CRITERIA 3

RESEARCH, INNOVATIONS AND EXTENSION

3.3.1 Number of research papers published per teacher in the Journals notified on UGC website

3.3.1 Number of research papers published per teacher in the Journals notified on UGC website during the last five years

2017-18

SL No	Title of Paper	Name of Author
1	Software Effort Prediction - A Datamining Approach	Ms. Vidya Gopinath
2	Identification and in silico characterization of a novel peptide inhibitor of angiotensin converting enzyme from pigeon pea (Cajanus cajan).	Nawaz, K. A., David, S. M.
3	IFRS: Impact on Indian Banks	Dr. R. Rupa
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6	Progress of MUDRA with special reference to Tamilnadu ,	Dr. R. Rupa
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8	Skill Development through Management Education - A Study among Alumni of Management Inst	George K Mathew
9	An Analysis of Trends of Banks In Nifty Bank using Relative Strength Index And Rate Of Change Indicator	V S Binu, Dr Vetrivel
10	Are NGO MFIs Successful? A Comparison between India and Bangladesh	Dr. R. Rupa

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Identification and in silico characterization of a novel peptide inhibitor of angiotensin converting enzyme from pigeon pea (Cajanus cajan)

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Identification and *in silico* characterization of a novel peptide inhibitor of angiotensin converting enzyme from pigeon pea (*Cajanus cajan*)

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ABSTRACT

Background: Plants are important sources of bioactive peptides. Among these, angiotensin converting enzyme (ACE) inhibitory peptides have a major focus on their ability to prevent hypertension. Inhibition of ACE has been established as an effective approach for the treatment of ACE associated diseases.

Hypothesis/Purpose: Some synthetic ACE inhibitory drugs cause side effects and hence there is a constant interest in natural compounds as alternatives.

Study Design: The study was designed to identify and characterize a peptide molecule from pigeon pea which has the biological property to inhibit ACE and can be developed as a therapeutic approach towards hypertension.

Methods: Seeds of pigeon pea (*Cajanus cajan* (L.) Millsp.) was fermented with *Aspergillus niger*, a proteolytic fungus isolated from spoiled milk sweet. The extract was purified by size exclusion chromatography by FPLC system. The fractions that showed ACE inhibition was subjected to LC-MS/MS for sequence identification. The stability of the peptide was analyzed by molecular dynamic simulations and the interaction sites with ACE were identified by molecular docking.

Results: The study report a novel ACE inhibitory octapeptide Val-Val-Ser-Leu-Ser-Ile-Pro-Arg with a molecular mass of 869.53 Da. The Lineweaver–Burk plot indicated that the inhibition of ACE by this peptide is in competitive mode. Also, molecular docking and simulation studies showed a strong and stable interaction of the peptide with ACE.

Conclusion: The results clearly show the inhibitory property of the peptide against ACE and hence it can be explored as a therapeutic strategy towards hypertension and other ACE associated diseases.

Keywords: Angiotensin converting enzyme, Inhibitor, Molecular docking, Peptide, Purification.

Abbreviations

ACE - Angiotensin Converting Enzyme; FPLC - Fast Protein Liquid Chromatography; HHL - Hippuryl-Histidine-Leucine; PBC - Periodic Boundary Conditions; RMSD - Root Mean Square Deviation

Introduction

Hypertension is one of the primary risk factors for heart disease and stroke, the leading causes of death worldwide. Awareness, prevention, treatment and control of hypertension are a significant public health measure. Angiotensin-converting enzyme (ACE, EC 3.4.15.1) is one of the key enzymes in blood pressure regulation because it generates the vasoconstrictor angiotensin-II and inactivates the vasodilator bradykinin. Apart from its regular function, ACE is expressed in several malignancies and influences tumor cell proliferation, tumor cell migration, angiogenesis, and metastatic behavior (Yoshiji et al., 2002). Inhibition of ACE is considered to be a useful therapeutic approach in the treatment of pathophysiologies in which ACE is involved. Anti-ACE drugs act as vasodilators by reducing the levels of Angiotensin II in the renin angiotensin system or by inhibiting the degradation of bradykinin in the kallikrein-kinin system (Erdos, 2006). They have been prescribed as a first-line treatment for hypertension in patients with type 1 diabetes, proteinuria and left ventricular systolic dysfunction (Flint, 2004). Some synthetic ACE inhibitory drugs such as captopril, enalapril, fosinopril lisinopril etc., cause well-defined side effects such as allergic reactions, hypotension, increased potassium levels, reduced renal function, cough, angioedema, skin rashes, and foetal abnormalities hence there is a constant interest in natural

compounds with ACE inhibitory potentials as alternatives to synthetic drugs (FitzGerald et al., 2004).

Numerous studies have shown that common foods from animal and plant origin are important sources of bioactive peptides exhibiting antimicrobial, antioxidative, antithrombotic, antihypertensive and immunomodulatory activities (FitzGerald et al., 2004; Korhonen and Pihlanto, 2006). Furthermore, the peptides that are inactive within proteins have shown physiological effects in the body when released. Among the bioactive peptides, ACE inhibitory peptides derived from food proteins have attracted particular attention and have been studied comprehensively for their ability to prevent hypertension. These peptides could be used as a potent functional food additive and represent a healthier and natural alternative to ACE inhibitor drugs. Some of these peptides have also been indicated to render an anticancer effect both in vitro and in vivo (Danquah and Agyei, 2012). Different legumes have been identified as sources of ACE-inhibitory peptides, mainly soybean (Gibbs et al., 2004; Zhang et al., 2006), chickpea and pea (Roy et al., 2010; Aluko, 2008). The presence of bioactive peptides in legumes can contribute to increase their food protein quality value and add functionality to food consumed on a daily basis.

Considering the importance of peptide inhibitors, in this study, the isolation, purification and structural identification of ACE inhibitory peptide from pigeon pea (*Cajanus cajan* (L.) Millsp.) fermented with a proteolytic fungus *Aspergillus niger* by solid state fermentation was carried out. Also, the binding interaction of the purified peptide with the active site of ACE was determined by molecular docking. To our knowledge, screening for an ACE inhibitory peptide from pigeon pea which is a common food among Asians is not yet attempted.

Materials and Methods

Peptide production

A proteolytic fungus *Aspergillus niger* (KR535626), isolated from a spoilt milk sweet (palkova) was identified by molecular techniques. To a well sporulated PDA slant of the culture, 10 ml of spore suspension medium (0.9% NaCl, 0.1% Tween 80) was added and the surface was scraped with a sterile inoculation loop so as to obtain a spore suspension. The suspension was agitated with a cyclomixer to resuspend the spores and filtered through glass wool. The concentration of the spores was measured using a hemocytometer and adjusted to 1×10^8 spores/ml and was used as the inoculum. The spore suspension (1 ml) was inoculated into 10 g of pigeon pea (*C.cajan*) in 250 ml Erlenmeyer flasks. The fungal extract and the substrate without the fungus were used as controls. The inoculated flasks were incubated at 27 °C for 7 days. The crude extracts from the solid substrates were obtained once the incubation period was completed. The fungal mats were gently removed from the solid substrate aseptically. Sterile double distilled water (50 ml) was added and placed on a rotary shaker at 180 rpm for 1 h for the contents to blend. The crude extracts were centrifuged at 4000 × g at 4 °C for 15 min to remove unwanted debris. Then filtered by Whatman® qualitative filter paper Grade 2 and the resultant filtrate were used for analytical studies.

Assay of ACE inhibitory activity

ACE inhibitory activity was measured by the spectrophotometric assay of Cushman and Cheung (1971) with modifications. 25 µl of test solutions at different concentrations (5-30 µg/ml) were incubated with 30 µl of 0.1 M borate buffer (pH 8.3) containing 0.1 M NaCl and with 6 µl (4 mU) of rabbit lung ACE (Sigma Chemical Co., USA) at 37 °C for 10 min. 5 mM Hippuryl-His-Leu (HHL) (Sigma Chemical Co., USA) was added to the reaction mixture and incubated at 37 °C for 30 min. The reaction was stopped by addition of 150 µl of 1 N HCl. The hippuric acid (HA) formed was extracted with ethyl acetate (1.0 ml). The mixture

$$\text{ACE inhibitory activity}(\%) = \frac{(B - A)}{(B - C)} \text{ x } 100$$

was vortexed for 30 min and subsequently centrifuged at 1500 × g for 10 min. The organic phase supernatant (800 µl) was vacuum evaporated. The residue was dissolved in 1.0 ml of distilled water and the absorbance was measured at 228 nm. Captopril, a common inhibitor was used as the control. The extent of inhibition was calculated as follows:

Where, A is the absorbance of HA generated in the presence of ACE inhibitory component, B is the absorbance of HA generated without ACE inhibitory component and C is the absorbance of HA generated without ACE.

Purification of potential ACE inhibitory peptide by size exclusion chromatography

The crude extract which showed a potential ACE inhibitory property was further purified by ultra-filtration. The extract was filtered through Amicon Ultra (Merk Millipore, USA) centrifugal filters of 10 kDa cut-off at 5000x g for 30 min. The portion which showed inhibition was further purified by size exclusion chromatography (SEC) using Hiload Superdex 30 16/60 column (GE healthcare) by means of fast protein liquid chromatography (FPLC) system (AKTA explorer GE Healthcare, Sweden). The column was equilibrated with two column volumes of the buffer (500mM Sodium borate, pH 8.3). NaCl (0.15M) was supplemented to the buffer to avoid ionic interactions with the matrix. After the sample was injected, the flow rate (0.3 ml/min), pressure, temperature, pH, conductivity and UV absorbance at 214 nm were monitored by UNICORN 5.20. All the peak fractions were collected. The protocol was repeated several times and the active fractions showing ACE inhibitory property were lyophilized for further analysis and application purposes. The purity of the peptide fraction was determined by analytical HPLC. The fractions which showed ACE inhibitory property were checked for its protein concentration by the colorimetric method of Lowry et al., (1951).

Statistical analysis

The analysis of ACE inhibitory activity was carried out in triplicate and the result was reported as mean ± standard deviation. Mean differences of ACE inhibitory activity in SEC fractions was analyzed using one-way ANOVA ($p < 0.05$) in SPSS 17.0 (SPSS Inc., Released 2008. SPSS Statistics for Windows, Version 17.0. Chicago: SPSS Inc.).

Identification of peptide sequence by nano LC-MS/MS

The peptide sequence of the purified sample which showed significant ACE inhibition (Fraction 70) was determined by nano LC-MS/MS (Agilent 1200 HPLC, Advion Nanomate Triversa, LTQ – Orbitrap Discovery). Briefly, the purified peptide was subjected to a solution for digestion by trypsin. The digested peptides were then subjected to standard 70 min Reverse-phase liquid chromatography-Mass spectrometry (RPLC-MS/MS) analysis with collision induced dissociation as the fragmentation method. Generated data was searched following standard approach for the identity using MASCOT 2.4 as the search engine on Proteome Discoverer 1.4.

Determination of inhibition pattern of peptide on ACE

The ACE inhibitory peptide fraction (F70) was added to each reaction mixture to different final concentrations (5, 15, 25 µg/ml). The kinetics of ACE activity in the presence or absence of the peptide was determined by the Lineweaver–Burk plots. Basic conditions of the experiment were the same as of ACE inhibitory activity assay. Briefly, ACE was pre-incubated with different concentrations of F70 followed by reaction with HHL in varying concentrations from 1 to 6 mM, respectively.

Molecular modeling of the purified peptide

The structure of peptide Val-Val-Ser-Leu-Ser-Ile-Pro-Arg was drawn using Chemsktech. The generated structure was dimensionally optimized for the tautomeric property. Universal Force Field (UFF) was applied to construct stretch and bend angle

between the peptide bond. In the UFF, the weaker force field was computed by the Expression 1 and stronger force field was calculated by Expression 2 for initial generation of peptide structure.

Expression 1 | $F_{WF} = \overline{F}_{WF}(\eta_0) + \overline{F}_{WF}(\eta_n) + f_{tn} t^n \overline{F}_{WF}(\eta_n)$

Expression 2 | $F_{SF} = \overline{F}_{SF}(\eta_0) + \overline{F}_{SF}(\eta_n) + f_{tn} t^n \overline{F}_{SF}(\eta_n)$

η_n -field intensity; SF- Strong force field; WF- Weaker Force field

The energy was minimized for the force field optimized peptide by Schrodinger MacroModel. Polak-Ribiere conjugate gradient method was used to minimize the peptide with a gradient of 2500 point iterations and threshold was set to 0.05 Å. The potential parameters were kept within 8.0 Å of van der Waal cut-off, 20.0 Å for electrostatic field, 4.0 Å for H-Bond interaction and 1.0 for dielectric constant. To generate multiple peptide loop conformation for the peptide, Molecular dynamics (MD) simulation was performed and 10000 individual samples were created. Conformer generation was restricted to 10000 samples with features such as low gradient using Polak-Ribiere Conjugate Gradient (PRCG) method with 500 maximum iterations at 0.05 convergence threshold, optimized potentials for liquid simulations (OPLS) 2010 force field and water solvent environment at 300 K temperature. Conformers of the monomeric peptide were kept under ionization state and stereo isomeric profile. All the conformations of the peptides were generated for weak and strong intra-molecular bonding.

Molecular docking of purified peptide with ACE

The crystal structure of human ACE-phosphinic tripeptide complex (2XY9) was obtained from the Research Collaboratory for Structural Bioinformatics Protein Data Bank (RCSB PDB). The interaction between ACE and peptide was performed by an extra precision method using Glide Dock. ACE protein was prepared by removing heteroatoms (water molecule) and co-crystal ligands. Polar surface amino acids were added with hydrogen atoms.

The prepared ACE protein was subjected to interact with peptide conformers. Interaction annotations were made to have 10 poses per iteration and RMSD > 2.26 Å. Molecule environment force field was set up to have OPLS 2005 as improvised solvation energy for rigid protein. The final ACE-peptide complex energy was minimized from the total internal energies (E_{int}). The final scoring functions of Glide Docking were calculated from the total energy model (E_{model}) to rank the poses of each ligand. E_{model} is the addition of GlideScore, non-bonded interaction energy and the excess internal energies of the complex.

Molecular dynamics simulation of ACE and ACE-peptide complex

The molecular dynamic simulation was performed with GROMOS96 force fields using GROMACS 4.5.5-1 package. Models were solvated with the explicit simple point charge (SPC216) water in a cubic box with the periodic boundary conditions (PBC). The energy minimization was performed for the system by using the steepest descent method. The topology files and charges for the ligand atoms were generated by the Bio-Linux supported Shell script. MD simulations were carried out for 20 ns with a time step of 2 fs. All simulations were run under periodic boundary condition with NVT (constant number [N], volume [V], and temperature [T]) ensemble by using Berenson's Temperature coupling algorithm for keeping the temperature at 310 K. The Particles Mesh Ewald (PME) algorithm was used to calculate the electrostatic interactions. All bonds were constrained by using the Linear Constraint Solver (LINCS) algorithm.

Results and discussion

Purification of potential ACE inhibitory peptides by SEC

An earlier review (Guang and Phillips, 2009) reported that numerous plants such as soybean, mung bean, sunflower, rice, corn, wheat, buckwheat, broccoli, mushroom, garlic, spinach, and grapes are the sources of ACE inhibitors. In the present study, an octapeptide was identified and purified from pigeon pea. *A. niger* (KR535626) was cultured on pigeon

pea (*C.cajan*) at optimum conditions for the production of ACE inhibitory peptides. The crude extract was separated and ultra-filtered (UF) with 10 kDa cut-off filter, which separated the extract into two portions, one with molecular weights greater than 10 kDa and the other of molecular weights below 10 kDa. The UF fraction with ACE inhibitory activity was fractionated by SEC. Each SEC fraction was tested for ACE inhibitory activity at a concentration of 20 µg/ml. Among the 100 SEC fractions collected, only two fractions (F70, F71) showed ACE inhibition. Among the two fractions, F70 exhibited significantly higher ACE inhibitory activity with an IC_{50} value of 9 µg/ml, where 85% of ACE enzyme activity was inhibited when treated with 30 µg/ml of the peptide (Fig. 1). The protein content and percentage of inhibition in different stages of purification is shown in Table 1.

Identification of ACE inhibitory peptide by nano LC-MS/MS

The amino acid sequences of the peptides in F70 were determined by nano LC-MS/MS. The spectrum of the peptide is shown in Fig. 2. A potential ACE inhibitory octapeptide Val-Val-Ser-Leu-Ser-Ile-Pro-Arg was identified with a molecular mass of 869.53 Da. A low molecular weight is an added advantage for a potent ACE inhibitor because large peptide molecules are restricted from fitting into the active site of ACE (Natesh et al., 2003). Crystallography study on ACE protein demonstrated that ACE only allows small peptides to enter the active site of the catalytic domain (Mahato et al., 2003). Furthermore, the type of amino acids present in peptide sequence is also a determining factor of its activity. Cheung et al., (1980) suggested that the most favorable N-terminus residues were branched amino acids such as valine, isoleucine for a potent ACE peptide inhibitor. In our peptide sequence, the content of hydrophobic amino acids is high and hence it provides a hydrophobic nature to the peptide and the N-terminal has a valine residue.

Inhibition pattern of the peptide

In order to elucidate the ACE inhibition pattern of Val-Val-Ser-Leu-Ser-Ile-Pro-Arg, the peptide was co-incubated with ACE and varied concentrations of the HHL. The Lineweaver–Burk plot at varying concentrations of Val-Val-Ser-Leu-Ser-Ile-Pro-Arg intersecting at a common intercept on the y-axis indicates that the peptide is a competitive inhibitor (Fig. 3). This suggests that the peptide might bind to the active site of ACE to block it from binding to the substrate. Although non-competitive ACE inhibitory peptides have been reported (Kohama et al., 1989; Nakagomi et al., 2000; Qiang et al., 2015), most ACE inhibitors either from snake venom (Cheung and Cushman, 1973) or derived from food protein hydrolysates (Matsufuji et al., 1994) belong to the competitive mode. A competitive inhibition pattern has been previously reported for ACE inhibitory peptides purified from edible mushrooms (Jang et al., 2011) and food-derived peptides, such as milk and freshwater clams (Gobbetti et al., 2000; Tsai et al., 2006). In addition, the first orally administered ACE inhibitory drug, captopril, also exhibits competitive ACE inhibition (Bhuyan and Mugesh, 2011). Moreover, ACE has been reported to show preference for competitive inhibitors that contain a hydrophobic amino acid at the third position from the C-terminal (Chel-Guerrero et al., 2012; Hong et al., 2008) and in this study, the identified peptide has hydrophobic isoleucine residue at the third position from C-terminal and concords with previous reports.

Energy analysis of purified peptide

The energy of the current and post processed conformers of the purified peptide was calculated to find the conformational stability. The current total energy was observed as 233685.17 kJ/mol, where the internal energies like the stretch energy between each peptide bond, bond energy, torsional, improper torsion (defined bond order), van der Waal energy, electrostatic energy and solvation energy were 616.62 kJ/mol, 271.72 kJ/mol, 372.83 kJ/mol, 5.95 kJ/mol, 233699.02 kJ/mol, -922.12 kJ/mol and -358.86 kJ/mol respectively. The total

energy of post minimization after 2500 steps of iterations with gradient descent method was -1131.67 kJ/mol. The values of other factors were: 31.43 kJ/mol stretch energy, 224.17 kJ/mol bend energy, 196.76 kJ/mol torsion energy, 4.06 kJ/mol improper torsion energy, -25.15 kJ/mol van der Waal energy, -1182.64 kJ/mol electrostatic energy and -380.30 kJ/mol solvation energy. A relative total energy of 232553.50 kJ/mol states that the relative stability was geometrically cleaned for peptide simulation.

Docking, bonding and energy profile of purified peptide with ACE protein

Schrodinger's Glide module calculates the bond energy (lipophilic bond energy and hydrogen bond energy) between the peptide and protein, ligand efficiency (solvent area) and complex model energy (van der Waal's energy, coulombs energy, rotational bond energy, internal energy). Based on the ranking (total number of poses) of the docking score, 9 poses of the purified peptide was within the feasible glide score. The total docking score of rank 1 peptide conformer was -11.91 kJ/mol. The lipophilic bond energy and hydrogen bond energy was found to be -1.28 kJ/mol and -1.02 kJ/mol respectively. Also, the van der Waal, Coulomb, rotational bond, internal and model energies was observed as -62.65 kJ/mol, -25.34 kJ/mol, 0.57 kJ/mol, 20.895 kJ/mol and -158.806 KJ/mol respectively. Total score of the complex, bond energy, and model energy depict the efficacy of the peptide in the surface solvent area and the energy it takes to occupy the area was -0.613 kJ/mol.

The docking score of purified peptide is within the limitations of Schrodinger's Glide module parameter setup. The purified peptide had a high binding affinity with the ACE protein. Hydrogen and Oxygen atom from peptide's Val 2, Ser 4, Leu 5 and Arg 8 formed bonds with hydrogen, nitrogen and oxygen atom from HID 353, Tyr 523, Glu 384, Arg 522, Asp 358 and Tyr 360 of ACE. A total of six hydrogen bonds were formed (Fig. 4). Bond 1 was flanked by protein N atom from HID 353 and peptide H atom from Arg 8 at a distance of

2.14 Å. Bond 2 was formed at a distance of 2.23 Å between protein O atom from Tyr 523 and peptide H atom from Arg 8. Bond 3 was formed between protein O atom from Glu 384 and peptide H atom from Arg 8 at a distance of 2.11 Å. A bond distance of 1.89 Å was observed between protein H atom from Arg 522 and peptide O atom from Val 2 as bond 4. Bond 5 was formed between protein H atom from Asp 358 and peptide O atom from Leu 5 with a bond distance of 2.15 Å. Bond 6 was at the distance of 2.03 Å between protein H atom from Tyr 360 and peptide O atom from Ser 4.

Research has shown that the inhibitor molecules combine with ACE protein through hydrogen, hydrophobic, van der Waals and electrostatic forces (Li et al., 2014). Among these forces, hydrogen bonds interaction force plays the most important role for stabilizing the docking complex and enzyme catalytic reactions (Chaudhary et al., 2009). The molecular docking of the novel peptide and ACE showed that the peptide interacts with the protein through six hydrogen bonds. ACE has three main active site pockets (S1, S2 and S1'). S1 pocket includes Ala354, Glu384, and Tyr523 residues, S2 pocket includes Gln281, His353, Lys511, His513 and Tyr520 residues and S1' contains Glu162 residue (Rohit et al., 2012). The Arg 8 residue of the peptide interacts with Tyr 523 and Glu 384 residues which are in the S1 pocket of ACE active site and this suggests a strong binding potential of the peptide on ACE.

Stability of peptide-ACE complex in biological system

The root mean square deviation (RMSD) analysis predicts the stability of the protein and its structural variation evolving with time. The RMSD of the protein-peptide complex for the trajectories written in the production run was analyzed to identify the stability of the system at each time interval. The observation of whole model system was categorized in two phases, I and II on availing saturation and stability point phase (Fig. 5). It was observed that the complex is stable between 0.1 ns to 5.9 ns and then the complex was observed to fluctuate

from the equilibrium with a minor deviation of 0.1 nm, thereafter the stability was obtained at 14.03 ns and the system attained equilibrium. On an average, the system was observed to be stable with RMSD of 6.1 nm. The system achieved equilibrium in early 10-15 ps initially and remained stable thereafter for 1.5 ns simulation period. The peptide complex stability showed that there is no major structural variation in ACE protein after its binding. The purified peptide was simulated in the protein's active site (Tyr, Arg, Glu, HID). The deviation of purified peptide was observed as 27.030 Å from a value of initial 8.24 Å. The deviation was taken from the initial and final trajectory of whole molecular dynamics with the system built for 20 ns in a water environment.

Computational investigation of ACE-peptide inhibition was organized by two approaches such as molecular docking and molecular simulation. Conformers of the purified peptide were stable at the junction of interaction and simulation process. The energy of both current and post processed peptide had inclined total energy to justify that the minimized peptide bear more conformational loop. Minimized and designed peptide interaction profile of ACE and peptide found a high binding efficiency to inhibit ACE. Molecular dynamic simulation acknowledged the good binding efficiency and inhibition profile of purified peptide. MD simulation analysis was done for intra ligand movement to find an internal motion that influences the total complex model system and it justifies maximum simulation inside the active site pocket without any change of surface amino acids conformation. This suggests a strong inhibition potential of the peptide on ACE.

Conclusion

Plants are a potential source for developing new peptide therapeutics against human pathophysiologies. The present study focused on the development of a peptide inhibitor of ACE protein from pigeon pea (*C.cajan*). In this study, a novel ACE-inhibitory octapeptide was identified and purified from pigeon pea by solid state fermentation with *A.niger*. The

peptide was purified by ultra-filtration and SEC using FPLC. The sequence of the peptide was identified as Val-Val-Ser-Leu-Ser-Ile-Pro-Arg and molecular mass was determined as 869.53 Da by nano LC-MS/MS. The analysis regarding the inhibition pattern of the inhibitor by Lineweaver-Burk plot showed competitive inhibition of ACE. Insights to the molecular docking and dynamics studies revealed a strong and stable interaction of the peptide with ACE. Since the peptide is derived from natural source, the side effects of the peptide when used as an anti-ACE drug will be trifling when compared to commercial anti-ACE drugs.

Conflict of interest

We wish to confirm that there are no known conflicts of interest associated with this publication and there has been no significant financial support for this work that could have influenced its outcome.

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Figure legends

Fig. 1. IC_{50} value of F70 fraction. The IC_{50} of the ACE inhibitory fraction (F70) was determined by using different concentrations of F70 in ACE assay. The IC_{50} was found to be 9 µg/ml**.**

Fig. 2. LC-MS spectrum of the peptide. The sequence and molecular mass of the peptide were identified.

Fig. 3. Inhibition pattern of the peptide. ACE inhibitory activity was determined in the absence and presence of different concentrations of the peptides (5, 15 and 25 µg/ml) at different concentrations (1 to 6 mM) of the substrate (HHL). Lineweaver-Burk plot was constructed using values of 1/V against 1/[S]. Each point represents the mean value of 3 independent experiments.

Fig. 4. Best-ranked docking pose of peptide binding with ACE. Purified peptide is shown in stick representation and ACE protein in ribbon representation. There are 6 bonds formed between peptide and protein shown with arrow marks.

Fig. 5. RMSD of peptide - ACE complex. RMSD in Å is plotted against the simulated time in ps. Total complex simulation was for 20 ns and 20000 trajectories.

Figures

Fig. 1

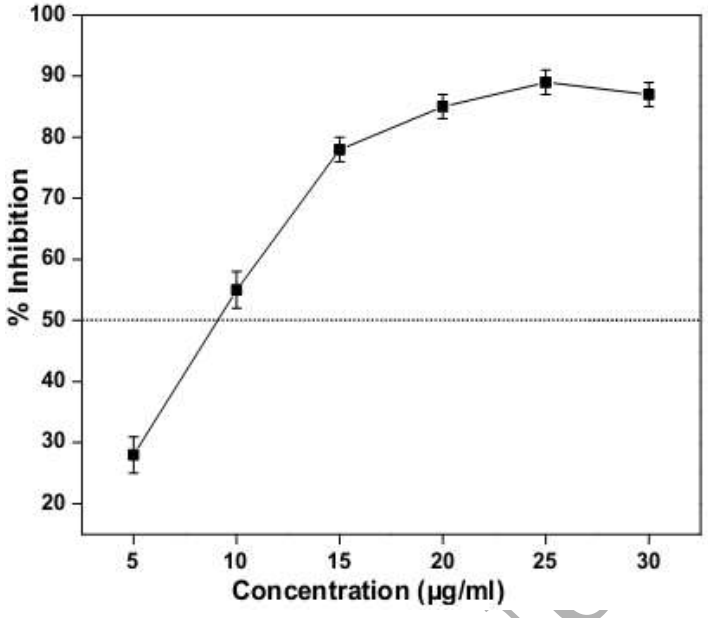


Fig. 2

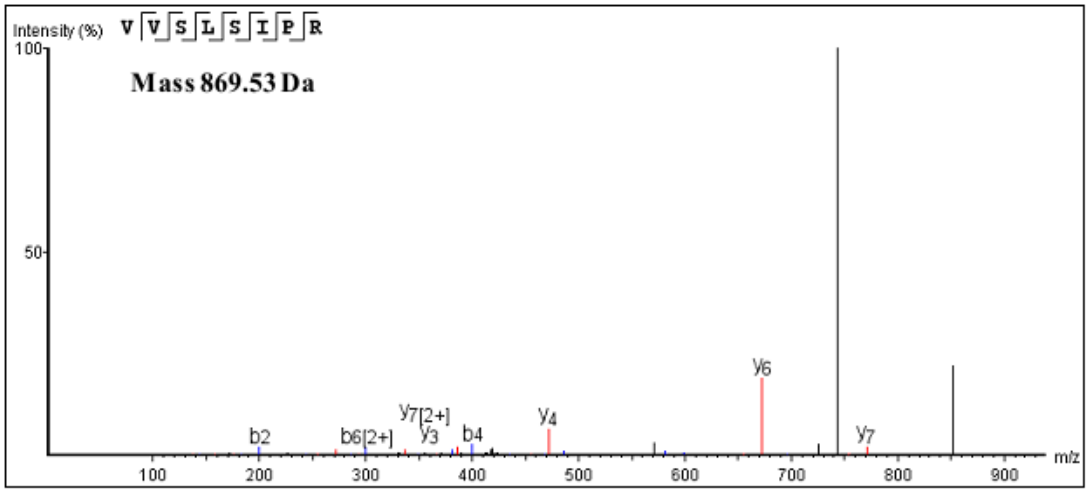
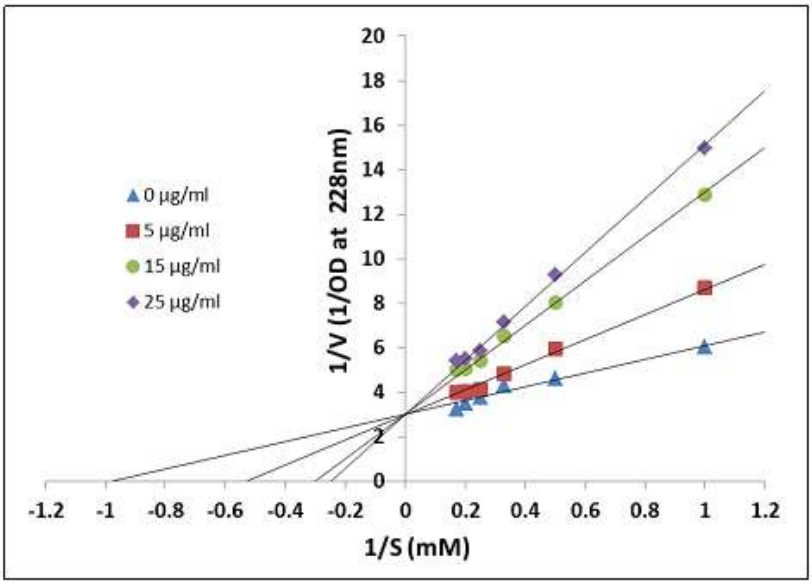


Fig. 3


0 µg/ml
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25 µg/ml
1/V (1/OD at 228nm)
1/S (mM)
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18
16
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12
10
8
6
4
2
0
-1.2
-1
-0.8
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Fig. 4

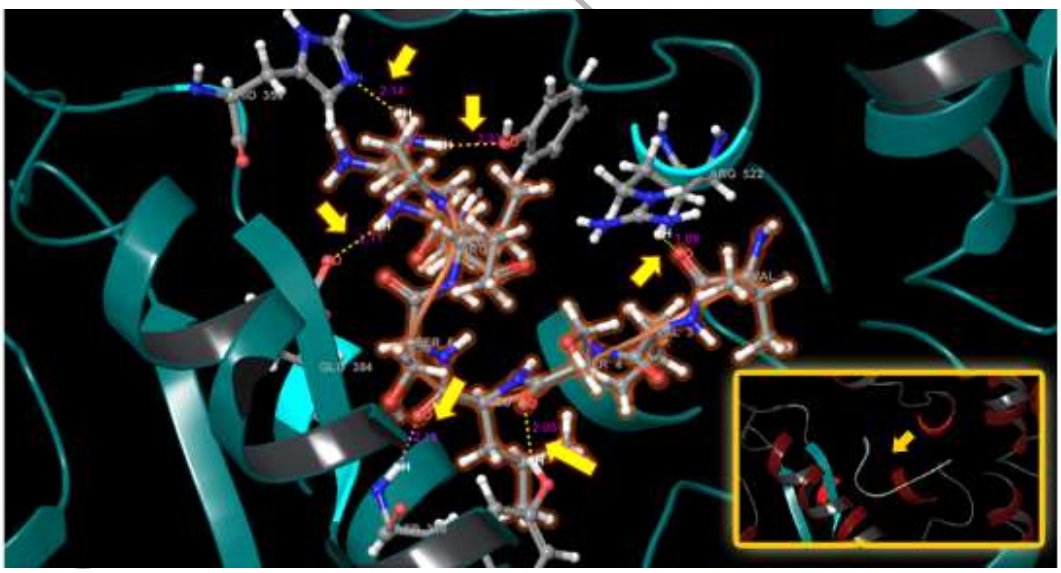


Fig 5

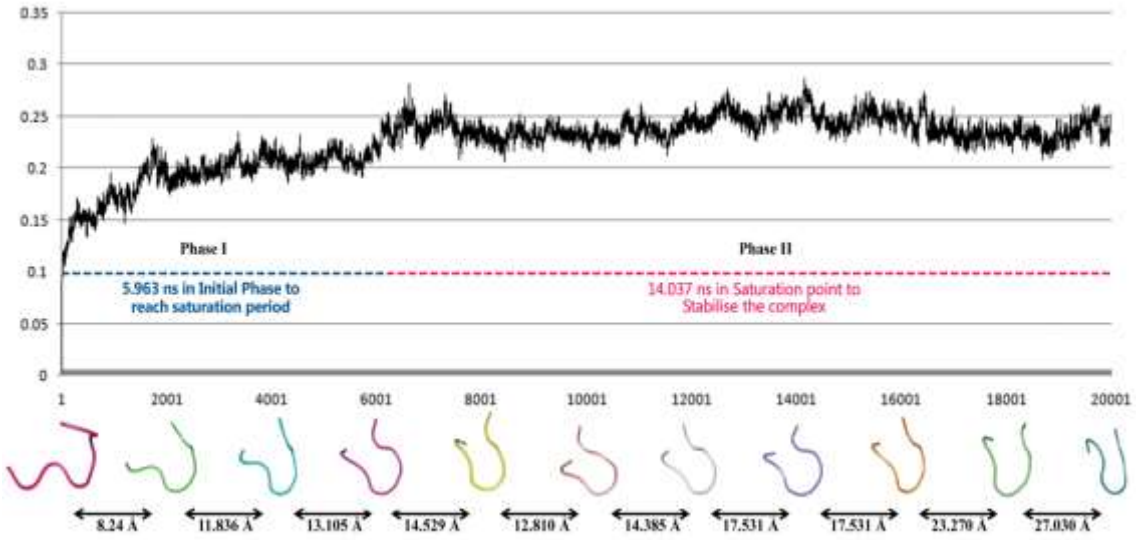
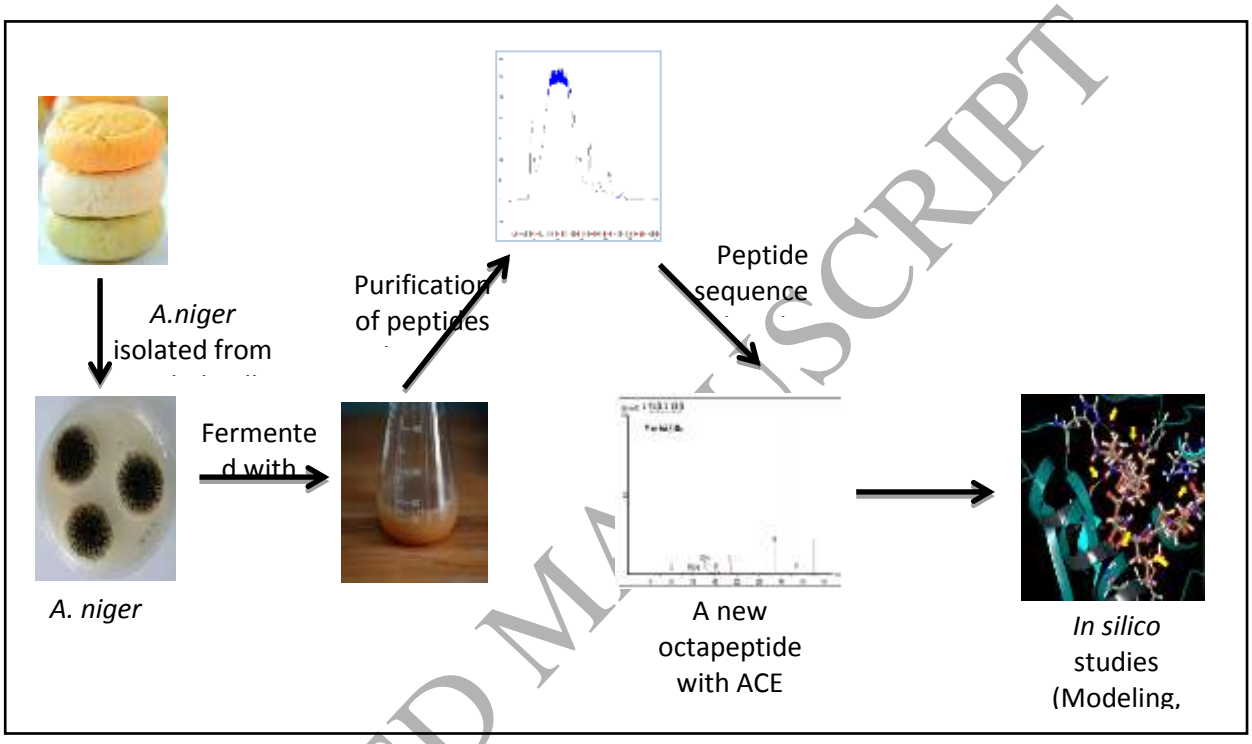


Table 1
Percentage of ACE inhibitory activity and protein content of the fractions

Fractions	Protein content	% ACE inhibition
Crude	32 ± 2 mg/ml	34 ± 4
UF	11 ± 3 mg/ml	51 ± 2
F70	0.72 ± 1 mg/ml	85 ± 2

ACE inhibitory activity of fractions was tested at 20 μg/ml protein and expressed as mean ± standard deviation (n = 3). Significant differences ($p < 0.05$) in the percentage of ACE inhibitory activity analysed by one-way ANOVA. F70 fraction was selected for further analysis.

Graphical Abstract



Software Effort Prediction - A Datamining Approach

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Author(s) Name: V. Gopinath, R. R. Menon | **Author(s) Affiliation:** Assistant Prof., Dept. of Comp. Science & Engg., Adi Shankara College of Engg. & Tech., India.

Abstract

Effective software project estimation is one of the most challenging and important activities in software development. Proper project planning and control is not possible without a sound and reliable estimate. As a whole, the software industry does not estimate projects well and does not use estimates appropriately. We suffer far more than we should as a result and we need to focus some effort on improving the situation. Effort estimation is important to minimize the cost of a software project. The existing situation may lead to serious consequences to the company as because of poor effort estimation a major percentage of the project turns out to be either more expensive than expected, late on deliver and many more issues. Not properly giving importance to the effort estimation task by under-staffing it, running the task of low quality deliverables and setting too short schedule resulting in loss of credibility as deadlines are missed always lead to problems. The current system available for effort estimation produces non-comprehensible results. Hence the purpose of this project is to produce a software system which produces a more accurate and comprehensible results using modern tools and make it easier for the project manager to easily identify the effort needed to complete a software project in terms size of project, cost etc. The various algorithm used are Support vector machine(SVM) which are best for both classification and regression and an Active Learning Based Approach (ALBA)for rule extraction from the output of SVM to produce a comprehensible output for rule.

Keywords: Classification, Datamining, Regression.

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IFRS: Impact on Indian banks

Dr. R Rupa

Associate Professor, SCMS School of Technology and Management, SCMS Campus, Prathap nagar, Muttom, Aluva, Cochin Kerala, India

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Keywords: international financial reporting standards, accounting standards, Indian banks

Introduction
Economic development of a country requires a sound financial reporting system sustained by good governance, clearly defined quality standards and established regulatory frame work. The Institute of Chartered Accountants of India (ICAI) is the formulating body of the accounting standards in our country. As we globalize, the significance of convergence increases with International Financial Reporting Standards (IFRS). In today's scenario of global business village India cannot afford to insulate itself from the developments and modifications taking place worldwide. These new set of accounting standards is more principles based as compared to the earlier standards that were basically a rule based. There are significant differences between the accounting treatments laid down in the existing Accounting Standards as against the treatments envisaged in the converged Indian Accounting Standards. These differences necessarily will have an impact on the depiction of profit and financial position of an enterprise.

IFRS are a set of accounting standards developed by the International Accounting Standards Board (IASB) that is becoming the global standard for the preparation of public company financial statements. IFRS is a refined system of financial reporting with improved corporate governance and increased free flow of capital across the globe which can be comparable across international boundaries.

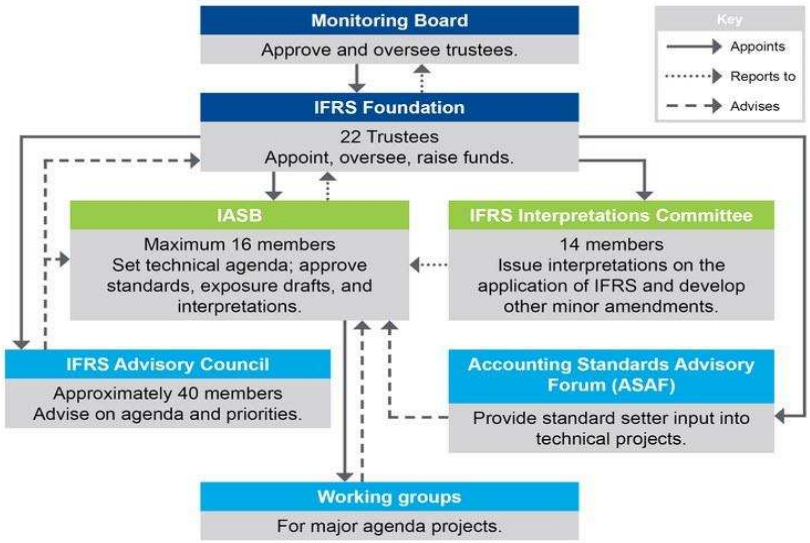
The goal of IFRS is to provide a global framework for how public companies prepare and disclose their financial statements. IFRS provides general guidance for the preparation of financial statements, rather than setting rules for industry-specific reporting. They are progressively replacing the many different national accounting standards.

Objective of the study
The objective of the present paper is

- To examine the structure, importance and advantages of IFRS in India;
- To study the process of convergence and how IFRS will affect the Indian banks

Research Methodology
The present study is descriptive work which covers the concept, importance and advantages, process of convergence, challenges and impact on Indian banks. This paper will provide an insight on the future prospects by following the convergence process. The data have been collected from purely secondary source like various websites and journals, as well as published books.

Who issues international financial reporting standards?
With the view of making the financial statements more reliable and transparent, the London based group namely the International Accounting Standards Committee (IASC), responsible for developing International Accounting Standards, was established in June, 1973. Between 1973-2001, the International Accounting Standards Committee (IASC) released International Accounting Standards. Between 1997 and 1999, the IASC restructured their organization, which resulted in formation of International Accounting Standards Board (IASB). These changes came into effect from 1st, April, 2001. The International Accounting Standards Board (IASB) is the independent, accounting standard-setting body of the IFRS Foundation. IASB publishes its standards in a series of pronouncements called International Financial Reporting Standards. The Foundation is governed by a board of 22 trustees.



By 2018, it is expected that all companies in major markets will be using IFRS. This requirement will affect about 7,000 enterprises, including their subsidiaries, equity investors and joint venture partners. The increased use of IFRS is not limited to public-company listing requirements or statutory reporting. Many lenders and regulatory and government bodies are looking to IFRS to fulfill local financial reporting obligations related to financing or licensing.

Approximately 120 nations and reporting jurisdictions permit or require IFRS for domestic listed companies, although approximately 90 countries have fully conformed to IFRS as promulgated by the IASB and include a statement acknowledging such conformity in audit reports.

Importance of IFRS

A strong need was felt by legislation to bring about uniformity, rationalization, comparability, transparency and adaptability in financial statements. The better way for getting rid of problems faced by different methods of standards is to have a single set of global standards, of the highest quality, set in the interest of public. The following are the major importance of International Financial Reporting Standards:

1. A business can present its financial statements on the same basis as its foreign competitors, making comparisons easier.
2. Companies with subsidiaries in countries that require or permit IFRS may be able to use one accounting language company-wide.
3. Companies may need to convert to IFRS if they are a subsidiary of a foreign company that must use IFRS, or if they have a foreign investor that must use IFRS.
4. Capital market regulators must be aware of only one set of accounting standards and the companies will experience efficiency in raising capital and reduced information processing cost.
5. The companies will no longer required to prepare its financial statement under different GAAP and make the task of listing shares in foreign exchange easier.

Advantages of the IFRS

a) The world's economies are becoming more integrated and having one accounting system will make life a little less complicated for both the companies and the investors.
b) As multinational businesses continue to grow and expand, a thorough knowledge of IFRS is now essential for internationally active, growing businesses.
c) There seems to be worldwide consensus surrounding the need for one global set of high-quality accounting standards and that IFRS is currently best positioned to fulfill that need.
d) In today's global economy the consistency of one reporting standard will make it more efficient for investors to research and compare financial statements globally and more effectively.
e) IFRS adoption leads to higher market liquidity, more investment flows through foreign mutual funds, and more favourable terms in private debt contracting, greater analyst coverage, and lower stock return synchronicity.

Process of convergence with IFRS in India

India has also mandate the IFRS for financial reporting statement from 1st April 2011 but still India have been not succeeded to resolve its issues relating to conversion with IFRS such as taxation. After enactment of Companies Act 2013 the ministry of corporate affairs has focused to implement IFRS.

Phase I 1st April 2016: Mandatory Basis

a) Companies listed/in process of listing on Stock
b) Exchanges in India or Outside India having net worth > INR 5 Billion
c) Unlisted Companies having net worth > INR 5 Billion
d) Parent, Subsidiary, Associate and Joint Venture of above

Phase II 1st April 2017: Mandatory Basis

a) All companies which are listed/or in process of listing inside or outside India on Stock Exchanges not covered in Phase I (other than companies listed on SME Exchanges)
b) Unlisted companies having net worth INR 5 Billion > INR 2.5 Billion
c) Parent, Subsidiary, Associate and Joint Venture of above

- Companies listed on SME exchange not required to apply Ind AS.
- Once Ind ASs are applicable, an entity shall be required to follow the Ind AS for all the subsequent financial statements.

- Companies not covered by the above roadmap shall continue to apply existing but the professionals are still having difference on how to get fair value of assets and liabilities. Therefore India needs to develop its conference regarding to IFRS convergence. Also need to develop some training programs for IFRS policies. For the purpose of successful conversion of IFRS with Indian Corporate, India needs to have efficient professionals to operate in this field. Apart from this, IFRS require the fair market value applications in financial reporting this may create significant differences in financial information currently presented in financial reports.

Problems and Challenges

India has several constraints and practical challenges to adoption and compliance with IFRS. So there is a need to change some laws and regulations governing financial accounting and reporting in India.

1. **Difference in GAAP and IFRS:** Adoption of IFRS means that the entire set of financial statements will be required to undergo a drastic change. The differences are wide and very deep routed. It would be a challenge to bring about awareness of IFRS and its impact among the users of financial statements.
2. **Training and Education:** Lack of training facilities and academic courses on IFRS will also pose challenge in India. There is a need to impart education and training on IFRS and its application.
3. **Legal Consideration:** Currently, the reporting requirements are governed by various regulators in India and their provisions override other laws. IFRS does not recognize such overriding laws. The regulatory and legal requirements in India will pose a challenge unless the same is been addressed by respective regulatory.
4. **Taxation effect:** IFRS convergence would affect most of the items in the financial statements and consequently the tax liabilities would also undergo a change. Thus the taxation laws should address the treatment of tax liabilities arising on convergence from Indian GAAP to IFRS.
5. **Fair value Measurement:** IFRS uses fair value as a measurement base for valuing most of the items of financial statements. The use of fair value accounting can bring a lot of instability and prejudice to the financial statements. It also involves a lot of hard work in arriving at the fair value and valuation experts have to be used.

Impact on Indian banks

Banks shall comply with Ind AS for financial statements for accounting periods beginning 1 April 2018, with comparatives for the periods ending 31 March 2018 or thereafter. Ind AS shall be applicable to both standalone financial statements and consolidated financial statements.

1. Banks shall apply Ind AS only as per the above timelines and shall not be permitted to adopt Ind AS earlier.
2. The boards of the banks should have the ultimate responsibility in determining the Ind AS direction and strategy and in overseeing the development and execution of the Ind AS implementation plan.
3. Banks are advised to set up a Steering Committee headed by an official of the rank of an executive director (or equivalent), comprising members from cross-functional areas of the bank to immediately initiate the implementation process.
4. The Audit Committee of the Board shall oversee the progress of the Ind AS implementation process and report to the Board at quarterly intervals.
5. Banks need to submit proforma Ind AS financial statements to the RBI from the half-year ended 30 September 2016 onwards.

The application of Ind AS is based on the listing status and net worth of a company. Ind AS will first apply to companies with a net worth equal to or exceeding 500 crore INR beginning 1 April 2016. Listed companies as well as others having a net worth equal to or exceeding 250 crore INR will follow 1 April 2017 onwards. From April 2015 companies impacted in the first phase will have to take a closer look at the details of the 39 new Ind AS currently notified. Ind AS will also apply to subsidiaries, joint ventures, associates as well as holding companies of the entities covered by the roadmap

Areas of impact

The Ind AS standards covers all aspects of financial statements. CRISIL believes the financial statements of a majority of companies it rates would be affected because of the following changes:

- Revenue recognition norms
- Changes in networth on account of fair valuation of instruments, property and acquired entities
- Treatment of intangible assets and goodwill
- Guidelines on consolidation of financial statements changes from the proportionate consolidation method for joint ventures to the equity method
- Changes in P&L on account of derivatives as well as foreign currency loan obligations
- Proposed dividend and deferred tax assets
- Employee based share payments
- Reclassification of actuarial gains and losses

Extent of impact

Though the above mentioned areas of accounting changes are likely to affect a majority of companies, the extent of impact will largely be driven by differences in reported net worth. A CRISIL study of 80 rated companies that have reported their first quarter results for the current fiscal as per Ind AS, shows only 8 of them have reported information on changes in Net worth as on March 31, 2016, under revised accounting standards. In 4 of these companies, the deviation in networth was 5% or more compared with Indian GAAP.

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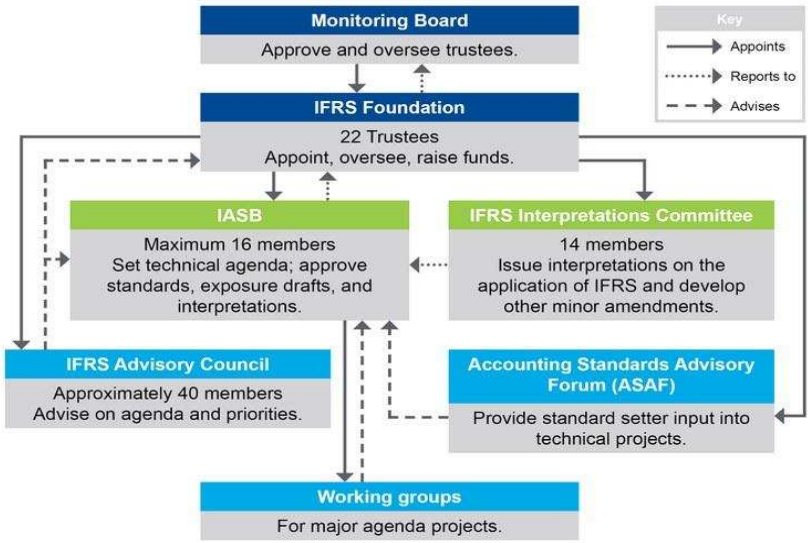

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Problems and Challenges

India has several constraints and practical challenges to adoption and compliance with IFRS. So there is a need to change some laws and regulations governing financial accounting and reporting in India.

1. **Difference in GAAP and IFRS:** Adoption of IFRS means that the entire set of financial statements will be required to undergo a drastic change. The differences are wide and very deep routed. It would be a challenge to bring about awareness of IFRS and its impact among the users of financial statements.
2. **Training and Education:** Lack of training facilities and academic courses on IFRS will also pose challenge in India. There is a need to impart education and training on IFRS and its application.
3. **Legal Consideration:** Currently, the reporting requirements are governed by various regulators in India and their provisions override other laws. IFRS does not recognize such overriding laws. The regulatory and legal requirements in India will pose a challenge unless the same is been addressed by respective regulatory.
4. **Taxation effect:** IFRS convergence would affect most of the items in the financial statements and consequently the tax liabilities would also undergo a change. Thus the taxation laws should address the treatment of tax liabilities arising on convergence from Indian GAAP to IFRS.
5. **Fair value Measurement:** IFRS uses fair value as a measurement base for valuing most of the items of financial statements. The use of fair value accounting can bring a lot of instability and prejudice to the financial statements. It also involves a lot of hard work in arriving at the fair value and valuation experts have to be used.

Impact on Indian banks

Banks shall comply with Ind AS for financial statements for accounting periods beginning 1 April 2018, with comparatives for the periods ending 31 March 2018 or thereafter. Ind AS shall be applicable to both standalone financial statements and consolidated financial statements.

1. Banks shall apply Ind AS only as per the above timelines and shall not be permitted to adopt Ind AS earlier.
2. The boards of the banks should have the ultimate responsibility in determining the Ind AS direction and strategy and in overseeing the development and execution of the Ind AS implementation plan.
3. Banks are advised to set up a Steering Committee headed by an official of the rank of an executive director (or equivalent), comprising members from cross-functional areas of the bank to immediately initiate the implementation process.
4. The Audit Committee of the Board shall oversee the progress of the Ind AS implementation process and report to the Board at quarterly intervals.
5. Banks need to submit proforma Ind AS financial statements to the RBI from the half-year ended 30 September 2016 onwards.

The application of Ind AS is based on the listing status and net worth of a company. Ind AS will first apply to companies with a net worth equal to or exceeding 500 crore INR beginning 1 April 2016. Listed companies as well as others having a net worth equal to or exceeding 250 crore INR will follow 1 April 2017 onwards. From April 2015 companies impacted in the first phase will have to take a closer look at the details of the 39 new Ind AS currently notified. Ind AS will also apply to subsidiaries, joint ventures, associates as well as holding companies of the entities covered by the roadmap

Areas of impact

The Ind AS standards covers all aspects of financial statements. CRISIL believes the financial statements of a majority of companies it rates would be affected because of the following changes:

- Revenue recognition norms
- Changes in networth on account of fair valuation of instruments, property and acquired entities
- Treatment of intangible assets and goodwill
- Guidelines on consolidation of financial statements changes from the proportionate consolidation method for joint ventures to the equity method
- Changes in P&L on account of derivatives as well as foreign currency loan obligations
- Proposed dividend and deferred tax assets
- Employee based share payments
- Reclassification of actuarial gains and losses

Extent of impact

Though the above mentioned areas of accounting changes are likely to affect a majority of companies, the extent of impact will largely be driven by differences in reported net worth. A CRISIL study of 80 rated companies that have reported their first quarter results for the current fiscal as per Ind AS, shows only 8 of them have reported information on changes in Net worth as on March 31, 2016, under revised accounting standards. In 4 of these companies, the deviation in networth was 5% or more compared with Indian GAAP.

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Motivations and Performance of Exhibitors: An Exploratory Study of a Destination Marketing Event

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Abstract

The tourism industry is going through challenging times. Innovative marketing tools are required to promote business for the firm and the destination. Trade shows have proved to be a successful destination promotion tool and is increasingly forming part of the marketing strategies in the tourism industry. The purpose of this empirical study is to identify the motivations and outcomes (trade show performance) of a destination trade show from the perspective of one of the main participants of a destination trade show i.e.exhibition attendees. Systematic sampling survey method was used during a destination trade show, Kerala Travel Mart, (KTM) 2012. Giving information on products emerged as the main motivation and developing and maintaining relationships as the second main motivation of exhibitors. Projecting an image of being a strong and solid company and fostering relationships are perceived as the most important outcomes for exhibitors. So it is evident that KTM has been a success as KTM has achieved one of the main motivations-building relationships. For quality of trade shows, quality of service and the competence of the organizers and staff were ranked the highest, followed by choice of venue. The managerial implications of these findings for destination managers, exhibition organizers and exhibitors are discussed in detail.

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PROGRESS OF MUDRA WITH SPECIAL REFERENCE TO TAMIL NADU

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ABSTRACT

Micro, small and medium enterprises is a vibrant, dynamic and fastest growing sector of Indian economy in complementary with the large industries. They are enormously contributing towards the socio-economic development of the country. The MSME sector contributes about 8% to GDP besides 45% to total manufacturing output, 40% to exports from country and provides employment to over 80 million people. In this background a need for a bank which exclusively supports the micro units was initiated and introduced which can support entrepreneurship and fulfill the financial needs of these units. MUDRA is an effort to 'fund the unfunded' like how microfinance has been to 'bank the unbanked'. The paper aims to understand the Mudra yojana and its significance; to examine the progress of Mudra and to analyse the pattern and amount of loans advanced to Tamil Nadu. To conclude this PMMY which is a good initiative from the part of government to encourage entrepreneurs is going to bring about a dramatic change in the MSME sector. If the partner institutions support this MUDRA yojana in same spirit as in the year 2015–16, MUDRA hopes to achieve higher target.

KEYWORDS: *MUDRA, Micro, small and medium enterprises, Small Business*

INTRODUCTION

Micro, small and medium enterprises is a vibrant, dynamic and fastest growing sector of Indian economy in complementary with the large industries. They are enormously contributing towards the socio-economic development of the country. The MSME sector contributes about 8% to GDP besides 45% to total manufacturing output, 40% to exports from country and provides employment to over 80 million people. The sector comprises of small manufacturing units, shopkeepers, fruits / vegetable vendors, truck & taxi operators, food-service units, repair shops, machine operators, small industries, artisans, food processors, street vendors and many others who are referred as Non Corporate Small Business sector. But constraints faced by these sectors are the low access to finance, Skill Development Gaps, Knowledge Gaps, Infrastructure Gaps and Lack of Market Development. This is due the reason many small industries are unregulated and informal and are not covered by the banking channels; since they do not maintain proper books of accounts and not formally covered under taxation also. Therefore, the banks find it difficult to lend to them. So they depend on friends and relatives or money lenders for the financial assistance. In this background a need for a bank which exclusively supports the micro units was initiated and introduced which can support entrepreneurship and fulfill the financial needs of these units. MUDRA has been formed with primary objective of developing the micro enterprise sector in the country by extending various supports like financial support in the form of refinance and entrepreneurial assistance. MUDRA is an effort to 'fund the unfunded' like how microfinance has been to 'bank the unbanked'.

OBJECTIVES

The objective of the study is

1. To understand the Mudra yojana and its significance
2. To examine the progress of Mudra
3. To analyse the pattern and amount of loans advanced to Tamil Nadu

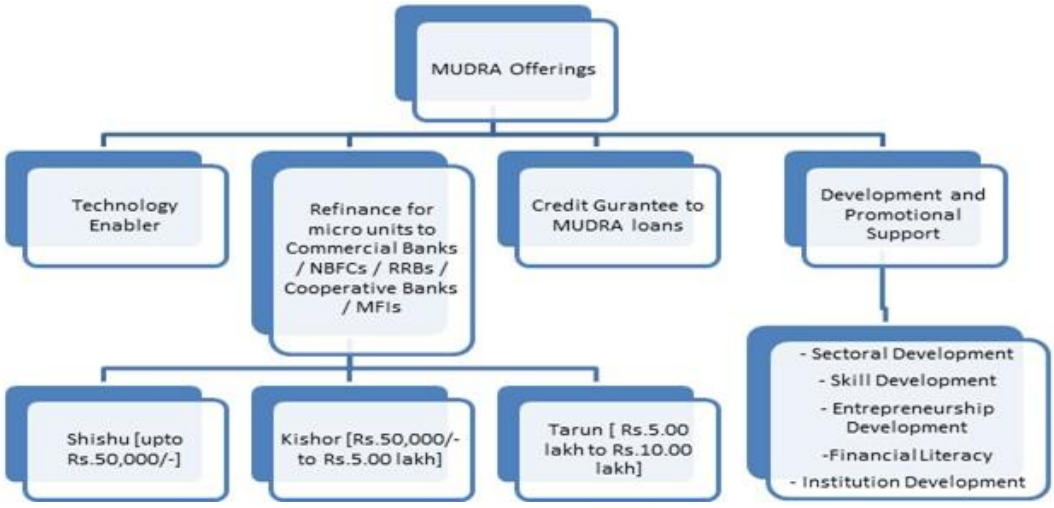
METHODOLOGY

The data have been collected from secondary sources like books, journals, magazines, websites and reports of Mudra bank. The data have been analysed using simple percentage.

OVERVIEW OF MUDRA

MUDRA, which stands for Micro Units Development & Refinance Agency Ltd, is a financial institution set up by Government of India for development and refinancing micro units' enterprises. The purpose of MUDRA is to provide funding to the non-corporate small business sector through various like Banks, NBFCs and MFIs. It has been registered as a Company in March 2015 under the Companies Act 2013 and as a Non-Banking Finance Institution with the RBI on 07 April 2015. It has been initially formed as a wholly owned subsidiary of Small Industries Development bank of India (SIDBI) with 100% capital being contributed by it. Presently, the authorized capital of MUDRA is 1000 crores and paid up capital is 750 crore, fully subscribed by SIDBI.

Offerings and Functions of MUDRA



Source: www.mudra.org.in

MUDRA's delivery channel is conceived to be through the route of refinance primarily to Banks/ NBFCs/MFIs and they are have been named 'Shishu', 'Kishor' and 'Tarun' to signify the stage of growth / development and funding needs of the beneficiary micro unit / entrepreneur and also to provide a reference point for the next phase of graduation / growth to look forward to. The funding support from MUDRA is of four types:

- Micro Credit Scheme (MCS) for loans up to Rs.1 lakh finance through MFIs. The mode of delivery through groups like SHGs/JLGs, the loans are given to the individuals for specific income generating micro enterprise activity. The MFIs for availing financial support need to enroll with MUDRA by complying with some of the requirements as notified by MUDRA, from time to time.
- Refinance Scheme for Commercial Banks / Regional Rural Banks (RRBs) / Scheduled Co-operative Banks. It is available for term loan and working capital loans, up to an amount of 10 lakh per unit. The eligible banks, which have enrolled with MUDRA by complying with the requirements as notified, can avail of refinance from MUDRA for the loan issued under Shishu, Kishor and Tarun categories.
- Women Enterprise programme to encourage women to take up entrepreneurship
- Securitization of loan portfolio - MUDRA also supports Banks / NBFCs / MFIs for raising funds for financing micro enterprises by participating in securitization of their loan assets against micro enterprise portfolio, by providing second loss default guarantee, for credit enhancement and also participating in investment of Pass Through Certificate (PTCs) either as Senior or Junior

The target clients of MUDRA are any Indian Citizen who has a business plan for a non-farm income

generating activity such as manufacturing, processing, trading or service sector whose credit need is less than 10 lakh can approach either a Bank, MFI or NBFC for availing of MUDRA loans under PMMY.

Scope of PMMY

Pradhan Mantri Mudra Yojana (PMMY) loans will be extended by all Public Sector Banks such as PSU banks, Regional Rural Banks (RRBs), Cooperative Banks, Private Sector Banks, Foreign Banks, Micro Finance Institutions and Non-Banking Finance Companies. All loans sanctioned on or after April 08, 2015 upto a loan size of 10 lakh for non-farm income generating activities will be branded as PMMY loans.

MUDRA Card

MUDRA Card is a debit card issued against the MUDRA loan account, for working capital portion of the loan. The borrower can make use of MUDRA Card in multiple withdrawal and credit, so as to manage the working capital limit in a most efficient manner and keep the interest burden minimum. MUDRA Card will also help in digitalization of MUDRA transactions and creating credit history for the borrower. National Payment Corporation of India (NPCI) has given RuPay branding to MUDRA Card and also separate BIN / IIN for the same, by which credit history can be tracked. MUDRA Card can be operated across the country for withdrawal of cash from any ATM / micro ATM and also make payment through any 'Point of Sale' machines.

PROGRESS OF MUDRA IN INDIA

Table 1 – Refinance under PMMY during 2015-16

Institutions	Amount sanctioned [Rs. in Crore]	Amount disbursed [Rs. in Crore]
RRB	239.25	239.25
Commercial banks	2432	2432
MFIs	812	616
Investment PTC (Securitisation)	49.96	49.96

It is understood from the above table that MUDRA has refinanced to RRBs, Commercial banks, MFIs and Investment PTC with Rs. 239.25, Rs 2432, Rs 812 and Rs 49.96 crores respectively. Of which the maximum refinance is to commercial banks followed by MFIs and RRBs. The amount sanctioned to MFIs has been found to be Rs.812 and the amount disbursed has been Rs.616 crores in the year 2015-16

Table 2 - Financing for New entrepreneurs under PMMY during 2015-16

Institutions	No. of accounts	%	Amount disbursed in crores	%
Public sector banks	38,22,226	30.66	35,463.13	60.20
Private sector banks	17,77,400	14.24	8,000.88	13.58
RRB	7,20,430	5.77	5,088.39	8.64
NBFC MFI	60,49,094	48.49	10,213.16	17.34
Non NBFC MFI	1,05,518	0.84	142.52	0.24
Total	**1,24,74,668**	**100.00**	**58,908.08**	**100.00**

It is evident from the above table that financing for new entrepreneurs in terms of number of accounts has been through the NBFC MFIs at 48.49% followed by public sector banks at 30.66% and then private sector banks at 14.24 %. Though the number of acocunts for financing new entrepreneurs has been through the NBFC MFIs the maximum amount disbursed has been through Public sector banks which stood at 60.20%.

Table 3 - Financing of Women under PMMY during 2015-16

Institutions	No. of accounts	%	Disbursement amount in crores	%
Public sector banks	14,75,907	5.34	10,352.09	16.39
Private sector banks	21,53,790	7.79	6,450.74	10.21
RRB	2,92,127	1.06	2,462.19	3.89
NBFC MFI	2,29,62,461	83.12	42,047.05	66.54
Non NBFC MFI	7,43,980	2.69	1,878.36	2.97
Total	**2,76,28,265**	**100.00**	**63190.43**	**100.00**

Table 3 indicates that the financing for women under PMMY during 2015-16 has been through the NBFC MFIs both in terms of number of accounts and amount disbursement at 83.12% and 66.54% respectively.

Table 4 - Disbursement to Minorities under PMMY during 2015-16

Institutions	No. of accounts	%	Disbursement Amount in crores	%
Public sector banks	4,98,634	12.19	5,313.69	39.18
Private sector banks	4,48,106	10.96	2,122.73	15.65
RRB	1,47,011	3.59	1,424.18	10.51
NBFC MFI	29,20,382	71.44	4,580.73	33.78
Non NBFC MFI	74,077	1.82	118.97	0.88
Total	**40,88,210**	**100.00**	**13,560.30**	**100.00**

Table 4 reveals the number of accounts by minorities under PMMY during 2015-16 has been mainly through NBFC MFIs at 71.11% and amount of disbursement to minorities has been maximum through public sector banks at 39.18%.

Table 5 - Target for the financial year 2016-17

Institutions	Target amount in crores
Public sector banks	77,700
Private sector banks	21,000
RRB	15,000
NBFC MFI	64,240
Non NBFC MFI	2,060
Total	**1,80,000**

The overall performance of the Yojana indicates that the target has been achieved during the year. As against the target of Rs.122188 crores in 2015-16, the Banks and MFIs together have disbursed Rs.132954.73 crores, thereby achieving 109%. The achievements by Public Sector Banks indicate a substantial credit growth in this segment. The other lending institutions have also achieved high credit growth in this segment due to the initiative of Pradhan Mantri MUDRA Yojana.

PROGRESS IN TAMIL NADU

Table 6 - Number of loans sanctioned under PMMY in Tamil Nadu

Loans	2015-16	%	2016-2017 (Progress as on 13/01/2017)
Shishu	45,06,237	94.24	30,94,132
Kishor	2,34,824	4.92	1,42,854
Tarun	40,506	0.84	14,371
Total	**47,81,567**	**100**	**32,51,357**

It is understood from the above table that the maximum loans have been sanctioned through Shishu (limit Rs.50,000) scheme at 94.24% which indicates many small units have been benefitted under the scheme followed by Kishore and Tarun. The number of loans sanctioned under Tarun scheme has been decreasing during the year 2016-17.

Table 7 - Amount of loan sanctioned under PMMY in Tamil Nadu

[Rs. in Crore]

Loans	2015-16	%	2016-2017 (Progress as on 13/01/2017)
Shishu	8252.46	52.07	6689.25
Kishor	4398.88	27.76	2274.60
Tarun	3194.80	20.17	1115.59
Total	**15846.14**	**100.00**	**10079.44**

It is understood from the above table that 52.07% of loan amount has been sanctioned under shishu scheme followed by kishor and Tarun at 27.26% and 20.17% respectively during 2015-16. The amount of loan sanctioned under PMMY in Tamil Nadu during the year 2016-17 has been showing a slight decrease when compared with that of 2015-16.

Table 8 - Amount of loans disbursed under PMMY in Tamil Nadu

[Rs. in Crore]

Loans	2015-16	%	2016-2017 (Progress as on 13/01/2017)
Shishu	8231.68	53.11	6677.62
Kishor	4282.07	27.64	2191.18
Tarun	2983.11	19.25	1074.83
Total	**15496.86**	**100.00**	**9943.63**

It is evident from the above table that the amount of loan disbursed to tamil nadu under PMMY during 2015-16 has been maximum through the shishu scheme and same in case during 2016-17.

FINDINGS AND CONCLUSION

Findings of the study are

1. It is found that the MFIs have contributed substantially to the number of accounts financed under the PMMY.
2. It is evident that out of 3.49 crore accounts financed during the year, 1.25 crore accounts were for new entrepreneurs, which work out to 36%.
3. MFIs contributed significantly for the financing women under PMMY.
4. It is understood that 2.76 crore women were funded out of the total number of 3.48 crore accounts, which is a whopping 79%.
5. It is found that the Banks and MFIs have been extending the maximum loans under PMMY for minorities as indicated that 40.88 lakh accounts were of minorities, which is nearly 12%.
6. It is evident that out of total sanction of loans under different scheme 13.7% has been to Tamil Nadu
7. The total number of card issued during the year 2015-16 was at 5.17 lakh for an amount of Rs.1476.96 cr.

CONCLUSION

To conclude this PMMY which is a good initiative from the part of government to encourage entrepreneurs and fund the unfunded is going to bring about a dramatic change in the MSME sector. Many initiatives has been taken by MUDRA to create awareness about loans for micro enterprises and to enhance the number of loans sanctioned - especially, those under *Shishu* category by organizing credit camps across the country. In 2016–17, the government has set a disbursement target of Rs.1,80,000 crore – an increase of 47.3 % over the target set for the year 2015–16 and 35.4% above the achievement. If the partner institutions support this MUDRA yojana in same spirit as in the year 2015–16, MUDRA hopes to achieve this target too.

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Role of Social Media in Crisis Communication in the Business Context: A Study With Indian Examples

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ROLE OF SOCIAL MEDIA IN CRISIS COMMUNICATION IN THE BUSINESS CONTEXT: A STUDY WITH INDIAN EXAMPLES

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ABSTRACT

The rise of social media has brought an increasingly open and transparent environment, where everyone can share thoughts and opinions with other people. This new world creates new opportunities and challenges in many fields. One of these is in the field of crisis management and crisis communication in particular. This paper explores the role of social media during crisis in the business context by citing examples from Indian companies. It tries to highlight the changes in crisis communications and in particular how social media can be a beneficial tool. The paper also tries to find what is important for companies concerning crisis management. This resulted in findings that companies need to monitor social media, need to be quick in replying and to reply in a human, non-corporate voice. It is well important to have a crisis plan and a crisis response team which is also responsible for crisis management and communication in social media.

KEYWORDS

crisis communication, crisis management, social media.

INTRODUCTION

In the era of wide media coverage and increase in the amount of people's sensitivity to public issues, every company employee has to know how to communicate during crisis situations. A crisis can be simply defined as a situation which has undesirable effects on an organization. Crisis communication is the communication between an organization and the public during, after or before the critical event (Fearn-Banks, 2007). Having an effective crisis communication system is important for effective management because at the time of a crisis, information resources may not be easily available, there will be a pressure to respond to the situation and every stakeholder will demand an answer. With the widespread usage of social media by individuals as well as organizations, at the outset of a crisis you are more vulnerable to questions from every possible corner through social media. Due to high stress levels during crisis situations people tend to get incorrect and contradictory information.

This paper focuses on the role of social media in crisis communication with special reference to crisis situations in business. The researcher tries to reach at findings regarding good and bad practices of crisis communication through social media.

RESEARCH METHODOLOGY

The study is conceptual in nature and is completely based on the secondary data and the observations of the researcher. The researcher has tried to focus on the concept of utilizing social media for crisis communication and has tried to compile examples of the same in the Indian context.

CRISIS MANAGEMENT AND CRISIS COMMUNICATION

Crisis can come in different shapes. It could for instance be an accident, a scandal of some kind, or a product safety incident. More specifically crisis can take the form of a bribery scandal, a hostile takeover, a product recall, mean rumors, or an environmental spill, and so forth. Crisis management is broadly defined as an organization's pre-established activities and guidelines for preparing and responding to significant catastrophic events or incidents (i.e., fires, earthquakes, severe storms, workplace violence, kidnappings, bomb threats, acts of terrorism, etc.) in a safe and effective manner. If an organization prepares for the 'worst-case scenario', then it can handle other situations as well. To go deeper regarding the effectiveness in crisis management means to understand if operations can continue to run at an acceptable level, or if they can be quickly taken up again.

Crisis communication is important for an organization because it helps to improve the brand image of the company after a crisis situation, gain the trust of the customers, get support from employees, sustain and grow in the industry after the crisis and to avoid misconceptions and misunderstandings.

SOCIAL MEDIA AND CRISIS COMMUNICATION

The importance of crisis communication is much higher than ever because of the amount of information available to the people on the Internet (Gonzales & Smith, 2008). As news spreads quickly on the web and social media, organizations are at a potential risk because it has become hard for them to hide potential bad news. During crisis it is important for organizations to communicate their values and identities in order to stand out and differentiate themselves from competitors. It also helps to have a credible relationship with stakeholders.

HOW TO EFFECTIVELY COMMUNICATE THROUGH SOCIAL MEDIA IN CRISIS SITUATIONS

1. Apologize - The public does not expect individuals or organizations to be perfect, but they do expect them to regret their errors. Apology is the first step toward forgiveness. Be swift and sincere.
2. Take responsibility - Acknowledgement of wrongdoing is essential for the public to hear, but it has legal consequences. Corporate attorneys will advise against admitting responsibility.
3. Pay to fix it - Mistakes are costly, but nothing is more expensive to an organization than losing its good standing in the eye of the public. Honorable organizations do not hesitate to recall a potentially dangerous product, or initiate a clean-up. Willingly paying to rectify errors helps avoid subsequent lawsuits and loss of public trust.
4. Take steps to ensure it will not happen again - There will be no going back to 'business as usual' in the aftermath of a crisis. To diffuse the negativity, let the public know how the organization feels about what has happened, and what actions it is taking to remedy the cause.
5. Be the first to break the bad news - The story will come out. If others tell it first you will be accused of a cover-up.
6. Put people ahead of everything else - As an example of what not to do, recall the first public statement from the chairman of Union Carbide after the Bhopal tragedy: 'I would just like to reassure the shareholders...' Be prepared to demonstrate human concern or you will be charged with inhumanity and irresponsibility.
7. Highest-ranking members of the organization must appear and respond early - It is crucial in crisis recovery for the public to see the CEO take personal charge of the aftermath.
8. Provide frequent updates - The media will fill any information void with whatever they can find.
9. Supply background information - The media will appreciate photos, diagrams, descriptions of any chemicals involved, and basic information about the company and employees, it will help them get the story right, and they will know that your organization wants to cooperate and communicate
10. Never, ever mislead or lie to the public - answer 'no comment'.

EXAMPLES OF CRISIS COMMUNICATION THROUGH SOCIAL MEDIA IN THE INDIAN CONTEXT

1. FLIPKART AND THE BIG BILLION SALE

E -commerce giant Flipkart's biggest marketing initiative 'The Big Billion Day Sale' on October 6, 2014, offering huge discounts and aggressively promoted for several days, turned out to be a huge disappointment for the rush of online shoppers as products were not available, servers crashed and social media was filled with stories of dropped orders of 'Flopkart'. Customers were not able to cash in on the promised shopping bonanza despite spending a lot of time trying to place orders.

Flipkart co–founders Sachin Bansal and Binny Bansal who claimed to have created e-commerce history with sales of US $ 100 million in 10 hours, were quick to send an email apology to every customer the very next day, accepting that the customer experience was less than pleasant and that Flipkart did not live up to the promise it made. They claimed responsibility, apologized and promised to work on the issues and regain its reputation for customer service excellence. It was a quick, credible action from top management.

Soon thereafter, Flipkart began strengthening its quality assurance team and improving its organizational structure. It also began working with companies providing cloud-based technology solutions to handle the massive traffic increases on days of big sales. The Big Billion Sale has continued every year and the company did not have to face a crisis of the same magnitude in the later years.

2. ALLEN SOLLY, MADURA FASHION AND LIFESTYLE, ADITYA BIRLA NUVO LTD.

Allen Solly is Madura Fashion's professional dressing brand, competing with Blackberry and Van Heusen. It provides trendy, youth-centric quality professional wear. Due to its brand positioning, the company maintains a very active social media presence as well.

When B.G. Mahesh, Managing Director of Oneindia spotted a typo- 'Comming Soon', on an Allen Solly hoarding in a mall at Bangalore, he immediately tweeted a picture to his 10 000 followers online. Allen Solly reacted quickly and thanked him for bringing this error to their notice. But the company wasn't done.

Two days later, Allen Solly came up with an innovative, humble and humorous apology for Mr. Mahesh. In a tweet, with him tagged, the company posted a picture of a ruled school notebook saying, 'We will not spell Coming Soon as Comming Soon.' By bringing in a humble apology everyone could relate to, they owned up to their mistake, and even added a funny twist to it. This social media move caught so many eyeballs that Twitter India added this conversation to their deck as a case study.

3. SNAPDEAL AND HINDUSTAN UNILEVER LTD.

In November 2014, Lakshminarayan Krishnamurthy, a Mumbai resident, ordered a Samsung Core Duos phone as a Diwali gift from Snapdeal. What he received was a Samsung package with a bar of Vim soap and half a brick. When he couldn't contact the online shopping platform's customer service, he decided to get on to social media and posted a picture of his delivery. Krishnamurthy's post soon went viral on Facebook with more than 20,000 users slamming Snapdeal for defrauding a customer. Snapdeal got in touch with Krishnamurthy, explained that the problem had resulted from a fault with an external courier company, apologized and refunded the amount he had paid.

Hindustan Unilever, which had at that time recently started investing in its digital media team to cut down advertising costs, stepped in and stepped up. The company sent Krishnamurthy a package that contained the phone he had originally ordered, two bottles of Vim liquid soap and a letter. In one shot, the company empathized with Krishnamurthy and grabbed an excellent opportunity to promote Vim.

In a letter to Krishnamurthy, Vim noted, 'The pictures you posted online show that our brand was used in this incident. Vim is one of our iconic brands with some great consumer franchise. We felt bad about it, not to mention what you went through. Here is a small gesture from our side to cheer you up.'

4. AIR INDIA

Air India's response to a viral video which shows its insensitivity to customers highlights the brand's pathetic online reputation management. The national carrier was taken by surprise when a video showing a passenger, due to give her exam the following day, pleading with Air India staffers as they refuse to allow her to board the flight as she was five minutes late, had gone viral. The passenger who arrived at the T2 International Terminal of the Chhatrapati Shivaji International Airport (CSIA) for a Mumbai-Delhi flight was seen justifying her reason for late check-in by saying that 'they had received wrong information from a travel website's message'.

The video was uploaded on Valentine's Day by another passenger Shivendra Namdeo. It being a weekend and with fans busy supporting India-Pakistan World Cup cricket match, the video started gaining attention only at the start of the week. Initially picked up by online portals, later the video became a talking point on almost every portal. In few days the video fetched more than 1.3 Million views on Facebook, Namdeo's Facebook post has been shared more than 50,000 times. To battle the negative sentiments on social media, Air India posted two tweets about the video on the 17th stating that it is distressed at the video that shows its staff in poor light and that the matter is being examined. However, the carrier had no response for the customer grievance.

5. UNILEVER AND KODAIKANAL MERCURY TOXIC WASTE ISSUE

A response from Unilever came after social media users bombarded Unilever's communication channels, questioning them on its alleged failure to clean up mercury contamination in Kodaikanal, an issue which is dated to 15 years ago. They alleged that company had dumped its industrial waste contaminated with mercury on the land behind its factory and had not taken responsibility for the damages caused. A social media campaign against the company achieved momentum after Chennai-born rapper Sofia Ashraf's song 'Kodaikanal won't', which took on the company, went viral on the internet. Four days after the rap song that took a swipe at Unilever for its failure to curb mercury poisoning in Kodaikanal became a social media hit, the company responded to the concerns about its former factory.

In a press release published on its website, Unilever said that it 'continues to take the issue very seriously and it's one we are keen to see resolved'. Listing several 'expert studies' that have been conducted since the factory's closure, Unilever claimed that its 'former employees did not suffer ill-health due to the nature of their work'. The company assured that it will 'continue to act in a transparent and responsible manner regarding this matter' and have asked all the NGOs, employee representatives and legal representatives to come together and agree on an outcome.

CONCLUSION

Companies need to monitor social media, to be able to respond quickly to any upcoming crisis. It is important that this response is adapted, to the channel, meaning that it should not be the same message as given to, for example, traditional media in a press release. The response should also be given in a friendly and human way. In social media people want to get a human response and not hear a corporate voice. A crisis plan, crisis response team and a main responsible for crisis management in social media are important parts for successful crisis management and crisis communication. The companies have to learn how to listen across platforms for issues and what their customers truly want. The responses should be directed from the top management. A company culture has to be created that leads to successful resolution of crisis through social media.

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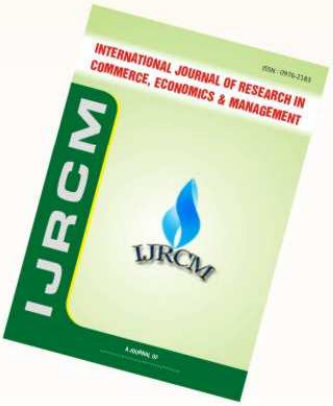

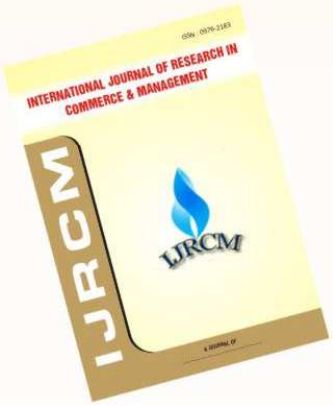

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IMPACT OF MANAGEMENT EDUCATION ON SKILL DEVELOPMENT: A STUDY OF ALUMNI OF MANAGEMENT INSTITUTES IN KERALA STATE

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Abstract
Management education in India gained demand with the opening of the economy in 1991. Many institutes and colleges have come up since then to offer Post Graduate courses like Master of Business Administration (MBA) and Post Graduate Diploma in Management (PGDM) to the students.

There is a widely prevalent perception among all stake holders that the quality of management education has been suffering, with only about 10% the B-School graduates employable, which in turn has been attributed to the lack of employability skills among the B- school graduates. The study identified the key dimensions of employability skills perceived to be beneficial through a survey of Alumni from the Kerala based management institutes.

The set of higher education skills expected of management graduates, as per the Framework for Higher Education Qualification (FHEQ) in UK was combined with employability skills propounded by other researchers and assessed with 28 qualification descriptors under six dimensions for employability skills.

Of the six dimensions of employability skills, the confirmatory factor analysis revealed that 30.5% variance in employability skills were explained by the Basic skills, 13% by the Knowledge/higher level understanding and over 9 % by the personal and interpersonal skills. Other factors - Managerial qualities, Analytical skills and Entrépreneurial skills - explained 4 to 6 % of the variances each. Together the above six factors explained for 67.8 % of the variance , which is quite significant.

Key Words: Qualification Descriptor, Employability Skills, Frame Work for Higher Education (FHEQ), Accreditation, Quality Accreditation Agency (QAA).

INTRODUCTION

Management education in India gained demand with the opening of the economy in 1991. Many institutes and colleges have come up since then to offer Post Graduate courses like Master of Business Administration (MBA) and Post Graduate Diploma in Management (PGDM) to the students. Presently, apart from 13 IIM's, there are about 3500 B-Schools in the country offering different management courses to over 5,00,000 students (ASSOCHAM,2013). There are 86 full time management institutes in Kerala with student admission capacity of over 8000 annually. Of these. 77 colleges which offer MBA are affiliated to one of the four universities viz Kerala, Mahatma Gandhi, Calicut and Kannur Universities approved by UGC. Nine other autonomous institutes offer PGDM programmes, which have been approved by the All India Council for Technical Education (AICTE), New Delhi.

Whereas the MBA courses follow the guidelines of the respective affiliated universities, the PGDM courses have the flexibility to decide their own curriculum and course content in tune with industry requirements and their strategic goals.

In addition to regular full time courses, there are a few part time as well as online distance education courses by various Institutes/ Universities available for students in Kerala. However, the scope of this research has been restricted to only regular full time courses conducted by institutes approved by either the Universities in Kerala or AICTE.

OBJECTIVES OF MANAGEMENT EDUCATION

As defined by Quality Assurance Agency (QAA), the independent body entrusted with monitoring and advising on standards and quality in higher education in United Kingdom, "The overall objective of master's level business and management degrees is to educate individuals as managers and business specialists, and thus to improve the quality of management".

There is a widely prevalent perception among all stake holders that the quality of management education has been suffering, with the proliferation of institutes across India (Abraham,2013) . As per the research report of ASSOCHAM only 10% the B-School graduates are employable. This has been attributed to the lack of employability skills among the B- school graduates (Kasetwar, R. B, 2013, ASSOCHAM, 2013). The literature review reveals that there are a host of issues – structural, strategic and systemic - that leads to lack of employable skills among the management graduates. The variables like the lack of adequate infrastructure, support services, academic processes as well as proper policy frame work and

lack of proper academic benchmark standards are some of the reasons cited as contributing to the lack of employable skills among the graduates (Kasetwar R.B,2013, Abraham,2013).

OBJECTIVES OF THE STUDY

The major aims of this study, undertaken as part of the doctoral research work of the authors, have been:

1. To explore the prevailing practices in management education and understand the expectations on the employability skills imparted through management education.
2. To identify the key dimensions of employability skills imparted through management education as perceived by the B-school graduates from the Kerala based management institutes.

RESEARCH METHODOLOGY

The study was carried through a two stage process:

1) In the first stage a qualitative research study was undertaken with a view to make an investigation of the field of higher education, more specifically the management education, both in the Indian and global context. This was sought to be achieved through a review of the literature on the status of higher education, drawing in the views of experts directly as well as through their publications and critically dissecting the dimensions of skill development in the sphere of management education. This part of the study was intended to bring forth various suggestions and possibilities for improving the skills imparted through management education. Extensive review of literature revealed the following:

a) Skill development has been a matter of great concern in UK, Australia and other European countries as well. The QAA have identified the set of higher education skills expected to be realized within the ambit of the Framework for Higher Education Qualification (FHEQ) in UK. It was thought appropriate that the model skills in the FHEQ, adapted for the Indian conditions, could be the starting point for this study on the impact of skill development through management education.

b) Various research scholars abroad have also done extensive studies and published articles on the employability aspect in higher education in UK. Mantz Yorke and Peter Knight (2003) in their article on 'Embedding employability into the curriculum' have identified cerain skills-basic (core), analytical (process) and personal and interpersonal - to be embedded in the curriculum to develop the employability among the graduates. The same has also been incorporated for assessment in this research study.

2) In the second stage, a descriptive research was carried out to make an assessment of the impact of management education on skill development through a perceptional survey of Alumni using a structured questionnaire encompassing the skills as shown in Figure 1 below.

Table - 1

List of skills		
Sl. No	Skill Name : with details	Abbreviation
1.	Listening: focused attention in which key points are recognized.	bs1
2.	Written communication: clear reports, letters etc. written specifically for the reader.	bs2
3.	Oral presentations: clear and confident presentation of information to a group.	bs3
4.	Ethical sensitivity: appreciates ethical aspects of employment and acts accordingly.	bs4
5.	Commercial awareness: operating with an understanding of business issues and priorities.	bs5
6.	Self confidence: confidence in dealing with the challenges that employment and life throw up.	bs6
7.	Self awareness: awareness of own strengths and weaknesses, aims and values.	bs8
8.	Emotional intelligence: sensitivity to others' emotions and the effects that they can have.	bs9

9.	Malleable self theory: belief that attributes [e.g. intelligence] are not fixed and can be developed.	pis1
10.	Resolving conflict: both intra personally and in relationships with others.	pis2
11.	Team work: can work constructively with others on a common task.	pis3
12.	Stress tolerance: ability to retain effectiveness under pressure.	pis4
13.	Influencing: convincing others of the validity of one's point of view.	as1
14.	Ability to work cross culturally: both within and beyond the country.	as2
15.	Computer literacy: ability to use a range of software.	as3
16.	Systematic understanding of knowledge about organisations, their external context and how they are managed.	hes1
17.	Critical awareness of current issues in business and management informed by latest research and field practices.	hes2
18.	Comprehensive understanding of techniques applicable to the investigation into the relevant business and management issues.	hes3
19.	Originality in the application of knowledge.	hes4
20.	Critical evaluation of current research and advanced scholarship in the discipline and propose hypothesis when necessary.	hes5
21.	Conduct research into business and management issues that requires familiarity with a range of business data, research sources and appropriate mthodologies.	mq1
22.	Deal with complex issues in a creative manner and make sound judgments in the absence of complete data.	mq2
23.	Communicate the conclusions/decisions clearly to specialist and non specialist audiences.	mq3
24.	Exercise initiative and take personal responsibility in professional work.	mq4
25.	Demonstrate self direction and act autonomously in handling situations.	es1
26.	Make decisions in complex and unpredictable situations.	es2
27.	Learn independently for continuing professional development and advance knowledge,understanding and skills to a higher level.	es3
Factor list: bs- basic skills, pis- personal & interpersonal skills, as-analytical skills, hes-higher skills (knowledge/understanding), mq-managerial qualities, es- entrepreneurial skills.		

THE SAMPLING DESIGN

The sampling frame consisted of the alumni of the management institutes, in Kerala, which have a standing of at least 5 years in the state - which means that at least three batches of students would have passed out from the institute. The sample size arrived theoretically was 381, considering an Alumni population of 32000 (ie 6400 seats* 5 batches) with a confidence level of 95% with 5% margin of error, against which 385 valid random samples were collected and analysed.

ANALYSIS: METHODS AND TOOLS

The study was used to understand the impact of management education on skill development in terms of the benefits perceived by the Alumni. Data was collected through a validated questionnaire which measured the perception of the variables under study. The generated response sheet was scrutinized to eliminate all possible errors using Microsoft Excel. The responses were analyzed using frequency test for detecting missing values. Standardized scores of the responses were

taken to identify outliers and any values with a z-score outside ±4 was considered as an outlier and eliminated. As many statistical methods require the normal distribution of the data, normality was checked using skewness and kurtosis for every variable separately. The final data set containing 385 responses were used to test the proposed hypothesis using appropriate statistical tools in SPSS and Structural Equation Modeling.

The hypotheses were tested using Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), One-Way Anova and T-Test. The sample was checked for the various assumptions required by the hypotheses testing methods. Durbin-Watson statistic was used to test for independence of observations; Runs test was used to examine the randomness of sample and Levene's test was used to confirm the equal variances of groups used for One-Way Anova and T-Test. For testing sample adequacy, KMO test was used. Bartlett's test of sphericity was used to reject the existence of an identity matrix in terms of inter-correlation between the items tested. The reliability of a reflective construct was checked using Cronbach's Alpha ( ) test .The validity was tested based on the literature review and theoretical foundation of the research.

RESULT OF DATA ANALYSIS

Descriptive statistics of the respondents showed that 60.3% of the responses were from male students and rest from the female students. Based on the universities, 48.8% of the responses were from students doing their management studies from Mahatma Gandhi University, 22.9% from Calicut University, 6.2% from Kerala University and the rest 22.1% from the Deemed University. Thus we can say that 79.9% of the respondents have undergone MBA and 22.1% did their PGDM course.The analysis started with an exploratory factor analysis to identify the dimension structure of the 'Perceived Employability Skill' construct. The Kaiser-Meyer-Olkin measure of Sampling adequacy was 0.895 and Bartlett's test of sphericity was significant ($p<0.001$) with a chi square value of 0.65 with 378 degrees of freedom confirming the goodness of data for further analysis. The exploratory maximum likelihood factor analysis identified the 6 components with Eigen value greater than 1, together explained over variance of 67.83 percent.

The factor structure developed from EFA has got adequate loading for each factor with minimum chance for cross loading. The 28 items could be classified into 6 factors in alignment with the pre conceptualized pattern. The six factors were Basic skills with 9 items, Personal & interpersonal skills with 4 items, Analytical skills with 3 items, Higher level knowledge/understanding with 5 items, Managerial qualities with 4 items and entrepreneurial skills with 3 items (as given in figure1)

Exploratory Factor Analysis for Employability Skill

EFA was conducted to verify whether the initial conceptualization of 6 factor structure is perceived in a similar manner by the respondents. A total of 52 items identified from the preliminary study was later on scrutinized on the basis of theoretical grounds as suggested by experts was shortlisted to 28 items and subjected to EFA analysis.

Figure 2

Total variance explained

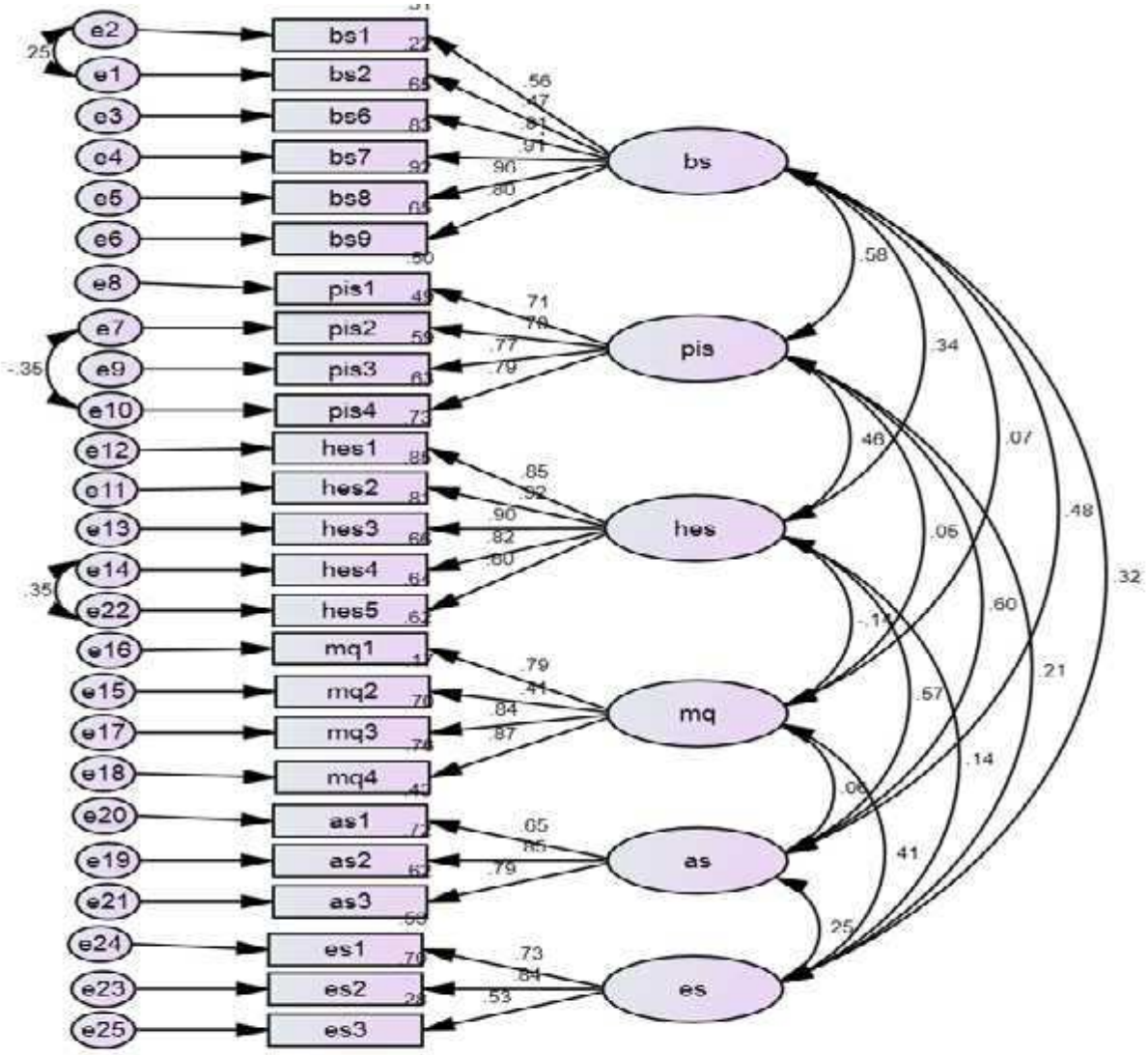
No	Factor component	Initial Eigen Values			Extraction Sums of squared Loadings			Rotation sums of squared Loadings		
		Total	% of variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	Basic skill	8.540	30.501	30.501	8.540	30.501	30.501	5.199	18.588	18.588
2	HigherEducation Knowlege/ Understanding	3.630	12.964.	43.455	3.630	12.964	43.465	4.244	15.155	33.724
3	Personal & Interpersonal skills	2.620	9.358	52.823	2.620	9.358	52.823	2.802	10.007	43.731
4	Managerial qualities	1.632	5.828	58.651	1.632	5.828	58.651	2.664	9.513	53.243
5	Analytical skills	1.340	4.785	63.436	1.340	4.785	63.436	2.045	7.304	60.548
6	Entrepreneurial skills	1.231	4.396	67.832	1.231	4.396	67.832	2.039	7.284	67.832

Extraction Method: Principal Component Analysis , Source: Research data

Once the EFA was done to reveal a factor structure, it was confirmed using a confirmatory factor analysis to determine the ability of predefined model to fit an observed set of data. CFA for the employability skill construct required validation of each measurement model from EFA followed by validation of structural model with all factors.

CFA for Employability Skill

The measurement model for basic skill dimension was validated to a better fitting model with recommended indices by eliminating three items 'bs3', 'bs4' and 'bs5' which showed a high level of cross loading. The measurement models for the rest 5 dimensions were showing a good fitting model with recommended indices in the first estimates itself. The structural model for employability skill construct showed that there exist statistically significant relationships among the employability skill and its extracted dimensions with a good fit model with all recommended indices.



Measurement Model for "Employability Skill" Construct

CMIN/DF = 1.744, CFI = 0.966, GFI = 0.916, SRMR = 0.0449
RMSEA = 0.044, PCLOSE = 0.927, HOELTER = 254

Figure 3 - Source : Research data

MAJOR FINDINGS OF THE STUDY

- The results indicate that there exist a significant relationship between the employability skill and the perceived benefits. Employability skill leads to perceived benefits.
- 67.8 % of the variances in employability skills are explained by the six factors: basic skills, higher education knowledge & conceptual skills, personal &interpersonal skills, managerial qualities, analytical skills and entrepreneurial skills.

- 30.5 % variance in employability skill is explained by the basic skills like self awareness, self management, self confidence, emotional intelligence, ethical sensitivity and commercial awareness.
- 13% of the variance in employability skill is attributed to the achievement higher education skill i.e. knowledge, understanding and other conceptual skills.
- Over 9% variance in employability skill is attributed to personal and interpersonal skills like stress tolerance, team work, conflict management and possessing a malleable self theory.
- 4 to 6 % variance each are attributed to managerial qualities, analytical skills and entrepreneurial skillsThe T-Test carried out to explore the difference in perception of male and female respondents towards the latent variable-employability showed that the two groups have no significance difference in their perception towards the employability skill construct.

THE SCOPE AND LIMITATIONS OF THE STUDY

Business schools are expected to provide qualified business graduates to the industry and their impact can be assessed holistically by evaluating the inputs, delivery processes as well as the outcome in terms of skills developed. This present study was limited to assessing the impact of regular B-School programmes, on skill development, based on a perception study among the Alumni within the state of Kerala. The study period was limited FY 2014 – 15 and hence the scope of the study is confined within the framework of policy regulations and directives prevailing at that time in the state of Kerala.

CONCLUSION

The study brought out the various dimensions of skill development and the perceived benefit from the skills imparted through management education as well as the inter relationship among the key skills in improving employability among B-school graduates. The management institutes and other researchers would be benefitted, from the framework adopted for this study, to pursue further studies/research on skill building through management education.

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AN ANALYSIS OF TRENDS OF BANKS IN NIFTY BANK USING RELATIVE STRENGTH INDEX (RSI) AND RATE OF CHANGE INDICATOR (ROC)

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ABSTRACT
Investment in equities involves a lot of risks. All investors who invest in equities should do ample analysis before investing. They should understand the fluctuations in the prices of equities frequently before making his buying and selling decision. The prices of equity stocks always move in unstable trends and cycles. An investor is always interested in buying stocks at low price and selling at high price. So fixing the buying and selling prices of a stock plays a vital role in equities investment. There are two approaches to decide the reasonable buying and selling price of equity stocks, Fundamental Analysis and Technical Analysis. The former approach determines the true value of the stock based on present and future earnings of the company and the latter determines the value of the stock based on the trends and movement of prices in the market. Since the present market is highly speculative, technical analysis works better. In this study, the trends of 12 banks of Nifty Bank index of National Stock Exchange is analyzed technically using oscillators like Relative Strength Index (RSI) and Rate of Change (ROC) indicator, for a period of past months of 2017.

Keywords: Technical Analysis, trends, Nifty Bank index, Relative Strength Index (RSI), Rate of Change Indicator (ROC), closing price, oversold and overbought.

INTRODUCTION
Investment in stocks is one of the risky investments. Those who invest in equities should do ample research and analysis before making their investments in stocks. The investors should make their decisions on buying and selling price only on the basis of their analysis rather random decision making. There are two approaches to do this, fundamental and technical analysis. The fundamental analysis is based on current and future earning capacity of the organization and true worth of the share is determined, but the technical analysis is based on the trends and price movements of the stocks only. The price is forecasted using historical price data. The present stocks market in our country is highly volatile and speculation dominates the market. So the technical analysis or trend analysis works better than fundamental analysis. The technical analysis is based on trends. Trends means the direction at which the stocks prices moves in the market. Downtrend or falling trend occurs when prices moves downward and raising trend or uptrend occurs when prices moves upwards. The prices of stocks always move in a trend and the stocks prices will not be in a straight line. The technical analysis can be done using oscillators as well. Rate of Change Indicator (ROC) and Relative Strength Index (RSI) are two of the oscillators. The measure of rate of change of current prices compare to the price of certain days ago is ROC and RSI is an indicator that gives buying and selling signals in advance ahead of market. In this study the researcher has analyzed the trends of stock prices of 12 banks in Nifty bank index of National Stock Exchange for a period of two months from January 1st 2017 to March 31st 2017.

REVIEW OF LITERATURE
Many past studies have emphasized the importance of technical analysis in making investment decision in equities. Equity stock is a perpetual financial instrument in which no return is promised by the issuer. So the investor has to do ample analysis before investing. The volatility in today's stock market has made technical analysis as a better tool. Jensen and Bennington explained that the past information which is used to predict the future will not work out exactly every time. Neftci explains that the process is linear measure and the technical analysis will not work perfectly. Falbo and Retizzari state that there are many methods for technical analysis. The profitability based on the method of technical analysis is dynamic over time. P Selvam and L Rakesh have explained the application of Relative Strength Index in identifying the movements of stock prices and how it is used in trading with regards to Information Technology sector.

OBJECTIVES
- To identify the best buying and selling price of stocks of banks in nifty bank index
- To understand the overbought and oversold condition of stocks of banks in nifty bank index
- To measure the expected capital gain or loss of investments made using Relative Strength Index and Rate of Change Index

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DATA COLLECTION

The study is based on secondary data which is obtained from the website of National Stock Exchange. The data are taken for a period of three months starting from 1st January 2017 to 31st March 2017.

TOOLS USED

The tools used for the analysis are Rate of Change Index (ROC) and Relative Strength Index (RSI). The formula of Rate of Change Index (ROC) is as follows,

ROC = ((Most Recent Closing Price – Closing Price n Period ago)/Closing Price n Period Ago) * 100

The formula of Relative Strength Index (RSI) is as follows,

RSI = 100-(100/(1+Relative Strength))

Relative Strength = 14 Days Average Gain / 14 Days Average Loss

ANALYSIS OF RATE OF CHANGE INDICATOR (ROC)

ROC is used to measure the rate of change of the current price in comparison with the price of certain number of days ago, usually seven days. Each and every day prices are divided by the price of prevailing certain days ago and the same is subtracted to 1. Simply it's a ratio of current price and price of certain days ago and it is subtracted to 1. The ROC of a stock can be positive, negative and zero. The negative ROC shows the oversold condition .i.e., the price of the particular stock is less because of too much of selling pressure and it is good price to buy the particular share. Hence the negative ROC signals buying. The positive ROC signals best selling price of a stock and the price of the stock will be high, positive ROC shows the overbought condition. Oversold condition means it is a situation in which the supply exceeds the demand and the selling pressure will be high which makes the price of particular share to fall. Overbought is a condition in which the demand exceeds the supply of a share and the price of the share will increase. The oversold condition is good for buying and overbought is good for selling.

The ROC will clearly show the trends and it is used to understand at what trend the particular scrip falls in at present. The two trends which occur usually are the buying and selling trend. The buying trend starts with highest price and ends with lowest price. The selling trend starts with highest price and ends with lowest price. It is very difficult to make buy or sell decision based on trends. ROC helps to understand the position of scrip in the trends. If scrip is found as oversold by ROC means, it is in the buying trend and if the scrip is found overbought means it is in the selling trend.

In this study the researcher has analyze the ROC of twelve banks as follows

1. Axis Bank Ltd.
2. Bank of Baroda
3. Bank of India
4. Canara Bank
5. Federal Bank Ltd.
6. HDFC Bank Ltd.
7. ICICI Bank Ltd.
8. IndusInd Bank Ltd.
9. Kotak Mahindra Bank Ltd.
10. Punjab National Bank
11. State Bank of India
12. Yes Bank Ltd.

The analysis of ROC of these banks from January 1, 2017 to March 31, 2017 is as follows.

The buying and selling trends of the twelve banks and the gain or loss made by an investor by making his investment decision on the basis of ROC is given in the following table.

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Trends	Buy Trend		Sell Trend		Gain / Loss (Rs)
	Date	Price (Rs)	Date	Price (Rs)	
Axis Bank					
Trend 1	12-Jan-17	455.20	19-Jan-17	483.80	28.60
Trend 2	20-Jan-17	450.70	13-Feb-17	490.30	39.55
Trend 3	14-Feb-17	486.90	03-Mar-17	512.90	26.00
Trend 4	06-Mar-17	518.65	14-Mar-17	510.90	-7.75
Trend 5	15-Mar-17	511.70	17-Mar-17	511.8	5.45
Bank of Baroda					
Trend 1	20-Jan-17	154.35	10-Feb-17	188.05	33.7
Trend 2	13-Feb-17	168.8	31-Mar-17	172.95	4.15
Bank of India					
Trend 1	20-Jan-17	112.35	13-Feb-17	128.75	16.40
Trend 2	14-Feb-17	128.60	31-Mar-17	139.25	10.65
Canara Bank					
Trend 1	20-Jan-17	272.65	25-Jan-17	281.75	9.10
Trend 2	27-Jan-17	284	13-Feb-17	300.90	16.90
Trend 3	14-Feb-17	303.20	21-Mar-17	288.45	-14.75
Trend 4	22-Mar-17	282.25	31-Mar-17	302.75	20.50
Federal Bank					
Trend 1	31-Jan-17	76.05	13-Feb-17	83.95	7.90
Trend 2	14-Feb-17	83.15	1-Mar-17	88.05	4.90
Trend 3	2-Mar-17	84.85	31-Mar-17	91.45	6.60
HDFC Bank					
Trend 1	10-Feb-17	1303.60	1-Mar-17	1391.65	88.05
Trend 2	2-Mar-17	1380.1	24-Mar-17	1424.35	44.25
Trend 3	27-Mar-17	1409.85	31-Mar-17	1442.55	32.70
ICICI Bank					
Trend 1	20-Jan-17	263.45	10-Feb-17	281.60	18.15
Trend 2	13-Feb-17	281.65	22-Feb-17	286.15	4.50
Trend 3	23-Feb-17	284.50	20-Mar-17	275.05	-9.45
IndusInd Bank					
Trend 1	20-Jan-17	1220.25	14-Feb-17	1330.40	110.15
Trend 2	15-Feb-17	1316.45	27-Feb-17	1320.75	4.30
Trend 3	28-Feb-17	1312.60	31-Mar-17	1425.15	112.55
Kotak Mahindra Bank					
Trend 1	20-Jan-17	723.05	3-Feb-17	765.30	42.25
Trend 2	6-Feb-17	766.70	31-Mar-17	872.20	105.50
Punjab National Bank					
Trend 1	13-Feb-17	142.35	21-Mar-17	142.85	0.50
Trend 2	22-Mar-17	136.40	31-Mar-17	149.90	13.50
State Bank of India					
Trend 1	13-Feb-17	271.65	20-Mar-17	273.90	2.25
Trend 2	21-Mar-17	272.35	31-Mar-17	293.40	21.05
Yes Bank					
Trend 1	6-Feb-17	1398.45	9-Feb-17	1408.20	9.75
Trend 2	10-Feb-17	1412.85	21-Feb-17	1449.75	36.90
Trend 3	22-Feb-17	1446.95	1-Mar-17	1454.65	7.70
Trend 4	2-Mar-17	1424.70	21-Mar-17	1484.75	60.05
Trend 5	22-Mar-17	1470.85	31-Mar-17	1546.75	75.90

AXIS BANK

The lowest price in this period taken for analysis is Rs 445, on 23rd of January and the highest price is Rs 528.15 on 23rd of February. The ROC of the lowest price day is -0.0224, this shows that the stocks of this bank is oversold .i.e., too much of selling and this recommends buying. The ROC of the highest price day is 0.0847,

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this shows the stock is overbought .i.e., too much of buying and this recommends selling. Thus the ROC helps to anticipate the trend movements and helps the investors to make buying and selling decisions. There are five trend cycles in this stock. The first trend starts on 12-Jan-17 at a buy price of Rs 455.20 and ROC of -0.0001 and ends with a sell price of Rs 483.80 and ROC of 0.0815 on 19-Jan-17. An investor would have enjoyed a gain of Rs 28.60 per share if he invests in this trend. The second trend starts on 20-Jan-17 at a buy price of Rs 450.70 and ROC of -0.0063 and ends with a sell price of Rs 490.30 and ROC of 0.0161 on 13-Feb-17 with a gain of Rs 39.55 per share. The third trend starts with a buy price of Rs 486.90 and ROC of-0.0077 on 14-Feb-17 and ends with a sell price of Rs 512.90 and ROC of 0.0170 on 03-Mar-17 with a gain of Rs 26 per share. The fourth trend ends with a loss of Rs 7.75 per share and the last trend ends with a gain of Rs 5.45 per share. The buying and selling price is decided on the basis of ROC.

BANK OF BARODA

The stocks of Bank of Baroda have two trend cycles in this period. The lowest price in the period taken for analysis is Rs154.20 on 23-Jan-2017. The ROC on that day is -0.0284. The highest price is Rs 188.05 on 10-Feb-2017 with ROC 0.0867. The first trend starts on 20-Jan-17 with a price of Rs 154.35 and ROC of -0.0329, the first trend end on 10-Feb-17 with a price of Rs 188.05 and ROC of 0.0867. An investor would have gained Rs 33.70 per share if he bought a stock in the beginning of the trend and sell at the end of the first trend. The second trend starts on 13-Feb-17 at a price and ROC of Rs 168.80 and -0.0498 respectively. An investor would have gained Rs 4.15 per share in the second trend.

BANK OF INDIA

The lowest price of Bank of India is Rs 112.35 on 20-Jan-17 and the highest price is Rs 139.25 on 31-Mar-17. The ROCs of lowest price and highest price are -0.0166 and 0.1069 respectively. There are only two trend cycles occurred in the trend of Bank of India. The first trend starts on 20-Jan-17 with a price of Rs 112.35 and ROC of -0.0166 and ends on 13-Feb-2017 at a price of Rs 128.75 and ROC of 0.0279. An investor would have made of gain of Rs 16.4 per share if he buys in the beginning of the trend and sells at the end of the trend. Similarly, the investors would have gained Rs Rs 10.65 per share.

CANARA BANK

The stocks of Canara bank had four trend cycles during the period of analysis. The lowest price is Rs 272.65 on 20-Jan-17 and the highest price is Rs 311.5 on 07-Feb-17. The ROCs on these days are -0.0132 and 0.0968 respectively. An investor would have gained Rs 9.10 and Rs 16.90 in the first two trends respectively. But the third trend ends with loss of Rs -14.75, the third trend starts with a price of Rs 303.20 and ROC of -0.0251. Since the ROC is negative it supports buying, but the trend end with least price. But there are many opportunities in this trend where the investors can buy at lower price and sell at higher price and book profit, for instance if the investor buys the stock on 27-Feb-17 instead of buying on the beginning day of the trend, he would have bought at Rs 288.40 and sold on the highest price day .i.e., on 1-Mar-17 at a price of Rs 296 he would have gained Rs 7.60 instead of incurring loss.

FEDERAL BANK

The stocks of Federal Banks had three trend cycles during the period of analysis and all the trends are profitable to the investors. The first trend starts on 31-Jan-2017 with a stock price of Rs 76.05 and ROC of -0.0136 and the trend ends with a price of Rs 83.95 per share and ROC of 0.0006. An investor would have earned a profit of Rs 7.90 per share. Similarly, the investor would have earned a profit of Rs 4.90 and Rs 6.60 in the second and third trends respectively.

HDFC BANK

The stocks of HDFC Banks had three trend cycles in the analysis period. The first trend begins on 10-Feb-17 at a price of Rs 1303.60 and ends at a price of Rs 1391.65. The investment in this trend gives a profit of Rs 88.05 per share. The ROC in the beginning and end of this trend is -0.0016 and 0.0106 respectively. Similarly the other two trends are also profitable for investments as given in the table.

ICICI BANK

The stocks of ICICI bank had three trend cycles during this period. The first two trends are positive to the investors and the last trend which started on 23-Feb-17 at a price of Rs 284.50 and ROC of -0.0005 and end on 20-Mar-17 at a price of Rs 275.05 ends at a loss of Rs 9.45 per share.

INDUSIND BANK

The stocks of the bank had three trend cycles during the period of analysis. The first trend starts on 20-Jan-17 at a price of Rs 1220.25 and ROC of -0.0110. The first trend ends on 14-Feb-17 at a price of Rs 1330.40 and ROC

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of 0.0209. The gain in this trend cycle is Rs 110.15. Similarly the next two buying and selling trends is also decide on the basis of ROC and it is found that both the trends has a gain of Rs 4.30 and Rs 112.55 respectively.

KOTAK BANK

The stocks of Kotak Bank had two trend cycles during the period of analysis. The first trend starts on 20-Jan-17 at a price of Rs 723.05 and ROC of -0.0073. The first trend ends on 3-Feb-17 at a price of Rs 765.30 and ROC of 0.0295. The gain in this trend is Rs 42.25. Similarly in the second trend the gain is Rs 105.50

PUNJAB NATIONAL BANK

The stocks of PNB had two cycles in the period of analysis. Both the trends gained Rs 0.5 and Rs13.50 respectively. The first trend starts on 13-Feb-17 with a ROC of -0.0018 and ends on 21-Mar-17 with a ROC of 0.0120. The second trend starts on 22-Mar-17 with a ROC of -0.0374 and ends on 31-Mar-17 with ROC of 0.0990

STATE BANK OF INDIA

The stock had two trend cycle in the period of analysis. The first trend starts on 13-Feb-17 at a price of Rs 271.65 at a ROC of -0.0060 and ends at a price of Rs 273.90 at a ROC of 0.0148. The gain in this trend is Rs 2.25 per share. The second trend starts with a price of Rs 272.35 on 21-Mar-17 with ROC of -0.0033 and ends at a price of Rs 293.40 on 31-Mar-17 with ROC of 0.0968. The gain in the second trend is Rs 21.05

YES BANK

The stocks had five trend cycles in the period of analysis. All the trend cycles are profitable. The gains in the trends from first to fifth are Rs 9.75, Rs 36.90, Rs 7.70, Rs 60.05 and Rs 75.90. The first trend starts on 6-Feb-17 at a price of Rs 1398.45 and ROC of -0.0059, the trends ends on 9-Feb-17 at a price of Rs 1408.20 and ROC of 0.0087. Similarly the other four trends were also profitable.

ANALYSIS OF RELATIVE STRENGTH INDEX (RSI)

Relative Strength Index is a technical indicator which is used to measure the strength or weakness of a stock. It is sued to determine the overbought and oversold condition. Overbought is a condition in which the demand and price of a stock is high and it supports selling. Oversold is a heavy selling condition in which the supply exceeds the demand. The price of a stock will be low and it supports buying. Measuring Relative Strength Index will help an investor to make his investment decisions .i.e., buy and sell decisions wisely. It gives an indication to investors about when to buy and sell a particular stock. Relative Strength Index is a momentum oscillator and it is measured in a scale of 0 to 100. The overbought condition is indicated when RSI of a stock exceeds 70 in the measuring scale and oversold is indicated when RSI of a stocks falls below 30 in the measuring scale .i.e., when RSI is above 70 means it is overbought condition and the price of a stock at this condition will be high and it supports selling. Similarly when RSI is less than 30 means it is oversold condition and the price of a stock at this condition will be low and it supports buying. The profitable Relative Strength Index days of 12 banks from 01-Jan-2017 to 31-Mar-2017 is given in the following table,

Oversold Condition (Buy)			**Overbought (Sell)**			**Gain/Loss**
Date	**Price**	**RSI**	**Date**	**Price**	**RSI**	
Axis Bank						
27-Mar-17	487.15	25.50	29-Mar-17	504.20	45.91	17.05
Bank of Baroda						
23-Feb-17	168.15	29.34	28-Mar-17	173.90	71.20	5.75
27-Feb-17	164.40	28.13	29-Mar-17	173.50	72.80	9.10
28-Feb-17	165.30	25.64	30-Mar-17	173.65	72.75	8.35
01-Mar-17	165.35	25.75	31-Mar-17	172.95	72.17	7.60
Bank of India						
2-Mar-17	125.95	31.07	28-Mar-17	135.95	70.10309	10
3-Mar-17	125.75	34.35	29-Mar-17	138.40	75.97656	12.65
Oversold Condition (Buy)			**Overbought (Sell)**			**Gain/Loss**
Date	**Price**	**RSI**	**Date**	**Price**	**RSI**	
Canara Bank						
23-Feb-17	291.50	26.04	29-Mar-17	302.10	63.94	10.60
27-Feb-17	288.40	24.02	30-Mar-17	303.15	66.96	14.75
03-Mar-17	288.70	29.51	31-Mar-17	302.75	69.07	14.05
Federal Bank						
23-Feb-17	84.1	48.31	28-Mar-17	90.55	70.62	6.45

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27-Feb-17	83.55	48.31	29-Mar-17	91.15	73.53	7.6
22-Mar-17	87.05	46.71	31-Mar-17	91.45	73.45	4.4
HDFC Bank						
14-Mar-17	1410.7	50.97	23-Mar-17	1430.9	82.94	20.20
15-Mar-17	1416.6	50.64	24-Mar-17	1424.35	79.39	7.75
ICICI Bank						
10-Mar-17	270.55	27.07	30-Mar-17	281.35	56.21	10.80
IndusInd Bank						
3-Mar-17	1,299.20	42.55	24-Mar-17	1,389.55	80.91	90.35
6-Mar-17	1,319.70	43.75	30-Mar-17	1,422.30	81.00	102.60
Kotak Bank						
15-Feb-17	784.30	43.50	24-Mar-17	879.35	93.62	95.05
Punjab National Bank						
28-Feb-17	141.40	31.39	16-Mar-17	148.20	66.84	6.80
State Bank of India						
27-Feb-17	268.20	28.46	29-Mar-17	288.45	70.81	20.25
28-Feb-17	269.20	28.98	30-Mar-17	291.05	70.31	21.85
03-Mar-17	265.05	29.37	31-Mar-17	293.40	73.74	28.35
Yes Bank						
07-Mar-17	1448.20	47.89	30-Mar-17	1552.15	69.17	103.95

AXIS BANK

The oversold condition .i.e., RSI less than 30 has occurred only on 27-Mar-2017 during the period taken for analysis. The overbought condition .i.e., the ROC above 70 has never occurred after the above mentioned date. Let us assume that an investor bought this stock on 27-Mar-2017 at a price of Rs 487.15 and RSI 25.50 and sold the stock at a price of Rs 504.20 on 29-Mar-2017. The RSI on this date is 45.91, which the highest RSI after the purchase of the stock and till 31-Mar-2017. So it is assumed that the investor has decided to sell at the highest RSI date rather at 70, because 70 has not occurred after the date of purchase of the stock, hence the investor sold it at the highest RSI date. The investor gains Rs17.05 per share of Axis Bank by buying and selling based on RSI.

BANK OF BARODA

The oversold condition has occurred four days, 23rd, 27th and 28th of February and 1st of March with price Rs 168.15, Rs 164.40, 165.30 and 165.35, RSI of 29.34, 28.13, 25.64 and 25.75 respectively. The overbought condition occurs from 28-Mar-2017 to 31-Mar-2017. The RSI of these days are 71.20, 72.80, 72.75, and 72.17 respectively. The RSI of all these days are above 70 and hence it supports selling. The price of the stocks on these days is Rs173.90, Rs 173.50, Rs 173.65 and Rs 172.95 respectively. Let's assume that an investor bought this stock at all the above oversold condition prices and sold them at the above overbought prices means he will gain Rs 5.75, Rs 9.10, Rs 8.35 and Rs 7.60 respectively.

BANK OF INDIA

The oversold condition has never occurred exactly with a RSI of 30 but the ROC of two days is close to 30. The RSI of 2nd and 3rd March is 31.07 and 34.35 respectively with the price of Rs 125.95 and Rs 125.75. It is assumed that the investor buy the stocks on the above mentioned days and sold them on 28-Mar-17 at a price of 135.95 and RSI of 70.10 and on 29-Mar-2017 at a price of Rs 138.40 and RSI of 75.97. By buying on 02-Mar-2017 and selling it on 28-Mar-2017, the investor would gain Rs 10 per share and by buying on 03-Mar-2017 and selling on 29-Mar-2017 would gain Rs 12.65 per share

CANARA BANK

The RSI of three days is less than 30. The RSI of 23rd & 27th of February and 3rd March are 26.04, 24.02 and 29.51 respectively. The prices of the stocks on these days are Rs 291.50, Rs 288.40 and Rs 288.70 respectively. The RSI of the stock is not signaling selling in any of the days after the buying day's .i.e., the above mentioned dates, but there are three days in which the RSI is close to 70. The RSI of 29th, 30th and 31st of March is 63.94, 66.96 and 69.07 respectively and the prices of stocks on these days are Rs 302.40, Rs 303.15 and Rs 302.75 respectively. If an investor buys at the low RSI prices and sells at high RSI prices means he would have earned Rs 10.60, Rs 14.75 and Rs 14.05 respectively.

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FEDERAL BANK
The RSI of the stock didn't signal buying at any point of time in the period taken for analysis. So the least RSI is considered to be the buy signal and it is assumed that the investor bought at the least RSI. The RSI of the stock on 23rd, 27th of February and 22nd of March is 48.31, 48.31 and 46.71 respectively. The price of the stock on these days is Rs 84.10, Rs 83.55 and Rs 87.05. The RSI of the stock very well signals the selling. The RSI on 28th, 29th and 31st of March is 70.62, 73.53 and 73.45 respectively. The price on these days is Rs 90.55, Rs 91.15 and Rs 91.45. If an investor buys on the low RSI days and sells at high RSI day means he would have gained Rs 6.45, Rs 7.60 and Rs 4.40 respectively.

HDFC BANK
The RSI of the stock didn't signal buying at any point of time in the period taken for analysis. So the least RSI is considered to be the buy signal and it is assumed that the investor bought at the least RSI. The RSI on 14th and 15th March is 50.97 and 50.64 respectively. The price on these days is Rs 1410.70 and Rs 1416.60. The RSI on 23rd and 24th March is 82.94 and 79.39 respectively. The price on these days is Rs 1430.90 and Rs 1424.35 respectively. The gain of an investor would be Rs 20.20 and Rs 7.75.

ICICI BANK
The RSI of stock is less than 30 only on 10th March. The RSI and price on this day is 27.07 and Rs 270.55 respectively. The RSI of none of the days signals selling, so it is assumed that the investor decide to sell at the highest RSI. The highest RSI after 10th March .i.e., the day of purchase, is 56.21 on 30-Mar-2017. The price is Rs 281.35. If an investor buy on low RSI day and sells at high RSI day means he would have earned Rs 10.80 per share.

INDUSIND BANK
The RSI of the stock didn't signal buying at any point of time in the period taken for analysis. So the least RSI is considered to be the buy signal and it is assumed that the investor bought at the least RSI. The RSI on 3rd and 6th of March is 42.55 and 43.75 respectively. The highest RSI corresponding to the purchase RSI is 80.90 and 81 on 24 th and 30th of March. The investor will gain Rs 90.35 and Rs 102.60 per share if invest on above mentioned dates.

KOTAK BANK
Since the RSI of the stock didn't signals buying, it is assumed that the investor will buy at the lowest RSI price. The lowest RSI is 43.50 on 15-Feb-2017, the price is Rs 784.30. The highest RSI is 93.92 on 24-Mar-2017; the price is Rs 879.35 per share. The gain of an investor would be Rs 95.05 per share.

PUNJAB NATIONAL BANK
The RSI of the stock is not less than or equal to 30 in any of the days taken for analysis, so the RSI very close to 30 is decide to buy. The RSI and price on 28-Feb-2017 are 31.39 and Rs 141.40 respectively. The RSI close to 70 after the date of purchase is on 16-Mar-2017, the RSI on the day is 66.84. The price on this day is Rs148.20. If the investor invests in this stock means he would have earned Rs 6.80 per share.

STATE BANK OF INDIA
The RSI of the stock supports buying and selling thrice during the period of analysis. The RSI of three days supports buying. The RSI on 27th, 28th February and 3rd March is 28.46, 28.98 and 29.37 respectively, since all the RSI are less than 30 it support buying. The RSI on 29th, 30th and 31st of March is 70.81, 70.31 and 73.74 respectively. Since all the RSI are above 70, selling is strongly recommended. The investor will gain Rs 20.25, Rs 21.85 and Rs 28.35 if he buy and sell on above dates.

YES BANK
The RSI of the stock is not less than or equal to 30. So the least RSI is taken to decide the buying, the least RSI is 47.89 on 7th March. The highest RSI after this date is decided for selling, the highest RSI is on 30th March. The RSI on this date is 69.17, the price is Rs 1552.15. If investor bought and sold as per thr RSI means he would have earned Rs 103.95 per share.

FINDINGS
The investment decision made on the basis of RSI is better than ROC. The decision made on the basis RSI should be compared with ROC for a better investment decision. In other words, make a primary decision on the basis of RSI and compare it with ROC. The findings of the analysis made on the basis on the oscillators, ROE and RSI are as follows,

- In the case of Axis bank, the buying is decided on 27th March at RSI of 25.05 which is less than 30. The ROC on this day is negative which supports selling as well. Since both the RSI and ROC supports buying, it

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is decide to buy the stocks on the day mentioned above. Similarly the stocks signals selling on 29th March, the RSI on this day is 45, which is not equal to or above 75, but this is the highest RSI since the day of purchase. The ROC on this day is also negative which supports selling.

- The stocks of Bank of Baroda signals buying on 23rd, 27th, 28th of February and 1st of March. The RSI on these days are less than 30, hence it supports buying. The ROC of all these days, except 27th February, is negative. The ROC is 0.01 in 27th February which is very close to neutral; hence it is assumed that it supports buying. The stocks signals selling on 28th to 31st of March, the RSI of all these days are above 70 and ROC is also perfectly positive in all these days as well.
- The buying and selling decisions of Bank of India has worked out better using RSI and ROC. The RSI of the stocks in 2nd and 3rd March is 31.07 and 34.35 respectively, the RSI of both of these days are not less than or equal to 30 but these are the least RSI in the period taken for analysis and close to 30 as well. The ROC of these two days is negative which supports buying. The stocks signals selling on 28th and 29th of March because the RSI of both of these days are above 70 and ROC of both the days is positive as well
- In the case of Canara Bank, the decision is made as per ROC is perfect because the ROC of buying dates is perfectly negative and ROC of selling dates are perfectly positive. As far as RSI is concerned, the RSI on 29th, 30th and 31st of March are the highest after the day of purchase of the stocks. The RSI of all these days are not equal to or greater than 70 but very close to 70, hence it is decided to sell and ROC of all these days are perfectly positive which supports selling.
- The decision made on buying and selling of Federal bank is entirely different from others because both the RSI and ROC are not perfect in making investment decisions because none of the days in the period taken for analysis is perfect for buying or selling as per RSI and ROC. There is no days with RSI is less than or equal to 30. As far as ROC is concerned, only very few days with negative ROC, hence buying decision became very difficult because of irregularities in both the oscillators. So it is decided to take buying decision based on the least RSI, the RSI of 23rd, 27th of February and 22nd of March are least and hence purchased. The ROC of these days is very close to neutral. The selling decision in not much complicated, because the RSI on 28th, 29th, and 31st of March are above 70 and ROC is also positive. The decisions made are profitable.
- The RSI of HDFC Bank is not less than or equal to 30 in any of the days taken for analysis. The ROC is also not supportive in buying. There are certain days in which the ROC is negative but the RSI is above 65, hence it is risky to buy. So it is decided to buy in least RSI days. It is found that the RSI is least on 14th and 15th March. The ROC of these two days is positive but close to neutral. The selling decision is very easy to take because the RSI on 23rd and 24th of March is above 70 and ROC of these two days is also positive and supports selling. The buying and selling as per the above dates are profitable.
- The buying decision made in the stocks of ICICI Bank, based on RSI and ROC is perfect. The stocks are suitable to purchase on 10th March because the RSI is less than 30 and ROC is negative as well. In the case of selling, there is no day with RSI less than 70 after the day of purchase. So it is decided to sell at a highest RSI day. On 30th March the RSI is 56.21 which are highest after the day of purchase and ROC on this day is also positive which supports selling.
- The purchase decision is not made exactly as per RSI in the case of IndusInd bank. There is no day with RSI less than 30. So it is decided to purchase at a least RSI. The RSI on 3rd and 6th March are the least and ROC is also negative. The selling decision is made perfectly because the RSI on 24th and 30th March is 80.90 and 81 respectively and ROC on these days is also positive.
- The RSI of Kotak Bank is not less than or equal to 30 in any of the days taken into analysis, so it is decided to considered the least RSI for purchase. The largest RSI is 43.50 on 15th February. The ROC on this day is also negative. The stock has given a gain of Rs 95.05 per share when it is sold on 24th March when the RSI is more than 70 and highest at 93.62. The ROC on the selling day is also positive.
- The buy and sell decision in the case of Punjab National bank is not exact as per RSI and ROC. The RSI has never reached 30 or less than 30 in any of the days of analysis. Similarly The RSI has never reached 70 or above. So it is decided to consider the highest and lowest RSI for selling and buying respectively. The least RSI in 31.39 on 28th February and ROC on this day is neutral. The highest RSI is on 16th March which is not equal to or above 70 but close to 70. The ROC on this day is positive which supports selling.

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- The buying and selling decision of State Bank of India on the basis of RSI and ROC is very perfect. All the purchase days RSI are lesser than 30 and all the selling days RSI are higher than 70. The ROC of all the buying is negative and selling ROC is positive.
- The investment decision on Yes Bank stocks based on RSI and ROC are not exact. The RSI of stocks is not less than or equal to 30 in any of the days. The least RSI is on 7th March at 47.89. The ROC on this day is neutral. The RSI of this stock is almost close to 70 on 30th March at 69.17. The ROC of the day is positive

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Indian NBFC MFIs Vs. Bangladeshi NGO MFIs

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Abstract

MFIs are the pivotal organizations in each country that make individual microcredit loans directly to villagers, micro entrepreneurs, impoverished women and poor families. NBFC MFIs have been playing a significant role in taking forward the financial inclusion agenda of the Government of India. Bangladesh which is the birth place of microfinance and also pioneer in the world for applying microfinance has NGO form of MFIs. This paper aims to compare the financial performance of NBFC MFIs in India and NGO MFIs in Bangladesh. The study is primarily based on secondary data. The variables, such as institutional characteristics, financing structure, outreach indicators, overall financial performance indicators, revenue and expenses, efficiency and risk and liquidity have been considered to analyse the financial performance of 27 Indian NBFC MFIs and 23 Bangladeshi NGO MFIs. The Mann-Whitney U test has been used for analyzing the data. It is found that the Indian NBFC MFIs stand better than the NGO MFIs of Bangladesh in many aspects, though Bangladesh is the place of origin for the concept of microfinance and Microfinance Institutions.

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