementing welfare schemes for rural women, the main objective of DWCRA is to improve the socio-economic, health, and educational status of rural women by providing financial assistance and creating employment opportunities for them to become self-reliant and to raise their standard of living. The target of DWCRA is the same as that under IRDP, i.e. the families living below the poverty line. However, the basic difference with IRDP lies in that under DWCRA, it is not an individual family which receives assistance, but a group of families. The scheme envisages the formation of groups each consisting of 15 to 20 women.

The DWCRA program was funded by the central and state governments. Every DWCRA group could avail of revolving fund of Rs 15,000 in order to meet capital expenditure such as purchase of machinery.

SCOPE FOR THE STUDY:

The study is confined to the women who have joined and are receiving the fund from the DWCRA.

II. METHODOLOGY

The study is qualitative in nature and is based on secondary source of information. Theoretical literature was mainly used to analyze the concepts of empowerment and poverty alleviation. The study has the characteristics of exploratory and descriptive as well as explanatory research. In exploratory research more precise questions are constructed which are almost negligible in this study. As the research is oriented towards

development policy and has focused on a specific case to describe it in detail, so both these characteristics make it a descriptive research.

OBJECTIVES OF THE STUDY

1. To study the role and concept played by the DCWRA for eradicating the poverty.
2. To examine various cases that has established the fact that women are more efficient converters of resources into productive purpose.
3. To provide the suggestions from the study.

III. REVIEWS OF THE STUDY:

Kappa Kondal (2014) in his paper described the role of SHG on the women empowerment in Andhra Pradesh. His finding of study justifies the greater role played by the SHGs in increasing empowerment of women, by making them financially strong, as well as it helped them to save the amount of money and invest it for further development. It is also found that the SHGs created confidence for social, economic self-reliance among the members in two villages. It develops the awareness programs and schemes, loan policies, etc. However, there is a positive impact of Self Help Groups on Women empowerment in Andhra Pradesh.

Grameen Foundation (2012): Grameen Foundation helps the world's poorest, especially women, improve their lives and escape poverty by helping to provide access to appropriate financial services new ways to generate income . By helping local microfinance institutions and other poverty-focused organizations become more effective we've helped millions pull themselves out of poverty.

World Bank (2012): The economics and development literatures vulnerability is defined as the 'probability of risk today of being in poverty or to fall into deeper poverty'.

Porter and Kramer, 2011 Studies of market-based measures to alleviate poverty are also gaining considerable traction in the management literature where scholars have developed concepts like 'base-of-pyramid' and 'creating shared value' to address what businesses can do to alleviate poverty and enhance social welfare.

Zulfiqar (2010) states that women's empowerment can be achieved through a number of factors like access to educational opportunities, participation in the political process, provision of economic opportunities and micro-credit programmes. It is not limited only to micro-credit facilities.

NABARD (2005) The role of micro finance program at international levels on the global economic situation, poorer households and poverty reduction, education, health as well as the social status of women has been put forward.

Shakuntala Narasimhan (1999), A bold statement was made by him saying that the even after five decades of economic planning, the status of the women is not changing much in India. He concludes that the mindset of the people is the key factor for the women empowerment in India.

Karmakar (1999) said that the advantages/success of the SHG in the rural banking sector is thoroughly investigated. Conventional rural banking is severely hampered by several factors like, poor loan recovery performance, weak human resource, etc. In order to overcome these factors, SHG s is tied up with various NGOs and banks. This leads to the SHGs is emerging as a viable credit mechanism in the rural areas with excellent women empowerment. Also, in his studies, he suggested various suggestions to minimise the flaws in the traditional rural banking system.

Rowlands (1995) noticed that power is generally defined in terms of control and influence over others. The control is demonstrated by men over men, men over women, and by dominant social, political and economic class over those who are marginalized. If people are continuously denied power and influence in a society, they begin to internalize this denial of power. Rowlands uses the term 'internalized oppression'. The marginalized people become used to it for their survival in a dominant social, economic or political class.

IV. SUGGESTIONS:

- As far as DWCRAs officials are concerned, field workers strength is to be increased for ensuring adequate attention to target groups.
- Periodical change of leadership is must for the members to share responsibilities and generate leadership qualities.
- The group leaders and other members associated with it should be trained to write the accounts, go to the bank, and prepare the minutes of the meetings so that over a period of time they will acquire leadership qualities. Hence, periodical training on self-management should be imparted at regular intervals to group members with the help of resource persons.
- All the groups should be treated equally by the government and by banks, in extending financial support.

- Lack of transparency and encouraging particular groups creates suspicion among the other groups. To overcome this, it has been recommended that frequent interface meetings be conducted between the group members and the officials concerned.

V. CONCLUSION:

Most of the studies carried out so far regarding the effect of SHGs towards the women empowerment show a positive trend. The women involved in the self help groups got better access to health care, socioeconomic development and independent decision making. However the negative side of the SHGs is so far not studied in detail. Some reports suggested that the DWCRA program had a positive impact on the lives of rural women.

However, most of the people were convinced about the success of the DWCRA program. Some analysts were critical about the role played by the government. They felt that the government was using DWCRA as a political weapon rather than to change the lives of the rural poor. They also pointed out that lack of training and failure to adapt to industry's needs, would lead to the unavoidable failure of some of the DWCRA groups. In spite of all these criticisms, it is accepted that the DWCRA program had been successful in bringing much needed change and awareness among the rural women.

REFERENCES:

- [1]. World Bank (2012) Measuring vulnerability. Available at: <http://go.worldbank.org/R048B34JF0> (accessed 15 February 2016).
- [2]. Porter, ME, Kramer, MR (2011) Creating shared value. *Harvard Business Review* 89(1): 62–77.
- [3]. Rowlands, J. (1995). Empowerment examined. *Development in practice*, 5 (2), 101-107.
- [4]. Zulfiqar, B. (2010). *Women & Economy: The Politics of Empowerment in Pakistan*. Accessed 10th September 2010. Available from World Wide Web: <http://www.sup>
- [5]. Neuman, W. L. (2000). *Social Research Methods: Qualitative and Quantitative Approaches*. London: Allyn and Bacon.
- [6]. Karmakar, K.G. (1999): "Rural Credit and Self Help Groups, Micro Finance Needs and Concepts in India" – SAGE Publications, New Delhi.
- [7]. Shakuntala Narasimhan (1999): "Empowering Women – An Alternative Strategy from Rural India" – Sage Publications India Pvt. Ltd., - New Delhi.
- [8]. Kappa Kondal (2014): Women Empowerment through Self Help Groups in Andhra Pradesh, India. *Int. Res. J. Social Sci.* Vol. 3. No.1. January (2014), P.13-16,.
- [9]. NABARD (2005): "Impact of Micro Finance Linkage Banking Programme in India on the Millennium Development Goals (MDG)" – Published by NABARD and GTZ; May, 2005.
- [10]. <https://www.icmrindia.org/casestudies/catalogue/Economics/Development%20of%20Wo>

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Selection of Distributors for Small and Medium Enterprises in Visakhapatnam District by Using Analytical Hierarchy Process

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ABSTRACT:

The activities of supply chain involve the transformation of natural resources, raw materials and components into a finished product that is delivered to the end customer. Flow of goods between a supplier and a customer passes through several levels in a supply chain mechanism and each level may consist of large number of facilities. A decision maker must consider decisions regarding the selection of the right distributors in the design of a supply chain and the selection of the distributors is a multi-criterion decision-making problem.

Distributors have long been relied on to serve as a bridge between manufacturers and customers. In today's increasingly globalized marketplace, this link becomes even more important.

The distributors play a very important role in increasing the sales of a company's products by ensuring the distribution of company's products in most of parts of their area through the network of retailers and wholesalers. The importance of appointing right distributors is essential for a company whether it can be a Small, Medium and Large enterprises because right distributors help the company march on path of progress and growth whereas "not right" distributors take the company backwards.

But in spite of the very important role of distributor in the supply chain it is matter of great concern that barring few top Indian and MNC companies, most of Indian companies do not take proper care and do not do proper homework before appointing a distributor. 90% of the time the distributors are appointed in a hurry just to meet month's targets.

Therefore the focus of this paper is to determine the composite weight of the factors, which are considered in the selection of distributors. Analytical Hierarchy Process (AHP) is used in the selection of the distributors after conducting survey.

Key words: Supply chain, Distributors, Small and Medium Enterprises, Analytical Hierarchy Process

INTRODUCTION:

Supply chain is a set of facilities, supplies, customers, products; and methods of controlling inventory, purchasing, and distribution. In a supply chain, flow of goods between a supplier and a customer passes through several echelons and each echelon may consist of many facilities. In designing a supply chain, a decision maker must consider decisions regarding the selection of the right distributors and distributor selection is a multi-criterion decision-making problem.

Supply chain is an entire network of entities, directly or indirectly interlinked and interdependent in serving the same consumer or customer. It comprises of vendors that supply raw material, producers who convert the material into products, warehouses that store, distribution centres that deliver to the retailers and retailers who bring the product to the ultimate user. Supply chains underlie value-chains because, without them, no producer has the ability to give customers what they want, when and where they want, at the price they want. Producers compete with each other only through their supply chains, and no degree of improvement at the producer's end can make up for the deficiencies in a supply chain which reduce the producer's ability to compete. Supply chain activities involve the transformation of natural resources, raw materials, and components into a finished product that is delivered to the end customer.

The path through which goods and services travel from the vendor to the consumer or payments for those products travel from the consumer to the vendor. A distribution channel can be as short as a direct transaction from the vendor to the consumer or may include several interconnected intermediaries along the way such as distributors, wholesalers, agents and retailers. Each intermediary receives the item at one pricing point and moves it to the next higher pricing point until it reaches the final buyer.

A supplier is someone who provides the products, commodity, or services to consumers, usually via distributors. The suppliers can also be manufacturers, processors, packagers, wholesalers, dealers, and merchants who deal in particular products and merchandise.

On the other hand, a distributor can be best defined as "an entity that buys the non-competing products or product lines, warehouses them, and then resells them to the retailers or directly to the end users or customers". Suppliers and distributors are a vital part of the supply-chain mechanism in a business world, and they can be either individuals or organizations that provide resources to each other to produce, supply and distribute the goods.

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The manufacturer produces the products according to the needs of the customers after procuring the sufficient raw materials from the suppliers. One of the prime motives of a manufacturer is to make available and sell his products to the customers. In order to achieve this, the distributors play a vital role in smoothly connecting the manufacturers and customers. Also, that they can expedite response times, enhance a company's reach, and even create value-added packages that complement a company's product offering or scope.

Distributors now more than ever are service providers. They don't just sell products, they provide engineering support and aftermarket services, reduce costs and optimize processes, as well as manage inventories, all of which creates value for manufacturers and customers alike.

IMPORTANCE OF DISTRIBUTION CHANNEL IN SMALL AND MEDIUM ENTERPRISES:

The significant feature which distinguishes any company especially the SMEs (Small and Medium scale enterprises) from the others is the implementation of its management system including the production, distribution, marketing, human resource management and so more. It is the responsibility of the owners to make the decisions. It has been observed that majority of the SMEs are one-man enterprises or those formed by two partners. In such a case, the owners are responsible for all the liabilities of the company and the firm's assets. This ensures that they are ready to bear the risks of the company and the personal risks as well.

When we talk about the SMEs, it is the sole responsibility of the owners to create a social structure within the organization which is usually linear and follows the autocratic management style. This type of the company structure usually reflects one-man management hierarchy, the decision flow in a quick manner, easy maintenance of discipline, less elastic and flexible activities and so more. Another significant characteristic of the SMEs is the nature of the financial management wherein the capital of such companies is the result of the creations of the funds of the owners (or partners) which is given support by the union funds, loans or credits. An important quality determinant which could be considered by talking about the share in the market is the role of the small and mid-sized companies in the satisfaction of the individual needs of the customers or the clients. This is a significant factor which might outplay the influence created by the demand and the supply.

In addition to the quality of the services offered by the Small and Medium Scale Enterprises (SMEs), the customers or the general public usually make use of the vital characteristics like the number of employees, the value of the assets, the financial results and much more. When talked about the management practices like the distribution channels, the production, the marketing of the goods and services; there could be spotted an issue in the role of the distribution of the competitive advantage of the small and mid-sized companies. The essence and importance of proper distribution channels are represented by the set of activities which focus on the marketing of the products and services in a proper form, time and place. These activities must be balanced with the other marketing factors to stimulate the efficient functioning of the distribution channel in any Small and Medium Scale Enterprises. The main role of an efficient distribution channel is to overcome the time, spatial and

ownership barriers which would separate these enterprises from their targeted customers. In addition to these, the distribution channel must be able to provide great customer satisfaction with the best quality on time, in the appropriate place, in the most comfortable way, and at competitive prices. However, this state could be achieved only when the SMEs would adopt an effective distribution channel. The choice of an appropriate distribution channel with a specified structure ensures increased sales volumes and significant throughput and profits. Therefore, proper implementation of the distribution channel within an SME organization can enhance their chances of assured success.

ANALYTICAL HIERARCHY PROCESS (AHP):

The Analytical Hierarchy Process is a structured technique for organising and analysing complex decisions based on Mathematics and Psychology.

It has application in group decision making and is used around the world in a wide variety of decision situations in fields such as government, business, industry, healthcare, shipbuilding and education

Rather than prescribing a correct decision, the AHP helps decision makers find one that best suits their goal and their understanding of the problem. It provides a comprehensive and rational framework for structuring a decision problem for representing and quantifying its elements for relating those elements to overall goals and for evaluating alternative solutions.

The AHP converts the evaluations to numerical values that can be processed and compared over the entire range of the problem. A numerical weight or priority is calculated for each element of the alternatives. These numbers represent the alternatives' relative ability to achieve the decision goal. In AHP the comparison of the factors or elements happens in a rational and consistent way. This capability distinguishes the AHP from other decision-making techniques.

LITERATURE SURVEY

JulijaPetuhova, YuriMerkuryev and George J. Klir et al (2005)carried out simulations to measure distributor's performance before and after applying the supply-side collaboration. Their results show that the supply-side collaboration can improve distributor's performance in terms of more accurate service level realization and better stabilizing effect.

Pandian Vasant (2004) attempted to model decision processes with multiple criteria in business and engineering leads to concepts of multi objective fuzzy linear programming.

Hasan Selim and IremOzkarahan (2006) have developed a supply chain distribution network design model. The goal of the model is to select optimum numbers, locations, and capacity levels of plants and warehouses to deliver products to retailers at the least cost while satisfying desired service level.

K. Venkata Subbaiah et.al (2009)Supply chain management is the plan and control of material and information flow among suppliers, facilities, warehouses, and customers with the objectives of minimization of cost, maximization of customer services and flexibility. The supply chain of a business process comprises mainly five activities viz., Purchase of materials from suppliers, transportation of materials from suppliers to facilities, production of goods at facilities, transportation of goods from facilities to warehouses and transportation of goods from warehouses to customers.

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Bayraktar, D., et.al (2003) Competitive international business environment has forced many firms to focus on supply chain management to cope with highly increasing competition. Hence, supplier selection process has gained importance recently, since most of the firms have been spending considerable amount of their revenues on purchasing. The supplier selection problem involves conflicting multiple criteria that are tangible and intangible.

A. Amid, et al (2011) Supplier selection is one of the most important activities of purchasing departments. This importance is increased even more by new strategies in a supply chain. Supplier selection is a multi-criteria decision-making problem in which criteria have different relative importance. In practice, for supplier selection problems, many input information are not known precisely. The fuzzy set theories can be employed due to the presence of vagueness and imprecision of information. An analytic hierarchy process (AHP) is used to determine the weights of criteria. The proposed model can help the decision maker (DM) to find out the appropriate order to each supplier and allows the purchasing manager(s) to manage supply chain performance on cost, quality, and service.

Amir Abbas KananiNezhad et al (2013) The logistics network design has attracted much attention as companies have become more global, and more responsive to redesign distribution networks more frequently to operate at the lowest costs while providing the best customer service. A logistics network consists of suppliers, manufacturing centers, warehouses, distribution centers, and retail outlets as well as channels for the flow of raw materials, work-in-process inventory, and finished products between the facilities.

OBJECTIVE OF THE STUDY

The main objective of this research paper is to find the composite weight of the factors or which factor has more influence in the selection of the distributors for small and medium companies which are in profit making business.

RESEARCH METHODOLOGY

The study was based on primary data. Interview Schedule was constructed for the collection of data using structured questionnaires. Data for this study were collected by means of a survey conducted in and around Visakhapatnam district. The structured survey questionnaires were in English and those were distributed to randomly selected 72 participants. Participants were the manufacturers of small and medium enterprises in and around Visakhapatnam district. The following are some of the factors considered in the selection of distributors.

- 1) Number of years in business
- 2) Size and quality of sales force
- 3) Transportation savings
- 4) Inventory strength
- 5) Reputation
- 6) Market coverage

- 1) Number of years in business: The number of years the distributor is in the business.
- 2) Size and quality of sales force: The size of the sales team and the quality of the sales team like performance, commitment, experience etc.
- 3) Transportation Savings: It is concerned with the environmental performance and improves the efficiency of network by reducing mileage, fuel consumption, greenhouse gas emissions, noise and congestion. To achieve time and place utilities.
- 4) Inventory Strength: Possesses sufficient stock to meet and satisfy the requirements of the wholesalers, retailers and customers and can act as a buffer guarding against uncertainties in supply and demand.
- 5) Reputation: The reputation, well establishment and leadership of the distributor in the business
- 6) Market coverage: The number of active retail and/or wholesale outlets that sell a specific firm's brands in the given market, which a distributor possesses.

Data thus collected were posted in a master table to facilitate further processing. The AHP analysis of the data were done through MS Excel in computer.

AHP MODEL CALCULATION

The following are some of the factors are considered in the selection of distributors such as number of years in business, size and quality of sales force, transportation savings, inventory strength, reputation and market coverage and a survey has been done with considerable sample of the size 72 taken from the manufacturers of small and medium enterprises in and around Visakhapatnam district consisting of various manufactures from varied sectors by considering the above mentioned six factors in the form of a questionnaire. A pair wise comparison is made by using a satty scale which is a relative scale to measure how much would one prefer regarding one factor with respect to another factor. After collecting the data from the respondents, the AHP methodology was applied to determine the relative weightage of the factors in the selection of distributors. Consistency check is done as per AHP procedure.

The consistency ratio is computed to verify whether the inconsistency is acceptable or not. If the value of consistency ratio is smaller than or equal to 10%, the inconsistency is acceptable. If the consistency ratio is greater than 10% we need to revise the subjective judgement.

ANALYSIS AND DISCUSSION:

Different manufacturers of small and medium enterprises were interviewed for identifying the priorities of factors for selection of the distributors. Conducting surveys is an unbiased approach to decision making. We can collect unbiased survey data and develop sensible decisions based on analysed results. By analysing result, we can immediately address topics of importance, rather than waste time and valuable resources on areas of little or no concern.

Once the data collected from the 72 respondents based on the factors we calculate the average values (AHP scores) and rounded to the nearest integer and then the column normalisation and row normalisation were done and finally the critical weight of the factors were determined.

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Here in the following table, 1 implies Number of years in business 2 is Size and quality of sales force, 3 is Transportation savings, 4 is Inventory strength 5 is Reputation and 6 is Market coverage

Table 1: Critical Weight of the factors

S.No.	1	2	3	4	5	6	Row Total	Critical Weight
1	0.398565	0.47619	0.45685	0.294118	0.184615	0.304348	2.114687	0.352448
2	0.199283	0.238095	0.304567	0.294118	0.246154	0.173913	1.456129	0.242688
3	0.132855	0.119048	0.152283	0.294118	0.369231	0.217391	1.284926	0.214154
4	0.079713	0.047619	0.030457	0.058824	0.123077	0.086957	0.426646	0.071108
5	0.132855	0.059524	0.025381	0.029412	0.061538	0.173913	0.482623	0.080437
6	0.056938	0.059524	0.030457	0.029412	0.015385	0.043478	0.235193	0.039199
Grand Total							6.000203	

The weightage of the factors are ascertained for the selection of the distributors who play pivotal role in supply chain management. The factors such as a) Number of years in business b) Size and quality of sales force c) Transportation savings d) Inventory strength e) Reputation of distributor and f) Market coverage are considered in the selection of the distributors. For this, AHP methodology has been applied to ascertain the weightages of the factors. The normalised score are as follows, it is 0.352448 for number of years in business, 0.242688 for size and quality of sales force, 0.214154 for transportation savings, 0.071108 fir inventory strength and 0.080437 for reputation and 0.039199 for market coverage. From this, it is found that number of years in business have to be considered for highest weightages followed by size and quality of sales force, transportation savings, reputation, inventory strength and market coverage respectively in the selection of distributors.

Table 2: Ratio of Weighted sum to Critical weight

	1	2	3	4	5	6	Weighted Sum (WS)	Critical Weight (CW)	WS/CW
1	0.352448	0.485376	0.642463	0.355538	0.241311	0.274392	2.351528	0.352448	6.671987
2	0.176224	0.242688	0.428309	0.355538	0.321748	0.156795	1.681303	0.242688	6.927836
3	0.117482	0.121344	0.214154	0.355538	0.482623	0.195994	1.487136	0.214154	6.944235
4	0.070490	0.048538	0.042831	0.071108	0.160874	0.078398	0.472238	0.071108	6.641131
5	0.117482	0.060672	0.035692	0.035554	0.080437	0.156795	0.486633	0.080437	6.052374
6	0.050350	0.060672	0.042831	0.035554	0.020109	0.039199	0.248714	0.039199	6.344919

$$\lambda_{\max} \text{ Average} = \sum (WS/CW)/n$$

where WS, CW and n are weighted sum, critical weight and number of factors respectively.

$$\begin{aligned} \lambda_{\max} &= 39.582482 / 6 \\ &= 6.597080333 \end{aligned}$$

$$\begin{aligned}\text{Consistency Index (C.I.)} &= \lambda_{\max} - n / n - 1 \\ &= 6.597080333 - 6 / 6 - 1 \\ &= 0.597080333 / 5 \\ &= 0.119416\end{aligned}$$

$$\text{Consistency Ratio (CR)} = \text{C.I.} / \text{R.I.}$$

Since the R.I. (Random Index) value is 1.24 for 6 determinants from the table value

$$\begin{aligned}\text{Therefore, CR} &= 0.119416 / 1.24 \\ &= 0.096303\end{aligned}$$

As per the AHP results, the value of consistency ratio is 0.096303 which is less than 0.1 or 10%. Hence it is concluded the subjective or qualitative judgement is in order

CONCLUSION:

Distributors play a vital role in the supply chain as they serve as a bridge between manufacturers and customers. This link has become even more important in today's increasingly globalized marketplace. The important factors such as number of years in business, size and quality of sales force, transportation savings, inventory strength, reputation and market coverage will affect the performance of the distributors and distributor ranking is also important for quota allocation to them by the manufacturer in order to sustain their reputation in the market. Here AHP technique has been employed and found to be suitable to determine the relative weightage of the factors or to prioritise the composite weight of the factors.

REFERENCES

1. Amid, S.H.Ghodsypour and C.O.Brien (2011), 'A weighted max-min model for fuzzy multi objective supplier selection in a supply chain', ELSEVIER, "International journal of Production Economics", volume 131, Issue 1, Pages 139-145.
2. Amir Abbas KananiNezhad, Emad Roghanian and Zahra Azadi (2013), 'A fuzzy goal programming approach to solve multi-objective supply chain network design problems', International Journal of Industrial Engineering Computations, Pages 315-324.
3. Bayraktar, D., and Cebi, F., (2003), 'Supplier selection using analytical hierarchy process' in Proceedings of PICMET'03. Portland, Oregon, USA, Pages 20-24.
4. Hasan Selim and IremOzkarahan (2006), 'Application of fuzzy multi-objective programming approach to supply chain distribution network design problem' Springer Berlin / Heidelberg, Vol. 4293, 415-425.
5. Dr. Naveen Nandal, Dr. AarushiKataria, Dr. Meenakshi Dhingra. (2020). Measuring Innovation: Challenges and Best Practices. International Journal of Advanced Science and Technology, 29(5s), 1275 - 1285.
6. JulijaPetuhova and Yuri Merkuryev (2005) [George J. Klir and Bo. Yuan, 'Fuzzy Sets and Fuzzy logic, Theory and Applications'], Indian Reprint, Prentice Hall of India Pvt. Ltd., New Delhi.
7. K. Venkata Subbaiah, K. Narayana Rao and K. Nookeshbabu (2009): 'Supply Chain Management in a diary industry – A Case study' Proceedings of World Congress on Engineering, Vol.1.595-599.
8. Pandian Vasant (2004), 'Application of multi objective fuzzy linear programming in supply production planning problem', Senior Mathematics Lecturer, Department of Mathematics, American Degree Program, Nilai International College, 71800 Nilai, Malaysia.

Scalable and Adaptable End-To-End Collection and Analysis of Cloud Computing Security Data: Towards End-To-End Security in Cloud Computing Systems

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Abstract— Cloud computing provides customers with enormous compute power and storage capacity, allowing them to deploy their computation and data-intensive applications without having to invest in infrastructure. Many firms use cloud computing as a means of relocating and maintaining resources outside of their enterprise, regardless of the cloud server's location. However, preserving the data in cloud leads to a number of issues related to data loss, accountability, security etc. Such fears become a great barrier to the adoption of the cloud services by users. Cloud computing offers a high scale storage facility for internet users with reference to the cost based on the usage of facilities provided. Privacy protection of a user's data is considered as a challenge as the internal operations offered by the service providers cannot be accessed by the users. Hence, it becomes necessary for monitoring the usage of the client's data in cloud. In this research, we suggest an effective cloud storage solution for accessing patient medical records across hospitals in different countries while maintaining data security and integrity. In the suggested system, multifactor authentication for user login to the cloud, homomorphic encryption for data storage with integrity verification, and integrity verification have all been implemented effectively. To illustrate the efficacy of the proposed strategy, an experimental investigation was conducted.

Keywords— Cloud Computing, Data Security, Encryption, Authentication

I. INTRODUCTION

The shift from locally installed programs to applications available on some remote system and being used by the user have just started, still its usage is in its infant state. Software installed on a locally available system still dominates the market and is not about to disappear, but the focus of innovation indeed seems to be entering into the field of cloud. Cloud computing is defined by the National Institute for Standards and Technology (NIST) [1] as:

"A model for enabling ubiquitous, convenient, on- demand network access to a shared pool of configurable computing resources that includes networks, servers, storage, applications, and services that can be rapidly provisioned and released with minimal management effort or service provider interaction".

Cloud computing refers to the process of providing services to access the data, programs, processing power or software through Internet, in which all hardware and software are owned by cloud service providers and users simply rent them for their usage. Even though cloud computing has matured recently, the basic concept of sharing the computer resources to multiple users is not new.

Hence, they were kept in continuous use executing the tasks one after another. Then, Advance Research Projects Agency, belongs to the Department of Defence expanded the distance of communication among the computers. Next, the ARPAnet project presented a platform for sharing the available computing resources among the distributed users.

So, the users were able to access a computer from anywhere on a network which was mainly used to link the government agencies and universities. As a result of which, Internet was developed. Then, with the advent of operating system, multiple functions could be carried out at the same time on standalone computers for the first time. This paved the way for multiple users to use many systems at the same time.

Cloud Computing has evolved as the result of these earlier efforts of shared computing. Since the costs of processing power and storage are minimized and facilitated with high speed internet connections, cloud computing has become an

attractive field for most of the individuals and organizations for storing their data online using software programs. In cloud computing history, one of the initial milestone is the advent of Salesforce.com which initiated the concept of conveying enterprise applications over the Internet in 1999.

By means of this service, individuals and organizations could use computers for manipulating their own computer applications and paid for it based on their usage. The next turning point emerged as Web 2.0 which enabled enterprise applications based on browsers through Google Apps. The key features that facilitate the advancement of cloud computing involves virtualization, emergence of high speed bandwidth and software interoperability standards. Hence, the cloud computing services enable the organizations to widen their infrastructure and increasing the capacity based on demand with improved flexibility and minimized cost.

In recent years, the cloud storage services have been identified to be increased extensively. For instance, the famous Dropbox cloud service surpasses 50 million registered users approximately. Likewise, Ubuntu and Mozy3 holds over three million registered users in recent years. Cloud storage helps the users to store large amount of digital images, audios, videos and pdf files. The procedures of many organizations are in digital forms such as communication data, accounts, agreements, marketing documents, productions or enterprise designs. Cloud computing quickly allows universal access appliance on Internet. Much attention has been taken to develop the standard definitions of cloud computing.

Cloud computing is a way to get direct cost savings from a capital-intensive method in an unpredictably changing environment. Individuals and corporations can use cloud services to develop software and hardware and distribute it to other parties in remote locations. The cloud computing model distributes information and computer resources access. A cloud computing service allows faster provision and discharge of resource with least management work and service provider interface. Storing the sensitive data with cloud storage service provider experiences serious security breaches.

The cloud data may expose private data or improper requested data to additional users apart from sending to the requested users. The increase of inconvenient data handling in cloud is because of bugs, collisions, operator errors, or improper arrangements. Cloud computing consists of user activities with their ability to develop their data in third party data centers. The three basic types of cloud computing services include:

- Software as a Service (SaaS): The SaaS applications provide software functions which can be installed and run on the client machine. The programmes are stored on cloud servers managed by cloud service providers, and users access them using a web browser via the Internet.

SaaS examples include Gmail, Google Apps, Salesforce, and others.

- Platform as a Service (PaaS): Cloud computing creates a platform for the purpose of building and deploying web applications through the Internet. Using PaaS, the users are able to develop new applications and distribute broadly to other users over the Internet.
- Infrastructure as a Service (IaaS): IaaS provides the users with resources that include memory, CPU, operating system and storage. It facilitates the users to access the servers, web storage space etc. The hardware is owned and maintained by the IaaS provider and the users can access it based on their needs, known as utility computing. Examples of IaaS include Amazon web services.

Based on how it's used, the cloud can be classified into three categories:

- Public cloud: A public cloud is a cloud that is available to the general public on a pay-as-you-go basis. A third-party provider offers services such as computing, storage space, networks, virtualization, and applications to a large number of clients in the public cloud.
- Private cloud: A private cloud is an association's data centre that is not accessible to the general public. IT resources in the private cloud are used by internal users and consumers.
- Hybrid cloud: When needed, a hybrid cloud combines public and private clouds.

Businesses that use public cloud services save money and time by exploiting the cloud's elastic scalability and market-oriented estimate capabilities.

II. SECURITY IN CLOUD COMPUTING

For connecting the resources with the user cloud system makes the use of Internet. As a result, all the security issues related to the Internet are there in the cloud as well. Cloud works like a client server system, but different than a traditional client server system with the use base across the world and server is on the virtual resources, connected using internet. It adds some additional layers to the traditional system, due to which it faces security problems related to these additional layers.

The security problems of traditional system such as virus, worms, and the problems due to hackers are as such available, and work as serious security concerns to the cloud and lead to more serious consequences due to the multi-tenant nature of cloud. Hackers may enter into one of the cloud account and crack its sensitive data stored in cloud. If not managed properly, the hacker can misuse the other accounts as well.

As the business applications and data connected to these applications are stored remotely. So, the system must ensure the security of resources working with application carefully. Cloud computing make the integration of the globally available resources using state of the art technologies that include service oriented architecture, virtualization and utility computing and make it available over the Internet. The technologies used in cloud hide the internal details of technologies used for implementation of services and there

management. It is the duty of provider to provide the security to the data, as the user can't secure its data at the level of hardware.

In case of cloud computing the aspect of security is take care of with the help of keys. Therefore key of resources and data related to privacy are very important for use of the cloud by the user. The cloud must ensure the security and integrity of this sensitive data of the user.

TABLE I. USER BASED SECURITY REQUIREMENTS

System Level	Service Level	Users	Security Requirements	Threats
Application Level	Software as a Service (SaaS)	Any individual or organization that pays for a cloud provide r's service is responsible for its use.	<ul style="list-style-type: none"> • Access control • Data protection against exposure to other users owing to the multitenant environment • Protection during communication • Service availability • Software Security 	<ul style="list-style-type: none"> • Data Modification at rest and in transit • Data deletion • Impersonation • Interception while in use • Network exposure • Privacy breach • Session hijacking • Traffic flow analysis
Virtual Level	Platform as a Service (PaaS) Infrastructure as a Service (IaaS)	Developer relates to a company that delivers software on cloud infrastructure and pays for it as well as charges its users.	<ul style="list-style-type: none"> • Virtual cloud protection • Access control • Cloud management control security • Data Security (Data in transit and data at rest) • Secure pictures • Security of Application 	<ul style="list-style-type: none"> • Communication disruptions • Connection flooding • DDOS • Impersonation • Network exposure • Programming weakness. • Session hijacking • Software alteration • Software deletion
Physical Level	Hardware used for cloud deployment	The terms owner refers to a person or organization that owns the resources on which cloud software is placed.	<ul style="list-style-type: none"> • Hardware availability. • Hardware Reliability. • Hardware Security • Legal Cloud Computing use. • Network Protection. • Network resource protection. • Software Reliability. 	<ul style="list-style-type: none"> • Connection flooding • Distributed Denial of Service (DDOS) • Hardware Interruption • Hardware Theft • Misuse of infrastructure • Natural disasters • Network bashes • Modification of hardware

Data security audits can provide this confidence. Data has various characteristics, such as integrity, which implies that only authorized users can change the data, and confidentiality, which means that only authorized users can read it. To preserve data integrity and security, cloud providers must provide secure access. This improves data management license, certification, and other factors. Many users in the cloud computing environment are dealing with dynamic responses to dynamically changing services.

When working in the cloud, users are uninformed of the location of their data and have no idea which server is processing it. Because of the system's versatility, customers have no idea from which network these services or data are being transmitted. As a result, the user cannot protect data privacy in the cloud on their own. The cloud provider can divide the data centre into zones, and data can be stored on any node in any zone. These zones (areas) are governed by different laws, so the security management must meet these

laws. Also due to the law of land of user cloud computing must improve in legal protections.

In case, to discuss the security issues in hybrid cloud, all the security concerns that are listed in the above paragraph are there. There are a number of security issues that are to be incorporated that are dependent on the structure/design of hybrid cloud, platform working on that cloud and the application deployed on that cloud. A breakdown of the security risks associated with various levels of cloud usage may be seen in Table 1.

There are a variety of security risks with cloud computing due to the fact that it incorporates a wide range of technologies such as networks and databases, as well as operating systems, virtualization, and resource scheduling. Furthermore, the virtualization paradigm introduces new security concerns as a result of cloud computing. The algorithms used to allocate resources and manage memory must be safe as well. Equipment and software in six distinct areas of the cloud

computing environment need special attention in terms of security.

A. Cloud Security Threats

Threats to cloud-based information assets vary depending on the cloud delivery methodologies utilized by cloud user associations. There are numerous security threats to which cloud computing is vulnerable. The security paradigm of confidentiality, integrity, and availability (CIA) divides the dangers for cloud clients. The security threats include:

- **Vulnerable data transmission:** The API (Application Programming Interface) for the cloud services can be accessed from anywhere using the Internet. Hence, the possibility is more for the malicious attackers to defeat the confidentiality of the cloud services. They can use the authentication token for accessing the API and manipulate other user’s data.
- **Malicious Insiders:** The employees of cloud service provider have complete access to the data being stored on cloud because the cloud does not maintain any security policy for the insiders. So, the possibility is more for them to view the customer’s sensitive data.
- **Data Loss:** Data loss can occur if the cloud service provider accidentally deletes the data or an attacker steals or modifies it. This can be solved, if any backup is used for all the data stored in it.
- **Account Hijacking:** The data stored in the cloud can be accessed and manipulated by using only a password. So, the attacker can at any time track our account and modify the sensitive data which becomes unworthy.

III. MULTIFACTOR AUTHENTICATION AND SECURITY IN CLOUD

Cloud computing provides a shared, on-demand, and scalable service over the internet, with the user’s data being processed in isolated servers and the necessary services being provided. The biggest barrier to implementing this new technology in numerous industries is customers’ concerns about data security, availability, and integrity on remote servers. In this research, we suggest an effective cloud storage solution for accessing patient medical records across hospitals in different countries while maintaining data security and integrity.

In the suggested system, multifactor authentication for user login to the cloud, homomorphic encryption for data storage with integrity verification, and integrity verification have all been implemented effectively. To illustrate the efficacy of the proposed strategy, an experimental investigation was conducted.

Cloud computing offers a high scale storage facility for internet users with reference to the cost based on the usage of facilities provided. Users use cloud to store their confidential data based on the service level agreements they sign and usually the data usage of users are outsourced to the cloud service providers. Various entities join together or exit the cloud in an elastic manner resulting in a more complex key management, searchable encryption methods, access control etc.

Confidential data is thus encrypted before outsourcing to cloud thereby resulting in privacy protection. This outsourced data will be safe with a service provider while a few selected data can be shared with the other service providers with respect to the service level agreement. The most frequent attacks encountered in cloud are as follows:

- XML Signature Wrapping Attacks here the administrative rights of the cloud are taken over by the hacker.
- Cross site scripting attack using which enables the bypass access control techniques.
- Flooding Attack Problem where the workload of the cloud servers is utilized needlessly.
- Denial-of-Service Attacks where intruded Malicious code would refuse services to the legitimate users
- Law
- Data Stealing Problem where the user’s account and password are hacked by the hacker.

IV. PROPOSED MODEL FOR HOSPITAL DATA MANAGEMENT IN CLOUD

A. Authentication

In addition to the user name and password protection, multifactor authentication of the data user can be utilized to tighten the protection level, when the data processed from the cloud is considered sensitive.

The multi-factors used in protection can be of the user’s Identification and password, fingerprint biometrics and random secret keys. User ID and password exhibits the user’s knowledge, whereas the fingerprint biometric represents the user himself, and the random secret keys can be used for verifying the user’s identity to the server.

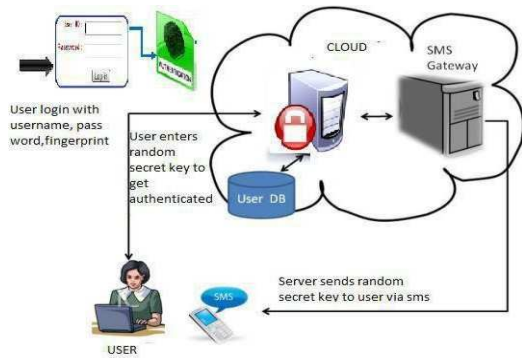


Figure 1: Multifactor authentication by user in cloud

The user can either be a doctor or any healthcare person or can be a person entering or modifying the records in cloud. Any authorized user can login to the cloud by means of the three stage authentication process as shown in Figure 1. First stage represents the user’s name and password verification, second stage can either be the fingerprint or iris authentication and the third stage is the secret key short message service that is sent to the user from the cloud.

B. Encryption and key management

Because the patients' personal data is secured in the cloud without a local copy, it must be encrypted before uploading, and encryption can be achieved using RSA/ECC/AES. As the encrypted data in cloud should support the search process, homomorphic encryption is adopted in this system.

C. Proposed Algorithm for Homomorphic Encryption

Let $E_{pk}(\cdot)$ represent the encryption function whose public key is pk and $D_{pr}(\cdot)$ forms the decryption function whose private key is pr . Any homomorphic system must fulfill the requirements stated below:

1. If $E_{pk}(m_1)$ and $E_{pk}(m_2)$ represents the encryption of m_1 and m_2 , then there would exist an algorithm to calculate m_1+m_2 public key encryption ie. $E_{pk}(m_1+m_2) := E_{pk}(m_1) +_h E_{pk}(m_2)$.
2. If there is a constant k and $E_{pk}(m_1)$ is considered as the encryption of m_1 , then an algorithm can be provided to calculate the public key encryption of k , where m_1 must exist and this is denoted by $E_{pk}(k.m_1) := k \times_h E_{pk}(m_1)$.

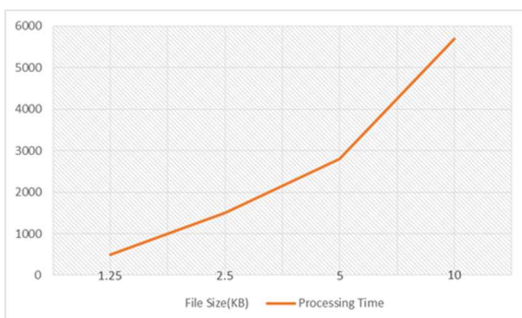


Figure 2: Processing time for generating homomorphic tags

TABLE II. LITERATURE ON SECURE AND CONFIDENTIAL DATA SHARING

Consider a data block (whole data is split into fixed size chunks) of length 160 bits, the processing time here for generating the homomorphic tags for various file sizes are shown in figure 2. It can be observed that as the file size increases the processing time thus increases.

The model for key management can be thus thought of as a model comprising of the following entities

The cloud provider (C) offers the various storage services

The data owner (D) includes the root or master key and holds the key management system

The sub data manager (S) of tree can process all the child node decryption keys. Each node comprises of two decryption keys-one decrypts the encrypted data of the corresponding node and the other searches for the related keys for the children.

A user or another sub-tree data manager (U), can either use or share S’s data.

As illustrated in Figure 3, the data stored in each node is encrypted using one encryption key that is linked to two decryption keys in this asymmetric encryption technique (since the encryption and decryption keys are different). One decryption key is used to decrypt the data at a related node and to generate sub-keys for child nodes, while the other key is used to decode the database at the same node. If e_{ij} is the encryption key and $d_{ij,k}$ is the decryption key, where I is the level of a tree, j is the index of nodes, and k is the index of decryption keys. The following is a description of the model:

D generates a master key, d_0 , which finds all the decryption keys and encryption keys.

Each node gets a master decryption key $d_{ij,1}$ and a secondary decryption key $d_{ij,2}$, that is generated from the root key ($d_{ij,2}$ is derived from $d_{ij,1}$).

S gets the master key $d_{ij,1}$, making use of which all the node keys of the sub-tree, including the secondary keys can be generated.

User U can request for a secondary decryption key $d_{ij,2}$ from D for retrieving the encrypted data stored in node N_{ij} .

D. Data Access Procedure

Attribute based encryption and Proxy Re-encryption are considered as the two most powerful techniques that offers extra protection and privacy for data sharing and the literature shown in Table 2 offers the history of the hybrid usage of this method. The extensive security issues during cloud storage usage are provided.

Method	Attribute based Encryption	Proxy Re-Encryption	Likelihood of collusion attacks	User revocation	Method
Tu et al [58]		X	X	Slow	Tu et al [58]
Li et al[59]		X	X	Fast	Li et al[59]
Tran et al[60]	X			Fast	Tran et al[60]
Yu et al[61]			X	Slow	Yu et al[61]
Yang and Zhang[62]			X	Fast	Yang and Zhang[62]
Liu et al[63]			X	Slow	Liu et al[63]

The privacy data of the patients is thus managed in cloud by means of a common data owner D. When a hospital(S) wants to upgrade the details of a patient, it delivers a key request to D, who would then send a subtree root key after verifying the data integrity. The encrypted data blocks would then be sent to S, with reference to the data access request from S to C.

The data is then upgraded and then sent to C by means of re-encryption. When another user U, who may be a healthcare person, who wants to make use of the data in order to provide treatment to the same patient in another place, would place a request to S, who would then send the secondary decryption key. U places a data access request to C, which delivers its encrypted blocks.

E. Remote integrity check for private data

Many of the cloud users save their confidential data and images in the cloud servers without possessing a local copy in their own personal computers. When there is a need for verifying the data integrity in cloud, the checker must make sure that the data is not lost or corrupted. Downloading large amount of data for verifying data integrity results in a loss of communication bandwidth. Various strategies were adopted in order to design a data integrity checking protocol, which would enable in data integrity verification without the need for complete data download.

D makes use of the keygen algorithm to generate the public and secret keys (pk, sk). TagGen generates the homomorphic tags for all the data blocks and transmits the same to C along with the Pk and the data blocks. Verifier V requests for integrity checking of the data blocks of file M. V would thus generate a challenge to C and the verifier finally checks for the integrity of the outsourced data. Computational cost for the verifiers and servers with different file lengths and fixed block sizes (216) are shown in figure 3.

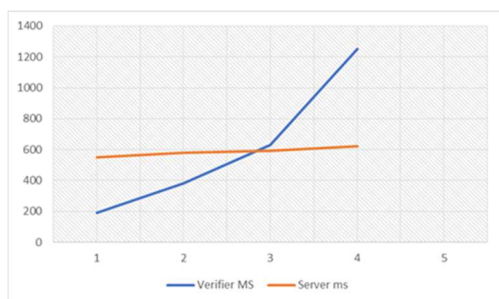


Figure 3: Computational cost comparison at verifiers and server

Figure 4 represents the preprocessing time of the client with different block lengths. It can be understood from the figure that as the block size increases, the processing time also increases

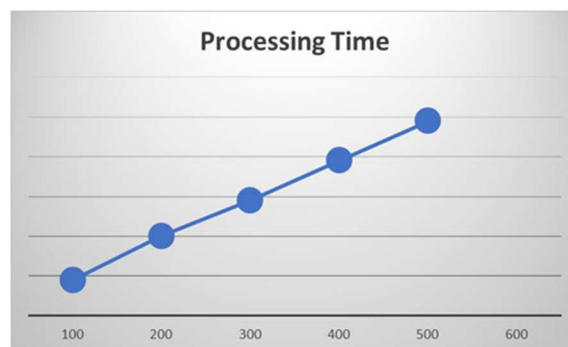


Figure 4 Clients preprocessing time with different block length

V. CONCLUSIONS

In this paper a new technique for protecting data access and integrity verification of medical data in cloud has been proposed. The proposed architecture offers a three stage authentication, secure data access and public verifiability. The proposed method also ensures security against unauthenticated access, entrusted server and also against third party verifiers. The experimental results prove that the proposed method is very effective and efficient with the only drawback being that during data modification, the tags and blocks must be upgraded with suitable computational and communication costs. The future work would concentrate on development in access control for different level of users. This research work may give the confidence to its various stakeholders and help in increasing its usage. Due to the various aspects that includes virtually infinite resources and parallel processing using concept of virtualization, this technology is with a bright future. One of the main issues behind the saturation in the use of cloud is lack of security. Due to this, research in the domain of security in hybrid cloud is needed. There is a scope of research that a model can be designed for the security in hybrid cloud computing systems. It is not possible to work on each and every aspect due to the lack of resources that include time and money. In the current research work the focus is on designing an effective and efficient security mechanism for hybrid cloud.

REFERENCES

- [1] Goyal V, Pandey O, Sahai A, Waters B (2006) Attribute-based encryption for fine-grained access control of encrypted data. 13th ACM conference on computer and communications security (CCS '06) 2006, pp 89–98.
- [2] Tu S, Niu S, Li H, Xiao-ming Y, Li M (2012): Fine-grained access control and revocation for sharing data on clouds. IEEE 26th international parallel and distributed processing symposium workshops and PhD forum (IPDPSW) 2012, pp 2146–2155.
- [3] Li M, Yu S, Zheng Y, Ren K, Lou W (2013) Scalable and secure sharing of personal health records in cloud computing using attribute-based encryption. IEEE Trans Parallel Distrib Syst 131–143.
- [4] Tran DH, Nguyen HL, Zha W, Ng WK (2011) Towards security in sharing data on cloud based social networks. 8th International conference on information, communications and signal processing (ICICS) 2011, pp 1–5.
- [5] Yu S, Wang C, Ren K, Lou W (2010) Achieving secure, scalable, and finegrained data access control in cloud computing. In: INFOCOM, 2010 proceedings IEEE, pp 1–9
- [6] Yang Y, Zhang Y (2011) A generic scheme for secure data sharing in cloud. 40th international conference parallel processing workshops (ICPPW) 2011, pp 145–153.
- [7] Ghassan, Sabeeh & Mahmood, Ghassan. (2017). Data Security Protection in Cloud Computing by using Encryption. Kirkuk University Journal-Scientific Studies. 12. 10.32894/kujss.2017.132392.
- [8] R, Kalaiprasath & Elankavi, R & Kumar, Udaya. (2017). Cloud computing security towards end to end terminology. International Journal of Pure and Applied Mathematics. 115. 637-641.
- [9] Ushmani, Azhar. (2019). DATA SECURITY ON CLOUD COMPUTING.
- [10] Youssef, Gahi & El Alaoui, Imane & Guennoun, Mouhcine. (2020). An End to End Cloud Computing Privacy Framework Using Blind Processing. 10.4018/IJSST.2020010101.
- [11] Bouchaala, Mariem & Ghazel, Cherif & Saidane, Leila & Kamoun, Farouk. (2017). End to End Cloud Computing Architecture Based on A Novel Classification of Security Issues. 303-310. 10.1109/AICCSA.2017.136.
- [12] Kumar, Arjun & Lee, Byung & Lee, Hoonjae & Kumari, Anu. (2012). Secure Storage and Access of Data in Cloud Computing. 10.1109/ICTC.2012.6386854.
- [13] David, Tolu & Akande,. (2020). Privacy and Security in Cloud Computing.
- [14] Sangeetha, R & Mohammad, Sameer. (2019). DATA SECURITY IN CLOUD COMPUTING. SSRN Electronic Journal. 6. 67-73.
- [15] Sangeetha, R & Syed, Habeebullah Hussaini. (2019). DATA SECURITY IN CLOUD COMPUTING. SSRN Electronic Journal. 6. 67-73.
- [16] R. Latif, H. Abbas, S. Assar, and Q. Ali, "Cloud computing risk assessment: a systematic literature review," in Future Information Technology, pp. 285–295, Springer, Berlin, Germany, 2014.
- [17] Ishaq Azhar Mohammed. (2011). Identity and Access Management System: a Web-Based Approach for an Enterprise. INTERNATIONAL JOURNAL OF ADVANCED AND INNOVATIVE RESEARCH, 1(4), 1–7.
- [18] Sudhir Allam, "THE FUTURE OF URBAN MODELS IN THE BIG DATA AND AI ERA: A BIBLIOMETRIC ANALYSIS", International Journal of Creative Research Thoughts (IJCRT), ISSN:2320-2882, Volume.6, Issue 1, pp.797-800, February-2018, Available at :<http://www.ijcrt.org/papers/IJCRT1133993.pdf>
- [19] Shucheng Yu, Cong Wang, Kui Ren, and Wenjing Lou. Achieving secure, scalable and fine-grained data access control in cloud computing, in: IN-FOCOM, 2010 Proceedings IEEE, 2010.p.1-9.
- [20] Lakshmisri Surya, "RISK ANALYSIS MODEL THAT USES MACHINE LEARNING TO PREDICT THE LIKELIHOOD OF A FIRE OCCURRING AT A GIVEN PROPERTY", International Journal of Creative Research Thoughts (IJCRT), ISSN:2320-2882, Volume.5, Issue 1, pp.959-962.
- [21] R. Velumadhava Raoa,, K. Selvamanib, "Data Security Challenges and Its Solutions in Cloud Computing" in proceedings of the International Conference on Intelligent Computing, Communication & Convergence (ICCC-2015) Conference Organized by Interscience Institute of Management and Technology, Bhubaneswar, Odisha, India .
- [22] D. Sun, G. Chang, L. Sun, and X. Wang, "Surveying and analyzing security, privacy and trust issues in cloud computing environments," in Proceedings of the International Conference on Advanced in Control Engineering and Information Science (CEIS '11), pp. 2852–2856, chn, August 2011.
- [23] Ishaq Azhar Mohammed. (2012). Analysis of Identity and Access Management alternatives for a multinational information-sharing environment. INTERNATIONAL JOURNAL OF ADVANCED AND INNOVATIVE RESEARCH, 1(8), 1–7.
- [24] A. Pandey, R. M. Tugnayat, and A. K. Tiwari, "Data Security Framework for Cloud Computing Networks," International Journal of Computer Engineering & Technology, vol. 4, no. 1, pp. 178–181, 2011
- [25] Ravi Teja Yarlagadda, "Understanding DevOps & bridging the gap from continuous integration to continuous delivery", International Journal of Emerging Technologies and Innovative Research (www.jetir.org), ISSN:2349-5162, Vol.5, Issue 2, page no.1420-1424, February-2018, Available :<http://www.jetir.org/papers/JETIR1802284.pdf>
- [26] M. Y. A. Younis and K. Kifayat, "Secure cloud computing for critical infrastructure: a survey," Tech. Rep., Liverpool John Moores University, Liverpool, UK, 2013.
- [27] A. Behl, "Emerging security challenges in cloud computing: an insight to cloud security challenges and their mitigation," in Proceedings of the World Congress on Information and Communication Technologies (WICT '11), pp. 217–222.
- [28] Ishaq Azhar Mohammed. (2013). Intelligent authentication for identity and access management: a review paper. International Journal of Management, IT and Engineering (IJMIE), 3(1), 696–705.

BIG DATA MANAGEMENT ON CLOUD – A SURVEY

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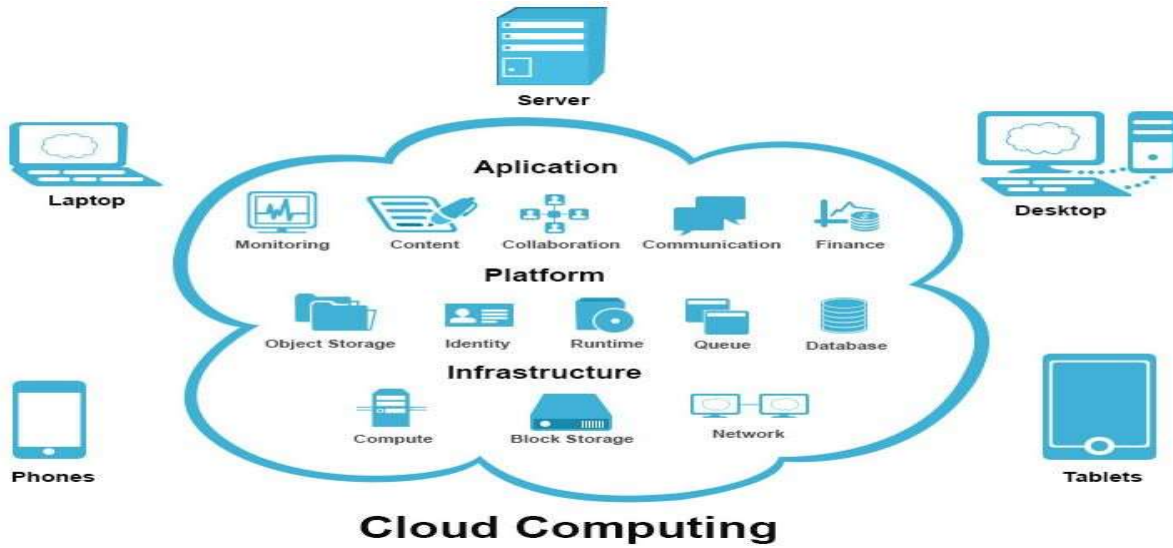
Abstract:

For any organization, enterprise or industry of any type and size, cloud computing is considered as the empire of startups which assist the energetic and insightful entrepreneurs which in turn is used in many business activities like collection, storage, computing analysis, data processing networking even application and programs development, total management of services and machine learning and lots more. Data centers build and maintained by large IT riches are converted into easy, on-going model worth or value service as a capital investment by a cloud provider.

Keywords: Cloud computing, techniques, big data storage, cloud provider, data security, public cloud, hybrid cloud, community cloud.

Introduction

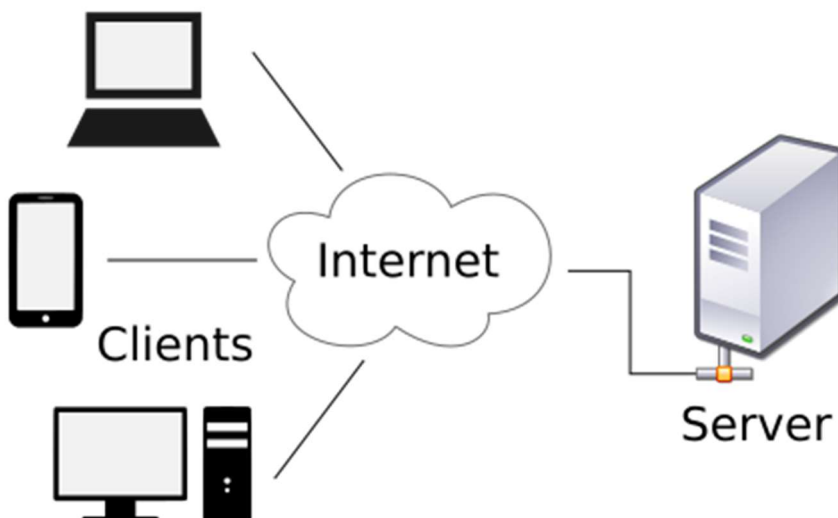
In a better stretchable and cost beneficial way, cloud computing is designed to run on all such IT premises which may or may not exists in real and that is where the real work of cloud computing comes in frame ie server less computing. This in turn is going to be marked as a new revolution of undoing an entire new transformation of digital business transactions. Within an immensely high performance, flexible and capable environment, clouds server as such platforms which are segregated technologies advancing with other complicated technologies useful in human cause at a very larger outlook.



In order to create a balance and proper building up of cloud environment certain key ingredients are required like a detailed knowledge of inner mechanics, models and architectural layers of the concern field along with a well developed outlook of economic factors of the business which can adopt and evolve with the real-world use of cloud computing

Cloud Computing

Without a direct active management by the user, cloud computing is defined as an active requirement or abundance of computer system maneuver mostly for data storage and computing power. Cloud computing is usually referred to explain large data centers accessible to unlimited users over the internet. From the central servers, huge clouds actively leading at



present are performing great reliability duties at diverse locations around the globe. New definition of an edge serve is also known as one of that connection which is comparatively near to other connections. Along with this, it is important to discuss here the meaning of cloud enterprise and public cloud stating the first one as those clouds restricted to only one enterprise whereas if same connections provided to

many folded users is coined under public cloud. With the objective to attain consistency and cost advantages with operations per unit, cloud computing is totally sustained by sharing of resources. Information in form of data is stored in from of some logical pools as digital data loops as a process of computer model for handling information known as cloud storage. A host company like protocol is managing and controlling multiple servers along with the physical environment is equipped with total data security and protection. Also where the data cloud storage is liable to facilitate the data as and when required. General public or any organization can further rent, lease, buy the storage capacity from providers. Till 2019, only Linux was the most widely used operating system offered by the Microsoft.

Working of cloud computing - with at present condition of infrastructure.

A collaboration of different kinds of services facilitated by various companies can be defined as cloud computing using internet service devices working with application software programs functioning to pool up with resource sharing system. In many functions of cloud computing few are worth mentioning as authorization of optimum use of desktop applications, development of virtual applications or even maintaining the virtual servers which in turn helps in targeting the economics of scale and gaining trust of the users attached As a part of a complete package of full digital evolution many companies have taken route of cloud computing on the other hand some are still thinking to transform slowly which opens way to hybrid environment. So it is very necessary for a cloud provider to facilitate with current infrastructure system through up to the mark connections and interfaces along with such looping systems and APIs model that easily assists in delivering cloud based and/or on ground to the end users applications.

Pons and Cons for shifting to the cloud computing from a Business point of view.

Lets discuss some important terms and uses for understanding the cases for organization willing to transform into cloud computing:

- **Disaster Recovery** of data can be a more proven cost beneficial to companies which was earlier much expensive. On the other hand, storing the data in public cloud with-in built facilities is a much better option.
- **Environment for R&D, testing and development:** Capital investments are increased with usage of public cloud infrastructure when replaced with on premises resources for testing and development requirements.
- **Management of Services:** Prior to making the consumption of in use system services which makes a wholesale infrastructure converted in to collaboration apps and even machine learning like Google Cloud ML engine to Google BigQuery to G suite. AI can be easily shifted to the cloud.

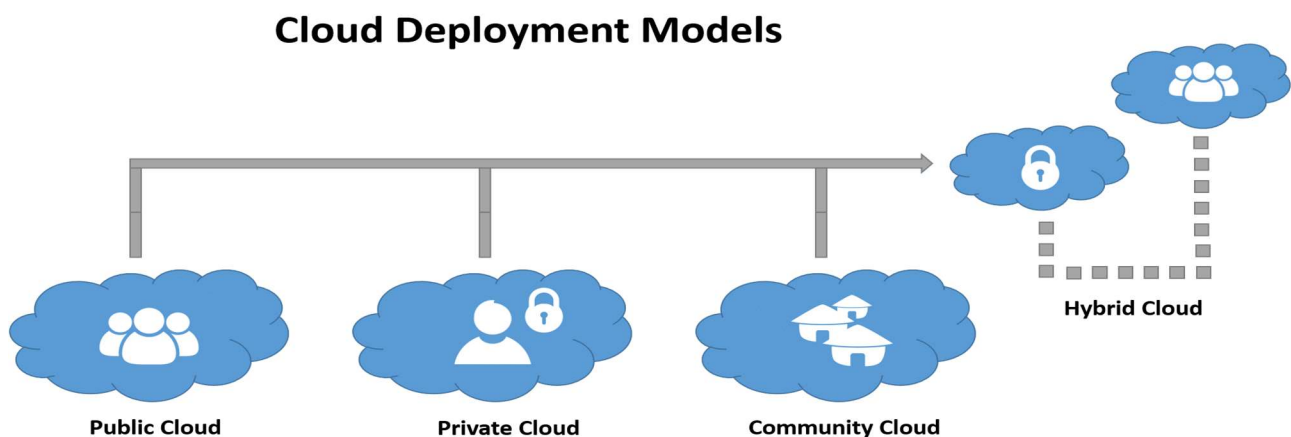
- **Archiving of data:** At low costing and larger pace the public cloud can very comfortably provide storage of data.
- **In Workloads based on specialized compute intensive pattern** is the only most appropriate option available to cloud where ad-hoc and transient large scale computing is required.

Cloud computing helps in providing various options with vendor requirements; depending upon the needs of organization's storage, cost model and process of shifting mode.

Cloud Computing Models

At the latest upfront there are two main types of cloud computing models:

1. Service Based
2. Deployment Based.
3. Being first one thoroughly discussed in above paragraphs lets have a look on cloud deployment models.



On basis of locations, models of cloud computing deployment are studied. A depth study of all four types of deployment models is necessary to know which deployment model would best suit into an organization.

- I. **Public cloud**, is installed where large number of public users are involved which in turn served through a host cloud service provider over a network.
 - The no control of customer is noticed here over the infra structure of the location.

- Pay per users service charges are incurred from each customer which means every user is also a self cost bearer based on the policy terms which is either free or not.
- Those entities having vast varieties of users on many different applications and also are in need of a hosting application management generally prefer the public clouds at ease.

II. Private Cloud, where wholesome only one organization is in charge of the usage is found.

- Internally managed high security data with strong firewall system is given by private cloud to such organizations.
- No issues of handling data within ie internally or outside the domain ie externally.
- Business entities who have uptime requirements of high profile security issues like banks, RBI, which needs very tight management and access demands.

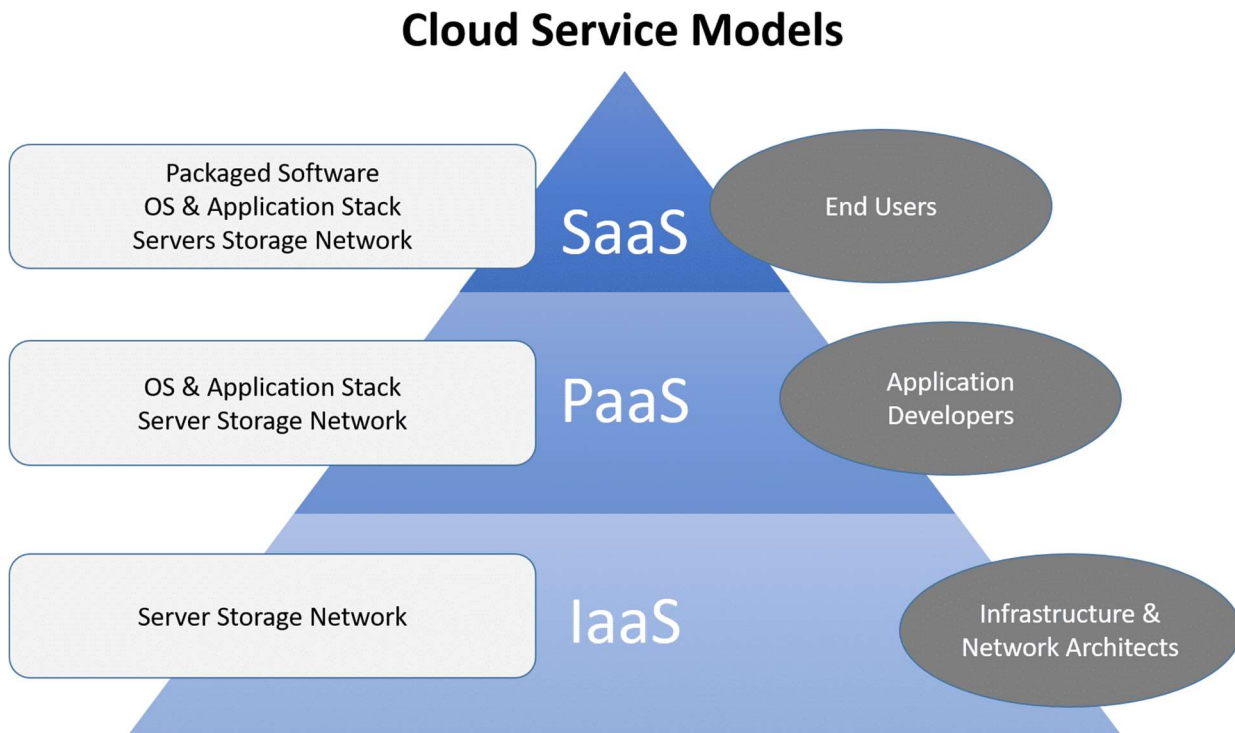
III. Hybrid Cloud, computing rotates around integrating both public and private cloud in spite of maintaining a separate personality from both.

- **Both ways either internally or externally recourses can be provided and well managed efficiently.**
- **It's a 3 in 1 package of better flexibility, security and scalability for long run.**
- A very good example of this is where an business entity can for the interaction with its customers can use public cloud along with having a well secured data on private cloud computing systems.

IV. Community Cloud, is a vast infrastructure pattern which is basically worked in between shared platforms with many organizations which are a part of particular big community.

- **Few concerns are shared on common basis like performance, security and privacy issues.**
- **The best example of community cloud working is noticed in banks, trading firms and government in a country.**
- **Same way community cloud is also easily managed and controlled by a third party provider charging for it.**
- **Joint ventures organizations are more demanding these community cloud setups which is a centralized managing ability for running and executing projects and functions at a fast pace.**

1) *Cloud Service Models*



Various other services are also provided to the clients in form of cloud service models.

Cloud Software as a service model, in which through a strong web browser applications are provided to the customers or the organization in demand.

- ❖ On the network of a strong server data for the apps are run marking difference of not running it through app on the user's computer.
- ❖ Only through subscriptions software are available for sale.
- ❖ Officer 365, Salesforce, Basecamp, and Google Docs are the famous examples of SaaS.

Cloud Infrastructure as a Service model, facilitate their users with virtualized OS and other hardware.

- ❖ For the purpose of computing power, software is charged up and utilized for instant CPU hours used for a month.
- ❖ Racspace, Amazon EC2, Google Compute Engines are the good examples of IaaS.

Cloud Platform as a Service model, on a hosted environment for its support and needs this model provide a networked computer framework in a better way.

- ❖ Only a certain specific program language or development phase is supported by PaaS.
- ❖ Even without any need to mention a certain code, we can enjoy the benefits of dynamic scalability, database automated backups by deploying our applications into these environments.
- ❖ On top of the IaaS charges Cloud platforms as a service model is charged and invoice as extra cost.
- ❖ Prominent examples of PaaS are Engine Yard, Cloud foundry, Google App Engine and lots more.

Wireless cloud printing is also a very famous tool connecting smart phones, tablets and computers along with shared printers to providing an internet connection for printing of any document. Without any installation of a wired network, organizations are benefitted from them using the cloud models helping in sharing paper amount to remote locations. Here employees have an option to select their own OS and devices in organization which deploy BYOD.

Conclusions:

- Practical users and researchers of hybrid and public cloud have openly talked about how cloud computing has eased the cost of IT infrastructure at foremost value.
- Organizations also claim their comments stating cloud computing assist in fixing the increasing demands which are not predictable and also have an extra edge over their applications which are function with more pace and accountability. This in turn has facilitated in more computing power as and when required at peak periods of demand and also helped in burst computing potential.
- Cloud computing help businesses in maintaining low-cost computers at high capacity networks along with storage devices resulting in growth of customer service oriented architecture, hardware virtualization providing a real metaphor to access at large.
- The complete impact on the inflows in a business and its long run good will has clearly noticed an upsurge to all those emerging organizations to concentrate on their core abilities of survival and growth with modification of customer experiences into digital testimonies via mobile tools through data handling centers.

- With the never ending demand of consumption and purchasing of recourses cloud computing facilitates an advance model for it known as pay as you go leading to minimization of unwanted expenses.
- Businesses are trending towards conversion of their capital expenses into the operating expenses.
- Now with the aid of cloud computing, overlooking the issues of infrastructure management and hardware arrangement, any cloud customer without a second thought on extra expenses and can aim for fast updating level in the technology.
- As access to services is possible around the globe with no up gradation on any compact tool or machine requiring any configuration or installation; end user productivity is multiplied.
- Right from the entry level stacks are built in vertical integrated patterns which are much far off from the reach of shelf components resulting in better infrastructure functioning.

References

- <https://www.computer.org/publications/tech-news/trends/big-data-and-cloud-computing>
- <https://blog.westerndigital.com/powerful-ways-data-is-changing-our-world>
- https://www.google.com/search?safe=off&client=firefox-b-d&sxsrf=ALeKk00vlfZ-sJyOFoX3dT4WOV6WTFcsFQ%3A1615201123043&ei=YwNGYPESAo6b4-EP8tWtgAk&q=big+data+changing+the+world&oq=big+data+chang&gs_lcp=Cgdnd3Mtd2l6EAEYAjICCAAYAggAMgIIADICCAAYAggAMgIIADIGCAAQFhAeMgYIABAWEB4yBggAEBYQHjIGCAAQFhAeOgcIIXCwAxAnOgcIABBHELADogQIIxAnOgUIABCRAjoFCAAQiwM6CAgAEJECEIsDOgoIABCHAhAUEIsDOgsIABCxAXCRAhCLAZoICAAQsQMqiwM6BwgAEIcCEBRQiugPWKOjEGCCsRB0AHABeAGAAZoDiAHwE5IBCjAuMTIuMS4xLjGYAQCgAQGqAQdnd3Mtd2l6yAEJuAECwAEB&scient=gws-wiz
- https://www.google.com/search?safe=off&client=firefox-b-d&sxsrf=ALeKk01hc7diiGSHj54BILsPJ8JGwq11_g%3A1615201392564&ei=cARGYOvzIaCJ4-EPvce-wA4&q=cloud+changing+the+world&oq=cloud+changing+the+world&gs_lcp=Cgdnd3Mtd2l6EAMyBggAEAcQHjoHCAAQRxCwAzoECAAQZoICAAQCBAHEB5QxL4FWLbPBWDg0QVoAXACeACAAbIDiAHiDJIBCTAuNC4xLjAuMpgBAKABAaoBB2d3cy13aXrIAQjAAQE&scient=gws-wiz&ved=0ahUKEwjr6_mJxqDvAhWgxDgGHb2jD-gQ4dUDCA0&uact=5
- <https://www.uniprint.net/en/7-types-cloud-computing-structures/>

EMPIRICAL STUDY ON LEADERSHIP STYLES AND ITS INFLUENCE ON JOB SATISFACTION OF EMPLOYEES IN BPO's – VISAKHAPATNAM.

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ABSTRACT:

This paper attempts to study the elements, which influences the performance of the employees working in BPOs at all the levels. To prove this, two elements i.e. leadership styles and job satisfaction are taken into consideration with the objectives to understand and identify the employee perceptions of their leaders' style, identify employee job satisfaction level and identify & predicting, which leadership style is best for employees in the present day scenario. For the purpose of analysis, SPSS version 20 is used to conduct t test for the acceptance or rejection of hypothesis and correlation analysis is used to find the degree of association between the elements of each element. It is observed from the analysis that the respondents felt that if they were given an opportunity for advancement in their job leads to job satisfaction and also the quality of manager i.e. allowing his/her employees to look at the problem from different angles was chosen by many of the respondents as the best quality in their managers which improves their job satisfaction and performance.

KEY WORDS: Leader, Leadership Style, Job Satisfaction, BPO

INTRODUCTION:

The leader and his activities are the integral part of any organization, whether service or manufacturing. The appropriate leadership style will enhance the organization's productivity and profit. Thereof increases the level of satisfaction and commitment in the employees of the organization. Leaders must enhance employees' motivation as having engaged employees is critical for an organization to achieve the goals (Batista-Taran et al., 2009). Previous studies, (Bakker and Bal, 2010; Harter et al., 2002; Xathopoulou et al., 2009) recorded the noteworthiness of employees' work engagement for organizational achievement measured in terms of monetary returns, productivity, customer satisfaction, and a number of individual-level enticing employees' characteristics such as taking initiative and being proactive. Leadership is an essential management function that helps an organisation to direct its resources for achieving goals and enhanced efficacy. In current competitive world, many companies are facing the challenges related to unethical practices; high labor turnover, poor financial performance, etc. may be due to the lack of effective leadership hence, there is a need of effective leaders for coordinating and motivating the employees (Vigoda-Gadot, 2012). Based on this postulation, the

present study targeted to explore the relationship between leadership style, organizational performance and employee satisfaction. There are several types of leadership styles such as transformational leadership, transactional leadership, autocratic, democratic leadership, charismatic etc.

Under transformational leadership style the leader always aims at transforming and improving functions and capabilities by assigning regular tasks and schedules to his/her employees for the development of the organization. Transactional leadership style is based on the action-reward concept. In the autocratic leadership style employees opinions were not considered, where democratic/participative leadership style is just opposite to autocratic style of leadership, which is employee centric. Charismatic leader has a certain kind of charm and the ability to connect with people on multiple levels to drive company initiatives and motivating and encouraging employees.

OBJECTIVES OF THE STUDY:

1. To understand and identify the employee perceptions of their leaders’ style.
2. To identify employee job satisfaction levels.
3. To identify and predict which leadership style is best for employees in the present-day scenario.

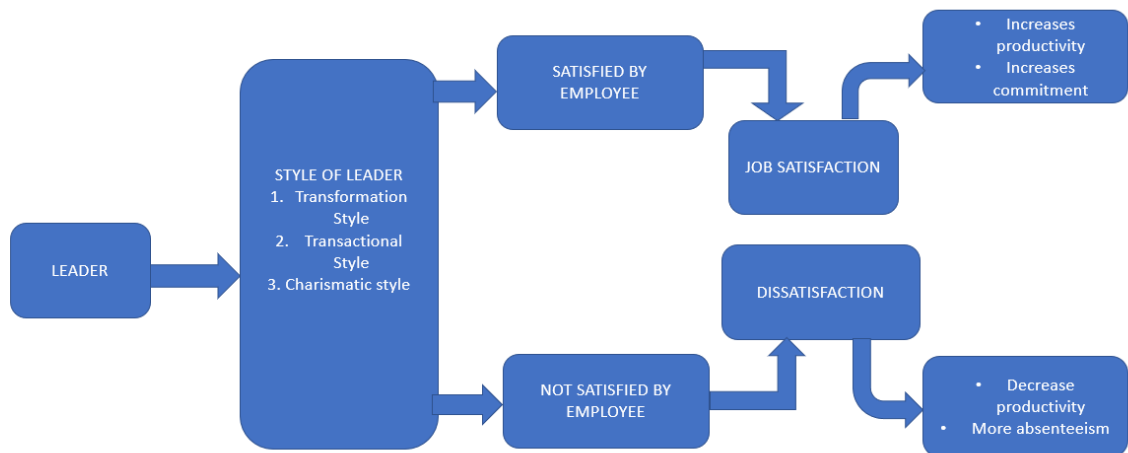
HYPOTHESES:

H_{0a}: There is no significant difference of various elements considered in job satisfaction

H_{0b}: There is no significant difference of the various elements considered in leadership qualities of managers.

CONCEPTUAL FRAMEWORK:

INFLUENCE OF LEADERS ON THE TEAM PERFORMANCE



REVIEW OF LITERATURE:**➤ LEADERSHIP STYLES:****a. TRANSFORMATION LEADERSHIP STYLE:**

Thomas W.H. Ng.(2017) observed that transformational leadership is positively related to employees' attitudes toward their jobs and work outcomes. Hina Saleem (2015) concluded that transformational leadership has a positive association with job satisfaction, which means that transformational leaders, through their inspiring and motivating behavior, can induce changes in the psychological states of members of the organization. According to Burns (1978) in transformational leadership, leaders encourage their subordinates to increase the level of their beliefs, morals, perceptions, motivations and coalitions with organizations objectives. Givens (2008) Transformational leaders show confidence and respect in their subordinates and have the ability to influence their subordinate's behavior in such a way that results in more work fulfilment and positive organizational outcomes (Givens, 2008).

a. CHARISMATIC LEADERSHIP STYLES:

Antonio Sacavem (2017) his research specifically focused on how immediacy and dominance will impact the relationship between leaders' delivery style and followers' mood, perceptions of charismatic leadership and their performance .

DeGroot & Kiker et.al(2000) concluded Charismatic leaders have been seen as friendly and warm but also strong dynamic and powerful

Riggio(1987) has defined charismatic leadership in terms of the non-verbal patterns of behaviour that which conveying a sense of the leaders' enthusiasm and confidence.

b. TRANSACTIONAL LEADERSHIP STYLES:

Judge & Piccolo (2004) in his research he observed that the transactional leadership style is ignored but meta analyses have strongly predicted the importance of transactional leadership towards employees in terms of motivation , leader effectiveness and job satisfaction. Bass, et.al(1997) concluded that the transactional leadership styles always tries to satisfy the needs of employees through recognition after reaching the agreed task objectives and goals.

➤ JOB SATISFACTION

Jelena Culibrk, et.al (2018) have conducted an empirical study with aimed at identifying and quantifying the relationship between work characteristics, Organizational commitment, job satisfaction, job involvement and organizational policies and producers in the transition economy. In their study they have concluded that job satisfaction is affected by work characteristics but not the organizational policies and procedures.

Schneider and Snyder, Locke, (1975 & 1976) Job satisfaction is one of the most researched phenomena in the domain of human resource management and organizational behavior. It is commonly defined as a "pleasurable or positive emotional state resulting from the appraisal of one's job or job experiences".

DISCUSSION OF RESULTS:

TABLE NO: 1 One-Sample Test

JOB SATISFACTION	Test Value=0						
	t	Df	Sig. (2-tailed)	N	Mean Difference	Std. Deviation	Std. Error Mean
Able to keep myself busy all the time.	20.149	29	.000	30	1.87	.507	.093
Given the opportunity to work alone on the job.	19.343	29	.000	30	2.30	.651	.119
Given the opportunity to do different things.	15.894	29	.000	30	2.17	.747	.136
Manager handles <u>hisTeam</u> Professionally.	15.766	29	.000	30	2.00	.695	.127
My Manager is Competent in Making Decisions.	21.734	29	.000	30	2.07	.521	.095
Have an opportunity for advancement in his job	21.079	29	.000	30	2.37	.615	.112
Freedom to use my own judgement	17.971	29	.000	30	2.33	.711	.130
Receive praise for doing good job	25.167	29	.000	30	2.07	.450	.082

From the above table, it is clear that eight elements are considered for measuring job satisfaction and 't' test is conducted at 5% level of significance. The sixth element "Have an opportunity advancement in this job" is with maximum mean value of 2.37 with a standard deviation of 0.615 when compared to other elements. The seventh element "Freedom to use own judgment" has scored next maximum mean value of 2.33 with a standard deviation 0.711.

The first element "Able to keep myself busy all the time" has secured least mean value of 1.87 with the standard deviation 0.507. Therefore it can be concluded that most of the respondents have preferred the element 'opportunity for advancement in the job', followed by 'freedom to use own judgment', 'given opportunity to work alone on the job', 'opportunity to do different things', 'praise for doing a good job', 'manager is competent in making decisions', 'manager handles his/her team professionally' and 'able to keep myself busy all the time' respectively. Hence it is clear that there is a high level of job satisfaction in employees which is the positive emotion feeling an employee gets when they are happy with their work. This happens when the work meets the expectations of the employee such as being given an opportunity to work alone, to do different things, managers are competent enough in taking right decisions, employee having freedom to use their own judgement, and receiving praises for their effective work etc.

Since the calculated values are more than the table value therefore the null hypothesis is rejected and it can be concluded that there is a significant difference among the elements of job satisfaction.

Table No.2: One-Sample Test

LEADERSHIP	Test Value=0						
	t	Df	Sig. (2-tailed)	N	Mean Difference	Std. Deviation	Std. Error Mean
Spends time in teaching and coaching	18.655	29	.000	30	2.000	.587	.107
Makes clear what one can expect to receive when performance goals are achieved	17.696	29	.000	30	2.067	.640	.117
Treats me as an individual rather than just a member of the group	18.018	29	.000	30	2.233	.679	.124
Act in ways that builds my respect for him /her	18.655	29	.000	30	2.000	.587	.107
Displays a sense of power and confidence	17.971	29	.000	30	2.333	.711	.130
Directs my attention towards Failure to meet standards.	21.138	29	.000	30	2.300	.596	.109
Gets me to look at Problem from different angles.	26.444	29	.000	30	2.433	.504	.092
Help me to develop my strengths	21.875	29	.000	30	2.200	.551	.101
Suggest new ways of doing things.	22.363	29	.000	30	2.167	.531	.097
Expresses satisfaction when I meet expectation	33.796	29	.000	30	2.133	.346	.063
use methods of leadership that are satisfying	18.582	29	.000	30	2.133	.629	.115
Talk about his/her most important values & belief.	19.338	29	.000	30	2.333	.661	.121
Is absent when needed	18.137	29	.000	30	2.200	.664	.121

From the table 2, the calculated values for thirteen elements are more than the table value at significance level of 5% and 29 degrees of freedom. Therefore the null hypothesis is rejected and it is concluded that there is a significant difference of the various elements considered in leadership qualities of managers.

Among the thirteen elements considered for the study the results depicts the seventh element i.e., “gets me to look at the problem from different angles” has the maximum mean value (2.43) with a standard deviation of 0.504 when compared to the remaining elements. Two elements five and twelve i.e., “displays a sense of power and confidence” and “talk about his/her most important values and belief” have the next highest mean value of 2.33 each, however with different standard deviations of 0.664 and 0.711 respectively.

Therefore most of the employees have stated that their manager possesses a high degree of qualities in sense of power and confidence by allowing subordinates to look at a problem from different angles, and shares about his/ her most important values and belief in the organization. Whereas the elements one and four i.e., “spends time in teaching and coaching”, “act in ways that builds my respect for him/her” have the least mean value of 2.0 with the same standard deviation of 0.587.

Therefore, it is well understood that there are several essential qualities that mould a successful leader for any organization. It can be concluded that most of the employees prefer leaders should possess essential qualities like capable of providing a chance in solving the problems, good sense of power and confidence and talking about important values and belief etc. In connection to discussion it is well understood that their leadership style causes change in individual and social system. In this ideal form, it creates valuable and positive impact in the followers with the end goal of developing followers into leaders.

CORRELATION ON

➤ JOB SATISFACTION:

JOB SATISFACTION		Able to keep myself busy all the time	Given the opportunity to work alone on the job	Given the opportunity to do different things	Manager handles his Team Professionally	My Manager is Competent in Making Decisions	have an opportunity for advancement in this job	Freedom to use my own judgement	Receive Praise for doing good job
Able to keep myself busy all the time	Pearson Correlation	1	.647**	.152	.391*	.296	.162	.223	.342
	Sig. (2-tailed)		.000	.424	.033	.113	.392	.236	.064
	N	30	30	30	30	30	30	30	30
Given the opportunity to work alone on the job	Pearson Correlation	.647**	1	.390*	.381*	.041	.146	.298	.400*
	Sig. (2-tailed)	.000		.033	.038	.831	.440	.110	.028
	N	30	30	30	30	30	30	30	30

Given the opportunity to do different things	Pearson Correlation	.152	.390*	1	.266	.236	.238	.087	.377*
	Sig. (2-tailed)	.424	.033		.156	.208	.206	.649	.040
	N	30	30	30	30	30	30	30	30
Manager handles his Team Professionally	Pearson Correlation	.391*	.381*	.266	1	.572**	.161	.070	.221
	Sig. (2-tailed)	.033	.038	.156		.001	.394	.714	.241
	N	30	30	30	30	30	30	30	30
My Manager is Competent in Making Decisions	Pearson Correlation	.296	.041	.236	.572**	1	.244	.031	.128
	Sig. (2-tailed)	.113	.831	.208	.001		.194	.871	.502
	N	30	30	30	30	30	30	30	30
I have an opportunity for advancement in this job	Pearson Correlation	.162	.146	.238	.161	.244	1	.499**	.158
	Sig. (2-tailed)	.392	.440	.206	.394	.194		.005	.405
	N	30	30	30	30	30	30	30	30
Freedom to use my own judgement	Pearson Correlation	.223	.298	.087	.070	.031	.499**	1	.359
	Sig. (2-tailed)	.236	.110	.649	.714	.871	.005		.051
	N	30	30	30	30	30	30	30	30
I Receive Praise for doing good job	Pearson Correlation	.342	.400*	.377*	.221	.128	.158	.359	1
	Sig. (2-tailed)	.064	.028	.040	.241	.502	.405	.051	
	N	30	30	30	30	30	30	30	30

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

* . Correlation is significant at the 0.05 level (2-tailed).

To test the relation among the elements which leads to job satisfaction, correlation test was conducted and based on the results it was observed in table 3 that there is most likely relationship (0.647) between the elements one and two i.e., “able to keep myself busy all the time” and “ opportunity to work alone on the job”. It was also identified that there is a likely relationship (0.572) between the elements four and five i.e., “manager handles his team professionally” and “manager is competent in making decisions”.

Thus from the above discussion it is well understood that the job satisfaction of employees working in the organization can be achieved if the management supports in achieving their goals by making them engaged all the time and by providing an opportunity to work alone because they are genuinely interested and happy with the work they do. In fact one should remember that job satisfaction is not driven by an employee’s sense of pride instead it is a strong emotion towards the fulfillment of doing what the employee loves.

➤ **LEADERSHIP ELEMENTS:**

Correlations														
LEADERSHIP		Spends time in teaching and Coaching	Makes clear what one can expect to receive when performance goals are achieved	Treats me as an individual rather than just a member of the group	Act in ways that builds my respect for him/her	Displays a sense of power and confidence	Directs my attention towards Failure to meet standards.	Gets me to look at Problem from different angles.	Help me to develop my strengths	Suggest new ways of doing things	Expresses satisfaction when I meet expectations	use methods of leadership that are satisfying	Talk about his/ her most important values & belief.	Is absent when needed
Spends time in teaching and Coaching	Pearson Correlation	1	.459*	.519**	.400*	.083	.197	.000	-.213	.332	.170	.187	.089	.354
	Sig. (2-tailed)		.011	.003	.029	.664	.297	1.000	.258	.073	.370	.323	.641	.055
Makes clear what one can expect to receive when performance goals are achieved	Pearson Correlation	.459*	1	.360	.459*	.177	-.054	.121	-.137	.068	.270	.577**	.272	.373*
	Sig. (2-tailed)	.011		.051	.011	.350	.776	.523	.470	.722	.149	.001	.146	.042
Treats me as an individual rather than just a member of the group	Pearson Correlation	.519**	.360	1	.519**	.333	.332	.198	-.221	.175	.304	.248	.205	.275
	Sig. (2-tailed)	.003	.051		.003	.072	.073	.294	.240	.354	.103	.187	.277	.141
Act in ways that builds my respect for him/her	Pearson Correlation	.400*	.459*	.519**	1	.330	.296	.233	.000	.443*	.170	.467**	.178	.354

	Sig. (2-tailed)	.029	.011	.003		.075	.113	.215	1.000	.014	.370	.009	.347	.055
Displays a sense of power and confidence	Pearson Correlation	.083	.177	.333	.330	1	.488**	.160	-.088	.122	.374*	.206	.196	.146
	Sig. (2-tailed)	.664	.350	.072	.075		.006	.397	.644	.521	.042	.276	.300	.441
Directs my attention towards Failure to meet standards.	Pearson Correlation	.197	-.054	.332	.296	.488**	1	.126	-.084	.273	.301	.166	.263	.366*
	Sig. (2-tailed)	.297	.776	.073	.113	.006		.506	.659	.145	.106	.382	.161	.047
Gets me to look at Problem from different angles.	Pearson Correlation	.000	.121	.198	.233	.160	.126	1	.050	-.021	.053	.029	.069	.144
	Sig. (2-tailed)	1.000	.523	.294	.215	.397	.506		.794	.910	.782	.879	.717	.447
Help me to develop my strengths	Pearson Correlation	-.213	-.137	-.221	.000	-.088	-.084	.050	1	-.118	-.145	-.279	-.189	-.490**
	Sig. (2-tailed)	.258	.470	.240	1.000	.644	.659	.794		.535	.445	.136	.316	.006
Suggest new ways of doing things.	Pearson Correlation	.332	.068	.175	.443*	.122	.273	-.021	-.118	1	.063	.241	.033	.196
	Sig. (2-tailed)	.073	.722	.354	.014	.521	.145	.910	.535		.742	.199	.863	.300

Expresses satisfaction when I meet expectation	Pearson Correlation	.170	.270	.304	.170	.374*	.301	.053	-.145	.063	1	.233	.252	-.120
	Sig. (2-tailed)	.370	.149	.103	.370	.042	.106	.782	.445	.742		.216	.180	.527
use methods of leadership that are satisfying	Pearson Correlation	.187	.577**	.248	.467**	.206	.166	.029	-.279	.241	.233	1	.221	.512**
	Sig. (2-tailed)	.323	.001	.187	.009	.276	.382	.879	.136	.199	.216		.240	.004
Talk about his/her most important values & belief.	Pearson Correlation	.089	.272	.205	.178	.196	.263	.069	-.189	.033	.252	.221	1	.314
	Sig. (2-tailed)	.641	.146	.277	.347	.300	.161	.717	.316	.863	.180	.240		.091
Is absent when needed	Pearson Correlation	.354	.373*	.275	.354	.146	.366*	.144	-.490**	.196	-.120	.512**	.314	1
	Sig. (2-tailed)	.055	.042	.141	.055	.441	.047	.447	.006	.300	.527	.004	.091	

*. Correlation is significant at the 0.05 level (2-tailed).

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

To test the relation among the select thirteen elements, which helps to know the leadership style, correlation test is conducted and based on the results it is observed that there is most likely relationship (0.577) between the elements one and eleven i.e., “spend time in teaching and coaching” and “ use methods of leadership that are satisfying”. It was also found that there is a likely relationship of 0.519 between the elements three and four i.e., “treats me as an individual rather than just a member of the group” and “act in ways that builds my respect for him/her”.

Whereas there is a negative correlation to the element eight i.e., “helps me to develop my strengths” with elements thirteen (-0.49) and eleven (-0.279) i.e., “is absent when needed” and “use methods of leadership that are satisfying” respectively.

From the above discussion it can be concluded that leadership is the ability to direct a group of people in realizing a common goal. Therefore leaders create commitment and enthusiasm among the employees by spending valuable time in teaching and providing coaching with the help of few methods that satisfy the employees. Effective leadership can be achieved by treating the employees as an individual rather than just a member of a group and thereby the managers can acquire respect for themselves. Thus there is a common belief that leadership is vital for effective organizational and societal functioning and its success.

FINDINGS:

Eight elements related to the employees' & managers' attitude and thirteen elements related to leadership qualities in their superiors were considered respectively in the study to measure the job satisfaction levels of employees and leadership styles that were adopted by managers and their impact on employees' performance from different BPO organizations in Visakhapatnam city. Based on the results, the following points were observed:

- Most of the respondents felt that if they were given an opportunity for advancement in their job that leads to job satisfaction.
- Majority of the employees opined that if they were given free hand to use their own judgment increases their job satisfaction levels.
- The quality of manager i.e., allowing his/her employees to look at the problem from different angles was chosen by many of the respondents as the best quality in their managers which improves their performance and leads to job satisfaction.
- The respondents felt that if the manager displays a sense of power and confidence and also talks about their most important values & belief that may pave way to job satisfaction and better performance of the employees.

SUGGESTIONS:

From the research it is suggestible that the employees can increase their level of job satisfaction under the style of a leader are as follows:

- It is suggestible to keep the employees busy all the time by giving them free hand while doing work. This might give a scope for the employee to go to next level, which leads to job satisfaction.
- Management development programmes should be conducted by the organization to change his/her behaviour aspects towards handling their team professionally and also making decisions effectively.
- Being a leader, he/she should inculcate the culture of spending time in teaching and coaching the team members.
- Managers should be exposed to seminars and workshops on personality development so that they can learn how to behave with their team members.
- Leader should define the job roles clearly to the team members in order to increase efficacy and satisfying of the employees towards the job.
- Leader should be available when the subordinate are in need of his/her help

CONCLUSION:

The study has revealed that effective leadership and job satisfaction are essential for the success of any organization. A capable leader spends time in teaching and coaching the employees moreover he makes clear what one can expect to receive when performance goals are achieved. Therefore an efficient leader

will always treat the employees as the most important asset in an organization. This research also explores the leaders now-a-days following the transformation style, where one can notice the change in the psychological states of members, through their inspiring and motivating behavior. The elements such as giving an opportunity for advancement in their job and given free hand to use their own judgment etc. show that there is a high degree of job satisfaction in employees.

So in accordance with the results, the transformational leadership has the ability to structure a relationship between the managers and their subordinates, which in turn helps to increase the job satisfaction of the employees.

REFERENCES:

1. Ng T.W. Transformational leadership and performance outcomes: Analyses of multiple mediation pathways. *Leadersh. Q.* 2017;28:385–417. doi: 10.1016/j.leaqua.2016.11.008.
2. DeGroot, T.Kiker, et.al (2000) . A meta-analysis to review organizational outcomes related to charismatic leadership, *Canadian Journal of Administration Sciences*, 17, 356-371.
3. Riggio, R.E(1987), *The Charisma quotient: what it is, how to get it, how to use it.* New York, NY: Dodd Mead.
4. Antonio Sacavem(2017) “Charismatic leadership : A study on Delivery , styles, Mood and Performance”, *Journal of Leadership studies*, 11(3):21-28.
5. Bass, B. M. (1997). Does the transactional-transformational leadership paradigm transcend organizational and national boundaries? *American Psychologist*, 52, 130–139.
6. Judge, T. A., & Piccolo, R. F. (2004). Transformational and Transactional Leadership: A Meta-Analytic Test of Their Relative Validity. *Journal of Applied Psychology*, 89(5), 755–768.
7. Jeelena Culibrik, et.al(2018),”Job Satisfaction , organizational commitment and job involvement: The mediating Role of Job Involvement”, *Frontiers in Psychology.*, 16 feb.
8. Schneider, B., and Snyder, R. A. (1975). Some relationships between job satisfaction and organization climate. *J. Appl. Psychol.* 60:318.
9. Locke, E. A. (1976). “The nature and causes of job satisfaction,” in *Handbook of Industrial and Organizational Psychology*, ed M. D. Dunnette (Chicago, IL: Rand McNally), 1297–1349.
10. A.B. Bakker, P.M. Bal, “Weekly work engagement and performance: a study among starting teachers” *J. Occup. Organ. Psychol.*, 83 (1) (2010), pp. 189-206.
11. L.C. Batista-Taran, M.B. Shuck, C.C. Gutierrez, S. Baralt, “The role of leadership style in employee engagement, M.S. Plakhotnik, S.M. Nielsen, D.M. Pane (Eds.), *Proceedings of the Eighth Annual College of Education & GSN Research Conference, Florida International University, Miami (2009)*, pp. 15-20
12. D. Xanthopoulou, A.B. Bakker, E. Demerouti, W.B. Schaufeli, “The role of personal resources in the job demands-resources model”, *Int. J. Stress Manag.*, 14 (2) (2007), pp. 121-141