MULTIDISCIPLINARY

APPROACH

In Research-

Benefits & Challenges

DR. PRATIMA SINGH

Multidisciplinary Approach in Research – Benefits & Challenges

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By:

Dr. (Mrs.) Pratima Singh

I/C Principal

Chandrabhan Sharma College of Arts, Science, and Commerce

Powai, Mumbai

PREFACE

Multidisciplinary research is needed to solve many, if not all, of the major research challenges.

Researchers seek to continue to raise awareness on various drivers and thereby continue to make innovations that take place as a result of multidisciplinary research. Interdisciplinary research either requires an individual researcher to gain a deep understanding of two or more disciplines and master their language and methodologies, or more frequently requires multidisciplinary teams to come together and create a common base of understanding and framework for discovery and research innovation.

For two thousand years, the advancement of knowledge has taken a path of increasing specialisation. Man has approached the comprehension of the world through the deconstructing of it into much smaller fragments that have given rise to all the disciplines that exist today along with their respective sub disciplines in order to be able to foretell, or at least explain, the behaviour of nature, humanity, and society.

In other words, this discipline involves the search for truth using many specialized branches of learning that aim to achieve a common goal using knowledge from other disciplines. Multidisciplinary research is an investigation or investigation of a problem to test the hypothesis combining many approaches, fields, or academic methods. Moreover, it can be defined as a knowledge search by an objective and systematic method for an original contribution to the existing stock of knowledge involving a combination of several disciplines and methods. Multidisciplinary studies address current and real problems, with a prioritized focus on solving them.

ACKNOWLEDGEMENT

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KNOWLEDGE ACQUISITION THROUGH JOINT TRAINING PROGRAMS BETWEEN VIETNAMESE AND INTERNATIONAL UNIVERSITIES AT THE UNDERGRADUATE LEVEL

Ai Huu Tran and Bich Dinh Nguyet
Van Hien University, Vietnam

ABSTRACT

The 21st century is the century of knowledge, in which societies and economies develop on the basis of creation, dissemination, reception, and effective use of information and knowledge. Knowledge creates an organization's competitive advantage, which is a key asset for an organization to survive and succeed. In Vietnam, in the wave of international integration, universities are also very active in absorbing training knowledge from advanced educational backgrounds. One of the ways Vietnamese universities is used to quickly absorb the best of training from international partners is through international joint training programs. Learning about the factors affecting the acceptance of training knowledge by lecturers through international training programs will shed light on how teachers can receive the most knowledge. Research results show that there are factors affecting knowledge acquisition: (1) Professional knowledge, (2) Intercultural knowledge, (3) Intrinsic learning, and motivation, (4) Thinking socialization thinking, (5) Interaction with partner lecturers, (6) The role of knowledge gatekeeper.

Keywords: Knowledge acquisition, international training links, competitive advantage, International integration.

1. INTRODUCTION

With the mission of disseminating and creating high-level knowledge, universities around the world are actively participating in the process of knowledge transfer and learning across borders, through various means of exchange and cooperation (Li-Hua, 2007). The form of international training association appeared with the advent of the innovation policy, changing from a centralized economy to a market economy, starting in the early 90s, then developing strongly in the following years. Although there is some skepticism about the quality of affiliate programs (Nhan and Nguyen, 2018), the majority agree that international joint training programs offer more benefits. The main benefits include the opportunity for Vietnamese universities to learn the best of international training practices and practices, and the learners have access to advanced education at a reasonable price (Welch), 2010).

In addition, research on knowledge acquisition in international cooperation in Vietnam and in the world has focused on the reception at organizational levels, not on the individual learning, as well as not much mention of the role of the individual in the acquisition of knowledge. Easterby-Smith et al (1998) argue that the individual is the organization's knowledge repository and part of the knowledge transfer mechanism. Nonaka (1994) asserts that knowledge cannot be created without individuals while emphasizing that organizational knowledge is derived from individuals' commitment to receive knowledge. Even so, studies have not sufficiently reasoned about individual-level influencing factors in knowledge transfer studies (Fey et al., 2014). An individual's knowledge acquisition is influenced by personal and social factors related to that person (Kankanhalli et al., 2012). Therefore, the studies on individual knowledge acquisition so far have focused on the influence of two groups of factors, namely individual characteristics and social characteristics.

In summary, in practical terms, the study of factors affecting the acquisition of training knowledge by lecturers through international training programs will contribute to the process of

innovation and integration internationalization of Vietnamese higher education by helping to identify factors that need to be improved or remedied so that faculty can learn the most from training practices, knowledge, and skills from advanced education systems developed in the world, thereby applying them in university teaching.

2. Theoretical Basis

2.1. The Concept
Although there is not really a consensus on the concept of knowledge (Jashapara, 2011), modern views are developed based on both these schools. Knowledge, according to Nonaka (1994), involves the dynamism of each person when demonstrating their belief in the quest for truth, which is "information, technology, know-how, skill" (Grant, 1996) or "information valuable for action" (O'Dell and Grayson, 1998). Knowledge is a rationally justified personal belief, through personal experiences, values and characteristics, and interactions with others (Alavi and Leidner, 2001). Sutrisno (2014) argues that knowledge can be viewed in terms of cognitive, practical, emotional, and socio-cultural aspects. Cognitively, knowledge involves recognizing, evaluating, and interpreting new information and experiences in order to enhance an individual's decision-making capacity (Sutrisno, 2014).

This study uses the knowledge concept of Davenport and Prusak (1998). Knowledge is a fluid mixture of experiences, values, contextual information, and insights, intended to provide a framework for evaluating and integrating new experiences and information. Knowledge originates and is applied in the mind of the knower. (Davenport and Prusak, 1998:5).

Knowledge is divided into many types based on different aspects as follows: (1) according to the explicit nature: there are two types of tacit knowledge and explicit knowledge; (2) according to the subject of knowledge: there are 2 types: personal knowledge and collective knowledge; (3) according to the nature and expression of knowledge: there are 3 types of knowledge: descriptive knowledge (know-what), know-how knowledge and understanding knowledge (know-why).

Contrary to explicit knowledge, tacit knowledge, according to Polanyi (1996) is the knowledge that cannot be described in words, intuitive and unclear. Tacit knowledge depends on senses, skills, experience, and intuition, and is context-specific ((Nonaka and Krogh, 2009) and thus difficult to synthesize and communicate (Dhanaraj et al., 2004). There is no clear boundary between explicit and implicit knowledge (Nonaka and Krogh, 2009, Polanyi, 1966) of an axis Almost all knowledge has a degree of implicit and explicit (Alavi and Leidner, 2001) For example, knowledge of student assessment methods in an international joint training program, The evaluation criteria provided by the foreign partner are visible, while the appropriate way of making the lecturer's comments is implicit, depending on the lecturer's experience. It is more difficult to receive and requires face-to-face interaction (e.g., meeting, attending seminars) to transfer. Therefore, in international training links, the receptivity of knowledge is often more compared with tacit knowledge.

Nonaka and Takeuchi (1995) define organizational knowledge as an organization's ability to create new knowledge, propagate that knowledge within the organization, and incorporate it into the organization's products, services, and systems. This study focuses on understanding the knowledge acquisition of individuals, that is, the process of transforming the organizational knowledge of foreign partners into the knowledge of individual staff and lecturers of international joint training programs. This is the acquisition of individual and collective knowledge (contents, methods, know-how..., about training) and transformed into personal knowledge.

The concept of descriptive knowledge and know-how was introduced by Ryle (1949), and then Anderson (1981) further developed into two groups: descriptive knowledge and know-how. Following this classification, a number of other authors (Garud, 1997) have developed and supplemented with knowledge-know-how. It can be seen that this is a deeper classification than the previous classifications, and is based on the information content - the understanding contained in the knowledge in question.

The theory of knowledge absorptive capacity was first laid by Cohen and Levinthal (1990), later developed by scholars, and extended to knowledge acquisition at both the organizational and individual levels. This theory states that the ability to absorb knowledge will determine an individual's knowledge acquisition and this capacity depends on individual characteristics, especially the level of effort and experience of that individual.

The school of personality traits affecting learning is explored by scholars Esmaeelinezhad and Afrazeh (2018). The individual characteristics exploited to include educational background (Rowold, 2007); conscientiousness, need for control, the degree of risk-taking, openness to new experiences, change resistance (May et al., 2011);

On the basis of Ajzen's (1991) theory of planned behavior, Esmaeelinezhad and Afrazeh (2018) argue that five traits in the personality model, including openness, conscientiousness, extraversion, sociability, and sensitivity (Costa and McCrae, 1992) have an impact on individuals' knowledge management behavior, including knowledge acquisition behavior.

Research falls under the theoretical branch of motivation, which examines the influence of individual motivational factors, including intrinsic and extrinsic motivation (Ko et al., 2005), goals, and needs for personal learning (Dao and Nguyen, 2016, Ojo and Raman, 2017), the same personal expectations and the fulfillment of those expectations (Rowold, 2007).

A review of studies on the influence of individual factors on knowledge acquisition shows that some studies are inconsistent with the results. While the study by Kankanhalli et al., (2012) did not find evidence of the influence of individual knowledge absorptive capacity on knowledge acquisition, other scholars (Ko et al., 2005, Ojo and Raman, 2017) confirm this influence. May et al (2011) also did not confirm the influence of learning motivation on knowledge acquisition. This suggests that there are regulatory factors in the relationship between individual factors and knowledge acquisition that previous studies have not mentioned.

Table 1: Summary of some studies on factors affecting the acquisition of personal knowledge

Authors	Method	Theme and Background	Theoretical basis	Influencing factors through testing	Contribute
Ko et al., (2005)	Quantitative	Knowledge transfer from 38 consultants to 80 client businesses in America	Szulanski (1996): knowledge transfer depends on the characteristics of the giver, the receiver, and the relationship between the giver and the receiver.	The ability to absorb knowledge Intrinsic Motivation, Know-ledge Sharing, Pleasant Relation-ships, Reliability of Knowledge Resources	Extending Szulanski's theory with knowledge sharing and communication factors:

Napier (2005)	Qualitative	Two-way knowledge transfer between US experts and Vietnamese officials andecturers in a training project in Vietnam	Gupta and Govindarajan (2000): Nonaka and Takeuchi (1995): Organizational foregrounds influence knowledge transfor-mation	Do not apply (not quantitatively tested)	stage of relation-ship, capacity of partners, state of communication channel , atmos-phere/context of organization
Rowold (2007)	Quantitative	Receiving knowledge of 84 employees after a day of training at the enterprise	Cannon–Bower et al., (1995): Coaching effectiveness is influenced by group factors: special training, trainees, and organization.	Educational background, Motiva-tion to learn, Meeting expectations, Commitment to business	Adding the role of expec-tation response in the knowledge ac-quisition process.
Kim and Lee (2010)	Quantitative	Acquiring knowledge of 322 employees at 5 private companies and 5 stateowned companies in Korea	Leonard (1995): clear vision and goal is that the organization promotes knowledge management	The level of unders-tanding of the organi-zation's vision and goals Application of information technology systems,	Model of the influence of organizational management on knowledge acquisition..

(Made by the author)

- **Research Methods**
- The study uses qualitative and quantitative methods for in-depth understanding, and at the same time quantifies the influence of factors on the knowledge acquisition of lecturers of international joint training programs. Qualitative research will complement the tests and statistics of quantitative research. Quantitative data analysis methods include statistical methods, data description, factor analysis, reliability analysis, regression, and correlation testing. The author uses SPSS 23.0 software for analysis.

- The object of the research is the factors affecting the acquisition of training knowledge by Vietnamese university lecturers through international joint training programs. Knowledge about training is defined according to the value chain of Sison and Pablo (2000) including training content, teaching methods, and assessment methods.

- In terms of space, the scope of research is international joint training programs implemented throughout the country. However, due to limited conditions, the study limited the scope of research to universities in Ho Chi Minh City. HCM ensures the following conditions:

- Being a public university (public universities and private universities are very different in terms of management context and goals, so in order to focus on in-depth research on factors, the author does not study programs in private universities).

These joint training programs with foreign countries are currently implemented in the following main forms: (i) full-time training cooperation in the country: foreign and Vietnamese partners

jointly provide training services training in Vietnam under the quality control of a foreign educational institution or (ii) franchising: the foreign educational institution transfers the training program to the Vietnamese educational institution and supervises the conditions to ensure quality, and (ii) connectivity: students study for a number of years in Vietnam (usually half or more of the training period) and complete the remaining training period at a foreign university. Therefore, the research focuses on the acquisition of training knowledge by lecturers through domestic and franchised training cooperation programs.

Research Model and Hypothesis

Based on a learning perspective that includes both personal and social aspects (Salomon and Perkins, 1998), and a review of studies on personal knowledge acquisition in the working environment and international cooperation, the author uses the theory of knowledge absorption capacity (Cohen and Levinthal, 1990) and knowledge creation theory (Nonaka and Takeuchi, 1995) as the basis for building a research model including the following 06 independent factors: (1) Expert knowledge (EK), (2) Intercultural knowledge (IK), (3) Intrinsic motivation (IM), (4) Socialized thinking, (ST) (5) Interaction with partner lecturers (IPL), and (6) The role of knowledge gatekeeper (RKG) and 01 dependent variables of Receptive knowledge (RK).

Table 2: Development of research on individual knowledge absorptive capacity

Scholar	Method	Main argument	Contribute
Park and Harris (2014)	An international joint venture case study	The micro-platform includes individuals, processes, and structures, and the interconnections between them, which are essential to the knowledge-absorption capacity of the venture.	Discuss individual factors in the capacity of enterprises to absorb knowledge
Lowik et al., (2017)	A quantitative survey of 200 employees at a Dutch company	Influencing factors: The variety of knowledge available, The variety of relationships Socialization thinking	Personal and social factors affect the ability to absorb personal knowledge
Tian and Soo (2018)	A quantitative survey of 1 Chinese car design company	Influencing factors: Intrinsic motivation	Personal and social factors affect the ability to absorb personal knowledge
Schweisfurth and Raasch (2018)	A quantitative survey of 864 individuals at a large company	Personal perception of the company's commitment to learning. The ability to absorb knowledge in terms of needs and solutions is positively related to employee innovation	In-depth study of personal awareness as the basis for 2 types of knowledge absorption capacity (needs and solutions)
Yildiz et al., (2019)	A quantitative survey of a multinational company in Europe with 2400 employees	Influential factors: Intrinsic motivation, Personal ability (knowledge, past experience), International experience Be open to experience	Personal factors affect the ability to absorb personal knowledge

(Made by the author)

Hypotheses Based on the Theory of Knowledge Absorption Capacity

Professional Knowledge
Pre-existing knowledge (Cohen and Levinthal, 1990), or abilities (Minbaeva et al., 2003) of an individual include that individual's knowledge, abilities, skills, and experience (Yildiz et al., 2003). 2019). The more relevant new knowledge is existing knowledge, the easier it is to recognize and assimilate. "The ability to assimilate knowledge depends on the abundance of existing knowledge structures" (Cohen and Levinthal, 1990). Memory plays an important role in learning. A person can value and assimilate external information related to the facts in their memory. According to Crossan et al., (1999), people learn through the process of intuitive perception and interpretation.

Therefore, hypothesis H1: Professional knowledge of Vietnamese lecturers has a positive influence on their acquisition of training knowledge.

Intercultural Knowledge
The intercultural knowledge base is not mentioned much in theories of knowledge absorption capacity but is recognized by some scholars (Dao and Nguyen, 2016, Yildiz et al., 2019) when researching knowledge acquisition, and knowledge absorption capacity in the context of multinational companies or international joint ventures.

When employees have rich international experiences, they have more confidence to learn in the future (Trevino and Grosse, 2002). When living in a different environment, people develop sophisticated cognitive systems, which in turn promote elaborate methods of processing, interpreting, and understanding the environment (Maznevski and Lane, 2003). The inconsistent information is integrated and transformed by the person into practical actions and solutions.

Therefore, hypothesis H2: Intercultural knowledge of Vietnamese lecturers has a positive influence on their acceptance of training knowledge.

Intrinsic Motivation to Learn
According to Minbaeva et al. (2003) and Kim (1998), the intensity of a person's both cognitive and behavioral efforts is determined by the motivation to learn. Motivation to learn is the willingness and motivation of an individual to receive knowledge. Although the ability to learn is high, if the motivation to learn is low, the acquisition of knowledge will be very limited (Minbaeva et al., 2003).

There are two types of motivation that affect an individual's effort in performing a behavior: (i) intrinsic motivation – comes from within the individual, implying that the individual performing a job is due to the work done the work is enjoyable for the individual, and (ii) extrinsic motivations are rewards for the results, for example, money (Tian and Soo, 2018). A person's efforts under the influence of external motivation are minimal and short-term for the purpose of enjoying The results, and his behavior will be to find the shortest path to achieving the specified result (Reinholt et al., 2011).

Therefore, hypothesis H3: The intrinsic learning motivation of Vietnamese lecturers has a positive influence on their acquisition of training knowledge.

Socialization Thinking
The process of value recognition and knowledge assimilation involves making connections between new knowledge and cognitive structures (Cohen and Levinthal, 1990), which is influenced by thinking style. Each person's thinking style reflects how they process information and make decisions (Lowik et al., 2017). There are two main thinking styles, the dissociative cognitive style, and the association cognitive style

Socialized thinking is thinking when a person uses imagination and intuition to come up with solutions outside of disciplinary boundaries to uncover connections that are not obvious.

In short, socialized thinking helps develop ideas, and synthesize information in new ways, thereby creating a connection between old and new knowledge, and promoting the ability to recognize, assimilate and apply new knowledge.

Therefore, Hypothesis H4: The socialization mindset of Vietnamese lecturers has a positive impact on their acquisition of training knowledge.

Interact with Partner Trainers

Interactions of Vietnamese lecturers with partner lecturers are the three starting points for international training knowledge received by Vietnamese lecturers. Nonaka's theory two decades ago suggested that face-to-face interaction is the setting of three initiations since face-to-face interaction is the only tool for capturing the full spectrum of psychophysiological sensations and responses – an important factor in sharing tacit knowledge (Nonaka et al., 2000).

In the international joint training program, Vietnamese lecturers receive a lot of knowledge currently provided by partners. However, to be able to practice correctly and standardly according to these documents is not easy because the practice requires tacit knowledge about skills, experience, and training philosophy. "Knowing it" is explicit knowledge, and "knowing how doing it" is tacit knowledge (Polanyi, 1966).

Therefore, Hypothesis H5: The interaction of Vietnamese lecturers with partner lecturers has a positive impact on their acquisition of training knowledge.

The Role of the Gatekeeper of Knowledge

In the international joint training program, lecturers not only receive international training, and knowledge not only from interacting with foreign partners, but also through interacting with professional staff, or assistants training the responsibility of the program. This Vietnamese official, referred to as a professional officer for short, when acting as a bridge between foreign knowledge and Vietnamese lecturers, is referred to by theories of knowledge transfer as "the gatekeeper of knowledge". ".

The "knowledge gatekeeper" was mentioned by Cohen and Levinthal (1990) in the theory of knowledge absorption capacity. It is the person who is at the crossroads between two companies in a joint venture/strategic alliance, between the company and the external environment, or between two departments within the company (Cohen and Levinthal, 1990). The expert role represents the support of the "knowledge gatekeeper" in applying knowledge to the context. "Knowledge gatekeepers" contribute to the organization by contextualizing new knowledge, i.e., connecting, and finding the relationship between new knowledge and current context (Kuznetsov and Kuznetsova, 2016).

Therefore, Hypothesis H6: The role of knowledge gatekeeper of professional staff has a positive impact on the acquisition of training knowledge of Vietnamese lecturers.

Research Models
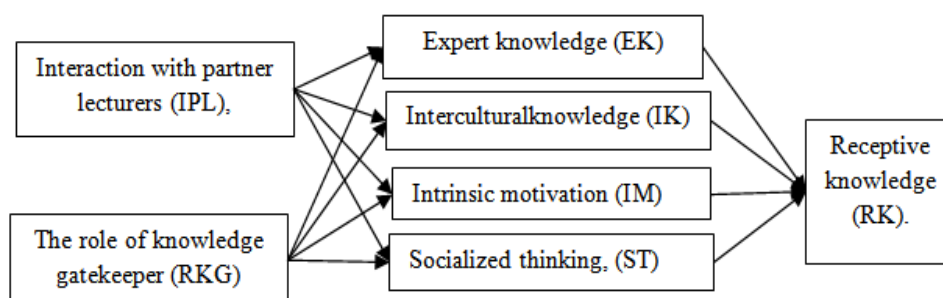
Figure 1: Research models

(Made by the author)

RESEARCH METHODS

- **Qualitative Research Methods**

Qualitative research has the goal of finding new factors, checking and screening independent variables in the preliminary model, preliminary determining the relationship between independent and dependent variables, and checking the scale. Qualitative research was conducted by in-depth interviews with lecturers of two different international joint training programs about their partners and majors, which is the Bachelor of Business Administration program in cooperation between Ho Chi Minh City University of Economics and Business Administration. Ho Chi Minh City with the University of Western Sydney (Australia) and Victoria University of Wellington (New Zealand). The author collects secondary information about the two programs above through information that is disseminated to the public. Primary information is collected through in-depth interviews with lecturers about their knowledge acquisition. The total number of interviewees is 5 lecturers.

- **Quantitative Research Methods**.

Quantitative research has the goal of re-testing the proposed model after adjusting through qualitative research. Quantitative research was conducted with 218 lecturers to test the research model, conducted from February to June 2022.

Data collection: The total number of lecturers participating in the survey is 224/323 lecturers because there are lecturers that the thesis author cannot access, and not all lecturers are willing to assist in answering the question questionnaire.

After removing the invalid answer sheets, the remaining 215 lecturers (66.35% response rate with valid answer sheets), ensured the minimum requirement of sample size.

The answer sheet has high reliability and shows that the respondents have a sense of answering as well as a deep understanding of the questions in the survey. Then, declare and enter data on SPSS 23.0 software. Test the reliability of the scale for the factor variables using the Cronbach Alpha index. EFA exploratory factor analysis to remove observation criteria that did not meet the criteria. Correlation analysis shows whether the research variables in the model are related or not. Multivariate regression analysis will show the influence of each factor on knowledge acquisition through regression coefficient.

The multivariate regression equation of the research model has the form:

Knowledge acquisition = $\alpha + \beta_1 EK + \beta_2 IK + \beta_3 IM + \beta_4 ST + \beta_5 IPL + \beta_6 RKG + e_i$

Research results on factors affecting knowledge acquisition of Vietnamese lecturers

- **Descriptive Statistics Results**

Based on the analysis results running on SPSS software, it shows that the mean (mean) and standard deviation (Std. Diversion) of the factors have high values, this shows that the factors have large values has a great influence on the knowledge acquisition of Vietnamese lecturer.

- **Test the Reliability of the Scale of the Factors in the Research Model**

Results after testing the reliability of the 6-factor scale in a research model to assess the influence of factors on the knowledge acquisition of Vietnamese lecturers, the author relies on the Cronbach Alpha coefficient, all meet the requirements.

- **EFA Factor Discovery Analysis Results**

Using the exploratory factor analysis method will help the author synthesize many observed variables into the main latent components representing the entire data. Due to the use of exploratory factor analysis, there is no distinction between independent and dependent variables (Hair et al., 1998). Therefore, the author conducted exploratory factor analysis with the independent variables simultaneously, and the dependent variables in the model were analyzed separately according to the following criteria: Load factor > 0.5; 0.5 < KMO < 1; Bartlett test has Sig < 0.05; Explanatory variance > 50%. The reason for this can be seen as that each part of the toolkit is evaluated on an issue, so right from the basic content has been divided into different groups. This represents a fairly high level of stability of the toolkit.

- **Correlation Analysis Results**

The purpose of performing the correlation analysis is to determine whether or not there is a linear relationship between the dependent variable and the knowledge acquisition of Vietnamese lecturers. and the independent variables are the 6 factors mentioned above. The results of this analysis form the basis for the regression analysis.

- **Results of Multivariate Regression Analysis**

Regression analysis aims to evaluate the influence of factors on fraudulent financial statements of companies listed on the Vietnamese stock market. Multicollinearity is a phenomenon where the independent variables have an almost linear relationship. Ignoring multicollinearity results in a higher standard error, lower statistical value, and possibly insignificant significance. To test this phenomenon, we use the Variable Inflation Factor (VIF) measure to test the correlation between the independent variables. The condition is VIF < 2 so that there is no multicollinearity Nguyen Dinh Tho (2013), (Dinh Phi Ho, 2014).

The research results show that the VIF of the variables included in the model is very low, all less than 2. Therefore, there is no multicollinearity between these variables.

Model Summary[b]										
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	0.822[a]	0.676	0.672	0.26229	0.676	143.208	6	411	0.000	1.259
a. Predictors: (Constant), EK, IK, IM, ST,IPL, RKG										
b. Dependent Variable: RK										

Source: Author's calculations

Corrected R2 value (adjusted R2) = 0.672. The adjusted R-squared parameter indicates how much (%) of the change in the dependent variable is explained by the independent variable. In this case, it can be said that the volatility of the dependent variable (knowledge

acquisition) due to the impact of the independent variables is 67.2%. In addition, the Durbin – Watson coefficient = 1.259 < 2 shows that there is no autocorrelation.

- **Match the Model.**

The objective of this test is to see if there is a linear relationship between the independent and dependent variables. The model is considered unfit when all regression coefficients are zero, and the model is considered fit when at least one regression coefficient is non-zero. Analysis of variance (ANOVA) was used to test. check the fit of the model. If the significance level has a confidence level of at least 95% (Sig. < 0.05), the model is considered appropriate (Nguyen Dinh Tho, 2013), (Dinh Phi Ho, 2014).

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	59.112	6	9.852	143.208	0.000[b]
	Residual	28.275	411	0.069		
	Total	**87.387**	**417**			
a. Dependent Variable: RK						
b. Predictors: (Constant), EK, IK, IM, ST,IPL, RKG						

Source: Author's calculations

ANOVA analysis shows that parameter F has Sig. = 0.000, showing that the regression

model fits the collected data set and the included variables are statistically significant at the 5% level of significance.

Table 3: Results of regression analysis on the influence of factors on knowledge acquisition of lecturers

Coefficients[a]										
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
	B	Std. Error	β			Zero-order	Partial	Part	Tolerance	VIF
(Constant)	.100	.139		.724	.469					
EK	.066	.024	.089	2.738	.006	.413	.134	.077	.749	1.335
IK	.071	.021	.102	3.424	.001	.297	.167	.096	.880	1.136
IM	.320	.030	.381	10.753	.000	.682	.469	.302	.626	1.597
ST	.232	.029	.282	7.889	.000	.639	.363	.221	.618	1.619
IPL	.215	.031	.244	7.036	.000	.588	.328	.197	.654	1.529
RGK	.112	.023	.140	4.852	.000	.186	.233	.136	.947	1.056
a. Dependent Variable: RK										

Source: Author's calculations

The coefficients in the regression model and the significance of the Sig value. are the most important parameters for us to draw conclusions about the relationship between variables in the multivariable regression model. Regression:

RK = 0.100 + 0.066EK + 0.071IK + 0.320IM + 0.232ST - 0.215IPL + 0.112RGK + ei

From Table 3, it is shown that all the factors on the scale of factors that have a positive impact (positive Beta coefficient) on the lecturer's knowledge acquisition with the significance level in all 6 factors have Sig = 0.000 – 0.006. There is a tolerance of variables > 0.618 and VIF coefficients of all 6 factors (1.056-1,619) < 2, so there is no multilinear phenomenon. The F-statistic is 143.208, the R^2 value is 0.676 and the adjusted R^2 is 0.672, at the Sig = 0.000 significance level; Durbin–Watson coefficient (1< 1,259 < 2) shows that

the results are consistent with the research model.

4.2.1. Discussing Quantitative Research Results

Basically, the test results confirm the effects of some personal factors and some social factors on the knowledge acquisition of lecturers, and at the same time confirm that social factors have controlling relationship details on the influence of personal factors on knowledge acquisition.

Professional knowledge of lecturers has a low significance level (β=0.089) on knowledge acquisition. This is quite consistent with the qualitative research results of the research on professional knowledge factors and in accordance with the studies of Ojo and Raman (2017).

Intercultural knowledge is a surprising factor because the significant effects on knowledge acquisition are quite low ($\beta = 0.102$). This is contrary to the hypothesis and previous research results of Dao and Nguyen (2016) that the intercultural knowledge of Vietnamese managers at the joint venture has a positive influence on the knowledge acquisition of the employees. Compared with qualitative research, it can be suggested that the lecturers who are accepted to teach in the international joint training program have fairly uniform cross-cultural knowledge because of their previous learning/ experience working abroad.

Intrinsic learning motivation affects the knowledge acquisition of lecturers with the highest significance (β=0.381), consistent with theory and some previous studies Tian and Soo, 2018, Yildiz et al., 2019). A person's intrinsic motivation to learn is a sustainable source of energy for the person to acquire knowledge, even if the benefits of learning are not anticipated (Yildiz et al., 2019).

Socialized thinking is a factor that affects knowledge acquisition which is confirmed with a rather strong significance level, (β=0.282) compared to other individual factors. The results are consistent with the theory and previous research of Lowik et al (2017), showing the importance of thinking style to knowledge acquisition in general. In the international joint training program, the higher the socialization mindset of the lecturer, the more knowledge is received. Differences in thinking styles account for differences in information processing and decision-making (Zahra and George, 2002.

The positive regulatory influence of interaction with partner lecturers on the relationship between socialized thinking and knowledge acquisition is strongly confirmed. This is consistent with the theory. The higher the interaction efficiency, the greater the influence of socializing, and thinking on the teacher's knowledge acquisition and vice versa.

Interaction with a partner lecturer is confirmed to have an impact on knowledge acquisition with strong evidence (β=0.244). This is consistent with Nonaka's theory and the results of the previous qualitative (Napier, 2005, Sutrisno and quantitative) studies (Kim and Lee, 2010).

People with a socialized mindset tend to connect, looking for connections that aren't obvious and solutions that are out of bounds (Lowik et al., 2017). Meanwhile, professional staff with the role of "knowledge gatekeeper" have a good impact ($\beta = 0.140$) to explain and guide lecturers about the subject content, teaching methods, and assessment methods that the lecturers are interested in requested by the partner.

CONCLUSION

The results of the qualitative survey clarify the knowledge received by the lecturers, the channel for receiving knowledge, and the influence of personal and social factors on the knowledge reception of the lecturers. In addition to professional and methodological knowledge, lecturers also receive subtle insights into training philosophies. Knowledge acquisition channels include documents, interactions with partners, and through program staff. Documentation is a channel for transferring current knowledge, and interacting with partner lecturers is an important

channel for transferring tacit knowledge about methods, professional skills, and training, while program specialists support lecturers. application of newly acquired international training knowledge in the Vietnamese context. Qualitative research also shows that there are cases where lecturers have good personal knowledge absorption capacity factors, but social factors do not support knowledge acquisition, and their training knowledge acquisition is limited. Meanwhile, there are cases where lecturers have low knowledge absorption capacity, but in an environment with very good social factors, there is a good level of knowledge acquisition. This finding hints at the moderating influence of social variables in the trainer's model of knowledge acquisition about training.

Society's demand for international joint training programs is huge. As of 2019, Vietnam has 70 higher education institutions offering international education programs and 352 joint training programs in operation (Ministry of Education and Training, 2019). Along with the increase in international integration and the expansion of autonomy for universities in training cooperation according to Government Decree 86/2018/ND-CP, the number of international joint training programs University is forecast to continue to grow in the next 5 years.

In order to teach in an international joint training program, in addition to professional requirements, lecturers must also meet English requirements. Due to the lack of qualified Vietnamese lecturers, current international joint training programs are using both Vietnamese and foreign lecturers to secure teaching resources. In recent years, the number of Vietnamese lecturers being trained abroad has increased, on the other hand, the teaching quality of Vietnamese university lecturers has also improved thanks to the receipt of knowledge from foreign universities and international training programs has been available. Therefore, over time, more Vietnamese lecturers will be qualified to teach in international joint training programs, leading to knowledge acquisition by more lecturers.

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FACTORS AFFECTING THE FRAUDULENT FINANCIAL STATEMENTS OF LISTED COMPANIES

Nguyen Le Thi Minh and Tran Huu Ai
[1]Hutech University
[2]Van Hien, University, Vietnam

ABSTRACT

The study of factors affecting financial statement fraud will serve as a basis for managers to improve corporate governance, and efficiency, and at the same time help policy makers to issue policies to control fraudulent financial statements in order to prevent fraudulent financial statements of companies listed on the Vietnamese stock market in the most effective way, contributing to improving the effectiveness of corporate governance authority of the State. There have been many studies on financial reporting fraud done in the world, with the greatest concentration in countries with developed economies such as the US, UK, and Australia, where the users of financial statements are well aware of the role of truthfulness and accuracy of the information in financial statements. However, according to the author's research, up to this point in Vietnam, empirical studies related to the search and identification of factors affecting the fraudulent behavior of financial statements of listed companies listing are limited.

Keywords: Fraudulent financial statements, listed companies, stock market, Vietnam.

1. INTRODUCTION

Recently, financial statement fraud (FFT) has become an increasingly serious problem for the Government, listed companies, and investors, threatening to destroy the confidence of the financial markets' business leaders. That has posed an urgent need to strengthen the management and control of fraudulent financial statements of companies listed on Vietnam's stock market.

Currently, countries are assessing how the COVID-19 pandemic will affect the world economy. Although there are many different views, all agree that the global economy after the pandemic will be very different from before. Indian experts commented that: "The world that we once understood and are familiar with, will most likely become historical memory".

The health of the US economy alone is a huge issue. The US economy accounts for about a quarter of global GDP. Americans lose their jobs, which means they are spending falls, imports into the US drop and investment in manufacturing in other regions plummets The U.S., imports in the first five months of the year fell more than 13%, or $176 billion, compared with the same period last year. In Germany, exports to the US fell by 36% year-on-year. In which, car exports plunged by 24%. Analysts expect this bleak situation to continue. The IMF predicts that US GDP will shrink by 6.6% this year.

So far, China has proved to be better than other major economies thanks to its successful control of the epidemic. Although the economic contraction in the first quarter of 2020 is higher than that of the European Union (EU) and the US (-6.8% compared to -3.5% and -4.8%), China is forecast to recover somewhat in the second quarter, while - the US will be worse during this period. Overall, the International Monetary Fund (IMF) forecasts the global economy will shrink by about 3% in 2020, the most severe recession since the Great Depression of the 1930s.

In the three largest economies, the EU is forecast to contract by -7.5%, the US buy -5.9%, and China by 1.2%. China's GDP last year was $14 trillion, or two-thirds of that of the United States ($21,000 billion), and this gap will narrow further. If this economic trend holds, the two

economies will reach the same size within the next decade, much sooner than previously forecast.

But that's a huge "If". The post-COVID-19 world is full of uncertainties and challenges for China, perhaps on a scale that the country has not seen since its opening to global capitalism in the 1970s. COVID-19, along with the US-China trade and economic competition, occurred at the slowest period of China's economic growth.

Regarding the prediction of financial reporting fraud, previous studies have used financial ratios as a measure. The representative criteria for these factors include gross profit ratio, and asset growth rate (Beasley, 1996; Beneish, 1999; Skousen and Wright, 2006) Difference between operating profit and cash flow, revenue receivable ratio, revenue to total assets ratio, and revenue to total assets ratio (Persons, 1995; Skousen and Wright, 2006). Gross profit ratio (gross profit on sales) or COGS to sales is a ratio that many studies have found to be effective such as Kinney (1987), Beneish (1999). In particular, Blocher et al (1988) argue that this is the best ratio to detect fraud in financial statements. The remaining recommended return ratios are net return on assets and return on assets (Kneutzfeldt et al., 1986 Person, 1995). The inventory turnover (cost of goods sold to inventory) and accounts receivable turnover ratio (sales in receivables) are highly appreciated ratios in the studies of Kinney (1987), Blocher, and other associates (1988), Beneish (1999). Person (1995) tested and found total asset turnover (revenue on assets) to be a useful ratio in identifying fraudulent financial statements. That has posed an urgent need to strengthen the management and control of fraudulent financial statements of companies listed on Vietnam's stock market.

In general, research results in the world show that the group of factors on managers' attitudes that have the most impact on fraudulent financial statements include: the integrity of the Board of Directors, Board of Directors have committed violations of securities laws or relevant laws in the past; professional attitude of management: intentionally limiting the scope of the audit, monopolizing and controlling the company's internal control, limiting access to employees and information, such as companies by: Albrecht and Romney (1986), Heiman et al. (1996).

Next, the second group that affects financial reporting fraud is a group of motivation/pressure factors: including financial stability, pressure from a third party, and pressure to achieve financial goals. (Sales, profit target, ...) because most of the income of the Board of Directors or the Board of Directors depends on the share price, and business results, which is the result of the research of Albrecht & Romney (1986), Bell & Carcello (2000).

Finally, the group of factors of opportunity is the group of factors that have the least impact on fraudulent financial statements, including the poor quality of internal control, financial reporting characteristics, and industry, characteristics of the board of directors, independent audit in Bell & Carcello (2000), Gramling & Myres (2003).

In addition, there are also a few studies that also show a number of factors in the group of pressure, opportunity, and attitude factors affecting financial reporting fraud, including stability. financial decisions, pressure from third parties, financial goals, pressure from investors and equity... (Tran Thi Giang Tan, 2014 and Le Nguyen The Cuong, 2013).

2. Theoretical Basis

2.1. The Concept

• Fraud Concept
In the world, the American criminal researcher - Sutherland (1994) was the one who coined the term "white-collar crime", to refer to the fraudulent behavior committed by the senior

executives of a company. created to deceive the public. Subsequent studies have used this term to replace the common term fraud.

According to KPMG Forensic Malaysia (2003), Fraud is an act of deliberate planning to deceive and carried out directly or indirectly with the intention of depriving others of property for one's own gain. According to Vietnamese Auditing Standard No. 240 (2012, 3), "Fraud is an intentional act committed by one or more persons in the Board of Directors, Board of Directors, employees or third parties by acts of deceit for an unjust or illegal gain".

• **The Concept of Fraudulent Financial Statements**
Based on the term "white-collar crime" of Sutherland (1940), financial statement fraud is fraud often perpetrated by managers. The concept of financial statement fraud is mentioned by many researchers.

Financial statement fraud is a fraudulent act that intentionally falsifies economic and financial information in order to adjust business results by one or more people on the Board of Directors, the Board of Directors, and affects the financial statements. financial statements, (Elliot & Willingham, 1980, Well, 2013;).

Financial statement fraud is an intentional fraud committed by management to the detriment of investors and creditors through material misrepresentation of information in the financial statements (Elliot and Willingham, 1980).

Thus, the common features in the concept of fraudulent financial statements are as follows: Fraudulent financial statements are an intentional act by management to falsify financial statement information on financial statements that is detrimental to investors and creditors. Errors and frauds in financial statements are both potential errors in the financial statements of each enterprise, affecting the results of the financial statements, and erroneously reflecting the actual business situation of the enterprise. . The difference between error and fraud in financial statements is shown in the following table:

Table 1: Distinguishing between errors and frauds in financial statements

Comparison criteria	Fraudulent financial statements	Errors in financial statements
In essence	An intentional, calculated, self-seeking act	Unintentional behavior, sometimes just an unintentional omission or due to limited capacity, recklessness in work, causing mistakes..
In terms of form of expression	Symptoms of fraud are: + Misrepresenting, modifying, forging documents, intentionally miscalculating numbers + Embezzlement of property Deliberately concealing information, making false records about economic transactions	Manifestations of errors: + Omission or incorrect recording of accounting transactions. Applying accounting standards, methods, principles, and regimes incorrectly but unintentionally + Wrong arithmetic calculation or wrong recording
About the level of sophistication	As an intentional act, the performer is often carefully prepared, so the level of sophistication is high, difficult to detect.	The level of sophistication is low, it is easy to detect because it often causes errors by accident
In terms of materiality	Always considered a material misdemeanor	Depends on the size and severity of the error

Source: VSA No. 240, 2012

- **Providing incomplete and Dishonest Information:** One of the principles of fraud is always to conceal the fraud. Businesses with fraud always find ways to hide the violation in the accounting books. Another form of concealment is the concealment of information disclosed in financial statements. Neglecting to disclose information about debt, important events, related party transactions, insider transactions, etc., can be a way to conceal the fraud. Inappropriate, incomplete disclosure can be a way to conceal evidence of fraud. Also in its research works, ACFE shows that methods 1, 2, and 3 are used a lot to cheat, accounting for 55% of total fraud cases**.**

2.2. Theories applied to study fraudulent financial statements of listed companies

- **Asymmetric Information Theory**

"Asymmetric information is a common phenomenon when trading in the market, in which the actors when transacting with each other intentionally conceal information, resulting in one party having full information while the other party has full information. lack of necessary information when making investment decisions or signing contracts"

- **Representation Theory**

Agency theory, also known as delegation theory, was first developed by Berle and Means (1932), and later developed by Jensen & Meckling (1976). The proxy theory of Jensen & Meckling (1976) argues that because ownership and control rights are separate, especially for listed companies, managers (delegates) – are competent people\ forced to use and manage capital effectively for shareholders, instead of serving the interests of shareholders (the proxy), engages in self-seeking acts, including fraud in the press\ financial statements of listed companies.

- **Fraud Scale Theory Based on Red Warning Signs**

The theory of research on factors affecting cheating behavior is based on the theory of cheating balance with red flags (Red flags) initiated by Romney et al (1986). Red flags are potential manifestations that exist in an enterprise business environment to identify signs of fraud and indicate potential fraud (Romney et al., 1986).

- **The Theory of the Cheating Triangle**

Cressey's theory of the cheating triangle (1953) is used to explain cheating behavior that occurs when there are three factors that make up the cheating triangle model: motivation/pressure, attitude (rationalization), and opportunity. When people are faced with personal pressure or external factors from deadlocks and difficulties in personal life such as financial shortages, cracks in relationships between employees, etc. tenants and owners, but if there is a favorable opportunity, the attitude is not good, fraud will easily occur..

2.3 Research overview of factors affecting financial reporting fraud in listed companies.

In addition to reviewing the research works on the topic of financial statement fraud, the study focuses on summarizing relevant studies on the factors affecting financial reporting fraud that are considered on many different topics different aspects. Accordingly, the groups of factors include:

• **Group of Factors on Motivation/Pressure (GFM)**

- Financial stability (FS)

- Financial goals (FG)

• **Group of Factors of Opportunity (GFO)**

- Characteristics of financial statements and operating lines of listed companies (CFSO)

- Size of listed company (SLC)

- Regulatory environment (RE)

- Macroeconomic environment (ME)

- Independent audit (IA)

• **Group of Factor Attitude (GFA)**
- Professional qualifications of the management board (PQM)

- Attitude and professionalism of the leadership (APL)

3. Research Methods

• **Qualitative Research Methods**

Qualitative methods are used to discover, adjust and supplement variables used to measure factors and criteria used in the research, ensuring the construction scale is consistent with the theory and concretized by reality. First, this method is implemented by studying the literature and conducting an overview of previous domestic and foreign studies. Thereby, identifying the groups of factors affecting financial reporting fraud. Next, qualitative research was conducted through in-depth interviews with experts with many years of experience in the fields of securities - finance - accounting.

• **Quantitative Research Methods**.

Through the results of interviews with leading experts, the author uses those results as an input basis for the quantitative research method. In quantitative research, the author uses the survey method to make descriptive statistics on fraudulent financial statements and test the research hypothesis. On the basis of theory, reality, situation analysis results, and expert consultation, the author inherits the fraudulent triangle research model and the fraudulent balance sheet model, to develop a research model of research. Based on the research model, the hypothesis is set as follows:

H: Các Group of factors on motivation/pressure (GFM), Group of factors of opportunity (GFO), Group of factor attitude (GFA) management's influence on fraud in the preparation of financial statements of companies listed on the stock market of Vietnam. The factors selected for the survey include 9 factors (2 factors of pressure/motivation, 5 factors of opportunity, and 2 factors of the manager's attitude). These factors are assessed to be common and important through the results of research reviews in the world and in Vietnam, and the results of in-depth interviews with experts in the field of securities - finance - accounting experience in Vietnam.
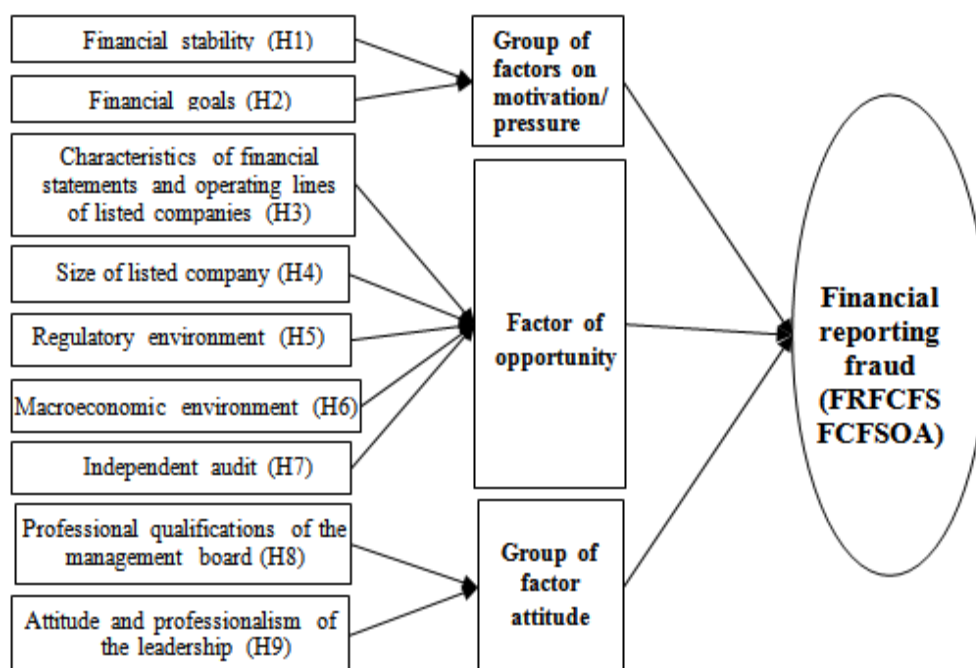
Figure 1: Research model

The research sample (selected survey subjects) to send the survey questionnaires is the independent auditors.

DATA COLLECTION

The total number of survey questionnaires that the author has given out is 540, in two forms: Sending the survey by email and sending the survey directly to the survey subjects. The total number of recovered survey questionnaires was 418 valid votes (accounting for 77.41%). The response sheet has high reliability and shows that the survey subjects have a sense of answering as well as a deep understanding of the questions in the survey. Then, declare and enter data on SPSS 23.0 software. Test the reliability of the scale for the factor variables using the Cronbach Alpha index. EFA exploratory factor analysis to remove observation criteria that did not meet the criteria. Correlation analysis shows whether the research variables in the model are related or not. Multivariate regression analysis will show the degree of influence of each factor on fraudulent financial statements of companies listed on the Vietnamese stock market through regression coefficients.

The multivariate regression equation of the research model has the form:

Financial fraud = α+β1FS+β2FG+β3CFS+β4SLC+β5RE+β6ME+β7IA+

β8PQM+β9APL + ei

4. Result

4.1. Results of Demographic Information about Survey Subjects

On average, the number of survey subjects over five years of experience accounts for more than 90%. The number of technicians with expertise in fraud detection accounts for 76.7%, the survey of these technicians to make a judgment about the influence of factors affecting fraudulent financial statements in companies listed on the Vietnamese stock market is reliable for the research results of the study.

4.2. Research results on fraudulent financial statements of companies listed on Vietnam's stock market.

- **Descriptive Statistics Results**

For the form of fraudulent financial statements, the form of false declaration of profits/assets accounted for the highest average value of 2.91 points compared to the other two forms of fraudulent financial statements again In which, the form of harmonization of profits/assets is 2.85 points and the less common form of fraud in preparing financial statements is declaring a decrease in profits/assets (2.74 points).

For the factor of fraudulent financial statements of companies listed on the Vietnamese stock market evaluation criteria. The survey results show that the criteria used to evaluate fraudulent financial statements of listed companies are often based on the criteria of sophisticated implementation, difficult to detect, which is common (4.48 points), followed by the criterion of the scale of committing fraud in financial statements (4.71 points) and finally the criterion of Frequency of committing frauds (4.17 points).

- **Evaluate the reliability of the scales**

According to the results of testing the reliability of the scale, the Cronbach's Alpha indexes are all greater than 0.8, which proves that the scales ensure the reliability of measuring the popularity of easy forms, methods, and items. Fraud in financial statement preparation, factors affecting the fraudulent financial statements of companies on the Vietnamese stock market.

4.3. Research results on factors affecting fraudulent financial statements of companies listed on Vietnam's stock market.

- **Descriptive Statistics Results**

Based on the analysis results running on SPSS software, it shows that the mean (means) and standard deviation (Std. Deviation) of the factors have high values, which shows that the factors have a high value have a great impact on fraudulent financial statements of companies listed on Vietnam's stock market.

- **Test the Reliability of the Scale of the Factors in the Research Model.**

Results after testing the reliability of the 9-factor scale in a research model to assess the influence of factors on fraudulent behavior on Financial statements of companies listed on Vietnam's stock market, the author relies on the Cronbach Alpha coefficient, all of which are satisfactory.

- **EFA Factor Discovery Analysis Results**

The use of the exploratory factor analysis method will help the author summarize many observed variables into the main latent components that represent the entire data. Due to the exploratory factor analysis method, there is no distinction between independent and dependent variables (Hair et al., 1998). Therefore, the author conducted exploratory factor analysis with the independent variables at the same time, and the dependent variables in the model were analyzed separately according to the following criteria: Factor loading > 0.5; 0.5 < KMO < 1; Bartlett test has Sig < 0.05; Explanatory variance > 50%. The explanation for this can be seen that each part of the toolkit is evaluated on a problem, so right from the basic content, it is divided into different groups. This represents a fairly high level of stability in the toolkit.

- **Correlation Analysis Results**

The purpose of performing correlation analysis is to determine whether or not there is a linear relationship between the dependent variable, which is fraudulent financial statements,

and the independent variable, which are the 15 factors mentioned above. The results of this analysis form the basis for the regression analysis.

- **Results of Multivariate Regression Analysis**

Regression analysis aims to evaluate the influence of factors on fraudulent financial statements of companies listed on the stock market in Vietnam. Multicollinearity is a phenomenon in which the independent variables have a nearly linear relationship. Ignoring multicollinearity causes the standard errors to be usually higher, the statistical value lowers, and may not be significant. To test this phenomenon, we use the measure of variability Inflation Factor (VIF) to test the phenomenon of correlation between independent variables. The condition is VIF < 2 to not have multicollinearity Nguyen Dinh Tho (2013), (Dinh Phi Ho, 2014).

Research results show that the VIF of the variables included in the model is very low, all less than 2. Therefore, multicollinearity does not occur between these variables

Model Summary[b]									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	0.848[a]	0.719	0.710	0.25680	0.719	80.792	9	284	0.000	1.148
a. Predictors: (Constant), APL, PQM, SLC, RE, FS, FG, IA, ME, CFSO										
b. Dependent Variable: FEF										

Source: Author's calculations

Adjusted R^2 value (Adjusted R2) = 0.710. The adjusted R-squared parameter indicates the degree (%) of variation in the dependent variable that is explained by the independent variable. In this case, it can be said that the volatility of the dependent variable (financial reporting fraud) due to the impact of the independent variables is 56%. In addition, the Durbin–Watson coefficient = 1.148 < 2 shows no autocorrelation.

- **Model Fit.**

The objective of this test is to see whether there is a linear relationship between the independent variables and the dependent variable. The model is considered unsuitable when all regression coefficients are zero, and the model is considered suitable when at least one regression coefficient is non-zero. Analysis of Variance (ANOVA) was used to test the goodness of fit of the model. If the significance level has a confidence level of at least 95% (Sig. < 0.05), the model is considered appropriate (Nguyen Dinh Tho, 2013), (Dinh Phi Ho, 2014).

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	47.953	9	5.328	80.792	.000[b]
	Residual	18.729	284	.066		
	Total	**66.683**	**293**			
a. Dependent Variable: FEF						
b. Predictors: (Constant), APL, PQM, SLC, RE, FS, FG, IA, ME, CFSO						

Source: Author's calculations

ANOVA analysis showed that parameter F has Sig. = 0.000, demonstrating that the regression model is suitable for the collected data set, and the variables included are statistically significant at the 5% level of significance.

- **Results of regression analysis on the influence of factors on fraudulent financial statements of companies listed on the Vietnam stock market**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	-0.399	0.179		-2.226	0.027					
	FS	0.136	0.031	0.158	4.414	0.000	0.450	0.253	0.139	0.775	1.290
	FG	0.080	0.026	0.116	3.115	0.002	0.477	0.182	0.098	0.714	1.401
	CFSO	0.313	0.034	0.363	9.103	0.000	0.689	0.475	0.286	0.621	1.610
	SLC	0.195	0.035	0.233	5.586	0.000	0.605	0.315	0.176	0.567	1.765
	RE	0.079	0.025	0.103	3.110	0.002	0.159	0.181	0.098	0.908	1.102
	ME	0.118	0.035	0.134	3.411	0.001	0.542	0.198	0.107	0.638	1.567
	IA	0.145	0.033	0.166	4.355	0.000	0.556	0.250	0.137	0.684	1.462
	PQM	0.047	0.019	0.080	2.397	0.017	0.187	0.141	0.075	0.892	1.121
	APL	0.034	0.016	0.072	2.152	0.032	0.073	0.127	0.068	0.895	1.118

<div align="center">Coefficients^a</div>

a. Dependent Variable: FEF

Source: Author's calculations

The coefficients in the regression model and the p-value significance are the most important parameters for us to draw conclusions about the relationship between variables in the multivariable regression model. Regression equation:

FEF = -0.682 + 0.136FS + 0.080 FG + 0.313CFSO + 0.195SLC - 0.079RE + 0.118ME + 0.145IA+ 0.047PQM - 0.034APL + ei

The author conducts a test to evaluate the factors affecting the fraudulent financial statements of companies listed on the Vietnamese stock market by assessing the significance of the regression coefficient. βi with a pair of assumptions:

H0: $\beta i = 0$

H1: βi 0

The test results show that there are significant regression coefficients of these 3 groups of factors, so it is possible to reject the hypothesis H0, and accept the hypothesis H1 ie the factors belong to the groups of factors on motivation/pressure and opportunities, this attitude really has an impact on fraudulent financial statements of companies listed on the Vietnamese stock market. As follows:

Based on Figure1, we can see that there are 9 variables with statistical significance that affect the fraudulent financial statements of companies listed on the Vietnamese stock market. Those are both factors of the group of motivation/pressure factors: financial stability, pressure from third parties, and financial goals, beta coefficients of these factors show: that pressure comes from other factors. The higher this factor, the greater the possibility of fraudulent financial statements of companies listed on the Vietnamese stock market. Next, two factors belonging to the group of factors on attitude also have a positive relationship with fraudulent financial statements and are statistically significant, showing the higher the violation of the Board of Director's attitude the more likely the financial statement fraud of companies listed on the Vietnamese stock market will be. Finally, two factors belonging to the group of factors of opportunity also have a positive relationship

with fraudulent financial statements: characteristics of financial statements and operating industries of listed companies, legal environment, etc., physical.

Fraudulent financial statements of companies listed on Vietnam's stock market rarely occur. The characteristics of the Board of Directors and the expertise of the Board of Directors are also negatively correlated with fraud in the financial statements, indicating that the greater the influence of these factors, the greater the fraud in the financial statements of the company companies listed on the Vietnamese stock market is limited.

5. Discuss research results on factors affecting fraudulent financial statements of companies listed on Vietnam's stock market.

• Group of Factors on Motivation/Pressure
The group of factors on Motivation/pressure is a group of factors with all variables having a positive impact on fraudulent financial statements of companies listed on Vietnam's stock market. In which, the pressure on the Board of Directors to achieve the financial targets set by the Board of Directors; pressure from completing procedures for listing on the stock market; losses from business activities that threaten the possibility of bankruptcy or delisting on the stock market; third-party profitability ratios or expectations, management is overly optimistic about the information in the annual report, creating an incentive for listed companies to commit financial reporting fraud.

This is explained by the characteristics of Vietnam's stock market, a market with many inadequacies, and risks and still young, investors are mostly short-term investments, only interested in listed companies. Listings have fast profitability and lack market-making organizations. Moreover, many Vietnamese investors when participating in the market lack the necessary basic understanding, analysis, and prediction, often invest in psychological factors, and are influenced by emotions.

Discussing research results on factors affecting fraudulent financial statements of companies listed on Vietnam's stock market.

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6. CONCLUSION
Based on the discussion of the results, the study made some recommendations for listed companies to minimize the factors that are likely to be present in the unit and should develop an anti-fraud program in the company listing, for auditing firms and technicians, such as approaching fraud audit according to fraud risk, exchanging experiences from analyzing financial reporting fraud cases in the world and Vietnam; for investors prudent in analyzing

information in financial statements based on fraudulent practices; for State agencies such as professional associations, the Ministry of Finance and the Securities Commission, it is necessary to strengthen sanctions against listed companies when they violate the law in preparing financial statements and take measures to handle the audit company when there is a mistake in the audit of financial statements, building control departments to improve the quality of the audit of financial statements in order to limit the practice of fraudulent reporting financial statements of companies listed on the Vietnamese stock market.

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A STUDY TO ENHANCE GRADUATES IN HOTEL MANAGEMENT'S PARTICIPATION IN THE HOSPITALITY START-UP ECOSYSTEM

Dr. Sonali S. and Dr. Sushil S.
[1]Gadekar G. College of Commerce & Economics, Nagpur
[2]Gadekar DAIMSR, NAGPUR

ABSTRACT

From 2008 to 2018, we saw a significant number of start-ups in the hotel industry emerge from India and establish themselves both nationally and internationally. OYO rooms, Fab hotels, Trebbo hotels, zomato, and Triliyo are a f With tech-savvy entrepreneurs, one of the most obvious impetuses for business growth in recent years has been the rapid scaling up of enterprises. The results indicate that, contrary to what may be expected, the number of start-ups formed in the past ten years by graduates of the hospitality industry has been significantly lower than that of start-ups founded by individuals with no formal training in the industries of the start-ups. Due to people creating businesses and predicting careers in hospitality from other fields (such as technology, management, or finance), the hospitality industry has grown limitless.

This study aims to determine the causes of the issue of unequal participation and offers some sensible solutions that IHMs may use to devise a system that will provide hospitality graduates a significant share of the hospitality start-up ecosystem. Although the NCHMCT and certain private hospitality institutes have made some major progress in this area, much more needs to be done. A pan-Indian exploratory study was undertaken using a sample of current industry employees who are specific hospitality degrees from various institutes. The study's research material included structured questionnaires based on controlled quota sampling and semi-structured interviews with 10 hospitality entrepreneurs who had degrees or diplomas in the industry. According to the findings, there is a need for some immediate changes in the institutions that provide hospitality education, and additional initiatives have been suggested, including curriculum changes, special programmes for students who show an interest in them, incubation centres, mentoring, and alumni outreach. As the nation's leading providers of hospitality education, IHMs and other hospitality institutes have a much more important role to play as the Indian hospitality start-up ecosystem continues to flourish.

Keywords: Start-up, Entrepreneurs, Institute, and Hospitality

1.0 INTRODUCTION

The DEMOGRAPHIC DIVIDEND, or the population aged 15 to 59 who are economically active, makes up more than 60% of the population of India. One of the most obvious advantages among others is technological progress. Without a question, technology is the mainstay for the quick growing up of enterprises nowadays. Consequently, those that are digitally knowledgeable have a distinct advantage. The research indicates that, contrary to common sense, fewer startups were created in the past ten years by graduates of the hospitality industry than by those who did not receive formal training in the field. As a result, the hospitality industry has expanded to include individuals from a wide range of backgrounds, including technology, management, and finance. which is wonderful.

But it also begs the question, "What is the cause of this disparity?" for the hospitality institutes. This study attempts to identify the causes of this disparity and offer some solutions to boost the involvement of hotel management graduates in the startup ecosystem.

But it also begs the question, "What is the cause of this disparity?" for the hospitality institutes. This study attempts to identify the causes of this disparity and offer some solutions to boost the involvement of hotel management graduates in the startup ecosystem.

1.1. LITERATURE REVIEW

By 2025, it is anticipated that we will have a robust 500 million workforce (Sunita Sanghi & A.Srija, 2016). Additionally, the same population drives economic demand. It appears to be a benefit, but if we can't give them jobs and an acceptable level of living, it may easily turn into a liability. Therefore, it is the duty of business, government, and all other interested parties to make the most of it and prevent it from becoming a liability. Gaining employment is essential to achieving this dividend. And the foundation for creating jobs is entrepreneurship. The service sector, of which hospitality is a component, has tremendous growth potential. For Indian hospitality start-ups, this is a significant opportunity. India is not a new country when it comes to entrepreneurship; in fact, more than 50% of the workforce there is self-employed (Sabrawal, Feb 2018).

However, the vast majority of those are unregistered members of the informal economy. The majority of them are run by a single owner. Encouragement of formal sector start-ups that can generate formal wage jobs is essential for the economy to expand. From 2008 to 2018, a significant number of start-ups in the hospitality industry came from India and established themselves both locally and internationally. To mention a few, there are OYO rooms, Fab hotels, Trebbo hotels, zomato, and Triliyo.

2.0 Current Projects by NCHMCT and Other Organisations:

The NCHMCT has launched a number of great projects.

similar to the IHMs' entrepreneurship programme, which is carried out in accordance with the Ministry of Tourism's requirements as part of the "Capacity Building for Service Providers" (CBSP) Scheme. sponsored Institutes for Tourism & Hospitality In order to help people become self-employed, this programme offers short-term (150-hour) courses in skills like cooking, using a tandoor oven, bartending, baking, working in a homestay, and making halwai, an Indian sweet. But there is a distinction to be made between self-employment and entrepreneurship. However, this program's primary objective is self-employment rather than the development of fresh, cutting-edge sta The NIESBUD conference, which took place in May 2019 at IHM Mumbai, recommended that all institutions establish an entrepreneurship cell.

A fantastic endeavour to foster entrepreneurship is the National Council Guidelines, issued January 4, 2019, on the subject of Entrepreneurship & Enterprise: A Collaborative Learning Experience for Students, which offers a number of recommendations for the institutions to follow.rt-ups. The recommendations include incorporating entrepreneurship into the curriculum like any other subject, teaching it as a life skill rather than as a management or economics subject, encouraging students to take on real-world projects, and preparing them for entrepreneurship challenges through hands-on learning.

Additionally, it lists some specific actions that the institute must perform, including:

- Interaction between subject matter experts and students for guest lectures

- Arrange for students to be sent to entrepreneurship-related events, networking opportunities, and TED presentations so they may meet new individuals from business and academics and gain inspiration and advice.

- Establish incubation centres to link various participants in the entrepreneurial ecosystem, such as students, young business owners, funding organisations, mentors, etc.

- Encourage students to enrol in online programmes and other types of training provided by other institutions.

- Establish a speaker series on entrepreneurship to educate students about the trends and problems affecting the sector.

- Interaction between subject matter experts and students for guest lectures

A few institutions, to mention a few, have already started making important efforts in this direction:

An incubator has opened at IHM Bhubaneswar.

SIHM Indore & IHM Hyderabad - In an effort to encourage experiential learning, some institutions have established start-up cafes, which are independently run by the students with initial assistance from the institution.

An entrepreneurial cell has been established at IHM Chennai.

An entrepreneurial cell is being established at CIHM, Chandigarh.

It will take some time for the measures to have results, but all of the aforementioned steps taken by various institutions are commendable. Having said that, it is essential to note that more concentrated and significant efforts in this regard are required for the scale and magnitude at which we anticipate start-ups to expand.

A survey of recent graduates in hotel management was done in order to better understand the viewpoint of the institutes and hospitality students. The following explanations for the situation are shown by data gathered from a survey of hospitality institutions and entrepreneurs who are also hotel management graduates:

Out of the total number of students in the class, only few choose to pursue entrepreneurship. The underlying cause of this, among others, is

Only students with a natural aptitude for entrepreneurship or those from business families are accepted into the undergraduate programme due to: a lack of inspiration from the institute toward entrepreneurship; a practical understanding of day-to-day business affairs; an overemphasis on operational/skill-oriented training in the curriculum; and these factors. Additionally, very few institutions keep track of the number of graduates who go on to found their own businesses, therefore there is no precise information available on this subject. It is accurate to say that the majority of students prefer to work for a few years to obtain expertise before launching their own business. However, by that point they have lost all touch with the institute because there is no system in place to update institutes' current profiles of graduates. As a result, these pupils are unable to seek the appropriate guidance at the appropriate moment from the institute or college. Due to lack of expertise and/or professional advice, the available alternative sources of assistance cause them to encounter several issues and frequently end in project failure. With the help of its incubation centres designed to foster entrepreneurship, such as I SINE at IIT Bombay and (ii) CIIE at IIM Ahmedabad, many IITs and IIMs in India have produced some laudable successes. In order to put these prestigious universities' best practises into practise, we had a discussion with them while keeping them in mind as the benchmark and places to learn from.

3.0 Support from Government Policy:
The government plays a crucial role in encouraging start-ups. The difficulty of finding money is one that new, aspiring business owners must face. And in response, the administration has made some positive strides in this area. The portal "startupindia" is the most notable example, offering assistance to business owners in a variety of areas, including research, networking with mentors,

other startups, and investors, patent application funding, income tax exemption, self-certification, etc.

3.1 The Department of Science & Technology (DST), Government of India, created the National Initiative for Developing and Harnessing Innovations (NIDHI), a programme umbrella.

Furthermore, many departments are running different programmes. resembles the National Initiative for Developing and Harnessing Innovations (NIDHI) programme, which was started by the Department of Technology. The Department of Science & Technology (DST), Government of India, created the National Initiative for Developing and Harnessing Innovations (NIDHI), an umbrella programme, with the goal of nurturing ideas and innovations (knowledge-based and technology-driven) into prosperous start-ups. DST has started the NIDHI-Promoting and Accelerating Young and Aspiring Innovators & Startups (NIDHI-PRAYAS) programme as part of this strategy.

The programme is designed for idea-stage business owners with physical product offerings who need assistance with prototyping.

Innovators would also benefit from physical infrastructure, technical direction, business mentoring, etc. Through PRAYAS centres in established TBIs, DST hopes to assist 500 of these innovators annually over the next several years. Over the next five years, 10 centres will be established, each of which will help 10 innovators annually. The PRAYAS centres should make sure that innovators who apply to seek funding are incubated using STEP/TBI.0 or will be incubated wit As a national Initiative Management Unit (PMU) for the PRAYAS programme, DST has nominated the Society for Innovation and Entrepreneurship (SINE) at IIT Bombay (DST-NIDHI-PRAYAS - PMU, n.d.).

3.2. The Ministry of Tourism, Government of India, is supporting government-sponsored tourism and hospitality institutes financially through its "Capacity Building for Service Providers" (CBSP) programme. The phrase "Entrepreneurship Program" is another name for it. Under this programme, 150-hour short-term courses in trades like cook, tandoor, barman, baker, homestay, multi-skilled caretaker, and halwai - Indian sweets - are given. Additionally, this program's goal is to encourage independent work.

4.0 RESEARCH OBJECTIVE
The goal of this study is to increase the hotel management graduates' involvement in the hospitality entrepreneurship ecosystem.

5.0 METHODOLOGY
In order to comprehend various viewpoints and produce an extensive result, it is crucial to take into account all the stakeholders. Consequently, the study incorporates the results from several relevant data sources.

.   Information was gathered from hotel management graduates who are also entrepreneurs in the hospitality industry. To learn more about this group's experiences launching a business after taking a hotel management course, a survey was given to them. We can identify their actual issues and work to overcome them with the use of this data.

•   Surveys of hospitality education institutions (mostly IHMs under NCHMCT) were conducted to learn more about the state of the entrepreneurial development programmes offered by various institutions.

•   In addition, prestigious institutions like IIT Bombay and IIM Ahmedabad have made commendable efforts by establishing incubation centres called SINE and CIIE, respectively. Therefore, taking note of their endeavours can greatly aid us in imitating their actions to enhance the start-up culture at IHMs.

6.0 RESULTS AND DISCUSSION:

The results of the survey for entrepreneurs

6.1 Q1. Was your decision to become an entrepreneur inspired by or motivated by any of the instructors at your college?
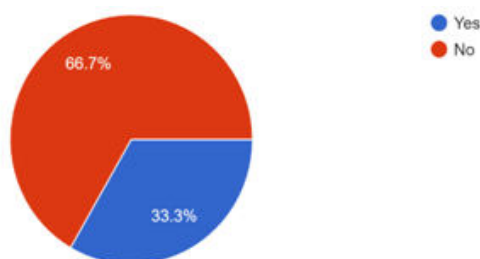
- Only one-third of those surveyed said that attending the institute inspired them to start their own business.

- The actual motivational elements included having a family business, having a childhood desire of opening a restaurant, the pay scale in the hotel industry, etc.

6.2 Q2. How long did it take you to launch your business after graduating from hotel management school?
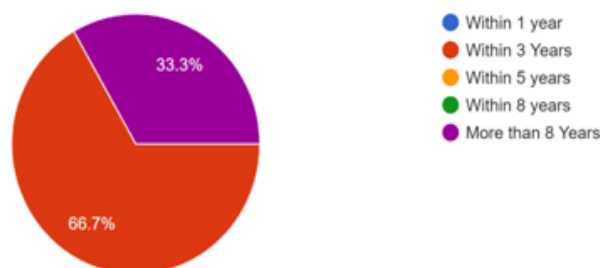
Ans. The following information from the respondents may have contributed to the variation in the initiation times:

- The current curriculum primarily teaches you to become an operational hospitality professional rather than striving to be an entrepreneur.

- Rather of fostering a decision-making, entrepreneurial, or risk-taking mindset, the teaching strategies focus on helping you land a decent job or succeed in an interview.

6.3 Question 3: Do you think the hotel management curriculum lacks the financial and economic expertise that an entrepreneur needs?
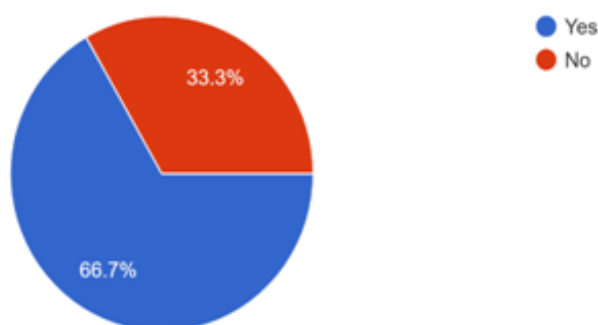
Diagram 3

Answer The respondents stressed the importance of include labour regulations and government-mandated standards (licences) for entrepreneurial goals in addition to the criteria of financial repercussions and sustainability.

6.4 Q4. Did you seek advice from your institution or another hospitality college for information on statutory (Govt related) projects or any guidance to launch your business?
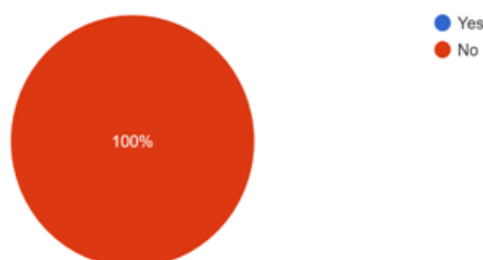
Diagram 4

Ans: None of the respondents resorted to the institute for guidance; instead, they enlisted the aid of their friends, relatives, and personal networks, as well as taking short-term (part-time) courses.

Results of the survey for institutions of hotel management: 6.5 Q5. Does your school keep track, year by year, of the number of students who go on to start their own businesses, either right away or later?
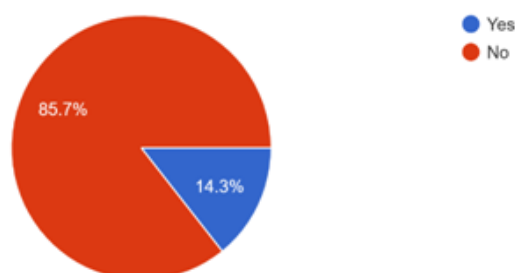
DIAGRAM 5

Only 14% of the institutes polled maintained records of these pupils, the answer.

Does your institution or institute offer a unique entrepreneurship course programme?
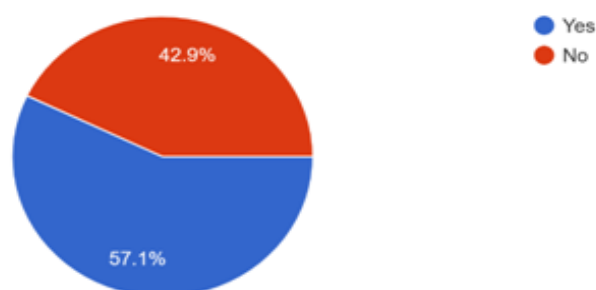
DIAGRAM 6

Ans. 57% of the institutes conduct some type of entrepreneurship programme, which includes hosting guest lectures on the topic and offering entrepreneurial courses in bakeries, Indian sweets, tandoors, etc.

6.7 Q.no 7. Does your university have an incubator or cell for entrepreneurs?
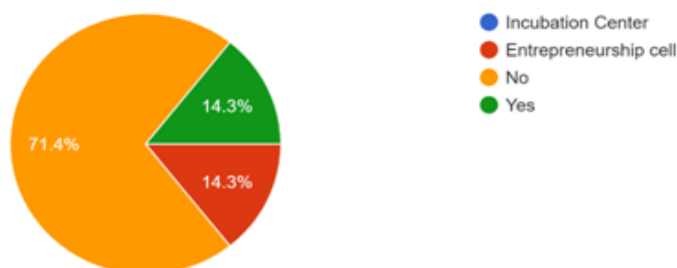
DIAGRAM 7

Ans. Less than 30% of institutes were found to have an entrepreneur cell.

7.0 A few of the open-ended questions yielded the information below.

- The majority of them prefer to delay starting their business for a few years in order to get some experience before making the jump into entrepreneurship as well as for other reasons like money raising, stability, etc. Thus, they were all employed throughout this time.

- Less than 5% of the cohort members are aware of their entrepreneurial cohort mates.

- Some institutions fail to identify them as entrepreneurs. All of them are prepared to offer their assistance to the institutions that will strengthen the start-up environment.

- The majority of them think that teachers play a crucial role in inspiring pupils and fostering an entrepreneurial climate in the classroom through programmes like workshops on entrepreneurship skills and ministry of skill development certification.

8.0 Some Ideas for Enhancing the Institute's Startup Ecosystem Include:
- They all agree that the institutions ought to start holding particular classes just for students who want to pursue careers as entrepreneurs.

- Discussion forums where successful businesspeople can share their tales of success and failure.

- Add entrepreneurship-related topics to the present hotel management curriculum, such as legal, financial, feasibility, and funding issues of a new enterprise.

- Form partnerships with financial organisations to obtain loans and maintain breakeven.

- Arrange seminars, field trips to start-ups, guest lectures, and case studies.

- Establishing an incubator.

9.0 Summary and Recommendations
9.1 ENTREPRENEURSHIP CELL: NCHMCT recommendations currently include setting up an entrepreneurship cell and an incubation centre, but less than 30% of institutes have been able to do so due to a lack of understanding of how the cell operates. The suggestions for running an entrepreneurship cell are listed below based on what has been learned from the IIT Kanpur's current entrepreneurship cells.

9.1.1 Establishing a core team of an entrepreneurial cell with students working under academic mentorship. The E cell can concentrate on the things listed below.

9.1.2 Establishing a database of mentors: The cell should concentrate on networking with industry experts for advice as well as with alumni who are currently entrepreneurs and other executives; this will serve as the foundation for the database of mentors for prospective entrepreneurs.

9.1.3 Planning an annual entrepreneurship festival—an occasion with a variety of competitions, panel discussions, lectures, and other similar activities to encourage entrepreneurship.

9.1.4 It ought to serve as a forum for prospective businesspeople to network with industry professionals.

9.1.5 This may also make it easier for those with startup ideas to get investors to provide seed money.

9.1.6 The cell should once more contain various smaller teams of 2 to 3 students working on various tasks, such as networking with the business community and alumni who are entrepreneurs, research teams focusing on research and innovation in the hospitality sector, and so forth.

9.1.7 It should begin under the direction of faculty members and eventually become self-sufficient and administered by students.

9.2 EXTRA-CURRICULAR TRAINING FOR INTERESTED STUDENTS:

Identifying the kids who are determined to become entrepreneurs in the future and then offering them a special programme to educate them on the nuances of entrepreneurship. The instruction should cover the specifics of money, policy, taxation, taking advantage of government initiatives, etc. The best days for these unique seminars are Saturdays.

9.2.1 Motivating Factors for Starting a Business:

Due to a lack of desire, the research indicates that very few students choose to become entrepreneurs. It is crucial to inspire students in order to create the proper atmosphere in the institutions.

9.2.2 Good alumni connections include: o Maintaining a strong alumni connection is also crucial for the growth of entrepreneurship. According to the data, more than 85% of institutions don't keep track of how many graduates go on to found their own businesses. On the other hand, all business owners are willing to use their individual resources to support the establishments' efforts to promote entrepreneurship. There needs to be an alumni in charge of this at the

9.2.3 Practical Exposure

. In addition to academic instruction, it is crucial to give students in entrepreneurship practical experience. Here's how to go about it:

. Having the students work on and resolve real-world issues faced by the industry. Every establishment experiences some kind of interruption, so reach out to them and offer to help them with their issues.

. There is a misconception that training should only take place in five-star luxury hotels, which is equally vital, but students who want to become entrepreneurs must be assisted by the institute in getting the training they need at start-ups. They will undoubtedly gain practical experience with running a firm thanks to this.

. Student-run businesses on campus, such as a student café and food festivals where students can set up their own booths.

9.2.4. The Institutes Have a Strong Culture of Research:

. Since research and innovation are strongly tied to entrepreneurship, students should be encouraged to do research, develop novel ideas, and market their goods and services in line with contemporary trends.

9.2.5. **Faculty Development:** o According to all respondents, the faculty plays a significant part in inspiring pupils. Therefore, it is crucial that faculty members receive particular training since they will inspire pupils.

9.2.6. **Improving the Standard of Strategic Subjects:** o These include topics like hotel accounting, food and beverage management, and strategic management.

9.2.7. Maintaining contact with and coaching students who have graduated, are working, and desire to launch a business after a short period of time in business: According to the research, the majority of entrepreneurs choose to work for a few years before launching their business. The majority of them require support during this time in order to plan their course of action and avoid becoming discouraged and giving up on the concept.

9.2.8. **Removing the Fear of Post-Failure Depression:** Many students dread failing in their profession if the start-up is unsuccessful. This worry can be removed by offering them a variety of placement support. Therefore, the institute should assist them in finding employment if the endeavour fails.

10.0 **Restrictions:** Compared to the growing number of hotel management institutes in India, this study uses a fairly small sample size for inference. A study like this can spur others who share the same interests to create a venue for exposure and indulgence using rules and regulations under a single hospitality roof. We are confident that the knowledge gained from this study will aid future research and produce a lot more implementation ideas.

In the interim, we commit to presenting alternate methodologies to fill in the gaps by increasing the sample size of respondents, institutes, and a more in-depth and structured questionnaire covering elements of the scope of new subject in the current syllabus frame, time-bound, expertise facilitators, and cues to entrepreneurial studies.

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FUNCTIONALLY RESPONSIBLE WASTE PLASTIC MATERIAL, ITS IMPACT ON THE ENVIRONMENT AND BIOREMEDIATION

Pritisha Barik and Trinath Biswal*

Veer Surendra Sai University of Technology, Burla Sambalpur 768 018, Odisha, India

ABSTRACT

Plastic is now becoming a very essential product in our day to day life of modern man. Its use has been noticed in almost all the important fields. Production of plastics and their extensive use cause of a significant threat to the living organisms. The annual production of the plastic in the world is approximately estimated to be 300 million metric tons and almost 50% of the total plastic produced has been rejected after use without proper recycling and management in every year. Their extensive production and use are the cause of huge accumulations of plastic wastes in both land & oceanic environments. The management, safe disposal of plastic wastes now becoming a serious global issue. Thus, recycling of plastics is now an acceptable necessity in order to protect our environment from hazardous plastic pollution. Recycling of plastic is associated with very high cost, more consumption of electricity, expensive transportation, problems of segregation, etc. The recycling of plastic comprises a variety of approaches viz. renewing, carbon sequestration, synthesis of carbon nano tubes etc. This review gives emphasis on the bioremediation of waste plastic materials for existence of a sustainable environment.

Keywords: Macromolecules, incineration, carbon sequestration, bioremediation, sustainable environment

I. INTRODUCTION

In 1940 plastic was first synthesized through an inadvertent chemical reaction and after that it surprisingly dominates in every sector of our day to day life, i.e. construction, packaging, electronic, electrical industry and medical applications. Due to rapid industrialization and urbanization, plastic products have been used as an important material to prepare new essential products in the whole world. Plastic contains long parent chains of carbon of high molecular weight and due to its hydrophobicity, it is non-degradable in nature. Plastics have been classified into two categories such as thermo- setting that cannot be molded on heating and cannot be recycled or reused and thermoplastic that can be molded into different dimensions on heating. The gross plastic waste generation touches approximately 330 million tons at every year and it drastically increased year after year. As per the report of the CPCB, the generation of plastic waste in India may be crossed 7.2 million tons in 2025 and per day plastic waste generation is approximately 1708 tons. Plastic wastes have an extensive adverse effect not only our environment, but also in the marine ecosystem and badly affects the fertility of the soil, releases toxic gas to the atmosphere, and its accumulation in the environment is the cause of serious health hazard risks and change inhabitants of wildlife [1],[2].Thus, to avoid or decrease the plastic pollution, scientists and researchers are focusing for the development of effective, innovative and eco- friendly techniques for the synthesis of novel biodegradable plastic and its suitable remediation .Bioremediation technique involves the use of microbes such as peroxidase, laccase, oxidoreductase etc. in order to degrade the plastic wastes. These enzymes help in breaking down of the plastic or polymer chains into the fragmented chain of monomers, dimers, and oligomers that can again be utilized by other microbes as the source of carbon or energy. For this purpose, systems biology genetic engineering and the man-made microbial system have been used to make genetic modification so that their degradation ability can be enhanced. These methods will provide us an alternative ecofriendly approach against the traditional landfilling technique and incineration [3],[4]. Figure-1 shows different plastic wastes in the marine ecosystem and its toxic effect.

Fig. 1: Plastic wastes in marine environment and its effect

II. PLASTICS IN VARIOUS ENVIRONMENTS

Plastics are now considered as an omnipresent material and due to their durability, light weight, good surface finishes and less cost of production. These are seen in the land and water bodies in massive scale and particularly it is abundant in marine environment. Plastics are generally synthesized from either petroleum-based products or from its derivatives. In our day to day life modern man uses both synthetic polymers like PET, PE, PVA and natural polymers like starch, chitin, alginate, cellulose etc. The addition polymers like PVC, polyethylene, polypropylene is made of carbon backbones, which cannot be degraded or undergo hydrolytic cleavage by any means. Thus, these polymeric materials are called as non-biodegradable materials. The condensation polymers like polyurethane, polyamide; polyesters, etc. are prone to hydrolytic cleavage because these contain amide or ester linkage, which cannot be easily broken down by the microbial community. The polymers like PLA, PGA, PCL etc. are although synthetic polymers but these are biodegradable in nature.

Condensation polymer contains toxic additives and will remain in the environment for 10 to 20 years due to their resistance to oxidation or biological degradation in landfill. Again, due to their crystalline structure and high molecular mass, plastics cannot undergo bio-degradation. The addition polymer cannot also be biodegraded because of its chemical inertness. The commercial plastics are highly stable in the environment as they contain stabilizing agent, fillers, antioxidants, additives etc. and can never be degraded even after thousands of years. [5] [6]

III. Environmental Impacts of Plastic Pollution

Management of plastic waste is very tedious and requires huge capital for its degradation. In Norway, Switzerland, Czechoslovakia, and EU approximately of 7.4 ton of plastic are land filled and incinerated. Land filling is very uneconomical and unscientific. It requires huge space; energy and the intrinsic valuable materials are ultimately of no use. Plastic pollution also causes harmful and catastrophic ecological effect in the marine environment. It acts as an environmental threat to the wildlife. The problem is due to absorption, intertwinement and absorption of plastic objects in the living species. The young animals are also entangled in the debris of the plastic and are affected by serious injuries. When the animal grows, it faces the

problem of breathing, feeding, etc. due to massive plastic contamination. In marine environment the birds mistakenly take the plastic as their food which is ingested in their body. The ingested plastic remains into the digestive system which decreases the food intake, reduces secretion of gastric enzyme, reduces steroid hormone and badly affects the reproductive ability. The health problems associated with these deposited lethal substances are cancer, neuron disorder, imbalance in hormone, growth retardation etc. The plastic fragments also attract many disease-causing vectors to our ecosystem which adversely affect the human health. In the oceanic environment, plastics are found to contain toxic organic matters such as polychlorinated biphenyls (PCBs), phenol, pesticides, other chlorinated compounds, aromatic hydrocarbons, DDT etc. These compounds pose the problem of infestation to wildlife and experience the substantial biomagnification and bioaccumulations inside the body of the animals or fishes, which has a deleterious effect on human health. Table-1 represents the various factors that influence bioremediation. The plastic fragments also attract many disease-causing vectors to our ecosystem, which adversely affect the human health [7],[8]

Table 1: Various factors and properties of polymers help in bioremediation.

1.	Abiotic Factors	Temperature pH Salinity UV Radiation Moisture Content
2.	Biotic Factors	Biosurfactants Hydrophobicity Extracellular Enzymes Initial Biomass
3.	Polymer Properties	Morphology and size Hydrophobicity Molecular weight and Crystallinity Presence of Plasticizer and additives Functional groups

IV. DIFFERENT STAGES OF BIODEGRADATION OF PLASTIC

The fragmentation of plastic materials through the microorganisms is called as biodegradation. As plastic is intrinsically nondegradable, it accumulates all over the world in soil, water and marine environment. A very few microbes like yeasts, fungi, etc. are found to degrade and digest some specific plastic materials. To curb plastic waste by employing microorganisms in the laboratory is a challenging task for researchers because of the availability of variety of efficient microorganisms. Thus, exhaustive knowledge on microbe and their mechanism of interaction with plastic is vital to develop efficient eco-utilization. Biodegradation of plastic by microorganism generally carried out through four phase's viz. adherence to the surface, fragmentation, assimilation and mineralization [9],[10]

A. Adherence of Microbes

This process can be carried out by the microbes in the surface of the plastic substrate through sequential steps. The microbes are first settled and then formed layer over the plastic surface through a particular mechanism. In this process some of the microbes modify their morphology according to the environmental condition. Then these species are in search of carbon assimilation from nearby sources. The process of interaction of microbes on plastic surface is a process, which undergoes through a no. of stages and affected by the biotic and abiotic factors. The abiotic factors include topographic condition, pH, temperature, coarseness of the surface, oxygen, etc. The degraded morphology of polymer is due to the abiotic factors, which helps in the settlement of microbes. Among the endogenous and exogenous factors, the endogenous

factors interact with the surface and accumulate over it by forming a thin film. Thus, after settlement is over, the polymeric material starts degradation. In this process temperature plays the vital role in the adherence of microbes over the polymer surface. In addition to this, biodegradation process also relies on the coarseness of the surface, energy of surface etc. Change in any factor affects biodegradation and it is observed that all microbial settlements and the formation of biofilm will lead to degradation of plastic wastes. Microbial adherence can be determined through different advanced techniques. The bacteria R. ruber can easily settle on the surface of polyethylene and form biofilm. Then it degrades the polyethylene surface and decreases the hydrophobic property of the surface. Figure-2 shows the different stages of degradation of plastic wastes. The adherence of microbes on a polymeric surface depends upon the ability of the microbes, the properties of the polymer, and the properties of the surroundings, etc. Thus, for enhancing the rate of degradation the optimization condition is vital. During the process of degradation, the mechanical properties, bond strength have been changed which results in the decrease of the molecular mass of the plastic wastes and the waste plastic products gradually undergoes fully degradation after a few years.[11],[12]
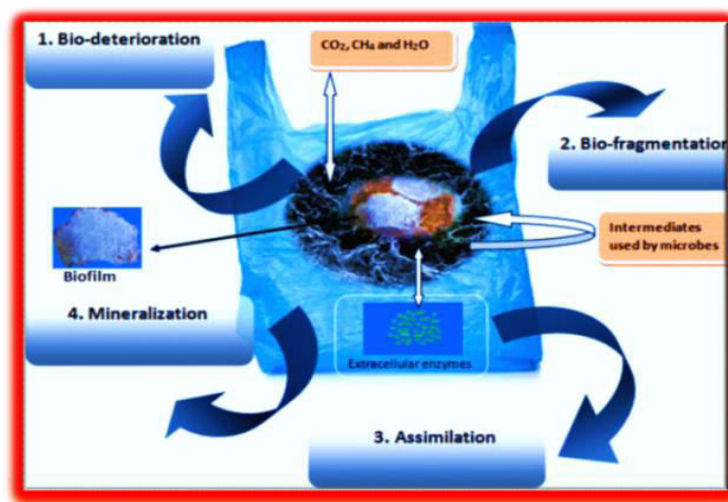
Fig. 2 various stages of biodegradation of plastic

B. Process of Fragmentation

The large quantities of polymeric materials undergo degradation by the chemical forces and several surrounding dynamic environmental factors. The microbe's attack the polymeric materials owing to its greater hydrophobicity developed by the interaction with abiotic factors. The various enzymes have the capability of breaking of terminal branched polymers into smaller fragmented molecules. The extracellular enzyme is accountable for the retardation in molecular weight and alteration of carbonyl bonds in polymeric chains at the edges. The enzyme oxidoreductase mainly causes the degradation of polymer into small fragments. The other enzymes, which specifically attack the carboxylic bond, are lipase, cutinase, esterase, hydrolase etc. in order to hydrolyse the plastics. In hydrolase the serine, histidine, aspartate present in the active site helps the hydrolysis of waste plastic debris [13],[14].

C. The Mechanistic Pathways

At first there is interaction of aspartate with histidine takes place, which leads to the formation of hydrogen bonds. Then histidine is orienting itself to interrelate with serine as a result of which the serine is deprotonated and a nucleophilic alkoxide is formed. This group then attacks ester linkage to form alcohol terminal groups and an acyl enzyme is generated. Then the specific enzymes are secreted that generates free radicals. For example, monooxygenase, dioxygenase

and oxidoreductase increase one or two oxygen atoms to form alcohol or peroxide group, which can be easily fragmented. Similarly, peroxidase catalyzes the reaction between peroxide molecule and the electron acceptor. Generally, two kinds of oxidation reactions take place on the surface of polymers via hydroxylation and catalytic free radical reaction. Hydroxylation enhances the polarity of the molecule whereas the catalyzing free radical reaction introduces the chain reaction which helps in the acceleration of the polymer transformation. In this process along with free radical low molecular weight fragments with oxidative ends are formed which helps in microbial ingestion. The oxidation of plastic depends upon the exposed length, used additives in it and the types of microbes employed. For example, polyester can be effectively depolymerized by the microbe actinomycetes. The analytical techniques employed to measure the synthesis and destabilization of functional group of plastic by FTIR Spectroscopy and the oligomers can be separated by GPC &High-pressure liquid Chromatography. NMR can be used to verify the mass and structure. [15], [16]

D. Process of Assimilation

The small and low molecular fragment obtained by fragmentation process is oligomers that easily enter to the metabolic activity by passing through the cell membrane. The biodegradation of plastic involves the transfer of electron and the energy is also released during this process. The monomers obtained after fragmentation resembles the carboxylic acid, acid amide, alcohol. The enzymes like cutinase, lipase, esterase etc. present in the microbes are causing hydrolysis of different plastics. As per the most of the research data the depolymerization of polyolefins and PE occurs via several oxidation steps along with β-oxidation. Then the electrons obtained from plastic gains energy and proceeds via the respiratory system to the electron acceptors. In this case aerobic biodegradation is much more effective than anaerobic. In assimilation process the movement of plastic can be determined from the CO_2 generation or the growth of the microbes. For this purpose, the polymer must be the carbon source by which it can be easily extracted from the microbial cell. Thus, the biodegradation of plastic has basically involved the erosion of the surface. In this process the pro-oxidant catalyzes the free radical generation that can again react with oxygen to carry out oxidation again.

But in soil the evolved CO_2 cannot be determined. Figure-3 shows the % of degradation of waste plastic materials by the microorganisms. Thus, to determine the carbon mobility isotopic labelling and FTIR technique can be used.[17], [18]
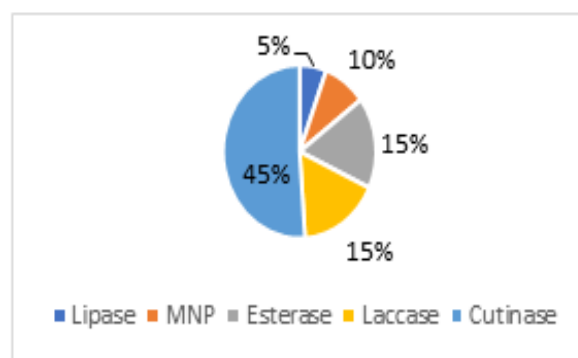
Fig. 3: Degradation of Plastics by enzymes in 2018

E. Process of Mineralization

The process by which the biomass is converted into gaseous form, salts, water, minerals and biomass residues is called mineralization. The complete mineralization process involves the complete conversion of solid carbon to CO_2 and H_2O along with CH_4either by aerobic or by the anaerobic process of oxidation. During this process CO_2, H_2O, $CH_4$and energy is released to the atmosphere. Recently South Korean researchers have utilized mealworm for the biodegradation

of Styrofoam and they reported that within a fortnight more than 75% of the plastic was ingested by the mealworms. This research covers the way for a new hope to make the earth free from plastic pollution in the days to come. Some researchers investigated the mineralization of polystyrene labeled with ^{14}Cby the microbe P. variabile and found that the result is very encouraging after sixteen weeks. Then the mineralization study was conducted by taking a low molecular weight labeled polymer with a species of fungi and it was reported that the rate of mineralization was higher and it was easily reachable by the microbes. For the better result of mineralization, modeling and field experiment are quite essential [19],[20].

V. VARIOUSAPPROACHES IN BIOREMEDIATION

A. Bioremediation through bioinformatics approaches

Bioinformatics requires enormous data from various sources viz. enzymatic function, structure of protein, sequence of proteins, etc. It is the combination of life science and computer science. The computer is used to store, manipulate, and distribute the information associated with proteins, DNA, RNA, etc. The main task of bioinformatics is to study the living cell and its function in molecular biology, which helps in gene sequencing of microbes and stored the data related to biological research. Sometimes it does not give accuracy in the result and thus computational method is introduced in biological science to augment the information related to biological systems. Thus, bioinformatics makes the detailed study of the various processes of cells like metabolism, growth and development etc. In addition to this the structure of proteins, its function and other genetic information can be properly understood so that it can be applied in a better way for bioremediation of the plastic wastes generated worldwide.[21],[22]

B. Bioremediation through Different Omics

The study of bioremediation can be done through genomics, proteomics, transcriptomics, interactomics and metabolomics which help in correlating the sequence of DNA with m RNA, proteins and the availability of metabolites. In this process it becomes easier to study about the process of bioremediation. For instance, the microarray is an important genomic technique to detect biodegradative genes in the microorganisms present in the soil. The other techniques which are helpful in studying the bioremediation are proteomics, interactomics, transcriptomics and metagenomics. These techniques are much better than microarray and can be applied to study the bioremediation process by taking the individual genome sequence.

C. Bioremediation through Systems Biology

The combined research methods involving the study of the biological complexity system by using
systems biology, which is an integrated theme of research to study complicated facts by investigating the interaction and networks at cellular, molecular, community, and ecosystem level is known as system biology. Systems biology helps a lot in dealing with 2010 Mexico oil spill through the process of phytoremediation or bioremediation.[23],[24] The Figure-4 shows the various approaches regarding the process of bioremediation
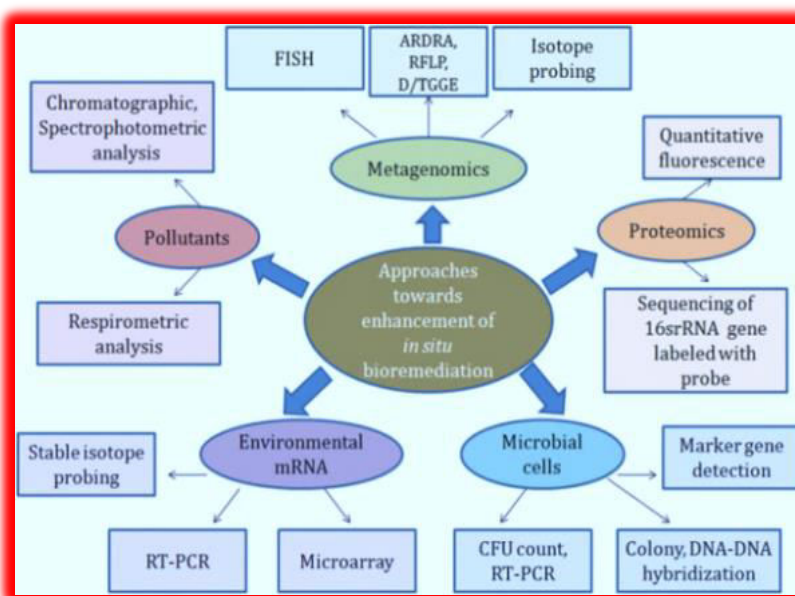
Fig.4.various approaches involved in Bioremediation

Vi. Interference of Biotechnology in Bioremediation Technology

Biotechnology develops many xenobiotic products for the comfort of modern man. Due to the use of xenobiotic substances, environmental sustainability is disturbed. Plastic is an example of xenobiotic substance that accumulates in the environment at a faster rate. Plastic waste is not degraded naturally due to the lack of catalytic activity of the microbes in the earth. Thus, to curb the detrimental effect of the plastic innovative approach is required. From 1990 the researchers have put much effort to degrade the plastic materials through biodegradation by using microbial activity.

Pseudomonas sp. is very active in degrading high-density polyethylene (HDPE). Arthrobacter also able to degrade. Some of the study on Pseudomonas sp. reported that in compost it can degrade the 29% weight of low molecular weight polyethylene approximately in 40 days. The consortium of microbes is very helpful in making the weight loss up to 75%. For example, Paenibacillus sp., Stenotrophomonas sp. and Pseudomonas sp. found in cow dung is able to make 75% weight loss of LDPE and 55% of HDPE within 4 months. Another study reported that Penicillium s. can degrade the polyethylene in a limited time period. Cutinase are mainly responsible for degradation of polyethylene terephthalate (PET). There are several microbes named after the substrate for example MHETase, PETase, BHETase, which are also helpful in bioremediation of plastic wastes.

The sophisticated testing method, molecular biology and engineering appeared to be partially feasible as the plastic pollution poses a major challenge to our society. Similarly, the bioinformatics and databanks become limited to genomics and the data related to a protein sequence. The application of genetic engineering in degradation of plastic faces many challenges, including restricted field tests, public awareness and regulatory constraints. Moreover, development of new software is vital in handling the huge data pertaining to the bioengineering research. Thus, the combined study of proteomic, transcriptomic, and metabolomic is required to disseminate information about the microbe cell and their effect. The information will be utilized to alternate the gene expression of the microbe to augment their activity. Figure-5 shows the degradation activity of different kinds of microorganism and Table-1 represents particular microorganism depredating particular kind of plastic waste. [25], [26]
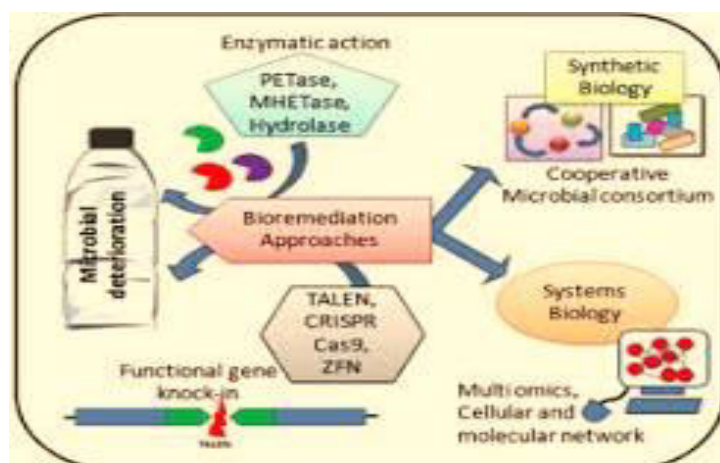
Fig.5 Bioremediation by different enzymes

Table 2: Degradation of different polymer by various microorganisms

Plastic	Microorganisms	Enzymes	Reference
Polyethylene LDPE LMWPE	Pseudomonas sp. AKS2 Pseudomonas sp. E4	Hydrolase Alkane hydroxylase	Tribedi and Sil (2013) Yoon et.al (2012)
Polystyrene High Impact Vinyl Chloride	Pseudomonas sp. P. putida AJ	Esterase Alkene monooxygenase	Mohan et.al (2016) Danko et al. (2004)
Polyurethane Polyester Polyester Polyester Polyester Polyester Polyester	P. chlororaphis P. aeruginosa P. aeruginosa MZA85 Pseudomonas sp. P. fluorescens	Polyurethanase Esterase Esterase Lipase Esterase	Ruiz et.al (1999) Mukherjee et.al (2011) Shah et.al (2013) Biffinger et.al (2015) Biffinger et.al (2015
PET	Pseudomonas sp.	Lipase	Muller et.al (2005)
PES	Pseudomonas sp. AKS2	Esterase	Tribedi et.al (2012)
PEG	P. stutzeri	PEG dehydrogenase	Obradors et.al (1991)
PVA	P. vesicularis PD	Esterase	Kawai et.al (2009)

VII. CONCLUSION

Plastic pollution causes environmental hazard and the microbes exists in the polluted environment are responsible for biodegradation of plastic wastes by the action of enzymes. The use of genomics, proteomics, and metabolomics helps in bioremediation of plastics in a more effective way. Gene editing tools such as TALEN, CRISPR, and ZFN help in creating effective microbes with the introduction of specific functional genes for effective bioremediation. To make elaborative study on degradation kinetics is the need of the hour. So, it is very necessary to explore microbes that can adapt in adverse condition and use the energy in order to grow and degrade the polymers as the host. Now the biotechnology intervenes in molecular engineering in order to study the genetic pathways. Computational biology can also be applied to predict the possible mechanism and metabolism along with microbial consortia during biodegradation. Hence, the researchers and the scientists are searching for an eco-friendly microbial based degradation in order to degrade the long chain synthetic polymer into simple monomers to save our beautiful globe from toxic hazardous plastic pollution. Thus, it is indispensable to produce biodegradable plastic and implement biotechnology-based approaches to make the environment free from plastic pollution.

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IMPACT OF CLIMATE CHANGE TO SEA ICE ECOSYSTEM

Rabiranjan Prusty and Trinath Biswal
Department of Chemistry, Veer Surendra Sai University of Technology Burla-768018, India

ABSTRACT-

The sea ice ecosystem is the largest one on the earth. It gives foodstuff to a large group of animals and other organisms. The uneaten natural substance of the ice sinks through the water segment and feeds benthic sea ice ecosystems. As the level of sea ice decreases, the algae contributes a small fraction of the total organic matter produced in polar waters. Recent changes in the temperature, atmospheric pressure, stratification, intake of nutrients, the oxygen content, and acidification in sea ice ecosystem with potentially growing organisms are related to increasing atmospheric CO_2 and climate changes. The effect of poles and tropics is particularly revealing because polar ecosystems are sensitive to sea-ice retreat and poleward organisms relocation and due to their susceptibility to mild climate changes. Enhanced economic impacts can change the energy flow and material as well as biological systems which subsequently affect the ecosystem as a whole and the services that depend on people and communities.

Keywords: Ecosystem; Biological system; Algae; Climate change; Temperature; Nutrient.

I. INTRODUCTION

The energy transfer of sea ice ecosystem from primary suppliers to the successive levels at the agricultural platform of intermediate customer goods, wild creatures (including humans), and pests and then again back through decomposition preserves aquatic habitats [1]. Thus Sea ecosystems are therefore ecological networks where most of the species were indirectly or directly interrelated with most of the organisms in the ecosystem with biological relevant interactions (e.g. predator-prey connections, rivalry, cooperation, collectivism). It represents the physical structure and a feature of sea ice ecosystem [2].This ecosystem is considered as a healthy microbial ecosystem because it promotes nutrients between the ice and the environment. This ecosystem maintains the vertical temperature and salinity levels within the ice. The productivity difference within the sea ice affects the different groups of microbial community present in sea ice [3]. Now a day due to increase in human stress, drastic climate change is the cause of significant impact and diverse repercussions on sea ice ecosystems [4]. The increase of CO_2in the atmosphere and global warming are the vital concern and its impact on sea ice ecosystem on ecological timescale is massive and persistent. Due to frequent changes in sea ice ecosystem a very clear outcome appears on oceans acidity and humidity levels [5]. The increase in temperatures generates numerous changes such as rising sea level, increased ocean stratification, and reduced sea-ice magnitude, negative impact on global weather trends, rainfall on marine ecosystem and change in the biodiversity of the marine ecosystems. Raising the sea level and altering the ocean migration function is also the cause of a decrease in the level of oxygen in the earth's atmosphere [6]. There are some improvements observed are impressive over the past few decades and can exceed certain species existing and possible future tolerances for adaptation. Specific impacts of ocean ecosystem due to the Physical and chemical changes can modify the physiological structure, behaviour and behavioural characteristics of the species contributing to regulate their population scale, geographic distribution, and environmental abundance [7]. These changes lead to significant role of species and microbial paths, climate signals and successive transfer from primary producers to higher-tropic level, such as fishes, seabirds, reptiles and marine mammals through the bottom-up to top-down ecosystems [8]. Distortion of biological experiences may contribute to changes in the structure and operation of the group and its environment. The analysis of individual species reaction to single influencing

factors offers an imperfect background and demonstrating the need for further extensions of the micro-species those analyses at the ecological level of the sea ice marine world [9].There is no single impact is observed due to increase in CO_2 in the marine environment, but many environmental strains on aquatic regions, including intense production of manure, destruction of aquatic life and benthic resources, fish farming and invasive plants. In a particular coastal environment, biodiversity loss is increased and 50% of the salt ponds, 35% of mangrove forests, 30% of marine ecosystems and 29% of wetlands are already destroyed from our globe. The combined and adaptive impact of CO_2 and other meteorological factors affects the marine habitats and marine biodiversity, which may be treated in general, not as a separate issue of human being. It also exhibits important interrelationships between sea ice ecosystems and the aquatic organisms present in it such as tropical interactions and exports of particles [10].

The life system in the marine environment is normally uncommon among to human beings because about 71% of our earth is covered by sea water. The sea supported life on our planet and assuming to be a commanding position in directing the atmosphere [11].Change in the sea ice ecosystem has been frequently fluctuated throughout the world, where life has flourished, dwindled or experienced disastrous decays. Our comprehension of how change in climate is influencing sea ice environments has lagged behind that of earthbound environments. This is because of the vast size and comprehensive nature of the sea. In this study, more focus is given to the belongings of anthropogenic environmental change in the sea ice ecosystem and it was revealed that most of the part of marine world are found to be rapidly changing with an increased of sudden nonlinear hazards due to frequent change in sea ice ecosystem. Green house effect plays a vital role in the sea ice ecosystem [12].

II.CLIMATE CHANGE DUE TO SEA ICE ECOSYSTEM

The climate change is mainly due to the burning of fossil-fuel, industrial activities, agricultural activities and population growth, which is the cause of changing the composition of the atmosphere. [13]. The earth's becomes worm due to long term global warming, trapping the solar radiation by greenhouse gases such as troposphere ozone, CO_2, CH_4, N_2O and CFCs .Due to the burning of fossil fuel, extensive industrial development the major greenhouse gases, including CO_2 drastically increases and huge amounts of carbon dust are produced, which in combination with atmospheric moisture form aerosol particles. These aerosol particles not only toxic to our biological community, but also cause of retaining heat and subsequently increase the temperature of the earth's troposphere, which was identified by the climate Change Panel (IPCC) over the past decade [14]. It is expected that the greenhouse gas emissions will start to rise over decades to centuries. The most recent IPCC assessment is the document substantial physiological changes in the sea ice ecosystem are reported. Since 1950 at the upper oceanic part the heat content is gradually increasing with increase in the sea surface temperature (SST) [15]. In the Arctic and the western Antarctic Peninsula region, particularly during the summer, the depth of the sea-ice has significantly dropped because of the raise in temperature. The Arctic is found to be free in ocean ice during the summer from beginning to the21[st] century. Arctic ice is being supplanted with dainty, first-year ice with the passage of time. Global climate change affects territorial weather systems and therefore the weather system is considered as multi-dimensional [16]. EBCSs is the cause of pressure differences among continental thermal basses and an ocean level as heating intensifies the pressurizing gradients between land and sea water and up wells are predicted to intensify it. Regional forecasts typically rely on enhanced wind regeneration and shifting of the wind blow direction and rate of blowing.

III.RATES OF CHANGE OF CLIMATIC CONDITION

Increasing in the greenhouse gas concentration has raised the global temperature by 0.2^0C over the past 25 years

and the heat energy being absorbed by a biotic component of the world ecosystem [17].The figure-1 (A, B,C D) shows the change in Temperature, Latitude, pH, Carbonate ion concentration in sea ice ecosystem Subsequently, the heat energy of the upper layer sea ice ecosystem at 700m height has found to be increased to 14×1022 J since 1975.Over the past 100 years the standard temperature increased at the upper layer of the ocean is 0.6^0C. Although going about as the planet's warm sink, the seas have ingested roughly 33% of the CO_2 created by human behavior [18].The retention of anthropogenic CO2 has fermented the upper layer of the sea, with a consistent diminishing of 0.02 pH over the last 30 years and a general reduction since the preindustrial period of 0.1units of p^H. In spite of the fact that those raised in terms of pH, these are correlated with a considerable decrease in the % of CO_3^{2-} particles and explain to a significant removal from the geochemical situations that have won in the worldwide sea for millions of years. Increases of ocean temperatures also contributed to more improvements [19]. Thermal warming of the seas along with improved melt water and ice discharges from inland ice sheets with glaciers has raised ocean depth. Heat content of the sea ice system has increased the storm system and some of the other deviations to the hydrological series. The expansion of the higher class of the sea often contributes to a stronger stratified of the water column, a decrease of the mixing of certain seas and, as a consequence, a decline in the supply of resources and food development. Such shifts also expanded the scale of the nutrient deficient ecosystems of the Pacific and Atlantic Oceans by 6.6 million km2 or 15% during the period 2007 to 2019 [20].
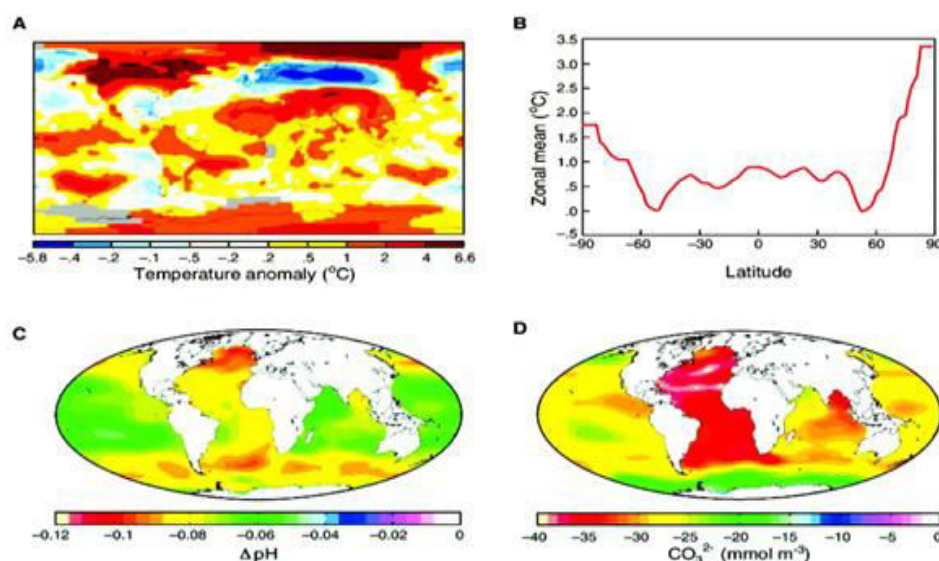
Fig.1 Change in Temperature, Latitude, pH, Carbonate ion concentration in sea ice eco system

Models in overall movement also forecast that the % of oxygen in the upper ocean layers is probable to reduction due to increasing stratification from the recent analysis. Declining amounts of oxygen have played an ever growing role in at least 3 or 4 climatic changes and induced large quantities of hydrogen sulfide driving into the environment leading to deep ocean annexes [21].For some circumstances enhanced recovery due to variations for wind power may contribute to greater flows of organic matter into deeper shell-waters, which may result in a rise in breathing, hypoxia, and in certain instances the emission of toxic gasses including CH_4 and H_2S from the bottom part of anoxic sediments. The irregular heating spread also has a direct effect on the actions of oceanic flows, which play important characters in the dynamics, environmental factors and sea ecology. Due to the uneven heating effect in earth's Polar Regions, the slowdown in the south overturning circulation (MOC) has important effects on regional climates. Since the temperatures of Polar Regions and the salinity in sea waters become

higher, the MOC would most definitely shift owing to ice sheet loss, which will tend to do so. In the ocean climate system the natural variability is occurring in several time scales either on seasonal basis or decadal basis, creating climatic condition including the ENSO, the North Atlantic Oscillation (NAO), along with the Pacific Decay Oscillation (PDO) [22]. While it is difficult to determine whether this instability could shift over the next several decades, the gradual rise in the heat gratified of the oceanic climate and environment would most definitely impact the intensity, trajectory and performance of the earth's largest current structures. Alterations in the environment, as shown by the latest influences of ENSO on the coral reefs and Kelp Forests have the ability to significantly affect the distribution and productivity of marine habitats [23]. In polar sea environments, where temperatures and climate change more than twice as global average change. The Arctic Sea Ice has decreased steadily as a result of the environmental changes. In March 2007 the area was 16.5 million km^2, but decreased to 15.25 million km^2 by March 2019. Continental ice panes such as Green lands and West Antarctica (WAIT) have significant implications for the melting of the polar oceans and increase in the global temperature. Changes in the thickness of ice sheets have a significant effect on the increase of the sea level, having an average input of up to 12m of mean sea level, if both WAIS Ice sheets and Greenland area melt entirely. Satellite data have shown that the global average marine level has been raising the speed 3.3 ± 0.4 mm/year.
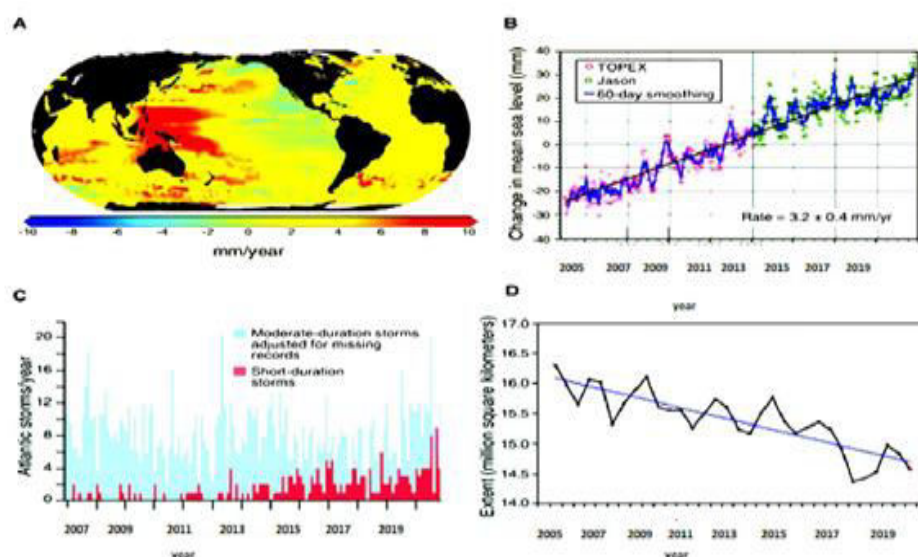
Fig.2 Global rate in sea ice ecosystem

IV. EFFECTS ON ECOSYSTEM FUNCTION

A wide range of biological processes has been stimulated by the scale and speed of increase in the physicochemical conditions in the world seas. Climate change has a significant impact on biochemical processes simply by affecting kinetic molecular theory (i.e. Maxwell-Boltzmann energy distribution), which defines the rate of basic principles such as membrane transport, diffusion and enzymatic reactions [24]. Moderate temperature increases metabolism, which ultimately determines the traits of life's history, population growth and processes of the ecosystem. During that scenario, species continue to respond to local atmospheric temperatures with optimum physiological responses very near to the global average temperature. Organisms will adapt to these optimal values to a wide range of temperatures. However, across and beyond this area, there are no acclimatization, elevated mortality threats, diminished health and decreasing populations or local extinction. Temperature variability may also influence important biological processes. In response to oceans heat treatment, acidification and stratification, the

abundance and distribution of the phytoplankton populations throughout the globe and their phonology and efficiency are changed. The world's primary annual production has declined by at least 6% and almost 70% of this decline in higher latitudes and major proportional declines in the Pacific and Indian gyres. Climate change affects ocean sustainability, with a direct effect on the production of global ocean phytoplankton's and chlorophyll resources [25].In addition, these shifts in primary development of the sea have major impacts on the aquatic biosphere, carbon sinks and biogeochemistry of the globe. The temperature-dependent metabolism of animals is therefore likely to change in ecological processes, including predator and prey interactions, when warming takes place. Respiration is much more effective than photosynthesis in changing the temperature [26].

V. TERRITORIAL COMPLEXITY AND ITS EFFECT

The most perfect, potential and significant impacts of environmental alteration on the seas are its effects on living space framing species, for example, corals, ocean grass, mangrove trees, salt swamp grasses, and shellfish along with the biotas form the territorial habitat and some additional species. Although certain animals that exist in these regions may not be completely important, others do and die if the ecosystem is lost. For example, mortality and mass coral bleaching is now decreasing the density of reef fish and other species with the increase in temperatures. Species such as mangroves, sea grass, and salt marsh face lot of threat problem from global ecosystem. While mangrove deforestation (1-2% a year) poses a higher threat in the long term, sea-level risks increase with anticipated mangrove losses of 10-20% by 2100. Impacts on mangrove ecosystems range from place to place; places with steep coastal roads or marine human infrastructure that are most at risk for land migration, territorial habitat with other species. Although certain animals that exist in these regions may not be completely important, others do and die if the ecosystem is lost. For example, mortality and mass coral bleaching is now decreasing the density of reef fish and other species with the increase in temperatures. Species mainly the mangroves, sea grass, and salt marsh face lot of threat problem from global ecosystem. While mangrove deforestation (1-2% a year) poses a higher threat in the long term, sea-level risks increase with anticipated mangrove losses of 10-20% by 2100. Impacts on mangrove ecosystems range from place to place; places with steep coastal roads or marine human set-up are found to be most at risk point of view for land migration. [27].

Sea ice often serves a vital function for a wide variety of birds and animals that serve as an internal or external site for important defensive, reproductive or migratory behavior. Almost all of the Arctic species face dangerous failures with the polar bears needed to sacrifice 68% of the summer living habitat by 2100. Ice reliant Antarctic species, including seal fishes and penguins are declining and, according to latest Antarctic warming forecasts, they pose a growing chance of extinction. [28]

VI. EXOTIC SPECIES ON SEA ICE ECOSYSTEM

The growth of new assemblies of species in the nearby future will be part of the eventual consequence of differing environmental tolerances between marine organisms. We do not have historical or current parallels, which ensure that maritime resource administrators and decision makers can face severe challenges. The growing number of aquatic "exotic" animals gives an illustration of the threats ahead. The drive of boats and other vehicles used for transportation throughout the world has allowed a large number of marine species to spread over the past several hundred years. However, efficient set-up depends on situations under which the invasive species are sensitive of their target. Recent global temperature change has improved the likelihood that organisms transported from below latitudes will develop and grow. An increasing number of organisms are extending their range, sometimes with a significant effect on their endpoint of the habitats. Recent changes in the intensity and frequency of disease outbreaks in aquatic environments have been influenced by rising temperatures [29].These

effects can be attributed to many factors such as the expansion of pathogen rates in reaction of heat, host vulnerability shifts as a consequence of growing ecological change, and the growth of possible objects. Nevertheless, the extremely high costs of a rising epidemic disease and occurrence are an significant factor to consider these improvements and restrict them.

VII. GLOBAL INTERACTIONS, THRESHOLDS AND SYNERGIES

While several anthropogenic stressors impact the bulk of the world and the capacity for large-scale synergies remains change. Also additive effects will exceed the potential difference of essential animals and whole ecosystems. The open ocean habitats, which affect complicated shifts to the migratory patterns and food-web processes in a wide variety of conditions, including over-fishing, enhanced ultraviolet light penetration and heating and stratification of surface waters. Recent data suggest that the possibility of certain limits being reached prematurely is now increasing. Increased ocean temperatures and acidities of CO_2 Concentration of 450ppm signify a major threat to ecosystem functioning like coastal areas. Throughout the above scenario, temperatures over 2 ° C are more likely to contribute to excessive levels of blanquing of masses of coral and mortality, whereas ambient ocean acidification of CO2 over 450 ppm would result in a loss of the carbonate content of the marine ecosystems[30]
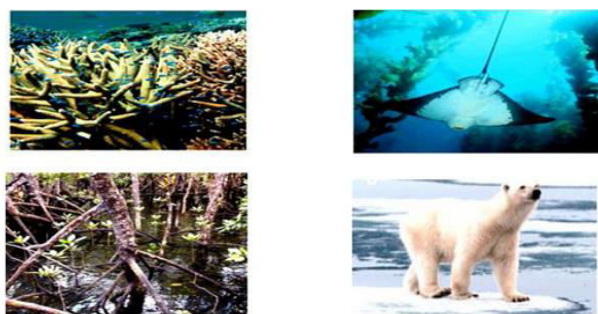
Fig. 3: Marine Ecosystem organism

VIII. CONCLUSION

The massive environmental changes that are taking place throughout the world's oceans provide administrators and politicians with significant challenges. Comprehension and reduction of risk exposure will be more and more important as climate shifts and the probability of major environmental changes arises. Such developments would decrease the importance of current systems and procedures for controlling aquatic resources and fisheries habitats and would drive the management of many aquatic assets to uncharted waters. Decrease the rate of flow of sediments and nutrients from the marine environment. Management of natural resources must be adaptable to execute the rapid and nonlinear shifts that may define the actions in the future of certain environments. But however, it remains a priority to reduce greenhouse gas emissions not only due to the reduction of enormous cost of adjustment, but also it reduces the increasing risk of driving our planet in a highly unidentified and hazardous way.

Significant forecasting requires progress in various interrelated research pathways and observations among them are as follows

1. Selection of observational and modeling goals

2. Enhanced knowledge of the natural constraints on regular, inter annual, decadal and 100-year timescales in the wider sense of predictability of the polar environment.

3. For seasonal and decadal forecasts and hind casts, model initialization is needed which has not been achieved with CMIP3 simulations.

4. Reaching determinations about the achievement or disappointment in hind casting the observed loss of the sea ice will require a dependable territorial region to initialize various fields.

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EFFECT OF CATEGORIZING EFL SHAQRA UNIVERSITY STUDENTS' WRITING ERRORS ON WRITING IMPROVEMENT

Islam Majzoub

Shaqraa University, College of Science& Humanities - Department of English, Saudi Arabia

ABSTRACT

This paper aims at using a strategy of categorizing EFL Shaqra University students' writing errors and identifying its effect in improving students' writing. The study hypothesized that categorizing students' errors into main headings related to the types of error, frequencies of error, examples of errors, and causes of errors will provide precise insight into the nature of students' errors. Moreover, providing students with models to read and extract the difficult vocabularies from them, understanding their meanings, and using them in their writing will improve students' writing. Hence, the researcher gave 65 female students a title to write about in lecture number one as a pre-test. The title was "women driving in Saudi Arabia", and in lecture number eleven, she gave them a post-tester in the same title after applying the hypothesized teaching strategy. The findings of students' essay analysis in the pre-test proved that students had many grammatical and lexical mistakes but in the post-test the students writing improved significantly in terms of style, diction, developing ideas, spelling, and punctuation. Even their errors decreased from 936 errors in the pre-test to 57 errors in the post-test which indicates the success of the teaching strategy adopted by the researcher. Accordingly, the researcher recommended that: firstly, instructors should categorize their students' writing errors to have a clear insight into the nature of their students' errors hence specifying much time in explaining the areas of students' weaknesses. Secondly, instructors should provide students with a well-written model to read; and then ask them to criticize those reading models. The students will learn through criticizing and imitating the style of reading models. Moreover, the instructors of Shaqraa should specify much time explaining morphology since it was the branch that the students make many errors in it.

Keywords: categorizing, writing errors, writing improvement

INTRODUCTION

Writing is a vital skill in learning, if our students succeed in writing effectively, then they will be able to express their needs and ideas. To be a good writer is an objective for many students.

In terms of EFL or ESL instructions, Anchale and Pongrat (2008, p.8) write about the importance of writing by claiming that "writing helps students learn". Moreover, writing reinforces the grammatical structures, idioms, and vocabulary that are taught to students, when students write, they also have a chance to be adventurous with the language to go beyond what they have just learned to say, and when they write; they necessarily become involved with the new language. As students struggle with what to put down next or what is the way to put it down on paper, they often discover a new way of expressing their ideas. Raimes (1983) points out that writing is a valuable part of any language course because of the close relationship between writing and thinking. She identified the different components for producing a clear, fluent, and effective writing piece: content, the writer's process, audience, purpose, word choice, organization, mechanics, grammar, and style. However, writing is a learned skill while speaking is acquired naturally, as Myles (2002, p.1) claims that "writing is not a naturally acquired skill, it is usually learned or transmitted as a set of practices in formal instructional settings or other environments." Zheng (1999) also thinks that acquiring the writing skill seems more laborious and demanding than acquiring the other three skills. As a result, a learner needs to write not only coherently but correctly and cohesively, which requires some time and effort. This difficulty in writing leads learners to be more susceptible to make errors. Although writing skill

is an indispensable part of advanced English course in Saudi Universities, tasks of writing remain daunting for many students. It has been noticed that most Saudi university students make errors in their writing.

Many studies aim at categorizing students' errors to know the area which causes many difficulties for the students. But what distinguishes this study is that it incorporates the categorization and the solution at the same time. That means the study investigates the efficiency of the strategy and the solution at the same time. Since the researcher categorized her students' learning errors before giving them the reading models and then she started applying the solution throughout the weeks of the semester. Finally, she categorizes her students' errors again after applying the suggested solution to investigate its efficiency.

Discovering how and why the errors are committed by Saudi EFL learners is very significant because it will provide feedback on language teaching and learning methods and practice. Moreover, it will give the instructor feedback on the nature of errors. Hence, the study attempts to Categorize students' writing errors which will contribute to understanding the nature of students' errors and their weaknesses. Accordingly, the instructors will specify much time explaining those areas of weaknesses. Moreover, the researcher thinks that providing students with reading models written cohesively and coherency to criticize and imitate will be of great benefit and a solution to students' errors.

Significance of the Study
The study is significant in many ways: firstly, it incorporates the strategy of categorizing students' errors, and the solution to the students' errors at the same time and this is distinguishing it from the studies in the same field. Secondly, it will provide the teachers feedback about the teaching and learning strategies and practices. Thirdly, it will provide feedback to the students and teachers about the areas of difficulties, hence specifying much time to it. Fourthly, it will provide instructors with practical solutions that could be adopted by them to reduce students' writing errors. Fifthly, it could be a good reference to the curriculum planner to incorporate reading and writing skills in one course since both skills are the input and output of each other. Finally, it will be a good reference for the researchers who are interested in the same field of study.

Statement of Research Problem
Writing is one of the productive skills which will enable us to do many functions such as expressing our feelings, asking for our rights, writing assignments, writing researches, answering exams, and many others. But writing is not just one step it includes many other steps such as thinking, planning, writing, and editing. And it needs a lot of knowledge such as coherence, cohesion, style, diction, good vocabulary to express ideas clearly and good knowledge about how to organize them in a clear text. Those many skills and knowledge make writing difficult for many students and make it easy for them to make mistakes. The researcher is not against making errors because errors are mirrors that reflect how learning is going on. But the study is conducted mainly to help students write comfortably.

The role of the instructor is to help students avoid making mistakes by explaining clearly the areas of difficulties and giving much practice and exercises in such areas. One of the strategies which will help instructors identifying their students' errors is categorizing their writing errors. Hence the study attempts to categorize the students' writing errors in order to gain feedback on the nature of teaching and learning practices as well as the nature of students' errors. Accordingly, instructors could specify much time explaining students' areas of difficulties.

RESEARCH OBJECTIVES

The study aims at:

1. Categorizing EFL Shaqraa university students' writing errors to identify the nature of their errors.

2. Identifying the area which causes difficulty for the students to specify much time explaining it.

3. Suggesting practical solutions to EFL Shaqraa university students' writing errors.

LITERATURE REVIEW

The studies have been done in the same field of the target study. All of them want to conclude the problem of students writing performance. They propose causes to the problem and suggest probable solutions for the problem and come up with findings. For example, Hamid Marashi (2015) conducted a study that aimed at using convergent and divergent tasks to improve writing and language learning motivation. The sample was 60 females intermediate EFL learners. They were taken among a total number of 90 students. The students were divided into two groups, thirty in each, the first group assigned to divergent tasks and the second one assigned to convergent tasks, 18 sessions of teaching and treatment were given to the students followed by writing a test to both groups and comparing of performances for each of them. The findings showed that the learners in the convergent group benefited significantly more than those in the divergent group in terms of improving their writing. The second null hypothesis was not rejected which means that the two treatments were not significantly different in terms of improving the learners' motivation. The study is different from the target study in the main aim, population, sample, and study time. The target study found that grammatical errors are common among university students because of a lack of practice among the students. Another study is submitted by Fawzi Eltayb Yossif (2016) of the University of King Khalid, Saudi Arabia. Its title is "An investigation of writing errors of Saudi EFL university students." The study aimed at investigating the writing errors of Saudi EFL university students of the College of Science & Arts, Tanumah at King Khalid University. The results of the study revealed that the students make errors in their writing performance as a result of some factors such as mother tongue interference, and insufficient activities, and the practice of necessary techniques of writing in addition to the lack of follow-up to the students' writing performance and some other factors. This study is similar to the target study in the main aim and findings except for the population and the date of conduction. One of the recent studies done in the field is by Amal Ibrahim Shousha, Nahed Moussa Farrag & Abeer Sultan Althaqafi.(2020) entitled analytical assessment of common writing errors among Saudi foundation year students: a comparative study. The study explored the most common writing errors of science and arts students of the foundation year program at a Saudi University that hinder them from achieving their course goals, learning outcomes, and becoming efficient writers. The main findings of the study were: lack of exposure to English language, inadequate application of primary language and writing mechanics. Suggested remedial solutions included addressing student's common errors in a proper and timely manner, hence giving feedback in a way suitable to student's individual levels, needs, and preferences. The main recommendations were: Increase the number of teaching weeks as writing is a skill that needs time for reinforcement and practice of grammar rules and writing conventions, address common writing errors repeatedly, either anonymously in a whole class discussion or individually, to eliminate fossilized errors.

Theoretical Background

English has undoubtedly become today's international language. Apart from 350-450 million native speakers, there are also about 800 million people who speak English as a foreign

language (James, 1998). It means that most of the communication in English takes place among its non-native speakers (Seidlhofer, 2005).

In Selinker's view, inter-language is "a different linguistic system resulting from learner's trials to produce the target language norm" (McLaughlin, 1987, pp.60-61). McLaughlin, (1987, p. 61) also agrees with Selinker's belief that inter-language was "the product of five central cognitive processes involved in second-language learning: (1) language transfer, i.e. transfer from the L1; (2) transfer of training i.e. some features transferred from the training process; **(3)** strategies of second-language learning i.e. an approach to the material taught; (4) strategies of second-language communication i.e. those ways learners use to communicate with L2 speakers; and (5) overgeneralization of the target language linguistic material".

Error Analysis
Error Analysis (EA) is the third of the main theories dealing with errors in second language acquisition.

Definitions and Goals
Error Analysis is a theory replacing the Contrastive Analysis, which was abandoned by linguists and teachers due to its ineffective and unreliability. EA also belongs to applied linguistics, however; it has no interest in explaining the process of L2 acquisition. It is "a methodology for dealing with data (Cook, 1993, p.2 cited in James, 1998, p.7)." At the very beginning of his Errors in Language Learning and use, James (1998, p.1) defines Error Analysis as "the process of determining the incidence, nature, causes, and consequences of unsuccessful language." Later he goes on explaining that EA "involves first independently or 'objectively' describing the learners' inter-language and the target language itself, followed by a comparison of the two, as to locate mismatches (James, 1998, p. 5)."

Sources of Errors
Identifying sources of errors can be considered as a part of error classification. Error Analysis is innovative in respect to the contrastive analysis hypothesis because it examines errors attributable to all possible sources, not just negative L1 transfer (Brown, 1980).

Among the most frequent sources of errors, Brown counts (1) interlingual transfer, (2) intralingual transfer, (3) context of learning, and (4) various communication strategies the learners use. James (1998) similarly classifies errors according to their source into four diagnosis-based categories with the difference that he terms category (3) induced errors.

(1) Interlingual transfer i.e. mother-tongue influence, causes interlinguas errors. They are very common at the initial stages of L2 learning since the L1 is the only language system the learner knows and can draw on; hence negative transfer occurs (Brown, 1980:173). Brown also argues that when one is learning L3, L4, etc. transfer takes place from all the previously learned languages but, the degree of transfer is variable (1980: 173).

(2) Intralingual negative transfer or interference is the source of intralingual errors (Brown,1980, pp.173-174). Brown gives only overgeneralization as a representation of negative interlinguas transfer, but (James,1980, pp. 185-187) goes into more detail. He refers to intralingual errors as learning-strategy-based errors and lists seven types of them: False analogy arises when the learner incorrectly thinks that a new item behaves like another item already known to him or her. For example, the learner already knows that dogs are the plural form of a dog, so he or she thinks that (sheeps)are the plural form of sheep.

A wrong analysis means that the learner has formed an unfounded hypothesis in the L2 and put it into practice. James (1980) gives an example of the context when the learner presupposes that it can be used as a pluralized form of it.

An incomplete rule application happens when the learner does not apply all the rules necessary to apply in a particular situation. It is the converse of overgeneralization. Exploiting redundancy appears when there is a redundancy in the language, e.g. unnecessary morphology, and intelligent learners try to avoid those items which they find redundant to learn and communicate easier. The opposite of exploiting redundancy is over elaboration which is usually observable in more advanced learners.

Overlooking co-occurrence restrictions mean that the learners do not know that specific words go together with specific complements or prepositions for instance. An example given by (James,1998, p.186) is when the learner ignores that the verb to enjoy is followed by a gerund and not a bare infinitive. Hyper-correction, as James (1998, p.186) argues, "results from the learner over-monitoring their L2 output". Overgeneralization means that the learner uses one member of a set of forms in situations when the other members must be used which leads to overuse of one form and underuse of the others. Familiar candidates for overgeneralization are pairs as other/another, much/many, some/any, and many others. James (1998) opines that the learner uses one of them instead of distinguishing between them and using each in the appropriate situation. Overgeneralization of language rules is also common, e.g. Does she can dance? Reflects that the learner over-generalizes the use of auxiliary verbs in questions.

(3) Context of learning refers to the setting where a language is learned. e.g. a classroom or a social situation, moreover, the teacher and materials used in the lessons. These factors can cause induced errors (Brown,1980, p.174). As Brown explains, "students often make errors gives a misleading explanation from the teacher, faulty presentation of a structure or word in a textbook, or even because of a patent that was rudely memorized in a drill but not properly contextualized". James (1998) divides induced errors into the following subcategories:

a. materials-induced errors

b. teacher-talk induced errors

c. exercise-based induced errors

d. errors induced by pedagogical priorities

e. look-up errors

(4) Communication strategies are consciously used by the learners to get a message across to the hearer. They can involve both verbal and non-verbal communication mechanisms (Brown,1980). Among the communication strategies:

i. Negligence arises when a learner consciously avoids specific language items because he feels unsure about them and prefers avoiding them rather than committing an error. There are several kinds of avoidance, e.g. syntactic, lexical, and phonological or topic avoidance (Brown, 1980).

ii. Prefabricated patterns are memorized phrases or sentences, as in 'tourist survival' language or a pocket bilingual phrasebook, and the learner who memorized them usually does not understand the components of the phrase (Brown 1980). However, their advantage is, as Hakuta (1976) cited in Brown (1980, p.179) notes, that they "enable learners to express functions which they are yet unable to construct from their linguistic system, simply storing them in a sense like large lexical items".

iii. Cognitive and personality styles can also cause errors. For instance, Brown (1980, p. 18) suggests that "a person with high self-esteem maybe willing to risk more errors, in the

interest of communication, since he does not feel as threatened by committing errors as a person with low self-esteem."

iv. Appeal to authority is a strategy when the learner, because of his uncertainty about some structure, directly asks a native speaker, a teacher, or looks up the structure in a bilingual dictionary (Brown, 1980).

v. Language switch is applied by the learner when all the other strategies have failed to help him. So, the learner uses his or her native language to get the message across, even though he knows that the receiver may not know the native language. (Brown, 1980).

Procedures for Error Analysis

Error analysis involves four stages (James, 1998): The first stage is when errors are identified or detected and therefore James (1998) terms it error detection. It is spotting the error itself. First, we collect a set of utterances produced by an L2 learner. A sentence is usually considered a significant unit of analysis and then the informant, a native speaker, or the analyst himself, points out the suspicious or potentially erroneous utterances and decides if the utterance in question is erroneous or not. However, this may not be so easy since there are many factors involved. It is easier, for instance, to spot someone else's error than one's own or to find the error in written language than in spoken (James, 1998).

The following stage is called error location. It occurs when the informant locates the error. James argues that some errors are difficult to locate because they can be diffused throughout the sentence or the whole text and appear after the whole text is carefully examined (1998). Burt and Kiparsky call such deviances global errors (opposite to local errors): "the sentence does not simply contain an error: it is erroneous or flawed as a sentence" (cited in James 1998, p.93).

The third stage is called an error description. Naturally, a learner's language has to be depicted in terms of some language system. The Inter-language hypothesis would suggest that the "learner language is a language in its own right and should, therefore, be described sui generis rather than in terms of the target (James 1998, p.94)." If we take Corder's idea of idiosyncratic dialect, which is the learner's version of the target language, we can compare it to the native speaker's code since both the codes were considered dialects of the same language and therefore "should be describable in terms of the same grammar" (James, 1998, p. 94). Also, a learner's language should be characterized in terms of the TL because error analysis is, by its nature, target language-oriented (James, 1998).

James (1998) also argues that the grammar used for the description must be comprehensive, simple, self-explanatory, easily learnable, and user-friendly. For these reasons, he rejects scientific and pedagogic grammars and recommends descriptive grammars, particularly Crystal's (1982) Grammar Assessment Remediation and Sampling Procedure (also known as GRARSP). There are, in James's opinion three significant purposes of the description stage: (1) to make the errors explicit, (2) it is indispensable for counting errors, and (3) it is a basis for creating categories since it reveals which errors are different or the same (James,1998).

Finally, the last step in EA is error classification or categorization (James, 1998). We can categorize errors into dictionaries or taxonomies. Dictionaries of errors are organized alphabetically and contain both lexical and grammatical information.

Dictionaries of 'false friends' represent another kind of dictionaries. According to (James, 1998, p. 101), "relevant to learners of a specific L2 who speak a particular mother tongue". For Czech learners of L2 English, there is Sparling's English or (Czenglish, 1991) that contains the most popular false friends and other items that usually cause trouble for L1 Czech learners.

The Importance of Learners' Errors

The powerful and innovative feature of EA is that it is quite error-friendly, which means that errors are not looked at as something negative or pathological anymore. However, as Corder claims, "a learner's errors … are significant in [that] they provide the researcher evidence of the way language is learned or acquired, what methods or procedures the learner is applying in the discovery of the language (Corder, 1967, p.167 cited in Brown 1980, p. 164)."

At the very beginning of Errors in Language Learning and use, James stresses the uniqueness of human errors: "Error is likewise unique to humans, who are not only sapiens and loquats but also homo errands (1998, p. 1)." He supports the idea of the importance of learners' errors by claiming that "the learners' errors are a register of their current perspective on the TL."

James (1998) gives Corder's five crucial points, primarily published in Corder's seminar paper titled 'The significance of learners' errors': (p.12).

1. L1 acquisition and L2 learning are parallel processes; both are governed by the same mechanisms, procedures, and strategies. Learning an L2 is probably facilitated by the knowledge of the L1.

2. Errors reflect the learners' inbuilt syllabus or what they have taken in, but not what the teachers have put into them. So, there is a difference between 'input' and 'intake.'

3. Errors reveal both learners of L1 and L2 improve an independent language system - a 'transitional competence.'

4. The terms 'error' and 'mistake' must not be employed interchangeably.

5. Errors are necessary because they (a) tell the teacher what he or she should teach, (b) are a source of information for the researcher about how the learning proceeds, and (c) allow the learners to test their L2 hypotheses. Moreover, Harmer (1995) states a brief history about errors in the classroom Transforming difficulty into success always seems to hinge on how learners perceive their ability, how they process feedback around them, and how they manage to make their errors work for them not against them. Historically error treatment in classrooms has been a hot topic. In today's time of the audio-lingual method, errors are viewed as a phenomenon to be evaded by over learning, memorizing, and getting it right from the start, then some methods to error, under the assumption that natural process within the learner will eventually lead to acquisition.

The Academic Writing Function

Every student as a new college learner may have much anxiety and many questions about the writing he will do in college. The word "academic," especially, may cause considerable anxiety for the students. However, with this first-year composition class, students begin one of the only classes in their entire college career to focus on learning to write. According to (Harmer, 1995) writing is hard, and he thinks that writing in college may resemble playing a popular game by wholly new rules (that often are unstated). Academic success in academic writing depends on how the students better understand what they are doing as they write and then the way they approach the writing task. Early research done on college writers discovered that whether students produced a successful piece of writing depended entirely upon their representation of the writing task. The writers' mental model for picturing their function made a massive difference.

METHODOLOGY

1. The Approach of the Study.

The study used the descriptive analytical approach based on Corder's model (1981) for EA as follows:

1. Identifying the common writing errors by analyzing the students' writing samples.

2. Classifying the errors into different linguistic types and categories.

3. Computing the frequency of these errors.

4. Exploring the causes behind these types of errors in the light of teachers' and student's perspectives.

5. Suggesting possible solutions for these errors.

The researcher chose this model because it ensures a comprehensive and precise categorization of students' errors.

2. RESEARCH DESIGN

The descriptive quantitative research design is used in this study to collect and analyze data. The researcher asked her students to write an essay about "women driving in Saudi Arabia in week number one of the second semester of 2017. Then she collected their papers corrected them and Categorized the students' errors according to Corder model (1981). From week number two till week number eleven the researcher provided her students with cohesive and coherent reading models with different topics to criticize them and to imitate them at the end of each lecture. So, the students writing improved gradually because while criticizing students pay more attention to the area of strengths of writing and then they try to imitate them, moreover, they gain new vocabulary which enabled them to express their ideas much comfortably. In week number twelve the researcher asked her students to rewrite about "women driving in Saudi Arabia" the result showed great improvement in Student grammar and mechanics, organization of ideas, diction, and style. The total number of errors reduced to 57 in week number twelve from a total of 936 in week number one.

3. PARTICIPANTS

The population of the study was EFL level seven female students in Saudi Universities who are studying advanced writing in the second term of 2017. The number of participants was 65 students because this was the total number of level seven students who were studying the course of advanced writing in Shaqra University, College of Science and Humanities, Department of English language in Dawadmi in 2017. So, the researcher selected her sample purposefully.

4. Tools of Data Collection and Corpus of Students' Work

Students target (65) group of level seven asked to write five paragraphs about "women driving in Saudi Arabia, "as a pre-test. In week number one of the second term of 2017. The researcher then collected their essays and graded them and analyzed their errors finally categorized them. The result showed many grammatical, punctuation, spelling, and style errors. As a result, the researcher decided to design and adopt two strategies, one for teaching and the other for analyzing the students' errors. As for the former, the researcher provided her students with reading models about ten reading models in ten respective lectures. Then, she asked them to extract the main idea, the areas of cohesion and coherence, the areas of rhetoric if any, the appeals which the writer used to argue his/ her audience. And the difficult vocabulary. Then they translated that new vocabulary studied them for 10 minutes and rewrote the reading model from their memory using the new repertoires as much as possible. Then the researcher corrected their models and categorized their errors of the ten weeks. The result was that the students' writing style, diction, spelling, and punctuation improved gradually each week. In week ten, the researcher asked her students to rewrite about "women driving in Saudi." The results will be presented, analyzed, and discussed in detail in the coming section.

5. Students' Essays Analysis

The researcher believes that errors are mirrors by which a teacher, a syllabus designer, a researcher, or even the student himself/ herself can see the weak points in his/her written work and find out the barriers that affect his/her performance. Depending on this view, the researcher collected (65) samples of essays written by the students; then, she checked them and categorized the errors in the pre-test and post-test. Hence, comparing the students' performance in both tests. The researcher's adopted strategy for categorizing her students' errors depended on the following steps.

6. Data collection, Correction, Categorization, Description, and Explanation.

The initial step required selecting a corpus of (65) samples of the free composition written by students; then, the researcher corrected and categorized the errors. The researcher divided the errors that she identified into two main categories: grammatical errors and lexical errors. Within the grammatical errors, there are two main categories of structural errors and function word errors. Structural errors include morphological errors, syntactical errors, word order errors, and tense errors. Function word errors include preposition errors and article errors. The Lexical category includes lexical items wrongly use in place of others, idiomatic mistakes in the scripts, and exotic meanings used in lexical items. Each one of these categories will be depicted and explained in detail in the following section.

7. Explanation of Errors: Explanation of errors is believed to be one of the main significant goals of error analysis, so a serious attempt was made to explain the plausible cause of the students' errors. They could attribute to many sources: mother tongue interference, intralingual interference, teachers' strategies, false analogy, and the familiarity of the appropriate collections. Analyzing the collected data will indicate the sources of these errors.

Presentation and Discussion of Data Analysis

The Main Questions Of The Research Are:

1. Is Categorizing EFL Shaqraa university students' writing errors will help in identifying the nature of their errors?

2. What is the writing area which causes difficulty for the students?

3. What are the most practical solutions to EFL Shaqraa university students' writing errors?

After categorizing the students writing errors in week one, the total number of errors in the (65) essays of the students in the pre-test was (936) errors. While the total number of errors in the post-test in week eleven was just (57). The results are presented under the following headings:

1. The number of errors of each type: function words, structural errors, and lexical errors.

2. Hierarchical typologies of errors according to the main categories.

3. Hierarchical typologies of errors within each category.

4. The total number of errors.

5. Explanation of the sources of errors.

The table below presents numbers, examples, and possible causes of these errors for each category in the pre-test.

Table (1): Frequencies of Errors

Category Function words errors	Type of error	Number of errors	Examples	Causes& interpretation
Prepositions	Omission	40	1. *When we want-speak about women. The traditions-Muslims is clear.	1.Incomplete rule application. Here the writer does not apply all the rule and omits the preposition (to),(of)
	Confusion	39	1. * I agree to women driving in Saudi.	1. Ignorance of rule restrictions. In this example, the student is ignorant of the real usage of the preposition in.
	Insertion	34	1. *In Saudi we have many cultures **of** customs.	1**.** False analogy. Here the student mistakenly thinks that we can add the preposition (of) after the word (cultures) because he previously knows that we can use **of** after many.
	Total number of errors	**114**		
articles	The Omission of the definite article(the)	36	1. *The most important thing is-low.	1. Incomplete application of the rule. The writer did not apply the rule and omitted (the).
	The Omission of the indefinite article(a)	24	1. *Both adults and kids males drive-car.	1. mother tongue interference. Because in the Arabic language we do not have the article(a).
	Addition of definite article(the)	13	1. *She and her **the** females friends.	1.. mother tongue interference. A direct literal Translation from Arabic with the addition of (the)
	Addition indefinite article(a)	19	1. *They invite strangers to drive **a** car.	1.Overgeneralization the learner knows that we can use (a) before nouns; hence she overused it in a situation where it should not be used.
	Total number of errors	**92**		
Structural errors	An omission of the main verb	51	1.*Arabs -different traditions.	1. Incomplete application of the rule. Maybe because some sentences in Arabic do not have verbs.
	An omission of the verb to be	34	1.*may be the husband- ill.	1.. Arabic interference. A Literal Translation from the first language is clear what leads the learner to omit the

				verb.
	An Omission of the subject	31	1. * – has different traditions in different areas.	1. Incomplete application of the rule. The learner omits the subject, which makes the sentence is redundantly incomplete.
	The sequence of tense	21	1. *After that they will not do more accidents people to share them, at that time the girls should forbid driving.	1. Ignorance of rule restriction. The writer here did not know that the sentences should be written in sequential order.
	repetition of the subject	21	1. *The driving it is not dangerous.	1. exploiting redundancy. There is an unnecessary repetition of the subject.
	passive voice	13	1. *After a three months which is call permission.	1. ignorance of rule restrictions. The student does not know the rule of passive voice construction.
	An omission of the object	9	1. * He comes with his permission to present-	1.incomplete application of the rule. Here the student omits an indispensable part of sentence structure; hence he did not convey a thought in this sentence.
Morphology	Irregular verbs	77	1. *He giving allowed with her.	**1.** Ignorance of rules & restrictions. Fragment sentence.
	Lack of agreement between subject and verb	71	1. *Some tribes have a good rule to play.	**1.**overgeneralization.the writer here overuses the verb has and under uses the verb have
	Using erroneous part of speech	57	1. *Saudi is a Muslim country where customs have been passed down.	**1.** False concept. because of the mismatch of English spelling and its pronunciation, which is not there in Arabic, the writer mistakenly used the verb were instead of the relative pronoun where.
	Number agreement	62	1. *We have different tradition.	**1.** Ignorance of rules restrictions. This student does not know that the adjective different indicates plural so it should be followed by a plural noun.
	Addition of suffix to infinitive	35	1. *When a Saudi women has car his entire friend collaborate and cooperation.	1. Exploiting redundancy. Instead of writing cooperate, the writer adds an unnecessary suffix, which changes the meaning. His is being used by

			the writer instead of her.	
	Demonstratives	26	1. * The driving of women will not end there.	1. False concept. The writer wrongly hypothesized that(their) is the right form. Hence, avoid using (there). And this is a spelling mistake due to the homophones of English that is not there in Arabic.
	Inappropriate plural ending	11	1. *Some of the Saudian traditions.	1. Misanalysis. The learner formed an unfound hypothesis about the spelling of the word Saudi and put it into practice.
	An Omission of the relative pronoun	8	1. *Any woman- would drive tells his husband.	1. Incomplete application of the rule. The learner did not apply the rule and omitted the relative pronoun that made the sentence fragment. Moreover, he used the pronoun His instead of the pronoun her.
	Model auxiliary within simple past or wrongly used	6	1. Driving * Which should be written about.	1. Hypercorrection. Results from the learner over monitor her L2 output.
Word order	Errors associated with nouns: two nouns, one of which was used attributively	67	1. * The women and the children at that day with the very traditionally Saudian way dress in.	1. Arabic interference. The Literal Translation into English.
Tenses	Confusion of tense	35	1. *They pay to the stranger after that they be driving.	1. ignorance of rules restriction. Fragment sentence.
	Past instead of the present	10	1. * At that time they are singing and the girls were very happy.	1. Ignorance of rules restriction. The learner started with present progressive and then changed the second part of the sentence to the past. Instead of using the present.
	Present instead of the past	1	1. * They prepared themselves for driving of the car.	1. Ignorance of rules restriction. The learner used the present tense instead of using the natural sequence of past tense.
	Total number	**646**		2. Arabic interference. The Literal Translation into English.
Lexical	Lexical items	68	1. * They present the	1.false analogy. The student

errors	wrongly used in place of others		sweets and made the car.	falsely interpreted the verb made as to the verb prepare. Maybe because of her lack of vocabulary.
	Exotic meanings used in lexical items	14	1. * According to tribal tradition, there are many things to do.	1. Misanalysis. Here the learner formed an unfounded hypothesis in the L2 and put it into practice when she used the word tribal instead of a tribe.
	Idiomatic mistakes	2	1. * The women then will take congratulation.	1. Overlooking co-occurrence. Here the student does not know that specific words go together with specific complements; hence, she used the verb take with congratulation and it is also referring to a direct translation into Arabic.
	Total number	**84**		

Table (2) Total Number of Errors

No	Area	Number of errors
1	Grammatical errors	852
2	Lexical errors	84
Total number of errors		**936**

Students Essays Analysis after the Post Test

Table (3): Frequencies of Errors.

Category **Function Words** errors	Type of error	Number of errors	Examples	Causes& interpretation
Prepositions	Omission	5	1. *driving a car is a prestige – of a woman.	1.Incomplete rule application. Here the writer does not apply all the rule and omits the preposition (to),(of)
	Confusion	3	1. * Saudi Arabia is a country that is governed in	1. Ignorance of rule restrictions. As the example shows, the student is ignorant of the real usage of the preposition in.
	Insertion	3	1. * Saudi Arabia judicial system derives its basis from the Quran and from the Sunnah.	1. Hypercorrection.
	Total number of errors	**11**		

articles	An Omission of the definite article(the)	2	1. *two documents are considered to be the constitution of the kingdom.	1. Incomplete application of the rule. The writer did not apply the rule and omitted (the).
	An Omission of the indefinite article(a)	3	1. *In that case, - woman is always supposed to be under the custody of a male person	1.mother tongue interference. Because in Arabic we do not have the article(a).
	Addition of definite article(the)	2	1. *this paper will look into the banon women to drive on the public roads.	1. mother tongue interference. A literal translation from Arabic with the addition of (the)
	Total number of errors	**7**		
Structural Errors	An omission of the main verb	5	1.*The rule that women should not drive on public roads is not - on any written penal code.	1. Incomplete application of the rule. That is because some sentences in Arabic do not have verbs.
	An omission of the verb to be	3	1.*it- mutually agreed according to the traditions and cultures of the Islamists in Saudi Arabia	1.Arabic interference. A Literal translation from the first language is obvious and leads the learner to omit the verb.
	A sequence of tense	9	1. * However, it's only in Saudi Arabia where women are not allowed to drive in public. Islamists' clergies claimed that women driving would expose them because they would be having to uncover their face, and that is contrary to Prophet Mohamed's direction that required all Muslim women to covering their bodies while in public.	1. Ignorance of rule restriction. The writer here did not know that the sentences should be written consecutively order.
	An Omission of the subject	0	-	-
	A repetition of the subject	0		-
	passive voice	1	1. * began The struggle by women to have equal rights as their male counterparts began in the 1970s.	1. Ignorance of rule restrictions. The student does not know the rule of passive voice construction.

Morphology	Irregular verbs	1	1. * They did this after they supervised American women driving military vehicles.	**1**. False concept, the student used the verb supervised instead of observed.
	Lack of agreement between subject and verb	9	1. * one of the renowned human right activists that campaigned for women's freedom to drive on public roads are Manal al-Sharif.	**1.**overgeneralization.the writer here overuses the verb has and under uses the verb have
	Using erroneous part of speech	2	1. * this campaign encourages all women to just get in the car and driving on October 26th	**1.** False concept**.** Again because of the mismatch of English spelling and its pronunciation which is not there in Arabic, the writer mistakenly used the verb were instead of the relative pronoun where.
	Number agreement	3	1. * This campaign has started a huge debate whether women should drives in Saudi Arabia or not	**1**. Ignorance of rule restrictions. This student does not know that the adjective different indicates plural and it should be followed by a plural noun.
	An Addition of suffix to infinitive	4	1. * Anyone who's been raised in the west would ask why are they not driving?	1. Exploiting redundancy, instead of writing cooperate the writer adds an unnecessary suffix which changes the meaning. the pronoun(His) instead of the pronoun (her) was used in the sentence.
	Demonstratives	0		
	An Omission of the relative pronoun	1	1. * I mean imagine - all cars are not following the traffic laws	1. Incomplete application of the rule. The learner did not apply the rule and omitted the relative pronoun (who) which makes the sentence fragment. And he used the pronoun His instead of using the pronoun her.
Word order	Errors associated with nouns: two nouns one of	0		-

	which was used attributively			
Tenses	A Confusion of tense	0	-	-
	Past instead of the present	0	-	-
	Present instead of past	0	-	-
	Total number	**38**		-
Lexical errors	Lexical items wrongly used in place of others	0	-	-
	Exotic meanings used in lexical items	1	1. * Religious police's role is simply to make sure no one hits any woman and roads stay safe.	1. False concept. She uses hits instead of harasses
	Idiomatic mistakes	0	-	-
	Total number	1		

Table (4) Total Number of Errors

No	Area	Number of errors
1	Grammatical errors	56
2	Lexical errors	1
Total number of errors		**57**

Discussion of Findings with Relation to Literature

The above tables show the presentation of students' errors frequencies, causes, interpretations and give some examples of each type of error both in the pre-test and the post-test.

It is clear from table one that the total number of errors related to prepositions is 114 and the number of errors in articles is 92. As for structural errors omission of the main verb is the area in which most of the students (51) made mistakes. Followed by the omission of the verb to be (34). This incomplete application of the rule may refer to mother tongue interference because some sentences in Arabic do not have verbs. While just 9 students omit the object in their essays. There are 77 mistakes related to morphology due to ignorance of rule restriction. And the researcher recommends specifying much time explaining morphology. There are 67 mistakes related to word order and also, they are due to ignorance of rule restriction that is why the researcher recommended paying more attention to such kinds of errors too. Most of the mistakes (35) related to tenses are of the type of confusion of tenses. As for the second type of mistake which is lexical one. Most of the errors (68) made by the students are related to lexical items wrongly used in place of others and this could refer to the false analogy which is a result of lack of practice.

Table two shows the frequencies of grammatical errors (852) which are more than the lexical ones (84).

After adopting the researcher teaching strategy of giving students well-written essays to be analyzed by them and then imitate the style of those essays. Their writing improved greatly and table three shows frequencies of errors of students after analyzing their essays in the post-test. It is clear from the table that the number of errors reduced enormously to be just 18 function word

type of errors (11 prepositions errors+ 7 article errors) from 206 as shown in table one (114 prepositions errors+ 92 article errors). Table number 4 shows that the total number of grammatical errors reduced to be 56 and lexical words reduced to be just one. This means the success of the strategy especially in the area of lexical errors. Accordingly, the researcher encourages using this strategy as a solution to writing problems. So, the target study is different from the study of Hamid Marashi (2015) that aimed at using convergent and divergent tasks to improve writing and language learning motivation. In its purpose and findings. However, there is a similarity in the treatment of students' errors using a teaching strategy. In Marashi study, for example,18 sessions of teaching and treatment were given to the students followed by writing a test for both groups and comparing performances for each of them. The findings showed that the learners in the convergent group benefited significantly more than those in the divergent group in terms of improving their writing. Also, if we look at the study of Fawzi Eltayb Yossif (2016) of the University of King Khalid, Saudi Arabia. "An investigation of writing errors of Saudi EFL university students." We will find one difference which is the main purpose of the study. Since the target one looks at Categorizing students' errors to identify the most common type of errors and the causes of these errors to suggest the possible solution accordingly while Yossif's study aimed at investigating writing errors. Although both studies were done in Saudi Arabia, the year of conduction as well as the population of the study are different. The results of Yossif's study revealed that the students make errors in their writing performance as a result of some factors such as mother tongue interference, and insufficient activities, and the practice of necessary techniques of writing in addition to the lack of follow-up to the students' writing performance and some other factors. Those findings are similar to the target study. One of the recent studies which conducted in 2020 by Amal Ibrahim Shousha , Nahed Moussa Farrag & Abeer Sultan Althaqafi. entitled analytical assessment of common writing errors among Saudi foundation year students: a comparative study. The study explored the most common writing errors of science and arts students of the foundation year program at a Saudi University that hinder them from achieving their course goals, learning outcomes and becoming efficient writers. The main findings of the study were: lack of exposure to English language, inadequate application of primary language and writing mechanics. So, the main similarity between it and the target one is the findings and the main difference is in the purpose since they only assess the students writing errors to identify the causes but the target study incorporates the solution to the problem as well.

CONCLUSION

From the researcher's experience in teaching writing courses inside and outside Saudi Arabia, she noticed that many writing errors that hinder students from achieving their purpose of writing. During writing, the writers should communicate using proper sentences, i.e. grammatically and semantically proper. From this point of view, the researcher chooses to analyze the grammatical and lexical errors which will hinder students from writing proper sentences subsequently being understood. To do this, the researcher analyzed her students' essays before and after adopting her strategy of teaching writing. She gave them a writing assignment then she collected her students' essays, corrected them, categorized their errors, and described them. Then she explained the probable causes of these errors. After the analysis of data, the main findings showed that the grammatical errors were the most typical types of error among students, besides lack of practice was responsible for most learners' errors so the intense practice could be one of the solutions to students' problems in writing. Moreover, the researcher found out that providing students with reading models before writing to analyze and criticize it will develop students' style of writing and enrich their vocabulary. As a result of the findings, the researcher suggested some recommendations; the most prominent one is that teachers should pay more attention to grammatical errors, especially morphology since it is the area in which most of the students make errors. Furthermore, teachers should provide their students with

reading models to learn from them ideas organization skill, the function of each paragraph in the essay, and the location of the thesis statement. Teachers should give their students many writing exercises after explaining the basic writing skills. moreover, teachers should analyze their students' errors after each essay writing and compare their performance. The researcher also suggested the effect of providing students with reading models to enhance writing learning as a further study.

There are some challenges the researcher faces during the study: firstly, the absence of some students during the weeks of the study, so the researcher should have a good rapport with her students and ask for the reason of absence and give them their task to be finished before the coming lecture. Secondly, the challenge to establish a need for the study since there are many studies that conducted in the same field. So, the researcher should come with something new such as using a strategy that will help the researcher identify the most common errors of the students and the reason for such errors. And adopting the solution at the same time. Thirdly, the challenge of finishing correction and categorization of all the 65 papers during mid exams which needs correction too. Hence, it needs much effort and time from the researcher to organize her time to finish all the tasks on time.

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INSTRUMENT DEVELOPMENT FOR IOT ADOPTION IN SMART CITY

Dr. Pragati Priyadarshinee
Assistant Professor, Indian Institute of Management Bodh Gaya, Bodh Gaya-824231

ABSTRACT

The present study is focused on IOT adoption in smart cities in India. Different components of IOT are considered as independent variables. Fog-computing works as a mediating variable. Initial pilot testing is done on 115 samples from 11 smart-cities. Based upon the survey reliability and validity of the measurement scale is derived.

Index Terms—IOT, Smart-city, Fog-computing, scale development

I. INTRODUCTION

Linking the Internet of Things (IoT) with smart sensing objects is a current trend. The smart device can collect, monitor, and control the real-world data to internet and communication technology. Smart signifies hardware, software, cloud, sensing devices coming together to communicate through the data with the real world. Sensor devices are inbuilt in IoT through wired or wireless networks using some addresses links of computer networks. It will be useful in important decision making by some analytics. The IoT is a smart connected device that can communicate with objects with some IP addresses. It can be smart lighting, smart logistics, and smart healthcare management, which can be innovative with smart technologies (Nam and Pardo, 2011; Monica Mital et al., 2017). Smart cities are city -connected through data where objects can interact with each other without any human interference. The Smart cities in India are encouraged to adopt IoT through the Technology Acceptance Model. As a policy of Smart city creation, the Government of India has declared for 100 Smart cities creations (Chatterjee et al., 2018). There are several studies on IoT, but its impact and the success ratio are demonstrated very less where the user can accept it. In this regard, Smart city creation can encourage more potential users of IoT technology. More IoT devices will increase the volume of data where the Big-data will come in the role. The data analysis can be done faster and accurately through big-data analytics. These data are transformed into meaningful information for any decision-making ability. Fog computing can be used to reduce the amount of data sent to the cloud for processing (Williams, & Weerakkody, 2015; Rana et al., 2017; Kapoor et al., 2014a; Chauhan et al., 2016; Chatterjee et al., 2017).

II. PROBLEM STATEMENT

Research Gaps

The articles discussed Smart city, Big-data analytics, Cloud computing, and IoT adoption in Industries. Some studies are Industry-specific, like SMEs and multiple case studies methods. Few studies carry specific research models, and some are surveys on Smart city. Rarely the discussion of Fog Computing is done to build a Smart city that can minimize data storage. There are certain variations between cloud computing and IoT, but we rarely connect this to Fog-computing, which stores the intermediate data with energy efficiency. The critical success factor identification for smart-city success is made in particular studies where only SEM is used for hypothesis testing. Rarely any study identifies each factor's effectiveness on a Smart city success rate (Chatterjee et al., 2018; Lom et al., 2016; Luthra et al., 2018; Rana et al., 2019).

Most of the studies discuss IoT as the only technology required for the success of Smart-city. Lom et al. (2016) first introduced the different aspects of IoT in terms of IoE, IoP, and IoS, which have the same importance as IoT for the success of Smart-city. To fulfill such a gap in this research, we have to include Fog-computing with IoT for Smart city building. The IoT data can be stored in the fog in terms of IoS, IoE, and IoP. There is a lack of study that combine all

such concept for better development of the smart city. To address such a gap, we have used an integrated approach of SEM and ANN. The existing literature revealed that IoT is required in a smart city's successful development (Strohbach et al., 2015; Centenaroet al., 2016; Mohammadi et al., 2017) Fog-computing is related to Cloud computing as the intermediate storage below the cloud. Some of the studies discussed various sub-factors in IoT (Ly et al., 2018; Mohammadzadeh et al., 2018), but there is a lack of study on Fog-computing and Smart cities. Therefore, it is essential to establish the relationship between IoT as IOS, IOP, and IOE, considering Fog-computing as the mediating variable.

III. Conceptual Model and Hypotheses Development

It is the inter-relationship between the endogenous and exogenous variables in a structured manner. Some kind of dependent and independent relationships are there among the factors.
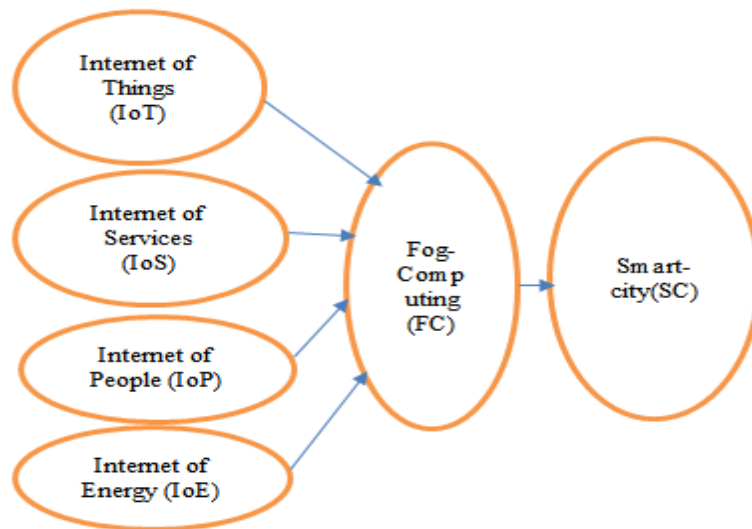
Figure 1: Conceptual Framework

At the initial stage, some logical grouping is done among the items to form the constructs. Data was collected from 13 Smart-cities out of 20 smart-cities in India for a pilot study. 13 Smart-cities were identified in the second round of smart-city campaigns, and in the first round, it was 20 Smart-cities. This is the reason to select 13 Smart-cities for our study.

A questionnaire was formed based on the factors and items used in the study. It was validated by a team consisting of 4 experts from the central government and three professors from academia. After the pilot analysis, the final set of variables was identified. With the help of final variables, the research model and hypotheses were framed. A one-point to seven-point Likert scale was used for data collection. The number of items was reduced after the pilot study. Four hypotheses were framed for the study.

The following hypotheses are formulated from the above conceptual framework.

H1: There is an effect of the Internet of Things on Fog-computing.

H2: There is an effect between the Internet of Service and FC.

H3: There is an effect between the Internet of People and FC.

H4: There is an effect between the Internet of Energy and FC.

H5: There is an effect between the Internet of People and FC.

B. Measurement Scale Development

Mixed-method research was used for the study and a survey instrument was developed based on 6 variables and 38 items. The questionnaire needs to be developed for survey to measure the variables of smart city. Mixed method signifies both qualitative and quantitative questions for the study. Items are framed for each variable and mostly taken from the previous study done so far and from the present literature review.

The questionnaire was prepared to gather certain information on one part as demographic profile such as name, age, email-id and place of birth. Before finalizing the questions or items, experts' opinions were taken. Initially, the variables definition and the items were identified. Some uncertain views on reliability and validity were also provided. In the next step a pilot study was conducted based on 115 respondents. And reliability and validity were derived.

C. Sample Design & Data Collection

Data collection was done from some smart-cities of eastern and southern India. The respondents were the Individuals of smart cities. Total 98 smart-cities were identified in this region. And we tried to cover 51 smart-cities. Initially, for pilot study we covered 11 smart-cities having 10 respondents from each city. The interviews were open-ended and discussion based and lasted maximum 45 to 65 minutes. Latter stage a content analysis was done based on this qualitative data.

IV. RESULTS AND DISCUSSION

From the initial stage of pilot study, we identified the Cronbach's alpha for each variable IOT, IOS, IOP, IOE, FC and SC. It satisfies the thresh-hold limit of more than 0.7 for each variable used in the study. It is   projected in table 1.

Table 1: Cronbach's Alpha Calculation

Variables	Cronbach's Alpha
IOT	0.914
IOS	0.917
IOP	0.922
IOE	0.926
FC	0.815
SC	0.925

Table 2: AVE and CR Calculation

Variables	AVE(Convergent Validity)> 0.5	CR (Composite Reliability) > 0.7
IOT	0.9154	0.9188
IOS	0.8234	0.9234
IOP	0.814	0.9172
IOE	0.9133	0.9234
FC	0.9812	0.918
SC	0.9122	0.9566

Table 2 gives the validity and reliability of each variable. Validity is represented as convergent validity which should be more than 0.5 and reliability is represented as composite reliability that should be more than 0.7. All the variables satisfy the threshold limit and can be considered for further study of hypothesis testing.

V. CONCLUSION

The present study identified five critical success factors that influence the success rate of Smart cities in India. A hybrid method constituting both SEM and ANN is used for analysis. The relationship between each factor is identified through exploratory factor analysis. Based upon

the research questions, research objectives were framed for the study. It may be noted that the smart-city is controlled by Fog-computing that enables the objects in the smart-city. FIoT is the main technology for the establishment of a smart city. It is visible from the study that FIOT affects Smart-city majorly with a higher value of regression weights of 0.088. IoS, IoP, and IoE have a significant effect on fog computing. The positive effect of Fog computing and IoT are separately explained in the previous studies (Lom et al., 2016).

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NEED AND IMPORTANCE OF LEADERSHIP QUALITY AMONG HOTEL MANAGEMENT STUDENTS – A REVIEW

Arun A[1*] and D. Gunaseelan[2]

[1]Research Scholar and [2]Assistant Professor , Department of Hotel Management and Catering Science, Jamal Mohamed College (Autonomous) Trichy 620020

ABSTRACT

Leadership is an indispensable value for an individual, entrepreneur, or employee to be successful in his career. Leadership is the quality or ability to lead a single or group of people towards a common goal. An eminent leader will always be valued for his eminence in motivating and inspiring leading skills by his subordinates and higher officials. The leader is always responsible for the morale of the employees by creating responsibilities and accountability for the organization. The hotel management students are the future workers into a concern with a complicated organizational structure in coordinating among the employees within and with other departments for a successful running of the hotel in treating the guest. The quality of a hotel management student is measured by his service towards the guest in upkeeping their levels of satisfaction with the hotel.

The hotel management program is a professional program with a composite of art, science technology, and management. The main function of the hoteliers is to be experts in selling basic hotel products like accommodation, food and beverages, and other ancillary services like banquets, spas, and other luxury services offered at the hotel. The curriculum of the program is more concerned with the theoretical and practical part of their standard operating procedures at all levels. It is concerned very little in developing the managerial function in the department. Students enhanced with the basic leadership qualities will always make the students handle situations in a neat and organized manner. These qualities have to be enhanced by the academic activities at the college level by the hospitality trainers or teachers.

Besides there is mere importance in incorporating the leadership qualities in the curriculum there exists a limitation in making the students understand the conceptual view of the quality. This can be overcome with more procedural activities of roleplays, case studies, handling situations, and making the students involved in the self-learning activities. Thus, the study involves exhibiting the importance and significance of leadership traits to be blended into the hotel management curriculum to sustain and meet the issues and demands of industrial requirements.

Keywords: Education; Hotel Management; Leadership Quality; Students

INTRODUCTION

Management is an essential mode or practice to organize a group of individuals to attain a common goal together. Efficient and effective management will be the strong backbone that composes the functions like planning, organizing, forecasting, coordinating leading, controlling, and motivating the organizational individual's effectiveness to achieve their visions and mission. Effective management controls and positively uses the man, money, machine, and materials with no wastage to achieve these an effective manager with all leadership qualities is a must factor.[1]

Leadership refers to a human ability to influence, motivate, and enable others to contribute toward the success of an organization's goal. A good leader is able to bring out the best abilities in his team member and motivate them to work together in achieving a shared goal. A good leader's achievement socially is the basic understanding of their fellow workers and organizing them individually or in a team and tracking them to focused achievements without delays[2]

LEADERSHIP DEVELOPS PROFESSIONAL PERFORMANCE

Many theories and studies propose a list of qualities for being a good leader that includes mastering communication, coordination, cooperation, behavioural impacts, empowered and good job knowledge, etc. beside the basics, diverse qualities of leadership differ according to the concern, department, human nature, key qualities at work and designations holding. A leader's qualities could not be just constrained to theories or studies.[3]

Leadership increases employee satisfaction and reduces their attrition percentages improve and motivates the morale between the concern and employees, establishes the vision and mission among the employees to work for their wellness in turn the concern's wellness.[4] The actual aspectual outcome of the leadership quality is to train and improve the productivity or performance under any pressurized situations with no wastages or error in the services. This can be attained at the hotel only by an effective leader with the ability to motivate, coordinate, cooperate, lead, communicate with fellow staff or guests or higher officials listen to their feedback, flexible in solving problems in an ever-changing workplace. Hereby the strong leadership quality is a must-added valuable job description for an employee to be an effective hotelier.[5]

Operative communication is indispensable to presenting a company's mission, vision, and goals to employees. Written communication skills were the top-ranked attribute. The leader encourages people to do their jobs by providing them with guidance, direction, and motivation. The main focus of a traditional leader is to progress a positive ranking in the business position of the company or the organization in the market. Tourism leadership is a process of leading others to achieve objectives; the concept encompasses motivating and guiding people to realize their potential and achieve tougher and more challenging organizational goals in the travel, tourism, and hospitality industry[6]

IMPORTANCE OF LEADERSHIP IN THE HOTEL INDUSTRY

The hotel industry is a manual-dependent industry where a set of employees is always required to run the daily operations, these human resource needs an effective leader than a real manager to run the concern in an error-free mode. The main objective of any organization is an expectation of running the daily operations with no wastage of the four M's namely money, man, material, and machine this can be achieved with an organized leader than a manager.[7] Hotel industry has varied standard operating practices and procedures which could not be always traced or treated hence any employee in the industry should owe a leadership quality in himself treating the property or guest as the king and treat them with utmost sincerity.[8]

Communicative and motivational aspects of leadership quality are more effective in the leading hospitality sector with a strategic direction truly welcoming the input and viewpoints of the operational staff to overcome the issues internally within departments or with the guest satisfaction issues. Thus, leadership is a vital management function that always helps to direct the hotel industry as a whole or individually serving a guest for efficient management of the inventories or property or guest issues in the achievement of goals.[9]

LEADERSHIP TRAITS FOR HOSPITALITY AS A CAREER

An effective leader to be in the hospitality industry needs to know how to address the needs of both the guest and in turn also run towards the goal in order to behold effective management. Being focused on the guest issues and problems in the day-to-day operation there should not exist any lag in the attainment of his long-term goals for the property. Thus, a leader in the hospitality industry must always be focused on the attainment of long-term goals by coordinating and taking his co-worker's cooperation in achieving all his successes. The hospitality industry is always focused on manual operations even a single mistake of an individual can ruin the whole property's value or ethic so a hospitality leader holds this pride in

always making his employees well understand about the property's value is the individual's self-respect in the society. To be an effective leader the individual has to be composted and make the employees follow the following traits for effective and smooth functioning of the hotels

1. **Adapting Attitude:** An adaptable individual either at lower or top levels of management will always propose and works towards the concerns goals adapting himself to any tough situations or issues. The hotel industry deals with both tangible and intangible services that change day to day in their promotional or servicing activities. An active leader must be able to adapt to any situation and act proportionally direct. Any obstacles have to be taken a chance to prove himself a good problem handler, communicative, cooperative, and democratic among the employees or with the guest.[10]

2. **Team-Player:** The hotelier's aim is to attain guest satisfaction it could not be achieved individually by a manager or a department cooperative work has to be done for example the service of good food experience for a guest can be achieved with the coordinative work of food production and the food and beverage service department any missing cooperation or communication between the department may spoil the food experience of the guest that results in a complaint. Thus, being a team player is an essential feature for any individual in the hospitality or tourism industry. It determines the strength of the concern in communicating, delegation of work, etc, team goals should go in hand-in-hand with the hotel's objectives for an effective outcome.[11]

Influenceable and Delegative: Always a hotel needs an influential and delegation leader where the operations could not be monitored or follow-ups can be done frequently, the leader must be highly skilful and knowledgeable in nature which creates a good impression. The work at any level of management has to be delegated to the subordinates where the personal inspections or monitoring of work for the leader will be reduced.[12] A houseman inspired by the job knowledge and positive attitude of the supervisor will always work efficiently in cleaning the rooms or public areas which do not need any more monitoring or inspections.

Accountability and Self-awareness: The individual being in a hotel industry-leading a group of employees as subordinates should be aware of all the happenings, practices, and procedures at the concern. Must be able to direct and coordinate his subordinates learn from mistakes, avoid guest issues, focus on their daily operational goals, etc. hereby the leader holds accountability for all the employees under his considerations.[13]

Training and Motivation: The leader must be a good trainer and motivator, hotel industry holds all standard operating procedures for every practice which has to be followed with utmost care or may result in guest complaints, an appropriate training session, and motivational facts have to be considered for the hotel employees to rejuvenate their mind and body towards work.[14]

IMPORTANCE OF LEADERSHIP SKILLS FOR STUDENTS
Hotel management students are under the curriculum that proposes learning the practical and theoretical aspects of standard operating procedures and following basic etiquette at hotels in maintaining good coordination with the employees and also with the guest. In all aspects of the designated official in the hotel industry should follow the rules and regulations of the hotel policies, hence the personal attitudes of the students the future hoteliers must be groomed in all facts to follow the policies of the hotel. It is important for a student to acquire the qualities of a good leader to maintain a trouble-free operation at the hotel industry.

The hotel management institutions must concentrate more on making the students effective leaders than rank holders, the student must be made eminent in handling tough situations, lead a

team, define their role toward the progress of concern, propose themselves as an entrepreneur, and effective internal or external communication, etc. Thus, the student has to be empowered with leadership qualities to enhance himself and motivate others in his future responsibilities as an employee or entrepreneur.[15]

Today most hotels look for employees with good motivation, strategic thinking, delegation, and emotional intelligence skills which are the attributes of a good leader, employee recruited with these qualities understands the basic need of hotel business operations.

PRACTICES THAT DEVELOP LEADERSHIP QUALITY AMONG STUDENTS:
The educators or instructors at hotel management institution has to practice teaching beyond the classroom learning techniques, the students have to understand the actual need and facts of practical learning to be a good hotelier, and the students must be made comfortable in setting up their goals academically and in intradisciplinary activities. Any goal being set up by themselves will intrinsically motivate them to achieve it with no regrets.

Besides the curriculum-based activities, students should be made involved in actively participating in role plays, group discussion of current and trending topics of the hospitality and tourism industry, designing standard operations, fusions of menus, formulations of new recipes, documenting all activities at departments, etc, these activities among the students at any level of study will make them practically get involved into the activities and understand facts. Hereby the leadership quality is a personal skill that could be enhanced only with the active participation of both teacher and students hence the student must be motivated in a manner to improve himself communicable, approachable, reliable, passionate, patient, etc.

CONCLUSION
Leadership begins with identifying and understanding the values internally and externally of a human it plays a prime role in building a loyal relationship officially. It is a strong belief in hotel industries that all members of all outlets should be capable of exercising leadership in different contexts. The more leadership is encouraged the more it flourishes and serves the guest to the maximum level of satisfaction. Good leadership in hotels helps to foster both a positive and motivating culture for staff and a high-quality experience for learners and trainees. Leaders at all levels in hotels can contribute to this by developing the top skill needed by the hotel organizations. Hence the significance of leadership skills is mandatory for all hotel industries. Hereby development of leadership skills among the hotel management students is mandatory to enhance the value of service at hotels during their hotel tenure. The hotel management institution must consider the practices of developing management processes into their curriculum for the production of leaderlike hoteliers in the industry.

Conflict of Interests: Nil

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A ROLE OF SELF HELP GROUP (SHG) FOR EMPOWERING WOMEN THROUGH ENTREPRENEURSHIP: AN ANALYTICAL STUDY OF NRLM IN KOLHAPUR DISTRICT

Dr. Hanumanth S. Patil[1] and Mr. Rajendra S. Panditrao[2]
[1]Assistant Professor, Department of Management Sciences, SRTMU, Nanded (Sub Center Latur)
[2]Research Scholar, Commerce & Management Faculty, SRTMU, Nanded

ABSTRACT
"Millions of women in our hamlets know what unemployment means. Give them access to economic activities and they will have access to power and self-confidence to which they hitherto have been strangers" - Mahatma Gandhi

NRLM (National Rural Livelihood Mission) came in India with the aim to eliminate poverty by empowering rural women and it is sound to be effective in bringing social and economical changes in rural India. It has been successful in increasing the participation of rural women in policy making through the Self help group model and by polishing their managerial skills. This Study reviews the "A Role of Self Help Group (SHG) for Empowering Women through Entrepreneurship : An analytical study of NRLM in Kolhapur District Maharashtra". SHGs provide financial facilities to rural women which helps in starting entrepreneurial activities and motivating women for establishing new small businesses. Women are participating in training and capacity building programmes and are utilizing the loan amount for income-generating activities. The number of women entrepreneurs is increasing all over the world but the condition of women in developing nations is different from that of women in developed countries. In India, the empowerment of women is an important issue as the condition of rural women is still very pathetic. The SHGs play a major role in achieving a sustaining livelihood by facilitating the rural women to enter into entrepreneurial activities. Globally, it is slowly proving one of the most effective strategies to neutralize poverty. SHGs provide women entrepreneurs with micro-loans to sustain their businesses, while also creating an environment for them to develop greater agency and decision-making skills.

Keywords: NRLM, SHG, Women Empowerment

INTRODUCTION:

SELF- HELP GROUP
Self- Help Group are small voluntary groups that are formed by people of the related committee or a group in a village consists of 10 or 20 local women. SHG act as a stimulant to make socially and economically backward women especially, to become self reliant. SHGs not only increase their income but also improve their status in society. SHG to a great extent address the women's un-employment problem by making them self-employed. Gender discrimination and inequality are also addressed, SHG play a vital role in sensitizing women to realize their importance and their empowerment. The group makes them to realize their potentials in promoting their financial independence.

WOMEN EMPOWERMENT
Women empowerment is a process that promote social, cultural and political participation of woman and their wellbeing. The concept challenges the existing establishments that suppresses women and denies their agency of being a change bearer. Empowerment ensures an environment for women where they can make decisions of their own for their personal benefits as well as for the society. We can also add that empowering women to participate fully in

economic life across all sectors is essential to build stronger economies, and improve the quality of life for women, men, families and communities.

REVIEW OF RELATED RESEARCH:

- **Jain and Jain (2012)** in their study found that self help groups (SHGs) had been successfully empowering rural women through entrepreneurial activities. Increased in savings habit of rural women, income, expenditure was also observed. The self help groups had main impact on social and economic life of rural women. The findings of the study revealed that SHGs helped the rural women in getting easier & quicker loans and diminishes the ill effects of taking loan from money lenders. There was increase in self confidence and social recognition in society.

- **Panda and Kanjilal (2013)** on the basis of their study "on women empowerment and entrepreneurship in Orissa" concluded that the micro-enterprises not only contributed in enhancement of production and employment opportunities but also played major role in personal, social, and decision-making abilities among women. Their involvement in SHGs improved the sense of achievement, leadership qualities, and social interaction. An increased level of political participation and improved living standards of SHG members was also observed in the study.

- **Acharya, (1983)** concentrated on Nepal women strengthening in various measurements like a job in spread the executives, household, and asset distribution by accepting the free factors as market work and unpaid family labor. They arrived at the resolution that carrying women into the market economy emphatically influences their impact on asset portions and residential dynamics. Business visionaries are happy to try sincerely and to accomplish greatness in spite of the difficulties and dangers of the earth. Also, endeavor to accomplish the objectives which are hard to accomplish by other common individuals. The solid should be a free or self-ruling individual is another main impetus related with the business visionary. They hate controls from a outsider.

- **Dorward, Andrew et al (2001),** Douglas R. Brown et al (2006), The Annual Report on Micro, Small and Medium Enterprise Development Organization (2007-08) on North East analysed asset based approach to identify livelihood strategies and concluded that asset endowment, technology up gradation and capacity building indeed appear quite important not only choosing empirically distinct poverty alleviation strategies but also in the returns earned from these strategies.

- **M.Suguna** in her study Education and Women Empowerment in India (2011) talks about how women's education in India has been a major preoccupation of both the government and civil society as educating women can play a very important role in the development of the country. Educating women plays an important role in empowerment because it enables them to respond to the challenges, to face and deal with the traditional role of life. Women education in rural areas is very low and this means that still large womenfolk of India are still illiterate, weak, backward and exploited. Education also minimizes the inequalities and functions as a means of improving their status within the family.

- **Meenakshi Malhotra in her book Empowerment of women**: Women in rural development (2004) argues that not all women face the same problem of social and economic changes that are taking place in the rural areas like offering opportunities to some whereas to some they bring difficult challenges. Globalization has affected those dependent on agriculture leading to restructuring and declining of agricultural sectors. The growth of service sectors and increased emphasis on technology. In many areas, it has now employment opportunities as

well as bringing changes in the role of the women. This study focuses on the development of rural women. In many parts of the world various programs are designed to empower them.

- **Kabeer (2001)** defined by empowerment as "the expansion in people's ability to make strategic life choices in a context where this ability was previously denied to them." which means allowing freedom to make strategic decision in their life for any level.

- **Pillai (1995),** women empowerment is an active, multidimensional process which enables women to realise their full identity and powers and authorities in all stages of life. Power is neither a commodity to be transacted nor can it be given away as alms. Power has to be acquired and once acquired it needs to be used to achieve , make it consistency and preserved.

- **Schreiner and Colombet (2001)** define microfinance as "the attempt to improve access to small deposits and small loans for poor households neglected by banks". The main object of microfinance is to raise the income of poor people by providing financial services or products of very micro amount. These financial services are leads to savings and credit and embrace financial services like payment services and insurance.

- **Ledgerwood J (1999)** gives the opinion that, when poor people are unable to obtain financial services from banks directly then microfinance plays an important role in providing financial services. which leads the vital contribution of microfinance to reduce poverty line of the country.

RESEARCH GAP

A range of studies has consider on the A Role of Self Help Group (SHG) for Empowering Women through Entrepreneurship : An analytical study of NRLM in Kolhapur District Maharashtra From the comprehensive review of literature, it is observed that no influencing factors of entrepreneurs in Kolhapur district under NRLM study has done on this specific field in the state of Maharashtra. Though few studies are focused on the impact of NRLM still their method, aim and objectives are different from this study. Hence, present analytical study attempt to explore the an Empowering Women through Entrepreneurship. The SHGs play a major role in achieving a sustaining livelihood by facilitating the rural women to enter into entrepreneurial activities. Globally, it is slowly proving one of the most effective strategies to neutralize poverty.

RESEARCH OBJECTIVES & PROPOSED HYPOTHESIS:

- To study role of Entrepreneurial abilities in rural women under NRLM beneficiaries.

- To analyze the influencing factors of entrepreneurs in Kolhapur under NRLM beneficiaries.

- To Study the Role of Self Help Groups in the Entrepreneurial Development among the Rural Women in Kolhapur District under NRLM.

- To measure the impact of training and development on the women self-help group members under NRLM.

- To study the socio-economic background of the NRLM beneficiaries.

RESEARCH DESIGN:

For the present research work Kolhapur district of Maharashtra have consider based upon the convenience purpose. The research design is exploratory and descriptive in nature. The study will be cover the districts of Kolhapur. The data will be collect using an interview schedule. The instrument used in the interview schedule will be developed through a literature review and several items will be develop by the researcher in order to realize the research's objective. The questionnaire consists of the items related to Role of Self Help Group (SHG) for Empowering

Women through Entrepreneurship. Every item will be use a 5 - point Likert Scale ranging from (5) strongly agree to (1) strongly disagree. To test the reliability of the items, the reliability test will have to be conduct.

SAMPLE SIZE:

There are 12 blocks in the Kolhapur District and from these 12 blocks, The selection of the concerned is based upon the essential parameters as (i) Majority of the members of SHGs in these blocks are involved in the entrepreneurial activities. (ii) The location is convenient for the purpose of data collection.

Sr.No	Block Name	New	Revived	Pre NRLM	Total	Total Member
	SHGs Under NRLM					
	Kolhapur District					
1	AJRA	643	93	191	927	8,936
2	BAVDA	547	3	144	694	6,050
3	BHUDARGAD	1,374	71	302	1,747	16,667
4	CHANDGAD	1,093	130	182	1,405	14,703
5	GADHINGLAJ	1,142	7	257	1,406	14,275
6	HATKANANGALE	2,346	24	479	2,849	27,884
7	KAGAL	1,275	35	275	1,585	16,292
8	KARVIR	2,240	33	604	2,877	27,629
9	PANHALA	1,136	46	256	1,438	14,230
10	RADHANAGARI	1,408	29	254	1,691	16,576
11	SHAHUWADI	1136	0	226	1362	13759
12	SHIROL	1495	13	231	1739	16792
	Total	**15,835**	**484**	**3,401**	**19,720**	**1,93,793**

Statistical Tools

The data analysis methodology used in the present study is descriptive. The results were processed with simple statistical methods like percentage, mean, and standard deviation. To measure success, a qualitative method will be use. The present study follows the model used to achieve the objective of the present study, factor and regression analysis will be use. Principal - components method of factor analysis will be use in the present study. For rotation of the variables, the varimax method will have to be perform.

Secondary Data

Secondary data like books, journals, articles, newspaper reports, websites and videos is used. Internet related data bases are also used as an important source. In Kolhapur district, Non-Governmental Organizations have been playing an important role in promoting and making the SHGs sustainable. Entrepreneurs association based is playing the role by giving loans to the SHGs which helps their group.

Secondary data The secondary data has been collected from the NGO's who are involved in the formation of SHGs, NABARD Reports, BDPO and CDPO's offices and from the Lead bank of the district Kolhapur.

LIMITATIONS OF THE STUDY

- This study is limited to Kolhapur district only.

- This study only focusing on Role of Self Help Group (SHG) for Empowering Women through Entrepreneurship.

- The SHG may not have maintained the detail record of the Clients which is limiting factor.

ROLE OF SELF HELP GROUP

- The SHGs of rural women consists of members who are the poor, having low saving capacity and who depend on money lenders for meeting their consumption needs and social obligations.

- Formation of women into self help groups paved a way to develop their economic standards, thereby building self confidence.

- Women in SHGs have been encouraged by the government as well as NGOs to undertake self employment ventures with locally available resources. Availability of micro-credit helped SHG women a lot and many women came forward and established micro enterprises.

- At present a number of NGOs and financial institutions have been offering micro finance especially to rural women micro entrepreneurs.

- They also motivate training programmes to develop their entrepreneurial skills and capabilities.

- Specific trainings in manufacturing or service sector are available for the prospective rural women micro entrepreneurs. These institutions have been encouraging women to start micro enterprises. As a result micro entrepreneurship is gradually growing importance among the rural women.

ENTREPRENEURIAL ACTIVITIES STARTED BY THE WOMEN

Women have engaged in various entrepreneurial activities after the joining of Self Help Groups. The entrepreneurial activities initiated by women after the skill training programme are dividing into three categories viz., manufacturing, trading and services.

Manufacturing entrepreneurial activities includes business of Fast Food Preparation, Candle Making and Detergent Powder making.

Trading entrepreneurial activities includes Bakery shops, General Stores and Garment shops in which women do the business of selling different kind of cloths to others.

A Service activity includes Boutiques, Beauty Parlors.

THE FACTORS RESPONSIBLE FOR ENCOURAGING WOMEN TO BECOME ENTREPRENEURS

The days have gone when women always passed her whole life within the boundaries of house now women are found indulged in every life of business. The entry of women into business in India is an extension of their normal home activities. But with the spread of education and passage of time women started shifting from doing work at home to the business venture. The main reasons for women to emerge into business ventures is –

(a) Skills, knowledge, adaptability in business

(b) Accept the challenging role to meet her person needs and become economically independent
(c) Innovative thinking

(d) Self-identity and social status

(e) Support of family members

(f) Role model to others

(g) Needs for additional income

(h) Family occupation

(i) Government policy and procedures

(j) Many women start a business due to some traumatic event, such as divorce, discrimination due to pregnancy or economic reason such as a lay off.

Socio Economic Background of NRLM Beneficiaries:
In terms of number of below poverty line (BPL) households, population density and female literacy the sample states are differing from each other. Of the sample districts, Kolhapur is the smallest in terms of their geography and population & its density. Unlike the majority of districts, the female population is more in Kolhapur, Sangli and Satara districts. NRLM works on three pillars – enhancing and expanding existing livelihoods options of the poor; building skills for the job market outside; and nurturing self-employed and entrepreneurs. The rural population is high across the districts; however, the percentage of urban population is more in Kolhapur district. Agriculture is prominent across the sample districts. Small scale industries are prominent in some of the districts.

SCOPE OF THE STUDY:
The scope of the study cover and extend to a large areas of people's participation in the society .Through Self Help Group ,women participation in decision making, public affairs are widening where women seems to get exposure to the outside world. It also studies the initiatives or the measures taken up by the government in framing the policies to empower women through SHG towards the sustainable development of the Nation.

Kolhapur is well known Historical as well as Industrial city in Maharashtra (India). Sustainable economic development needs skilled manpower which is raised through productivity and efficiency of individuals that is only possible through Entrepreneurship. There are end numbers of Self Help Groups in Kolhapur run by different tribes both male and female from all walks of life. But when we take a closer look we see that the SHGs are mostly operated by the women folk (mostly housewives). These women are not only from the rural areas but also from the urban areas as well.

SIGNIFICANCE OF THE STUDY
Why India is still called as a Developing Country? – Poverty, illiteracy, malnutrition, unemployment, lack of awareness in women have been the major reasons. In the recent times, the woman has contributed to a great extent towards the development of the economy but not many are aware of this that they have the potential. The recent development has been in the entrepreneurial activities undertaken by them.

CONCLUSION:
Self help Groups has an important role in the Women Entrepreneurship Development. The factor which has major contribution in the entrepreneurship development of the women is considered as skill training programmes. The other factors like the financial literacy programmes, Group saving, Micro-credit facility, separate identity in family, time to repay the loan, chance to repay old debt, ability to fulfill family needs, increment in the decision making in family and society level do not have major impact upon the entrepreneurial development of the women.

The outcome of the study would indicates the factors that are responsible for the functioning and working of SHG formed by Government and Non-Governmental Organizations in the state of Maharashtra .The result of these could be used as means to motivate Self Help Group members for their enhanced participation in the group towards empowering of women through entrepreneurship. Thus Self Help Group is necessary and important play role as they emerged with the objectives and a powerful instrument to alleviate poverty and empowering women in rural economy towards holistic social development. It gave a glance on how women change

within themselves and also their contribution to the community and development of the Nation as a whole.

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THE USE OF LEXICAL UNITS RELATED TO EDUCATION IN ENGLISH AND UZBEK

Ahmedov Oybek Saporbayevich, Doctor of Philology
Professor of English Language Teaching Methods, Uzbek State University of World Languages

Tilavova Malika Mamaraimovna, Teacher of English
Language Theory and Practice Department, Djizak State Pedagogical Institute

Ayakulov Nurbek Abdug`appor o`gli, Doctor of Philology (PhD)
Ministry of Innovative development, Sirdarya regional Department, Gulistan State University

ABSTRACT

The article explores the lexical units of education in modern English and Uzbek and the structural and semantic features of their field of word formation, which is one of the researches that has not been analyzed in detail yet. Examples of lexical units of education in the Uzbek language, their features are described. Examples of lexical units related to English education are also given and their meanings are discussed. Lexical units of education are selected and described in a comparative aspect, functional-semantic criteria that differ from their meaning in the general lexicon are developed, etymological comparative analysis of lexical units is carried out. The examples broadly explain the semantic structure of lexical units associated with education in Uzbek and English, the places of use of these lexical units in two languages and their use in meaning. In addition, statistical quantities are studied, similarities and differences between the two languages are highlighted.

Keywords: lexical units, education, lexicology, semiotics, onomasiology, linguistics, archaisms, historisms, neologisms, phraseological units, idioms, zoom, vocabulary, research, etymology, philology

INTRODUCTION

The dynamics of the development of science in the field of Uzbek and foreign linguistics has significantly increased in our country. At the same time, the rational use of the achievements of world linguistics, their application in practice has yielded positive results, and our achievements are becoming known not only in the linguistics of our country, but also in world linguistics. In addition to the achievements, there are necessary studies that need to be done, including the study of the phenomenon of lexical units related to education.

In the world of philology today, there is a growing desire to carry out fundamental work on human speech activity and the possibilities of depicting the linguistic landscape of the world. Attempts are being made to harmonize lingvopragmatic features through cognitive semantics in the formation of lexical units belonging to different structural languages. In this sense, the need for Uzbekistan to be globally competitive in the field of science, intellectual potential, modern personnel, high technology shows the need for further development of Uzbek linguistics.

The attention paid to this issue is an important cornerstone of the future development and prosperity of Uzbekistan. Not only our native language, but also foreign languages play an important role in the development of our children into mature professionals and in the development of scientific innovations and scientific research. After all, the power of any state is measured by the innovations and research in the field of science by the intellectuals who work tirelessly.

After the adoption of the Resolution of the First President of the Republic of Uzbekistan Islam Abduganievich Karimov No. PP 1875 of December 13, 2012, the attention to teaching and learning foreign languages in our country has become even stronger. A new stage, a new era

in the teaching of foreign languages   has begun in our country. The use of advanced pedagogical technologies, interactive, innovative methods, communicative media is required in the process of teaching foreign languages.

President Sh. M. Mirziyoyev noted, "For us, it is a task that will never lose its relevance and importance - the task of educating our children as independent-minded, modern knowledge and professions, strong life position, truly patriotic people." Indeed, strengthening the emphasis on language is one of the main tools in educating such a generation. [Mirziyoyev SH.M, Buyuk kelajagimizni mard va oliyjanob xalqimiz bilan quramiz (2017).p-103]

Decree of the President of the Republic of Uzbekistan dated February 7, 2017 No. PF-4947 "On the Strategy of actions for further development of the Republic of Uzbekistan", Cabinet of Ministers of the Republic of Uzbekistan dated August 11, 2017 No. 610 On Measures to Further Improve the Quality of Foreign Language Teaching in Higher Education Institutions ”No. PQ-3775 of June 5, 2018   The current research has a special significance in the implementation of the tasks set out in the "Regulatory Additional Measures", as well as other normative legal acts related to social activities.

Extensive socio-political work carried out in the framework of Uzbekistan's integration into the world community in the field of gender relations, as well as the further development of the science and education system directly related to training in our country, quality training of competitive and potential personnel paves the way.

The socio-political changes taking place in our society, their impact on language in various forms, today pose new challenges to the science of linguistics.

Language is the mirror of every nation, its true source. As long as there is a language, the nation is alive. A word is the most important nominative, basic, and central unit of a language and makes up the total vocabulary of words in a language. Vocabulary (Greek lexis - word, lexical) - a set of all words and phrases in the language, the lexical structure of the language. Vocabulary is a coherent and complex system that follows certain rules. The vocabulary of the language is constantly changing. This can be seen in the process of the emergence of new words in the dictionary, the obsolescence of some of the existing words, the change of lexical meaning and the acquisition of new meanings. Vocabulary is enriched by the development of society and changes in social order. In the 20th century, the vocabulary of the Uzbek people, like all nations, grew and developed rapidly. International words have entered the Uzbek lexicon on a large scale. Over the centuries, languages have evolved from one word to another. This is also an opportunity. Language as a system is in constant motion, evolving, which stems from its social nature: the two-way relationship between language and society, language and consciousness, language and thinking determines their interaction - what happens in society Socio-political processes, scientific and technological progress, reforms in the economic and educational spheres require the emergence of new words and terms in the vocabulary of the language, as well as the transformation of a certain word-lexeme into an outdated historical category. This process creates lexical units in the vocabulary of the language, which is the object of lexicology, such as historism, archaism and assimilation neologism. The study of lexical units related to education with linguistic and non-linguistic factors, the fields of lexicology, semiotics and onomasiology, the department of etymology of linguistics is currently one of the pending studies.

When we learn a foreign language, along with the language, we need to study the way of life, mentality, worldview, culture of the people. Because extralinguistic factors influencing language today allow for a deeper and broader study of language. Today, research in linguistics is based on the principle of language-speech. In other words, a serious effort is being made to examine the speech occurrence of linguistic commonalities identified by theoretical

linguistics.This is evidenced by the rapid development of a number of socially and economically effective areas, such as sociolinguistics, linguoculturology, psycholinguistics, lingvocognitology, computer linguistics, which deal with the practical realization of language and its effective use.

The level of development of each language is assessed, first of all, by the degree to which its methodology is developed. Because the essence of language is manifested in style, that is, in the forms of speech activity. It is understood that the solution to the global problems of language development requires the promotion of methodology to the status of the science of public speaking, the study of lexical units of education in Uzbek and English used in functional methods. It also requires them to develop curricula, textbooks, and dictionaries to substantiate that they grew up in linguistics, which is a scientifically and practically independent field. The relevance of the topic lies in the fact that lexical units related to education in English and Uzbek are poorly studied, they do not have a clear idea of what field of linguistics, what language level, its subject of study, the object of description.

The study of lexical units related to bilingual education is important not only for linguistics but also for language history and ethnography. A lexicon is a set of words that make up a language and are part of its vocabulary. Languages are adapted to the situation, customs, and experiences of the people who speak them. One of the tasks of the lexicology department of linguistics is to create lexical units such as historism, archaism, slangs, and neologisms in a particular language vocabulary. The vocabulary of the language is constantly changing. This can be seen in the process of the emergence of new words in the dictionary, the obsolescence of some of the existing words, the change of lexical meaning and the acquisition of new meanings.

Historical words. The thing of the past is the words that express events but do not have their own synonym in our modern language. For example: miri, paqir, (currency) qozi, qushbegi, yasovul, xalifa (career names), omoch, yorgichok, charkh, etc.

2. Outdated words (archaisms). These are outdated names of things and events that exist today. Obsolete words will be synonymous in the modern language.

For example: budun, ulus, raiyat - xalq (people; population); handasa -geometriya (geometry); muarrix – tarixchi (historian); dudoq- lab (lip); lang – cho'loq (lame).

3. New words (neologisms). What has emerged as a result of socio-economic development and change are the new names of events. Neologisms (Greek neos - new, logos - word) are words that describe the development of society, new things and concepts that have emerged in response to the demands of life. The novelty of neologisms is felt only when they first appear: over time, they lose their "novelty" and usually become active words. For example, the words marketing, reconstruction, rating, and tender, which have been new to the Uzbek language for several years, are now commonplace.

The words used in the speech of a certain class are called slangs. For example, tanzil-foyda (benefit).

Slangs are words used by members of a certain narrow group of people with similar interests, occupations, and ages. They use words related to the common language in a different sense. Musicians, thieves, traders have their own slang in Uzbek language. For example, a) from musicians; yakan (money), joyi (no), dah (good); b) from the slangs of the thieves: loy (money), ligavi (policeman), harif (owner of money); d) from the slangs of traders: sar or sarpiyoz (thousand soums), kapara (six thousand soums); e) from the hoodlums' slangs: zamri (don't talk), hamka (bread). With the disappearance of such classes, associations, and gangs, slangs also disappear.

Among the obsolete dictionary are archaisms and historisms. This is determined not by their "age" in speech, but by their application: those who call necessary, vital concepts and terms do not age over the centuries, others quickly become archaic, we stop using them because the objects themselves marked with them, the words disappear. In particular, the education system in our country has changed, so terms such as latofatli xonim (gentle lady), kollej talabasi (college student), realist (" a real schoolboy") have disappeared from the speech.

The use of such lexical units in speech, their linguo-specific features are relevant not only for Uzbek linguistics, but also for its history, modern ethnolinguistics. Although lexical units related to education have been the subject of scrutiny in Uzbek and English linguistics from a certain point of view, methodology as a research object still remains a subject that needs to be addressed.

RESULTS AND DISCUSSION

The first researches in the department of lexicology in Uzbek linguistics were carried out by I.Rasulov, A.Shomahsudov, R.Kunurov, then M.Yuldashev's "Linguistic analysis of the literary text" and S.Karimov's reflected in scientific research. It seems that a lot of work has been done in the field of lexicology. The neologisms in the Uzbek dictionary have not been fully studied yet. SI Ojegov admits that vocabulary is more complex and multifaceted than other levels of language.[Ojegov S.I, Lexicology. Lexicography. A culture of speech. –M., (1974).p-47]

Its task is, on the one hand, to reflect the existing existence in society with all its complexities, and, on the other hand, to create lexical, semantic, methodological-synonymic words and express the complex linguistic relations of a number of such phenomena. The acquisition of words from one language to another is highly valued as a mixture of languages. Well-known linguist L.V. Shcherba considers such a process to be one of the most important problems of linguistics. [Shcherba L.V, Selected works on linguistics and phonetics (1958).p-40-42]

V.A.Bogoroditsky, one of the representatives of the Kazan School of Linguistics, emphasizes the need to take into account the influence of another language in the study of their language and its importance. [Bogoroditsky V.A,Introduction to Tatar linguistics in connection with other Turkic languages (1934). P-75-76]

Analysis of many examples shows that the stability of terms and nomenclature is a complex issue. At a time when the Republic of Uzbekistan was under the control of the former Soviet Union, when Russian had a strong influence on other languages   in the territory of the Union, we could not hesitate to , we could use words like respublika, oblast, rayon, avtor, agitatsiya, propaganda, ideya, plan, forma, protsent, protsess, komandirovka, raport, spravka, student, sekretar, ministr even though they have alternatives in our language (regardless of which language they were previously adopted from). Naturally, these words were reacted to by the public in connection with the independence of our country. Alternative options such as jumhuriyat (republic), viloyat (province), tuman (district), targ'ibot (propaganda), g'oya (idea), reja (plan), shakl (form), jarayon (process), safar (trip), bildirishnoma (notification), ma'lumotnoma (reference), talaba (student), kotiba (secretary), vazir (minister) are also from the early 90s began to be used equally with, and this parallelism has been maintained for some time as the norm in our language.

Now, more than a decade later, the picture is completely different. In the meantime, we can safely say that the words of the first group have largely given way to the words of the second group. Why do we say basically? Because, each of these words has passed through time. Some still retain the feature of parallelism: like respublika-jumhuriyat (republic), universitet-dorilfunun (university).This is because their semantic and methodological meanings are not exactly the same.

There are other reasons for this parallel use. In our linguistics we have epithets -sifatlash, derivations-so'z yasalishi, affixes-qo'shimcha, abbreviations – qisqartma so'z, anaphora - repetition of sounds at the beginning of a line, anthroponyms - personal names, toponyms - place names, attribute - determiner, affricates – qorishiq undoshlar, style - uslub, stylistics – uslubshunoslik. This is because the first of the terms is used as an international term in all languages.

It follows that the acceptance and standardization of new suggested words also depends on whether they have been used in the language before. In other words, it helps them to get used to seeing and hearing.

In addition, the terminology of science and various fields is constantly evolving. The lexicon of the Uzbek language includes its own and its own layer, as well as all-Turkic words and Uzbek words derived from them.

In today's age of technology, it is no longer surprising that so many new words about education are entering our lives. Let us now turn our attention to one of these words. During the pandemic in our country, as in other countries, almost all educational institutions in our country operated online. It is known that the lessons were held on the Zoom platform. Let us pay special attention to this word.

Zoom Video Communications, Inc. (Zoom) is an American communications technology company headquartered in San Jose, California that provides remote conferencing services using cloud computing. Eric S. Yuan (born 20 February 1970) is a Chinese-American billionaire businessman, engineer, and the chief executive officer and founder of Zoom Video Communications. **Zoom** was originally founded in 2011. Its headquarters are located in San Jose, California. Zoom also has offices in Europe, Asia, and Australia. During the COVID-19 pandemic, there was a major increase in the use of Zoom for remote work, distance education, and online social relations. It has been used by banks, schools, universities, and government agencies around the world.

ZOOM

Acronym	Definition
ZOOM	Zet Object Orientation Model
ZOOM	Zeroed Output Optical Meter (fiber optics)
ZOOM	Zion Originated Outreach Ministry (Minneapolis, MN)
ZOOM	Z Owners of Minnesota

Morphological and syntactic properties
Zoom (noun)

IPA pronunciation: [zu:m]

Semantic properties

Meaning
1. Buzzing sound, hum, buzzing

2. Av. jarg. candle, slide; sharp rise up

3. Increase or decrease in the image

4. Approach (less often departure) (video effect)

Synonyms

1. Buzz, chur, hum, humming, boom, birr

2. Hoick

3. Enlargement, blow-up

4. Zooming, dolly- in (hitting)

The groups of people who use slang words are different, slang words also vary in the nature of their origin. Most jargons are transient, temporary, and change rapidly as time and conditions change. Sometimes slang can be transformed into simple speech and then into literary language. Common features are as follows:

1. Slang words are a term in a different, very narrow group of things and events that have a name in literary language.

2. Slang words always have an expressive-stylistic color. Many slangs are transient, temporary, and then, gradually, either completely forgotten, or due to the emotional-stylistic dye, the transition to simple speech, from it to general use, that is, to unlimited vocabulary. possible.

Attention to youth jargon was noted in the late 19th - early 20th centuries. Linguists (B.A. Larin, V.V. Vinogradov, A.M. Selishchev, etc.) have focused on this part of the language life of society from the study of general jargon, in particular, the vernacular. Later, L.I. Skvortsov, B.A. Serebrennikov, L.P. Krisin, V.G. Kostomarov et al., First of all, created descriptions of individual jargons.

The UK is known for its excellence in higher education and is now attracting international students from all over the world The UK is home to some of the most famous universities in the world, such as Cambridge University and Oxford University. Therefore, it is not surprising that higher education diplomas obtained in the UK are recognized worldwide.

The arrival of an international student in the UK for further study can be exciting, but also frightening. There are many different dialects of English in the UK. Most students have difficulty overcoming the language barrier. To add insult to injury, students must act in intelligent slangs in English to understand or comprehend their thoughts. But to be honest, English slang words sound great and are widely used.

There are some words that you are familiar with in your home country that have a completely different meaning in the UK. So next time a Brit asks you, "Fancy a beer?", don't go around thinking, "Why does he want to dress up a beer…?"

Let's take a look at the most commonly used English slangs that are widely used in students' lives.

- **Uni** is one of the foremost well known slang words among understudies. Understudies generally allude to their college and/or college by fair saying uni.

- Another university-related cool British slang word is **fresher** which means a first-year student. **Libes** is the British university slang word for a library.

- The another time you're sitting on a seat and a British companion comes over inquiring you **to budge up,** you superior know what it implies! You ought to move or make room for him to sit following to you.

- **Mate** could be a term of charm that's frequently utilized to call a college companion that could be either male or female. A male companion can too be called a lad or chap and the female version of typically young lass or lassie.

- After a long college day, being **knackered,** which is one of the foremost prevalent British English slang words and expressions, basically implies being exhausted.

- **Buzzing** implies to be cheerful or energized around something and psyched implies being very energized approximately something.

- **Dynamite** is used for awesome and cool. **Wicked** too is used to convey the same meaning.

- **Ace** is a British slang term meaning excellent. It is mostly used in Liverpool. In the rest of the UK, Brits use the term **"Brilliant".**

- People mostly use the word **"Cheers"** when toasting drinks, but British people also use it to say thank you.

- **Gutted** means upset and disappointed — this might be used by your peers if they describe a test they didn't do well on.

- **Dodgy** implies unlawful, untrustworthy, or suspicious.

- **Pork pies** could be a equivalent word for lies and the expression "Porkies" is another way of saying lies. Chinwag is to chat and to deal is to negotiate.

- **To know your onions** implies to be knowledgeable.

- **Skive off** implies to be sluggish or a slacker. Kip is the slang word for a rest and faffing is to squander time.

- **Jimjams** is another term for "pyjamas" and the television is alluded to as Telly. When getting to bed, Brits say "I'm Off to Bedfordshire." –

- **To let** basically implies that a place is empty to be lease, so in case you're searching for a student accommodation within the UK close your college, you know which British slang words to utilize or anticipate hearing from our understudy settlement experts.

- **Spend a penny** implies progressing to the lavatory, so in the event that your flatmate specified this, don't think he must borrow cash.

- **Full of beans** is as a rule utilized to portray an enthusiastic individual, and **yakking** is utilized to describe the activity of talking as well much.

- One of the popular slang terms in 2020 is **to cap**, which means to lie. If you are not sure your friend is telling the truth, you can simply send a baseball cap to them, and they will understand.

- **Skive** means: to avoid doing something, not going to something, missing something on purpose. Example: When I was a teenager I used to skive homework. Now that I am studying English at Stafford House I never skive going to school.

- **Sit up** - You're likely to come across this slang when you're sitting in class and your friend wants to sit next to you. It means to move or make room.

- **Buddy** - If you think that we have confused our islands, you are mistaken. Most of us associate the word mate with Australia, but the truth is that the British also use this word. It is a term of endearment used to refer to a friend, man or woman. A male friend can also be referred to as a boyfriend or lad, while the feminine version of the word is called a girl or maiden.

- **Sloshed** - "Dude, I'm really drunk" is another term that you will be familiar with at the university. It means being drunk. Alternative slang words that convey the same meaning are don't give a damn, smash, piss off, smear and ride a cart.

- **Gobsmacked**- It is a truly British expression meaning to be shocked and surprised beyond belief.

- **Hunky-Dory**- It is a little piece of British uni slang that means that a situation is okay, cool, or normal.

- **Minging** – This is an alternative to the word disgusting or gross.

- **Sick** – Here being "sick" is actually a good thing. It's like a stronger form of "cool"

- **Throwing a wobbly** – This phrase means the same thing as having a tantrum.

- **Dosh** – This is a fancy word for money. Wonga, dough, dollar, and bread are some other words for money.

- **Cracking** – Cracking means something that is particularly good or excellent.

- **Botched –** If something is botched, it means that has not gone according to plan.

- **Easy peasy** – If something is not difficult then it is usually pronounced as being easy peasy.

- **Naff – Naff** is something that is a bit uncool.

- **On your bike** – It is a British slang that is a not so polite way of telling someone to go away.

- **Quid** – It is a common British slang word for a British pound.

- **Snookered** – To be snookered means you are in a situation from which you can see no obvious escape.

- **Blud** – This is a term of endearment for a good friend. It comes from the term, "Blood brother".

- **Yonks** – It is a general uni British slang for a long period of time

- **Chuffed** – When someone is chuffed, it means they are very pleased or happy about something.

Nowadays, in addition to student life, we also encounter slang words in our lives that refer to teachers. Students are constantly coming up with new slang words that we adults have a hard time keeping up with and understanding. So it's time the teachers have their own slang. Let's take a look at a few of them.

1. Uso
Define: Unidentified Sticky Object

Use in a sentence: There's nothing worse than finding a "USO" on a paper when grading assignments.

2. Extra Credit
Definition: extra > over the top, excessive

Use in a Sentence: Karen was being so "extra credit" during the staff meeting with all those questions at the end!

3. Sub Plans
Definition: something annoying

Use in a Sentence: I can't stand when students tap their pencils on their desks. It's so "sub plans"!

4. T-Burn
Definition: the teacher look that burns and stops students in their tracks

Use in a sentence: I often give random kids in public the "t-burn" if I see them misbehaving.

5. Mc Hammer
Definition: off-limits; not allowed to touch ("Can't Touch This")

Use in a sentence: I always tell my students that my flair pens and Expo markers are "MC Hammer" at the beginning of the year, so they know better.

6. Marshmallow Feet
Definition: walk quietly

Use in a sentence: OK class, when we walk through the halls, we need to put on our "marshmallow feet" so we don't disturb the other classes.

7. Ptb
Definition: Parent-Teacher Beatdown; when parents insult you and blame you during a PTM

Use in a Sentence: I needed a shot of tequila after last night's "PTB" with Jason's parents.

8. Pencilepto
Definition: someone who steals pencils

Use in a sentence: I had to start marking all my pencils because my students are a bunch of "pencileptos".

9. Shinge
Definition: spending your whole weekend or break binge-watching all the shows

Use in a sentence: During spring break, I plan to sleep in every day and "shinge" my a** off!

10. Crayola:
Definition: cray-cray; crazy; off the walls

Use in a sentence: My class was "crayola" today, I almost lost my shitake mushrooms.

11. Gray-Gray
Definition: Spending all night or all weekend grading papers.

Use in a sentence: My weekend was "gray-gray"!

12. IBH
Definition: Inappropriate But Hilarious

Use in a Sentence: One of my students said something so "IBH" today, I couldn't stop myself from laughing out loud in class!

13. SWAY
Definition: Summer, Where Are You?

Use in a sentence: Today was a rough day… "SWAY"!

We also use idioms, which are one of the phraseological units, a lot in our lives. There are also many English educational idioms now that serve to enrich our speech.

1. With Flying Colors
To succeed easily, with a very high mark or grade.

"I'm confident that Jenny will pass her English exam with flying colours."

2. Brush up on
To improve your knowledge of something already learned but partly forgotten.

"My English is getting weak. I had better brush up on it."

3. Cram
To try to learn a lot in a short period of time (mostly used in British English).

"Hikaru is cramming for tomorrow's IELTS exam."

4. Bookworm
We use this idiom to describe someone who is always reading.

"Maria is always reading. She's a real bookworm."

5. Class clown
A class clown is a disruptive student who often makes jokes instead of paying attention and doing their work.

"Brett is a college professor now. Ironically, he was the class clown of our elementary school."

6. Teacher's pet
A teacher's pet is a student who is clearly the favorite of the teacher and often receives special treatment.

"I know he's the teacher's pet now, but that doesn't mean he'll be like that when he's a teenager."

7. Honor roll
If we belong to the honour roll, then our names are included in a list of names of people with outstanding performance or achievements.

Example:

Her name was included in the honor roll. She's one of the brightest kids in her class.

8. To Breeze/Sail Through
To breeze/sail through something means to easily succeed at something.

"I don't think you'll be able to breeze through college if you're majoring in chemical engineering."

9. To Ace
To ace a test means to get an "A" or a very high grade.

"Sometimes I think my teacher is secretly disappointed when we all ace his tests."

10. Cheat Sheet
A cheat sheet is a piece of paper with answers written on it that student use to cheat on a test.

"I would never use a cheat sheet. I'm not dishonest."

11. to bomb
To bomb a test means to get a terrible grade on a test.

"Do you think Mrs. McGillicuddy will give let us retake the test if we all bomb it today?"

12. a piece of cake, a cakewalk, a breeze, a cinch, a walk in the park
We use all of these idioms to communicate that something is very easy. They all can

be used to talk about tests, exams, or classes.

"The exam was a piece of cake. We all received high scores."

"We thought the test was going to be a cakewalk, but it was actually pretty hard."

"Psychology 101 was a breeze for Jim. He had already taken psychology in high school, so most of the material was a review for him."

"I'm good at learning languages. Beginner's French was a cinch for me."

"Everyone wants to take Dr. Sullivan's biology class. Everyone knows it's a walk in the park."

13. To Play Hooky

To play hooky is an informal expression which means to miss school or work without having a valid reason or excuse.

"There's a baseball game tomorrow at 2 p.m. We should play hooky and go see it."

14. To Cut/Skip/Ditch Class
To cut, skip, or ditch class means to intentionally miss class, usually in favor of doing something else.

"Students are automatically suspended for cutting class."

"If you skip a class, it's going to be very difficult for you to catch up."

"Will you take notes for me today? I'm thinking about ditching class."

15. To Hit the Books
To hit the books means to study.

"Finals are next week and I haven't even started studying yet. I'd better hit the books tonight."

"Four of our football players are in danger of being academically ineligible. They won't be able to play if they don't hit the books."

16. To pull an all-nighter
To pull an all-nighter means to stay up all night studying or working.

"I'd recommend that you not pull an all-nighter. It's not good for your health."

17. To Catch On
To catch on means to understand something after initially not being able to comprehend it.

"The present perfect tense used to be hard for me. It took me a while to catch on."

18. To Burn the Midnight Oil
To burn the midnight oil means to study or work late at night.

"Many people prefer to burn the midnight oil and study at night. Others prefer to study during the day."

19. To Drop Out
To drop out means to decide to leave school and no longer pursue a degree or diploma. We can also use drop out as a noun to talk about someone who drops out of school.

"Why do you think so many people drop out of college?"

20. Flunk/Fail Out
To flunk/fail out means to be expelled from an institution because of low grades or poor performance.

"Matt never went to class and eventually flunked out of college."

"I have no idea how I'm going to tell my parents that I'm in danger of failing out of school."

21. Copycat
Someone is a copycat if he or she copies or steals the work of other people.

Example:

She was called a copycat after she turned in an assignment that she copied from her seatmate.

22. As Easy As ABC
Something is as easy as ABC if it is very simple and uncomplicated. It is absolutely easy to understand.

Example:

Answering his chemistry test is as easy as ABC for him.

23. Schoolboy Error
A very basic or foolish mistake.

He made a schoolboy error when he passed some of the responsibilities to Jonah, who took all the credit for everything they'd done

24. A Quick Learner
Someone who is able to learn a new skill or task very quickly.

Kelly is a very quick learner; she has only been here for a week so far and has already taken on most of the previous secretary's roles!

25. University Of Life.
The daily life and work where you learn more than you would by going to university.

My grandfather began to work on the family farm when he was fourteen and learnt everything from the university of life.

CONCLUSION
It is true that the identification of lexical units of education in modern English and Uzbek and their structural and semantic features of the field of word formation is one of the most important studies that has not yet been thoroughly analyzed. This article also discusses the processes of use of lexical units in Uzbek language education in terms of meanings, and the types of lexical units in English language education according to their meanings. Lexical units of education were selected and described comparatively, and an etymological comparative analysis of lexical units was performed. At present, the comparative study of educational terms, phraseological units, lexical units, jargons, neologisms in English and Uzbek languages is one of the important scientific innovations awaiting its solution. It is also an important study in which new statistical quantities need to be studied, highlighting the similarities and differences between the two languages.

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COMPARISON OF THE IMPERATIVE THEORY OF AUSTIN WITH THAT OF BENTHAM

Dr B Bhavana Rao
Faculty, School of Law, University of Petroleum and Energy Studies, Dehradun

ABSTRACT

The theory of 'Legal Positivism' which puts focus on 'what law is' is a product of mainstay ideas of philosophers spanning over 200 years and one of the chief aspects of this doctrine is the 'Imperative theory' advocated by theorists of the likes of Jeremy Bentham and John Austin. Positivists assert the importance of legal concepts systematically. This paper aims at bringing about the differences in the respective theories of Bentham and Austin by comparing the main code of belief of each of these great philosophers and addressing mainly their understanding of 'what law is' from the imperative stand point rather than 'what law ought to be'.

Keywords: Imperative theory, Austin, Bentham, Comparative and Jurisprudence

INTRODUCTION

The theory of 'Legal Positivism' which puts focus on 'what law is' is a product of mainstay ideas of philosophers spanning over 200 years and one of the chief aspects of this doctrine is the 'Imperative theory' advocated by theorists of the likes of Jeremy Bentham and John Austin. Positivists assert the importance of legal concepts systematically. This paper aims at bringing about the differences in the respective theories of Bentham and Austin by comparing the main code of belief of each of these great philosophers and addressing mainly their understanding of 'what law is' from the imperative stand point rather than 'what law ought to be'.

What is Imperative Theory?

To begin with, in this paper a mention of what the imperative theory is, would be beneficial to the reader as both Bentham and Austin could be branded under the league of 'Imperative theorists'. The imperative theory is the legal theory that laws should be made by a sovereign, and that by its definition law is the command of a sovereign .The main exponent of the theory is Austin, although as a theory the imperative theory of law has been widely discredited, most notably by Hart.

Basic Doctrine of Bentham

For Bentham law is a manifestation of the principle of utility and also each of the legislation for him revolves around this principle. Having taken a concrete form they may be classified on the basis of:

How the laws bind the people or the sovereign that is whether they are Supreme Laws or Ordinary Laws, Their nature of enforceability that is whether those are Permissive laws or punitive laws, Nature of obligations i.e., whether those are Imposing obligations on the sovereign or are Imposing obligations on the subjects or Imposing obligations by one subject over another, Derived from which source whether it is Legislations, Executive Orders, Judicial Decisions, Orders by one individual to another under the authority of the sovereign. In general Bentham emphasises the importance of the source, the subject, the object, the extent, the aspects, the expression, the force and the remedial appendages of the legislations.

Jeremy Bentham, in his work 'Of Laws in General' says: Law has eight different aspects, Its source (The root of command that is whether it is command of a sovereign or other men),its subject (individuals and objects to which it may applies),its objects (the actions and situations to which it may applies),Its extent (the general or specific scale of its relevance),Its aspects (the

manner in which it is to be applied),Its force (the motive it relies upon to produce its desired effect),its expression (the signs by which the will of the source is made known),Its remedial appendages (other laws subjoined to the principal law in question as an aid to enforcement).The First separation then is between the- Legal – those mandates which emanate from the sovereign and -Illegal – every other mandate whatsoever. This dividing wall bears reference to the source of law. The will expressed (to be law) must be the will of the independent sovereign in a state. Such will has no force or effect upon a person not subject to the will of that sovereign, yet the will of that sovereign is still law. The Sovereign's will may be a mandate in two ways: By conception (will originating in that sovereign) and By adoption (by taking the mandate of another as his own).They are the time at which the adoption is performed-Either mandates already issued or Mandates to be issued, The persons whose mandates are thus adopted-Former sovereigns or Subordinate power-holders Enforcement of private agreements (contract), The degree to which those mandates are adopted First step is the mandate given to the subordinate to make a mandate for the sovereign The extent to which the mandate of the subordinate will be enforced, The form of expressions by which the adoption of the mandates is performed, Either by a grant of permission to the subordinate power-holder, or By a command to the public to obey mandates issued by the subordinate power-holder Mandates are refer-able to the sovereign or not: if not, then they are illegal Legal Mandates are either Private or domestic which the sovereign will enforce or Civil or Public from the Sovereign or his authorized subordinates.

Bentham's sovereign can be either a single person or sovereign body, or a group of persons or their subordinates.

Basic Doctrine of Austin

On the other hand Austin emphatically seems to proclaim that the weight of the command of a sovereign is the most important aspect of positive law. The elements of his theory are Command, Duty, Sanctions and last but not the least, the Sovereign who alone has the authority to command and he is under no obligation to another sovereign.

That thing which he calls law can be brought under and classified in the following heads.

1. Positive Law which is classified by him as that which is either divine law or, those given by men to men and those given by men to men are further classified as those commands which are given by a sovereign to his subjects and those which are given by other men (who are subjects) to other men (subjects) and 2. Positive Morality and this kind of law are not enforceable as there is no sovereign who can be traced in this kind of system.The Imperative Theory cannot be studied in isolation with the other doctrines of these philosophers as it is just one aspect of their theories and is influenced by the particular doctrines and political and legal thought of Bentham and Austin respectively. Therefore I find it useful to mention the other theories of these philosophers from their perspective as well as compare their philosophies with one another. Also an understanding of what they mean when they talk of law as command in the current context would be worth a mention. We shall proceed by basing our study on Legislation as mentioned by Bentham and Law as a command of the Sovereign by Austin.

Thus the focus of this paper would be on the following:

1. The divergence in the core philosophies of Jeremy Bentham and John Austin

2. The differences in the ideology of Jeremy Bentham and John Austin

THE DIVERGENCE IN THE CORE PHILOSOPHIES OF JEREMY BENTHAM AND JOHN AUSTIN

Dias says "It is worth remarking that neither Bentham nor Austin should be thought of as writing in periods of particular stability. What they represent is the intellectual reaction against naturalism and a love of order and precision. Bentham was a tireless campaigner for reform, and

both he and Austin insisted that prior to reform there has to be a thorough-going clarification of the law as it is." Assuming the readers to be aware of the core philosophies of each of these philosophers to a significant extent it is just to proceed to understand the differences of Bentham and Austin in relation to the following:

THE SOVEREIGN

The Sovereign of Bentham

Whether we can find the absolute sovereign in Bentham's work or not is disputable owing to the fact that in terms of his core ideas, he talks only about Pain and Pleasure as two absolute masters. In Professor Upendra Baxi's words,

"Nature has placed man under the empire of two sovereign masters, pleasure and pain"

As was emphasised in Bentham's philosophy. So these are the two sovereign masters. In his theory of hedonistic calculus, Bentham emphasises on the balancing of the two as the means to utilitarianism. The purpose of all legislation is the aim of achieving the greatest happiness of the greatest number of people. To him the need of legislation emanates from this idea of balancing both pleasure and pain so that no one is taxed more than he can endure but each should be subjected to an amount of pain which would bring greatest happiness to all. Greatest happiness of the maximum number of people is the goal of all commands. He did not talk of any specific master, rather he emphasised on the true purpose of positive law which could emanate to bring about maximum happiness.

Now, utility can be a term of abstractness and vagueness. Prof Baxi emphasises the different countenances of this word . They briefly are:

One. For one a party to the principle of utility may be one who can gauge the approval or disapproval of any action, public or private, by the act's propensity to produce pain or pleasure. So his masters, pain and pleasure are symbolic of his own approval or disapproval of the pain or pleasure emanating out of his actions.

Two. An ascetic person thinks of each pain as a right and every pleasure a wrong as he believes that we have to bear pain in this world to gain pleasure in another. So the divine law guides him to suffer pain happily and avoid all pleasures, thereby attacking the notion of utility.

Three. An action is either approved or disapproved not because it is conformable but because it pleases or displeases him who judges. This is the principle of sympathy and antipathy according to Bentham. In a way Bentham's sovereign remains a formless design if there is no unanimity on the principles of pain and pleasure and thus, utility. However his contribution to bringing proximity between societal and moral values is remarkable and contemporary theorists will vouch for his understanding of this aspect of law and that law and society can never be separated. Also he did not treat natural laws with the same position as moral values and morality as a principle.

The Sovereign of Austin

As compared to Bentham's sovereign, Austin's sovereign is a definite person or a group of persons to whom the general public known as 'subjects' pays habitual obedience. According to him, there has to be a determinate superior and therefore commands emanate from this determinate person or group of persons and become binding even if not accepted with will by those who pay obedience. The aspect of morality is completely excluded from his treatment given to commands of the sovereign, which is all positive law.For him a sovereign is an established and determinate personality or a collection of persons. And laws emanate only from this determinate person or group of persons. So a sovereign in his theory is a fixed and

undivided individual or group of individuals or a unified body of persons. His powers are illimitable and indivisible. So his power cannot be shared by anyone.

LAW

Bentham's Idea of Law

Bentham emphasised the need for a good legislation which balanced pleasures and pains. However not all pleasures and pains can be brought into the ambit of calculating utility. Only those principles which are accepted by the society at large, and in general, possibly will be brought into the gamut of positive law. All legislation by the government is the result of sympathy or antipathy. Vice and virtues are generally uniform and have remained so for several centuries. No legislator has followed a particular pattern of utility but according to Bentham the principle has penetrated almost all laws. The early laws have almost been in conformity to the theory of pleasure and pain, good and evil, vice and virtue. To Bentham a legislation which balances the pains and pleasures is an ideal legislation and that kind of legislation is derived out of the principle of greatest happiness to the maximum number of people with limited pains and maximum pleasure. However he ignores customs and customary practices in deriving a legal code. Bentham, according to Hart, is a jurist with "extraordinary combination of a fly's eye for detail, with an eagle's eye for illuminating generalizations". Wacks developed that Bentham has "devoted himself to exposing what he saw as the shibboleths of his age and constructing a comprehensive theory of, inter alia, law, logic, politics, and psychology, founded on the principle of utility". A founder of legal positivism, Bentham attacked the common law system which embodied natural reason. He was quoted as saying "the only determinate, concrete content that can be given to natural law or reason is entirely private and subjective because of the abstractness of these notions… they offer no public shared standards for assessment of rules, law, actions, or decisions". The doctrine of precedent, in Bentham's words, was 'dog law' as "whenever your dog does anything you want to break him of, you wait till he does it, and then beat him for it". Bentham continued that such law, based on legal fictions, 'equity' and 'natural law', is vague and uncertain as "it cannot provide a reliable, public standard which can reasonably be expected to guide behaviour". Furthermore, the courts are not sufficiently accessible, for the language they use is not comprehensible to ordinary person. As such, Bentham suggested that the law should be codified.

Austin's idea of law

'All law is the command of a determinate sovereign (and a law is a command which obliges a person or persons)', says Austin.

He talks about separation of law from morality and to him traditional or customary law is a rule or a law only if it comes from the sovereign in the form of tangible and existing concrete laws. Austin vigorously seems to announce that the credence of the command of a sovereign is the most important aspect of positive law. The elements of his theory are Command, Duty, Sanctions and last but not the least, the Sovereign who alone has the authority to command and he is under no obligation to another sovereign.

Austin says,

"A law, in the most general and comprehensive acceptation in which the term, in its literal meaning, is employed, may be said to be a rule laid down for the guidance of an intelligent being by an intelligent being having power over him." Under this definition are concluded, and without impropriety, several species. It is necessary to define accurately the line of demarcation which separates these species from one another, as much mistiness and intricacy has been infused into the science of jurisprudence by their being confounded or not clearly distinguished.

In the comprehensive sense above indicated, or in the largest meaning which it has, without extension by metaphor or analogy, the term law embraces the following objects:-

Law set by God to his human creatures, and laws set by men to men."

Laws can thus be brought under and classified in the following heads.

Positive Law

-which he further classifies as that which is either divine law or, those given by men to men. And those commands which are given by men to men are further classified as those commands which are given by a sovereign to his subjects and those which are given by other men (who are subjects) to other men (subjects) and Positive Morality

-which he says are those commands which lack sanction and therefore not enforceable as in the case of all positive law.

SUBJECT

The Subject of Bentham
According to Dias, distinguishing political from natural society, Bentham, in his Fragment on Government thus defines the political society : 'When a number of persons (whom we may style subjects) are supposed to be in the habit of paying obedience to a person, or an assemblage of persons, of a known and certain description (whom we may call governor or governors), such persons altogether (subjects and governors) are said to be in a state of political society.' And in order to exclude from his definition such a society as the single family conceived of above, he adds a second essential of political society, namely that the society should be capable of indefinite duration. Considered as a definition of independent political society, this definition is inadequate or defective. In order that a given society may form a society political and independent, the superior habitually obeyed by the bulk or generality of its members must not be habitually obedient to a certain individual or body: which negative character or essential of independent political society Mr. Bentham has forgotten to notice. And, since the definition in question is an inadequate or defective definition of independent political society, it is also an inadequate or defective definition of political society in general. Before we can define political society, or can distinguish political society from society not political, we must determine the nature of those societies which are at once political and independent. For a political society which is not independent is a member or constituent parcel of a political society. Or (changing the expression) the powers or rights of subordinate political superiors are merely emanations of sovereignty. They are merely particles of sovereignty committed by sovereigns to subjects."

The Subject of Austin
Austin's subjects give habitual obedience to the determinate sovereign and they are duty bound to obey every order of the sovereign. Austin in his work states, "The superiority which is styled sovereignty, and the independent political society which sovereignty implies, is distinguished from other superiority, and from other society, by the following marks or characters:- 1. The bulk of the given society is in a habit of obedience or submission to a determinate and common superior: let that common superior be a certain individual person, or a certain body or aggregate of individual persons. 2. That certain individual, or that certain body of individuals, is not in a habit of obedience to a determinate human superior. To that determinate superior, the other members of the society are subject: or on that determinate superior, the other members of the society are dependent. The position of its other members towards that determinate superior, is a state of subjection, or a state of dependence. The mutual relation which subsists between that superior and them, may be styled the relation of sovereign and subject, or the relation of sovereignty and subjection. Hence it follows, that it is only through an ellipsis, or an abridged form of expression, that the society is styled independent. The party truly independent

(independent, that is to say, of a determinate human superior), is not the society, but the sovereign portion of the society: that certain member of the society, or that certain body of its members, to whose commands, expressed or intimated, the generality or bulk of its members render habitual obedience. Upon that certain person, or certain body of persons, the other members of the society are dependent: or to that certain person or certain body of persons, the other members of the society are subject. By 'an independent political society', or 'an independent and sovereign nation', we mean a political society consisting of a sovereign and subjects, as opposed to a political society which is merely subordinate: that is to say, which is merely a limb or member of another political society, and which therefore consists entirely of persons in a state of subjection." Thus in an independent political society the subjects render obedience only to a single sovereign and this sovereign is illimitable and indivisible. The sovereign is a determinate person and the subjects are dependent on this person. So the subjects render obedience to a single political authority and not to any limb or organ of the same. The majority or a big volume of portion of this independent political society renders regular submission to the determinate person and to no one else. Also this person is not subject to any other person's commands.

SANCTIONS

Bentham on Sanctions

If commands are not obeyed where there is a duty to do or refrain from doing something, the consequence can be sanctions in the form of punishments but when we read his work we gather that he is not saying that the only way of enforceability of laws is by having adverse consequences. Laws could be punitive as well as permissive. His laws being wider in application than just being of a criminal accountability in nature, the enforceability comes not only if sanctions are imposed but even otherwise. For him the term sanction, or enforcement of obedience, is applied to conditional good as well as to conditional evil, and therefore may be a cause of confusion to many."A command, then, is a signification of desire. But a command is distinguished from othersignifications of desire by this peculiarity: that the party to whom it is directed is liable to evil from the other, in case he comply not with the desire.

Being liable to evil from you if I comply not with a wish which you signify, I am *bound* or *obliged* by your command, or I lie under a *duty* to obey it. If, in spite of evil in prospect, I comply not with the wish which you signify, I am said to disobey your command, or to violate the duty which it imposes. Command and duty are, therefore, correlative terms: the meaning denoted by each being implied or supposed by the other. Or (changing the expression) wherever a duty lies, a command has been signified; and whenever a command is signified, a duty is imposed. Concisely expressed, the meaning of the correlative expressions is this. He who will inflict an evil in case his desire be disregarded, utters a command by expressing or intimating his desire: He who is liable to the evil in case he disregard the desire, is bound or obliged by the command." A law which is command according to him is thus a peculiar aspect of desire of one party to be obeyed and the other party would be liable in case of non compliance. If one does not obey, he violates a command and thereby has to undergo evil consequences. Therefore command and duty are correlated and are by implication both are present that is in case of either being present the other is implied to be present and existent. A command is signified wherever a duty lies and vice versa.

Austin on Sanctions

Austin's work reflects his strong tendency to have related all laws to the criminal system. He talks about evil consequences emanating in case of non compliance of the commands of the sovereign. Without the force of sanctions laws are imperfect laws. He says, "The imperfect laws, of which I am now speaking, are laws which are imperfect, in the sense of the Roman jurists: that is to say, laws which speak the desires of political superiors, but which their authors

(by oversight or design) have not provided with sanctions. Many of the writers on morals, and on the so called law of nature, have annexed a different meaning to the term imperfect. Speaking of imperfect obligations, they commonly mean duties which are not legal: duties imposed by commands of God, or duties imposed by positive morality, as contradistinguished to duties imposed by positive law. An imperfect obligation, in the sense of the Roman jurists, is exactly equivalent to no obligation at all. For the term imperfect denotes simply, that the law wants the sanction appropriate to laws of the kind. An imperfect obligation, in the other meaning of the expression, is a religious or a moral obligation. The term imperfect does not denote that the law imposing the duty wants the appropriate sanction.It denotes that the law imposing the duty is not a law established by a political superior: that it wants that perfect, or that surer or more cogent sanction, which is imparted by the sovereign or state." Duties imposed by commands of God or duties imposed by positive morality are no obligations at all. The law requires or wants the sanction appropriate to the kind of law it is and intended to be, else it remains only positive morality and cannot be enforced as those which are positive laws. So any command devoid of sanctions is imperfect and can be traced either to positive morality or law of nature where this term 'imperfect obligation may be fitted in a different meaning according to the source it emanates from, other than the wishes of a determinate person, where the obligations, if not met are meted out with reverse consequences to the person who is under a duty to obey by doing something he is under obligation to do is not doing so, whether they are acts of commission or omission. So Austin's sanctions make a command enforceable. He remarkably avoids talking about moral and other sanctions which too have may well have weight age.

THE DIFFERENCE IN THE IDEOLOGY OF BENTHAM AND AUSTIN

Bix says, Austin "came under the influence of Jeremy Bentham, and he was arguably the first writer to approach the theory of law analytically". Wacks stated, "Austin's conception of law like Bentham is based on the idea of commands or imperatives, though he provides a less complex account of what they are". Throughout Austin's work, despite his scope narrower and more objective than Bentham's, he retained Bentham's emphasis on the separation between what the law 'is' and what the law 'ought to be', and thus the separation between law and morality. Taking Austin's 'Command Theory', which remains the central tenet of Austin's theory, he asserts that the notion of law lies to the command given by the sovereign. Arguably, this was borrowed from Bentham, who views the law as "the command of a sovereign backed by a sanction". Although there are much similarity between the theses of Austin and Bentham, there are a number of significant differences. As Morison rightly puts it, "Austin wished himself to construct a science of law rather than involve himself in Bentham's art of legislation". Unlike Austin, Bentham proposes for "a single, complete law which adequately expresses the will of the legislature". Also, Austin is willing to accept judicial law-making which was vehemently opposed by Bentham as stated above. More importantly, their views differ on the 'Command Theory' expounded by Austin. For Austin, as Wacks correctly pointed out, "anything that is not a command is no law and only commands emanating from the sovereign are 'positive laws'". Bentham, on the other hand, however, argues that "commands are merely one of four methods by which the sovereign enacts law". Wacks further says, "Bentham distinguished between laws which command or prohibit certain conduct (imperative laws) and those which permit certain conduct (permissive laws)". Hart gave examples of each of Bentham's methods:

- Command: 'Shut the door!'

- Non-command: 'You may refrain from shutting the door!'

- Prohibition: 'Do not shut the door!'

- Non-prohibition: 'You may shut the door!'

Another essential element of Austin's theory is that of sanction. Sanction was defined by Austin as "an evil to… be incurred by the failure to comply with the wishes of the sovereign". As such, a command includes the expression of the sovereign's wishes followed by a sanction. Bentham, however, "is willing to concede that a sovereign's commands would constitute law even in the absence of sanctions in the Austinian sense". For Bentham, " law includes both punishments and rewards". Also different is the definition of sovereignty. Austin defines sovereignty that " if a determinate human superior, not in a habit of obedience to a like superior, receive habitual obedience from the bulk of a given society, that determinate superior is sovereign in that society, and the society is a society political and independent". Unlike Austin who emphasized on "the illimitability and indivisibility of the sovereign, Bentham acknowledges that the supreme legislative power may be both limited and divided". Hart condemned Austin's formulation of the concept of law. Whilst Austin claims that all laws are 'coercive orders' that impose duties or obligations on individuals, "surely not all laws order people to do or not to do things". In Hart's view, law may instead confer powers or privileges. Also, Hart criticized Austin's account of sovereignty that "the whole conception of a supreme and independent sovereign habitually obeyed… is misleading, since there little in any actual legal system which corresponds to it". Hart points out that the laws may apply to individuals who made them and not only to other individuals and for instance, "the supreme legislature of the Soviet Union is not in the habit of obeying the Queen in Parliament". These pitfalls and criticisms had led Hart to devise an entirely new basis for positivism, which he began by distinguishing primary and secondary rules. Primary rules that impose duties or obligations on individuals which involve "physical movement or changes". Secondary rules, as Hart stated, "are in a sense parasitic upon or secondary to the first; for they… introduce new rules of the primary type, extinguish or modify old ones, or in various ways determine their incidence or control their operations… which lead not merely to physical movement or change, but to the creation or variation of duties or obligations". In essence, it is Hart's proposition of secondary rules, which have also been termed 'rules of recognition', that refines Bentham's and Austin's conceptions of law. Austin's idea of what could be called the "view" of legal positivism is as follows: "The existence of law is one thing; its merit or demerit is another. Whether it be or be not is one enquiry; whether it be or be not conformable to an assumed standard, is a different enquiry. A law, which actually exists, is a law, though we happen to dislike it, or though it vary from the text, by which we regulate our approbation and disapprobation." Law as defined by Bentham is, "…an assemblage of signs declarative of a volition conceived or adopted by the sovereign in a state, concerning the conduct to be observed in a certain case by a certain person or class of persons, who in the case in question are or are supposed to be subject to his power: such volition trusting for its accomplishment to the expectation of certain events which it is intended such declaration should upon occasion be a means of bringing to pass, and the prospect of which it is intended should act as a motive upon those whose conduct is in question."

Where does the Constitution of a country stand in the Command theory?
A Constitution is a document which cannot be called a manuscript which controls the subjects in the Austinian theory as it does not have a will of its own and therefore loses its significance. According to him a Sovereign can only be a 'determinate person or body of persons' with a capacity to have its own will and ability to command. But since Bentham says that the sovereign's power could be divided, we may assume that he admits the Constitution to be a valid source of Law and therefore could be equated to the command of a sovereign. "For Austin, to the four features of a command (wish, sanction, expression of a wish and generality) is to be added a fifth, namely, an identifiable, political, superior or sovereign, whose commands are obeyed by political inferiors and who owes obedience to no one" So Austin relegates big portions of Constitutional Law to Positive Morality.

Where does International Law stand for Austin and Bentham?

International Law is only Positive Morality as it does not emanate from any determinate body or body of persons and therefore the subjects are not bound by any command of a sovereign. Bentham on the other hand accepts international law as positive law as he believes that commands are just one of the four methods by which sovereign enacts law. Bentham refers to a 'state of political society' whereas Austin refers to a 'society political and independent' .And therefore Bentham admits International Law as Law whereas for Austin it does not have the force of Law. The sovereign must not be any indeterminate sovereign as such a sovereign cannot command expressly or tacitly or can receive obedience or submission of any member of the society. Logically this makes Austin exclude from his definition of law International Law.

How important is Legislation for Austin and Bentham?

For Austin, Legislation is a source of law when it comes from the Sovereign as a wish of the sovereign, or as a desire, expectation or order of the sovereign. However for him legislation which does not lead to sanctions or which is devoid of enforcement mechanism in the form of punishments is, or are, improper commands, that is, those commands which are not proper for they lack the power of sanctions and therefore enforceability. Austin does not talk about permissive laws and rewards but only punitive laws. In this sense the laws of Bentham are very wide in encapsulating all permissive laws also along with the punitive laws.

The Place of Custom in the works of Austin and Bentham

Austin puts it under positive morality, even though they may be laws properly so called. They lack the power of commands which are enforceable by the machinery of a Sovereign body. Bentham also did not give due weight to custom though he was not as adamant as Austin in not calling it a proper law. However both Austin and Bentham can be said to be ignoring the value of customs unless legitimised by a sovereign or legislation backed by a sovereign authority.

The Importance of Institutions

Austin recognises only a single power emanating from a single sovereign and therefore does not validate the distribution of powers of the sovereign among the various organs of a polity. His sovereign being illimitable and   indivisible, can take only one form which is undivided and illimitable. On the other hand Bentham talks of possible divisibility and limited powers of the sovereign and therefore promotes distribution of power among various institutions and bodies like the legislature, executive and the judiciary.

The Importance of Judiciary

Austin did not hate judiciary and judicial decisions as much as Bentham but he made it clear that if a judicial legislation is in the making it will be a proper law only under the authority of the sovereign. Till then it will be an improper law or something similar to custom. Rather than being called commands these were norms to be enforced through State machinery. If the sovereign wanted them to be observed as rules then they had the necessary force of law and violators would be punished. Bentham on the other hand refuted to take judicial decisions as law as these did not have the imperative force of law or command of a sovereign.Judicial law making was considered a form of customary law with all its uncertainties and ambiguities on the other hand for Austin. This kind of legislation was capable of providing a basis for generating a code of the common law. Though they both adhere to a utilitarian philosophy, Bentham pursues the notion of a complete law which expresses the will of the legislature and seeks to show that a single law could create a single offence as being the *" the narrowest species of that kind of offence recognized by the Law"*

CONCLUSION

Anything that is not a command of the sovereign for Austin is not Law. 'General commands' could only count as Law and those emanating from the sovereign are only 'Positive Laws'.

Austin's such insistence on commands of the sovereign being the only Law has been a big focus of attack on his theory. It excludes customary international and constitutional law from the field of jurisprudence. Bentham on the other hand argues that commands are only one of the four methods by which the sovereign enacts law. In developing his far more sophisticated theory of the structure of Law, he distinguishes between laws which command or prohibit certain conduct and those which permit certain conduct. In 'Of Laws in General' Bentham is concerned with the distinction between penal and civil laws." The connection between sanction and obligation is an important element in Bentham's theory and is, again, more sophisticated than Austin's account. There is a distinction between *contrectation* and *imperation* to demonstrate the manner in which a particular sanction may be used to make laws complete. For both Austin and Bentham, the key concept is sovereignty which they regard as a point of the social fact of habitual obedience. However, Bentham's views are more sophisticated and Austin's views are more doctrinaire.

Austin defines sovereignty in the following way:

"If a determinate human superior, not in habit of obedience to a like superior, receives habitual obedience from the bulk of a given society, that determinate superior is sovereign in that society and the society including the superior is a society political and independent"

Bentham's definition is strikingly similar, and hereunder is the definition.

"When a number of persons are supposed to be in the habit of paying obedience to a person, or an assemblage of persons, of a known and certain description, such persons altogether are said to be in state of political society."

Austin's theory represents an astute acknowledgement of "'the phenomenon of centralised modern state power in a way that classical common law thought seemed wholly ill equipped to do"

Bentham of course is a clear utilitarian. Austin's objection against blurring the distinction between what law is and what it ought to be is quite general: it is a mistake, whatever our standard of what ought to be, whatever "the text by which we regulate our approbation or disapprobation." His examples, however, are always confusion between law as it is and law as morality would require it to be. For him, it must be remembered the fundamental principles of morality were God's commands, to which utility was an "index": besides this there was the actual accepted morality of a social group or "positive" morality. Bentham insisted on this distinction without characterizing morality by reference to God but only by reference to the principles of utility. Both thinkers' prime reason for this insistence was to enable men to see steadily the precise issues posed by the existence of morally bad laws, and to understand the specific character of the authority of a legal order. Bentham's general recipe for life under the government of laws was simple: it was "to obey punctually; to censure freely." But Bentham was especially aware, as an anxious spectator of the French revolution, that his was notenough: the time might come in any society when the law's commands were so evil that the question of resistance had to be faced, and it was then essential that the issues at stake at this point should neither be oversimplified nor obscured. Yet, this was precisely what the confusion between law and morals had done and Bentham found that the confusion had spread symmetrically in two different directions. On the one hand Bentham had in mind the anarchist who argues thus: "This ought not to be the law, therefore it is not and I am free not merely to censure but to disregard it." On the other hand he thought of the reactionary who argues: "This is the law, therefore it is what it ought to be," and thus stifles criticism at its birth. Both errors, Bentham thought, were to be found in Blackstone: there was his incautious statement that human laws were invalid if contrary to the law of God, and "that spirit of obsequious quiet-ism that seems constitutional in our Author" which "will scarce ever let him recognise a difference" between what is and what ought to be. This indeed was for Bentham the occupational disease of lawyers: "[I]n the eyes of

lawyers-not to speak of their dupes - that is to say, as yet, the generality of non lawyers- 'the is and ought to be' were one and indivisible." There are therefore two dangers between which insistence on this distinction will help us to steer: the danger that law and its authority may be dissolved in man's conceptions of what law ought to be and the danger that the existing law may supplant morality as a final test of conduct and so escape criticism. In view of later criticisms it is also important to distinguish several things that the Utilitarians did not mean by insisting on their separation of law and morals. They certainly accepted many of the things that might be called "the intersection of law and morals." First, they never denied that, as a matter of historical fact, the development of legal systems had been powerfully influenced by moral opinion, and, conversely, that moral standards had been profoundly influenced by law, so that the content of many legal rules mirrored moral rules or principles. It is not in fact always easy to trace this historical causal connection, but Bentham was certainly ready to admit its existence; so too Austin spoke of the "frequent coincidence" of positive law and morality and attributed the confusion of what law is with what law ought to be to this very fact. Secondly, neither Bentham nor his followers denied that by explicit legal provisions moral principles might at different points be brought into a legal system and form part of its rules, or that courts might be legally bound to decide in accordance with what they thought just or best. Bentham indeed recognized, as Austin did not, that even the supreme legislative power might be subjected to legal restraints by a constitution and would not have denied that moral principles, might form the content of such legal constitutional restraints. Austin differed in thinking that restraints on the supreme legislative power could not have the force of law, but would remain merely political or moral checks; but of course he would have recognized that a statute, for example, might confer a delegated legislative power and restrict the area of its exercise by reference to moral principles.What both Bentham and Austin were anxious to assert were the following two simple things: First, in the absence of an expressed constitutional or legal provision, it could not follow from the mere fact that a rule violated standards of morality that it was not a rule of law. Conversely, it could not follow from the mere fact that a rule was morally desirable that it was a rule of law.

The history of this simple doctrine in the nineteenth century is too long and too intricate to trace and may be summarized by saying that after it was propounded to the world by Austin it dominated English jurisprudence and constitutes part of the framework of most of those curiously English and perhaps unsatisfactory productions-the omnibus surveys of the whole field of jurisprudence.

A succession of these were published after a full text of Austin's lectures finally appeared in 1863. In each of them the utilitarian separation of law and morals is treated as something that enables lawyers to attain a new clarity. And obviously one cannot deny the contribution of Bentham who could have been labelled the father of Legal positivism had his works been published much earlier.

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46. Supra note 27

INSIGHTS INTO FACULTY PERCEPTION TOWARDS ICTs IN INSTITUTES OF HIGHER LEARNING

Dr. Sunil Belladi
Assistant Professor, Symbiosis Centre for Media and Communication, Symbiosis International (Deemed) University, Pune, Maharashtra, India

ABSTRACT

Advancements in Information Communication Technologies (ICTs) and on-going information revolution come with a great promise and have drastically impacted the approach and functioning of humankind. Education sector in developing nations like, India is not immune to this global trend. The study sets out to locate the role of ICTs and digital technology as means to reach out to students of Higher Education who have been left out from the formal contact classes during the wake of pandemic (now endemic). Traditionally education has given emphasis and put teaching at its centre. Now it is high time that we quickly adapt and move towards what is called learner centric. The paper as well looks at NEP and how it points out to the direction of optimal application of technology in Higher Education in the country. In an enthusiasm and urgency to embrace ICTs in Education some important and vital issues need to be addressed and what kind of caution needs to be followed, are elucidated in the paper. The future of Higher education with teacherbots and AI being employed are discussed. The paper concludes that Online Education is not the future but the present and its relevance and impact is bound to increase. The teaching fraternity in the country is confident that the education sector will get innovative and alter their approach to suit the needs of the student community.

Keywords: ICTs, Higher Education, COVID 19 and Faculty Perception

INTRODUCTION

Education as a service and a social instrument of change since the beginning of human history has endured and evolved. It diversified and broadened its reach. Each nation across the globe developed or adopted an education system in order to express and support its distinctive socio-cultural uniqueness and as well helped prepare its people to face the challenges of the times. Apart from being an important factor in the growth of a nation's economy, education is a source of self-actualization and making of an informed citizen. The first President of Republic India, Sarvepalli Radhakrihna, calls education as instrument of change in all the spheres of human activity many it be social real, economic progress or cultural protection and promotion.

Advancements in Information Communication Technologies (ICTs) and on-going information revolution come with a great promise and have drastically impacted the approach and functioning of humankind. Education sector in developing nations like India are not immune to this trend. Though not a very old phenomenon; the use of technology in the form of distance education has been a mode of teaching and learning for at least the past few decades and has brought about a tremendous change in the education system in the country by benefiting and fulfilling the need of those who are unable to attend regular formal education. More and more Institutes of Higher Education have been embracing this newfound talisman, (Online & Hybrid) in order to reach out to the student community. Application of digital technology in creating, providing and facilitating an ideal learning environment has brought about perceptible differences in the way students of Higher Learning get education and the way the Universities provide them.

As the COVID 19 began to spread many education institutes had to shut down their operations (no contact Classes) and grappled to find new ways to reach the student community. (Ajey Lele 2021) notes that the community of teachers of Higher Education (not all) could catch up with

the new way of class deliver ie online mode. Even the students struggled to adjust to the 'new normal'. The inmates of prisons in California, US during the Pandemic were given tablets and laptops wherein, after thorough security checks were allowed to take online lectures through zoom and continue their educational pursuit.

The University Grants Commission which oversees the functioning of various Higher Education Institutes in the country and a statuary regulatory body has come up with graduate attributes which was unheard of earlier in India. 15 graduate attributes (UGC 2020) have been listed and it's very interesting if you go through them then we also have outcome orientation education approach. Of which employability of the student seems to be one of the important attributes of a graduate. With the asynchronous mode of education, the student can go back and gain exposure and learn topic that would help them secure a job. One of the chief differences amongst synchronous and asynchronous method of teaching and learning is that in the synchronous mode the learner is given the same instruction and the lecture discourses happen at the same time and the Faculty is present to deliver the lecture and address the doubts arising from the students. Whereas in the asynchronous method of teaching learning the student has the liberty to learn at their own pace and convenient time. The student can as well refer to and get assistance from the additional material supplied in this mode. (Moallem 2015) states that asynchronous mode of class delivery lacked much needed social connection and as well emotional association amongst the facilitator and the learner. Whereas, synchronous mode of instruction allowed a greater interaction and participation among the students and the Faculty. Many are of the opinion that synchronous is more powerful than asynchronous, but if you know how to build how to organize asynchronous platform it can be far more powerful than synchronous mode of education.

Traditionally education has given emphasis and put teaching at its centre. Now it is high time that we quickly adapt and move towards what is called learner centric. Education is going to be a game changer and one question that require series pondering is that this sector is the last to transform when every other sector has transformed but this sector has not transformed, and the moment has arrived.

CONTEXT

The study sets out to locate the role of ICTs and digital technology as means to reach out to students of Higher Education who have been left out from the formal contact classes during the wake of pandemic (now endemic). The pandemic in the form of the novel corona virus made all the educational institutes across the globe to rethink their approach. The added relevance is that it is in accordance with the NEP 2020, which all set for an overhaul in the education sector in the country. The NEP clearly points out to the direction of optimal application of technology in Higher Education.

India only about 15 per cent of its population have access to Higher Education despite the country having over 500 universities and thousands of Institutes of Higher Learning. It is easy for Faculty members to imagine oneself in a classroom, with students at their desks, surrounded by other co-learners. And there we(Faculty) stood in front of the students telling them all about the facts that relate to a subject area, preparing them for that all important examination. The students sat silently, taking notes, preparing, listening intently to the skills that they need to get that desired qualification. This is historically the role of a teacher in a traditional educational setup. However, it is becoming increasingly clear over these last few years that that role is changing. The students must navigate their way through life, through an uncertain future, and they'll need skills to do that. In view of these changing times teachers need to evolve, from being just knowledge deliverers to skill and knowledge developers. They need to embrace new technology and find innovative ways to teach students and prepare them for the future. (Alexander B 2020) states that there are pertinent challenges and outlines the possible

opportunities for educational institutes in the near future, which they can capitalise on. He suggests two ways of countering the uncertainties that are fogging the Higher Education scenario world-wide; a methodological framework which involves trend analysis and scenario development.

Hussain A, Sanderson (2022) notes that there is not enough clear policy guidelines for Institutes of Higher Learning with regard to implementation of ICTs in education. Time constraint, absence of training, and support in terms of implementation are few impediments for a successful deployment of ICTs in Education, the authors state. Many Students in the rural pockets of India have struggled to partake in online mode of education and one pertinent reason is unequal access to required technology and connectivity to internet. However, this is likely to change with more investment in infrastructure and a push from both Government and Private Agencies. The Facilitator (Teacher) of Higher Education though hesitantly has slowly started accepting the fact (has come to terms) that the Digital platforms allow to enhance the learning of the student.

(Alexander B 2020) states that there are pertinent challenges and outlines the possible opportunities for educational institutes in the near future which they can capitalise on. He suggests two ways of countering the uncertainties that are fogging the Higher Education scenario world-wide; a methodological framework which involves trend analysis and scenario development. Stressing the need to provide a highly efficient skilled employees for the global environment, Belsky(2019) notes that, Universities play an important and a pivotal role. And through the online learning platforms and by partnering with other Institutes of Higher Learning, Universities can redefine themselves as provider of quality human capital, the author states.

SOME CAUTION

ICTs can facilitate learning by providing the subject information with Audio visual to explain or demonstrate skills and allows self-assessing opportunities It also enables smooth communication between teachers and students. An effective use of ICTs in Higher Education helps in the providing concrete basis for conceptual thinking and, hence, assists in better understanding and arouses high degree of interest in the students. The key element associated with the effectiveness of ICTs is the pedagogical quality and presentation rather than the nature of the media through which the materials are imparted. The quality, content and presentation of multimedia material needs to be suitably developed and appropriately changed when needed. It should be self-explanatory, self-illustrated and self-sufficient in the totality of the subject they approach and should be done in a holistic manner. Course material should also be prepared in a way that offers a, systematic and substantial foundation to students and inculcate the habit of self-study. One rule of thumb is- always keep the audience in mind before constructing the message. Conceptualizing Creating and delivering content is an ongoing process and entails much required research, dedication, planning and continues evaluation by the educational institutes.

The criteria of good quality ICTs in using multimedia is that, first and foremost it should be acceptable 'academically'. All the information given should be factual and no room for ambiguity has to be left. In quest for more understandability and acceptance there is a greater chance of the content being oversimplification and this should be avoided and one should abstain from over generalization of the topic or subject that is dealt with. A satisfactory amount of balance between the subject matter and its treatment has to be maintained for better understanding of the core concepts of the subject. Conscious or unconscious bias in the treatment of a subject has to be totally avoided. There should always be avenue for the student to become aware of different points of view and interpretation of the subject. One has to critically consider the uses of ICTs with regard to appropriateness and acceptability by both

facilitator and the student community at the same time keeping in view socio- economic and cultural background, The ability to access and comprehend the learning by the student and the skill to provide quality content by facilitators should be addressed before fully integrating ICTs in Higher Education. With the online mode of education (Aparajita. S. 2020) is of the opinion that, it would have an impact on the already fragile social relationships amongst the co-learners, the institution and the student community on the whole. The gap arising from the detachment of the teacher from the leaner is bound to increase. She notes.

No specific method can be helpful for all types of learning requirements, a combination of traditional and the new age ICTs would help in realizing the goal of education for all. Technology should be seen as an enabler and not as the one which dictates the entire process of education. Similarly several questions raised about the quality of education using ICTs have to rightly answered an analysed using empirical data.

THE FUTURE

In 2019, Yuki was inducted as an assistant to a professor at Phillips University of Marburg in Germany, the professor is known as a digital teaching pioneer and one of the first professors to have a humanoid. Yuki (robot) helps the professor in making the lectures interactive. Popenici & Kerr (2017) state that the Teacherbots would be in future used to perform the role of traditional teacher assistant which would come handy in collecting, organizing and retaining information quickly. These teacherbots in an all-online mode of instruction would be used for enabling, supervising and managing the student learning. The traditional formative and summative test that have been carried out by various Higher Education Institutes worldwide seem to receive a formidable challenge from the AI based assessments, predicts, Luckin (2017). Backed with the power of conducting seamless assessments and providing continues feedback to the test taker, the facilitators and the parents of the wards, AI tracks and predicts the progress of the student learning, the author states.

CONCLUSION

Commenting of the infrastructure and logistical hindrances, a study conducted in rural India, Lal & Paul (2016) conclude that for greater penetration and acceptance of ICTs in Higher Education, a public private partnership model should be employed and the Faculty members should be motivated towards greater use of the technology. Online courses need to be combined with provision of personal attention at Institute level and create a comprehensive robust learning platform with endorsement for better acceptability. The facilitator is given the liberty to determines the structure and kind of content that are required to be delivered to the students, they (Faculty) may select to include interactive pedagogy such as audio-visual content, podcasts, conduct short quizzes and elicit much needed feedback immediately, in the courses they deliver.

Over the years a lot of pondering and policy driven initiative have been focusing on teaching and instruction, but a shift has taken palace wherein the entire fulcrum of education has moved to what we usually call the leaning centric approach. Many misfit terms have been used to describe a student of Higher Education, some call them users, some prefer the word customers, and some name them as clients. However, in the present times, we need to acknowledge the role of the student in the entire transformative process as participants. Not all learn the same way and at a same pace. In an excitement of embracing ICTs in Higher Education, Faculty should also keep in mind slow learners. Institutes should make a deliberate effort in identifying students who are slow learners and ensure some remedial and extra classes for their benefit.

Despite the differences, in pedagogy and philosophy in teaching and learning process one consensus seems to be echoing in Higher Education in India, is that Online Education is not the future but the present and its relevance and impact is bound to increase. The teaching fraternity

in the country is confident that the education sector will get innovative and alter their approach to suit the needs of the student community.

Learning seems to be affected more by what is delivered than by the delivery medium.

Wilbur Schramm

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ALGEBRAIC NOTION OF DOUBLY STOCHASTIC CENTRO-SYMMETRIC MATRIX

A. Anna Sheela

Assistant Professor, Department of Mathematics, Saradha Gangadharan College, Puducherry

ABSTRACT

This paper investigates the algebraic notion of Doubly Stochastic Centro-Symmetric Matrix. The properties of the group is verified in connection with the theorems and the axioms and deduced the Doubly Stochastic Centro-Symmetric matrix forms the group, ring and field. Also by using numerical examples the concepts are examined and concluded that Doubly Stochastic Centro-Symmetric matrix can be applied to further algebraic properties.

Keywords: Doubly Stochastic Group, Doubly Stochastic Centro-Symmetric Matrix.

1.1 INTRODUCTION:

A square matrix known as a stochastic matrix in mathematics is used to describe a Markov chain's transitions. Each of its elements is a probability represented by a nonnegative real number[1,2]. Andrey Markov invented the stochastic matrix at the start of the 20th century, and it has since been used in a wide range of scientific disciplines, including probability theory, statistics, mathematical finance, linear algebra, computer science, and population genetics[2]. A straightforward generalisation of the centrosymmetric relation, AJ = JA occurs when J is replaced with an involuntory matrix K (i.e., $K^2 = I$) [4,5,6] or, more generally, a matrix K satisfying $K^m = I$ for an integer m > 1. Finding every involuntary K that commutes with a fixed matrix A is the inverse problem for the commutation relation AK = KA that is covered in [3]. Also, Bi-symmetric matrices are occasionally used to refer to centro-symmetric, symmetrical matrices. It has been demonstrated that when the underlying field is the field of real numbers, bisymmetric matrices are precisely those symmetric matrices whose eigen-values remain the same aside from potential sign changes after pre- or post-multiplication by the exchange matrix. [3]. Further, A similar result can also be applied for Hermitian centro-symmetric and skew-centro-symmetric matrices [7].

The paper is organized as follows:

In section 2, details the characteristics of stochastic matrix followed by the basic definitions and preliminaries. Section 1.3 and 1.5 elaborates the properties of Group with respect to addition and multiplication. Section 1.4 and 1.6 explains the properties of Abelian group with respect to addition and multiplication. Section 2.1 and 2.2 gives the properties of Homomorphism with respect to addition and multiplication. Furthermore, Section 3.1 elaborates the properties of Ring. Section 4.1 elaborates the properties of Field. Finally, section 5 concludes the remarks.

2. CHARACTERIZATION OF STOCHASTIC MATRIX:

(i)   A Stochastic matrix is a square matrix whose elements are probabilities and whose columns add up to 1.

(ii) A Right Stochastic matrix is a real square matrix, with each row summing to 1.

(iii) A Left Stochastic matrix is a real square matrix, with each column summing to 1.

A Doubly Stochastic matrix is a square matrix of nonnegative real numbers with each row and column summing to 1.

In addition, a Sub-stochastic matrix is a real square matrix whose rows are all≤ 1.

In mathematics, especially in probability and combinations, a doubly stochastic matrix (also called Bi-stochastic matrix) is a square matrix of non-negative real numbers, each of whose row and columns sums to 1.

i.e.) $\sum x_{ij} = \sum x_{ij} = 1$

Thus, a doubly stochastic matrix is both left stochastic and right stochastic.

2.1 DEFINITIONS

2.1.1 CENTRO-SYMMETRIC MATRIX

In matrix theory Centro-symmetric matrices are symmetric about its center. In case of square matrix A = $(a_{ij})_{nxn}$ is centro-symmetric when its (i, j) the elements satisfy the conditions $a_{ij} = a_{(n-i+1, n-j+1)}$ for i ≥ 1, n ≥ j or matrix A is centro-symmetric if and only if A × Rn = Rn × A.

For instance, all matrix of order (2 × 2) and (3 × 3) are denoted by $\begin{bmatrix} a & b \\ b & a \end{bmatrix}$ and $\begin{bmatrix} a & d & c \\ f & b & f \\ c & d & a \end{bmatrix}$.

We can simply arrange second and third ordered Centro-symmetric matrix but in case of higher order arrangement of elements, the case is different. For arrangement of Centro-symmetric matrix of order (4 × 4)), we are using above Centro-symmetric condition for arranging the elements of matrix i.e., $a_{ij} = a_{(n-i+1, n-j+1)}$ for i ≥ 1, n ≥ j.

For instance, let A = $\begin{bmatrix} a_{11} & a_{12} & a_{13} & a_{14} \\ a_{21} & a_{22} & a_{23} & a_{24} \\ a_{31} & a_{32} & a_{33} & a_{34} \\ a_{41} & a_{42} & a_{43} & a_{44} \end{bmatrix}$, then $a_{11} = a_{(4-1+1, 4-1+1)} = a_{4,4} = α$, $a_{12} = a_{(4-1+1, 4-2+1)} = = a_{4,3} = = β$, $a_{13} = a_{(4-1+1, 4-3+1)} = = a_{4,2} = γ$, $a_{14} = a_{(4-1+1, 4-4+1)} = = a_{41} = δ$, $a_{21} = a_{(4-2+1, 4-1+1)} = = a_{34} = ϵ$, $a_{22} = a_{(4-2+1, 4-2+1)} = = a_{33} = ζ$, $a_{23} = a_{(4-2+1, 4-3+1)} = = a_{32}$

= s, $a_{24} = a_{(4-2+1, 4-4+1)} = = a_{31} = t$ and we find Centro-symmetric matrix A = $\begin{bmatrix} α & β & γ & δ \\ ζ & η & θ & κ \\ κ & θ & η & ζ \\ ζ & γ & β & α \end{bmatrix}$

2.1.2 DOUBLY STOCHASTIC GROUP WITH RESPECT TO MULTIPLICATION:

A collection of absolute non-singular doubly stochastic matrix (G, *) is said to be a doubly stochastic group with respect to multiplication, it satisfies the following axioms.

Axiom-1   It is closure with respect to multiplication.(i.e.) A * B ∈ G.
Axiom-2   * is associative. (i.e.) A* (B * C) = (A * B) * C.
Axiom-3   There exists an identity matrix I in G such that A * I = I * A = A for all a ∈ G.
Axiom-4   For each A ∈ G there exists a matrix A^{-1} ∈ G such that A * A^{-1} = A^{-1} * A = I

⇒A^{-1} is the inverse of A.

2.1.3 DOUBLY STOCHASTIC ABELIAN GROUP (*):

A doubly stochastic group (G, *) is said to be doubly stochastic abelian group if the binary operation * is commutative. (i.e.) A * B = B * A ∀ A, B ∈ G.

Note:

(i)   Product of doubly stochastic matrices is a doubly stochastic matrix.

$$A = \begin{pmatrix} a_{11} a_{12} a_{13} \\ a_{21} a_{22} a_{23} \\ a_{31} a_{32} a_{33} \end{pmatrix} \text{ and } B = A = \begin{pmatrix} b_{11} & b_{12} & b_{13} \\ b_{21} & b_{22} & b_{23} \\ b_{31} & b_{32} & b_{33} \end{pmatrix} \text{ then } AB = \begin{pmatrix} c_{11} c_{12} c_{13} \\ c_{21} c_{22} c_{23} \\ c_{31} c_{32} c_{33} \end{pmatrix}$$

where $c_{ij} = \sum_{k=1}^{n} a_{ik} b_{kj}$ (i.e) $A = (a_{ij})_{nxn}$ and $B = (b_{ij})_{nxn}$ then $AB = (c_{ij})_{nxn}$

where $c_{ij} = \sum_{k=1}^{n} a_{ik} b_{kj}$

2.1.4 DOUBLY STOCHASTIC GROUP WITH RESPECT TO ADDITION

A collection of non-singular doubly stochastic matrix (G, +) is said to be a doubly stochastic group with respect to addition, it satisfies the following properties.

Axiom-1   It is closure with respect to multiplication. (i.e.) 1/2 (A + B) $\in$ G.
Axiom -2   Addition is associative. (i.e.)1/3[A + (B +C)] =1/3[(A +B) + C].
Axiom-3   There exists an identity matrix 0 in G such that A + O = O + A = A for all a $\in$ G.
Axiom-4   For each A $\in$ G there exists a matrix A-1 $\in$ G such that A + A^{-1} = A^{-1} + A = O.

If $\sum_{i=1}^{n} |a_{ij}| = 1$, I = 1, 2, …n and $\sum_{j=1}^{n} |a_{ij}| = 1$, j = 1, 2, ….n $\Rightarrow A^{-1}$ is the inverse of A.

1.2.7 DOUBLY STOCHASTIC ABELIAN GROUP

A doubly stochastic group (G, +) is said to be doubly stochastic Abelian group if the binary operation + is commutative.

(i.e.) 1/2 [A + B] = 1/2 [B + A] $\forall$ A, B $\in$ G.

1.2.8 HOMOMORPHISM OF DOUBLY STOCHASTIC GROUP

A homomorphism of a doubly stochastic group G in to G' is a map f : G $\rightarrow$ G' is defined by f(a) = a^2 such that , f(ab) = f(a).f(b) for all a, b$\in$G with respect to multiplication.

A homomorphism of a doubly stochastic group G in to G' is a map f : G $\rightarrow$1/2G' is defined by f(a) =A/2 and f(b) = B/2 such that f(a+b) = f(a) + f(b), for all a, b$\in$G with respect to addition.

1.2.9 DOUBLY STOCHASTIC RING

A collection of non-empty and non-singular doubly stochastic matrix R together with two binary operations denoted by "+" and "." are addition and multiplication which satisfy the following axioms is called a doubly stochastic Ring.
Axiom -1   (R, +) is an abelian group.
Axiom -2   "." is associative binary operation on R.
Axiom -3 $\frac{1}{2}$ [A .(B + C)] = $\frac{1}{2}$ [A .B + A.C] and

$\frac{1}{2}$ [(A + B) . C] = $\frac{1}{2}$ [A . C + B . C] for all A, B, C $\in$ R.

3. THEOREM

A Doubly Stochastic Centro-symmetric matrix in M_3(R) is a Doubly Stochastic Centro-symmetric group with respect to multiplication.

PROOF:
Axiom-1

Let $A = \begin{pmatrix} a & 0 & 1-a \\ 0 & 1 & 0 \\ 1-a & 0 & a \end{pmatrix}$ and $B = \begin{pmatrix} b & 0 & 1-b \\ 0 & 1 & 0 \\ 1-b & 0 & b \end{pmatrix} \in M_3$ (R) then

$$A * B = \begin{pmatrix} 2ab - b - a + 1 & 0 & a - 2ab + b \\ 0 & 1 & 0 \\ b - 2ab + a & 0 & -b - a + 2ab + 1 \end{pmatrix} \in M_3 \text{ (R)}.$$

Axiom-2

Let $A = \begin{pmatrix} a & 0 & 1-a \\ 0 & 1 & 0 \\ 1-a & 0 & a \end{pmatrix}$ $B = \begin{pmatrix} b & 0 & 1-b \\ 0 & 1 & 0 \\ 1-b & 0 & b \end{pmatrix}$ and $C = \begin{pmatrix} c & 0 & 1-c \\ 0 & 1 & 0 \\ 1-c & 0 & c \end{pmatrix} \in M_3(\text{R})$, then

A * (B * C) =

$$\begin{pmatrix} 4abc - 2ac - 2ab + a + c - 2bc + b & 0 & 2ab - 4abc + 2ac - c - b + 2bc - a + 1 \\ 0 & 1 & 0 \\ 2bc - c - b - 4abc + 2ac + 2ab - a + 1 & 0 & b - 2bc + c - 2ab + 4abc - 2ac + a \end{pmatrix}$$

Similarly

(A * B) * C=

$$\begin{pmatrix} 4abc - 2bc - 2ac + c + a - 2ab + b & 0 & 2ab - 4abc - b + 2bc - a + 2ac - c + 1 \\ 0 & 1 & 0 \\ 2bc - 4abc + 2ac - b - a + 2ab - c + 1 & 0 & b - 2bc - 2ab + 4abc + a - 2ac + c \end{pmatrix}$$

(i.e.) A*(B*C) = (A*B)*C.

Hence * is associative.

Axiom-3

Let $A = \begin{pmatrix} a & 0 & 1-a \\ 0 & 1 & 0 \\ 1-a & 0 & a \end{pmatrix} \in M_3(\text{R})$, there exists an identity $I = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} \in M_3(\text{R})$

such that

$A * I = \begin{pmatrix} a & 0 & 1-a \\ 0 & 1 & 0 \\ 1-a & 0 & a \end{pmatrix}$ = A and

$I * A = \begin{pmatrix} a & 0 & 1-a \\ 0 & 1 & 0 \\ 1-a & 0 & a \end{pmatrix}$ = A

(i.e.) A * I = I * A = A $\forall$ A $\in M_3(\text{R})$.

Axiom-4

Let $A = \begin{pmatrix} a & 0 & 1-a \\ 0 & 1 & 0 \\ 1-a & 0 & a \end{pmatrix} \in M_3(\text{R})$,

Using Cayley's Hamilton theorem, we get the inverse.

The characteristic equation is $|A - \lambda I| = 0 \Rightarrow A^{-1} = \begin{pmatrix} \frac{a}{2a-1} & 0 & \frac{a-1}{2a-1} \\ 0 & 1 & 0 \\ \frac{a-1}{2a-1} & 0 & \frac{a}{2a-1} \end{pmatrix}$ (i.e.) A * $A^{-1} = A^{-1} *$ A = I.

Hence M_3(R) is a Doubly Stochastic Centro-Symmetric group with respect to the given operation multiplication.

3.1 THEOREM

A Doubly Stochastic Centro-Symmetric matrix in M_3 (R) is a Doubly Stochastic Centro-Symmetric Abelian group with respect to multiplication.

PROOF

From theorem 1.3 (M_3 (R), *) is a Doubly Stochastic Centro-Symmetric group. Now it satisfies A * B = B * A.

Let A $= \begin{pmatrix} a & 0 & 1-a \\ 0 & 1 & 0 \\ 1-a & 0 & a \end{pmatrix}$ and B $= \begin{pmatrix} b & 0 & 1-b \\ 0 & 1 & 0 \\ 1-b & 0 & b \end{pmatrix} \in M_3$(R)then

A * B $= \begin{pmatrix} 2ab-b-a+1 & 0 & a-2ab+b \\ 0 & 1 & 0 \\ b-2ab+a & 0 & -b-a+2ab+1 \end{pmatrix}$

B * A $= \begin{pmatrix} 2ba-a-b+1 & 0 & b-2ba+a \\ 0 & 1 & 0 \\ a-2ab+b & 0 & -a-b+2ab+1 \end{pmatrix}$

$\Rightarrow$ A * B = B * A $\forall$ A,B $\in M_3$(R).Hence M_3(R) is a Doubly Stochastic Centro-Symmetric abelian group with respect to the given operation multiplication.

3.1.1 EXAMPLE

Let a = 2 and b = 3 then

A $= \begin{pmatrix} 2 & 0 & -1 \\ 0 & 1 & 0 \\ -1 & 0 & 2 \end{pmatrix}$ and B $= \begin{pmatrix} 3 & 0 & -2 \\ 0 & 1 & 0 \\ -2 & 0 & 3 \end{pmatrix}$

(i) A * B $= \begin{pmatrix} 8 & 0 & -7 \\ 0 & 1 & 0 \\ -7 & 0 & 8 \end{pmatrix} \in M_3$(R)

(ii) Let c = 4 then

C $= \begin{pmatrix} 4 & 0 & -3 \\ 0 & 1 & 0 \\ -3 & 0 & 4 \end{pmatrix}$

A * (B * C) $= \begin{pmatrix} 53 & 0 & -52 \\ 0 & 1 & 0 \\ -52 & 0 & 53 \end{pmatrix}$ and

(A * B) * C $= \begin{pmatrix} 53 & 0 & -52 \\ 0 & 1 & 0 \\ -52 & 0 & 53 \end{pmatrix}$

$\Rightarrow$ * is associative

(iii) There exists an identity I $= \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$ then

A * I $= \begin{pmatrix} 2 & 0 & -1 \\ 0 & 1 & 0 \\ -1 & 0 & 2 \end{pmatrix}$ = A and I * A $= \begin{pmatrix} 2 & 0 & -1 \\ 0 & 1 & 0 \\ -1 & 0 & 2 \end{pmatrix}$ = A

(iv)   There exists an inverse using theorem 1.3,

$A^{-1}=\begin{pmatrix} \frac{2}{3} & 0 & \frac{1}{3} \\ 0 & 1 & 0 \\ \frac{1}{3} & 0 & \frac{2}{3} \end{pmatrix}$ then A $^*A^{-1}=\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$= I and A^{-1}* A =$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$ = I

(v)   A * B =$\begin{pmatrix} 8 & 0 & -7 \\ 0 & 1 & 0 \\ -7 & 0 & 8 \end{pmatrix}$ and B * A =$\begin{pmatrix} 8 & 0 & -7 \\ 0 & 1 & 0 \\ -7 & 0 & 8 \end{pmatrix}$.

Hence the given Doubly Stochastic Centro-Symmetric matrix in M_3(R)is an abelian group with respect to multiplication.

4. THEOREM:

A Doubly Stochastic Centro-Symmetric matrix in M_3(R)is a Doubly Stochastic Centro-Symmetric group with respect to addition.

PROOF

Axiom-1

Let A =$\begin{pmatrix} a & 0 & 1-a \\ 0 & 1 & 0 \\ 1-a & 0 & a \end{pmatrix}$ and

B =$\begin{pmatrix} b & 0 & 1-b \\ 0 & 1 & 0 \\ 1-b & 0 & b \end{pmatrix} \in M_3$(R) then

A + B =$\begin{pmatrix} a+b & 0 & -a-b+2 \\ 0 & 2 & 0 \\ -a-b+2 & 0 & a+b \end{pmatrix}$

1/2[A+B] =$\begin{pmatrix} \frac{a+b}{2} & 0 & \frac{-a-b}{2}+1 \\ 0 & 2 & 0 \\ \frac{-a-b}{2}+1 & 0 & \frac{a+b}{2} \end{pmatrix} \in M_3$(R)

Axiom-2

Let A =$\begin{pmatrix} a & 0 & 1-a \\ 0 & 1 & 0 \\ 1-a & 0 & a \end{pmatrix}$ and B =$\begin{pmatrix} b & 0 & 1-b \\ 0 & 1 & 0 \\ 1-b & 0 & b \end{pmatrix}$ C =$\begin{pmatrix} c & 0 & 1-c \\ 0 & 1 & 0 \\ 1-c & 0 & c \end{pmatrix} \in M_3$(R) then

1/3[A + (B + C)] =$\begin{pmatrix} \frac{a+b+c}{3} & 0 & \frac{-a-b-c}{3}+1 \\ 0 & 2 & 0 \\ \frac{-a-b-c}{3}+1 & 0 & \frac{a+b+c}{3} \end{pmatrix}$Similarly

1/3 [(A + B) + C] =$\begin{pmatrix} \frac{a+b+c}{3} & 0 & \frac{-a-b-c}{3}+1 \\ 0 & 2 & 0 \\ \frac{-a-b-c}{3}+1 & 0 & \frac{a+b+c}{3} \end{pmatrix}$

$\Rightarrow$ 1/3[A + (B +C)] =1/3[(A +B) + C].

Axiom-3

Let A=$\begin{pmatrix} a & 0 & 1-a \\ 0 & 1 & 0 \\ 1-a & 0 & a \end{pmatrix} \in M_3(R)$, there exists an identity O =$\begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix} \in M_3(R)$

such that A + O =$\begin{pmatrix} a & 0 & 1-a \\ 0 & 1 & 0 \\ 1-a & 0 & a \end{pmatrix}$ = A and O + A =$\begin{pmatrix} a & 0 & 1-a \\ 0 & 1 & 0 \\ 1-a & 0 & a \end{pmatrix}$ = A

$\Rightarrow$ A + O = O + A = A $\forall$ A $\in M_3(R)$.

Axiom-4

Let A =$\begin{pmatrix} a & 0 & 1-a \\ 0 & 1 & 0 \\ 1-a & 0 & a \end{pmatrix} \in M_3(R)$ and their exists an identity O in $M_3(R)$ then the additive

inverse of A is$A^{-1}=\begin{pmatrix} -a & 0 & -1+a \\ 0 & 1 & 0 \\ -1+a & 0 & -a \end{pmatrix} \Rightarrow$ A + A^{-1}= A^{-1}+ A = O.

Hence $M_3(R)$ is a Doubly Stochastic Centro-Symmetric group with respect to the given operation addition.

4.1 THEOREM

A Doubly Stochastic Centro-Symmetric matrix in $M_3(R)$ is an Doubly Stochastic Centro-Symmetric abelian group with respect to addition.

PROOF

From the theorem 1.3 ($M_3(R)$, +) is a group.
Now its satisfies 1/2 [A + B] = ½ [B + A]

Let A =$\begin{pmatrix} a & 0 & 1-a \\ 0 & 1 & 0 \\ 1-a & 0 & a \end{pmatrix}$ and B =$\begin{pmatrix} b & 0 & 1-b \\ 0 & 1 & 0 \\ 1-b & 0 & b \end{pmatrix}$ then 1/2 [A + B]

=$\begin{pmatrix} \frac{a+b}{2} & 0 & \frac{-a-b}{2}+1 \\ 0 & 2 & 0 \\ \frac{-a-b}{2}+1 & 0 & \frac{a+b}{2} \end{pmatrix}$ and

1/2 [B + A] =$\Rightarrow$1/2 [A + B] =1/2 [B + A] $\forall$ A, B $\in$ M3 (R).

Hence $M_3(R)$ is an Doubly Stochastic Centro-Symmetric abelian group with respect to the given operation addition.

4.1.1 EXAMPLE

Let a = 2 and b = 3 then
A =$\begin{pmatrix} 2 & 0 & -1 \\ 0 & 1 & 0 \\ -1 & 0 & 2 \end{pmatrix}$ and B=$\begin{pmatrix} 3 & 0 & -2 \\ 0 & 1 & 0 \\ -2 & 0 & 3 \end{pmatrix}$

(i) A + B =$\begin{pmatrix} 5 & 0 & -3 \\ 0 & 2 & 0 \\ -3 & 0 & 5 \end{pmatrix}$ 1/2[A + B] = 1/2 $\begin{pmatrix} 5 & 0 & -3 \\ 0 & 2 & 0 \\ -3 & 0 & 5 \end{pmatrix}$ =$\begin{pmatrix} \frac{5}{2} & 0 & -\frac{3}{2} \\ 0 & 1 & 0 \\ -\frac{3}{2} & 0 & \frac{5}{2} \end{pmatrix} \in M_3(R)$

(ii) Let c = 4 then $C = \begin{pmatrix} 4 & 0 & -3 \\ 0 & 1 & 0 \\ -3 & 0 & 4 \end{pmatrix}$

$1/3[A + (B + C)] = 1/3 \begin{pmatrix} 9 & 0 & -6 \\ 0 & 1 & 0 \\ -6 & 0 & 9 \end{pmatrix} = \begin{pmatrix} 3 & 0 & -2 \\ 0 & 1 & 0 \\ -2 & 0 & 3 \end{pmatrix}$ $1/3\ [(A + B) + C] =$

$1/3 \begin{pmatrix} 9 & 0 & -6 \\ 0 & 1 & 0 \\ -6 & 0 & 9 \end{pmatrix} = \begin{pmatrix} 3 & 0 & -2 \\ 0 & 1 & 0 \\ -2 & 0 & 3 \end{pmatrix} \Rightarrow$ addition is associative.

(iii) There exists an identity $O = \begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}$ then

$A + O = \begin{pmatrix} 2 & 0 & -1 \\ 0 & 1 & 0 \\ -1 & 0 & 2 \end{pmatrix} = A$ and

$O + A = \begin{pmatrix} 2 & 0 & -1 \\ 0 & 1 & 0 \\ -1 & 0 & 2 \end{pmatrix} = A$

(iv) There exists an inverse,

$A^{-1} = \begin{pmatrix} -2 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & -2 \end{pmatrix}$ then

$A + A^{-1} = \begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix} = O$ and

$A^{-1} + A = \begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix} = O$

(vi) $A + B = \begin{pmatrix} 5 & 0 & -3 \\ 0 & 2 & 0 \\ -3 & 0 & 5 \end{pmatrix}$

$1/2[A + B] = 1/2 \begin{pmatrix} 5 & 0 & -3 \\ 0 & 2 & 0 \\ -3 & 0 & 5 \end{pmatrix} = \begin{pmatrix} \frac{5}{2} & 0 & -\frac{3}{2} \\ 0 & 1 & 0 \\ -\frac{3}{2} & 0 & \frac{5}{2} \end{pmatrix}$

$B + A = \begin{pmatrix} 5 & 0 & -3 \\ 0 & 2 & 0 \\ -3 & 0 & 5 \end{pmatrix}$

$1/2[B + A] = 1/2 \begin{pmatrix} 5 & 0 & -3 \\ 0 & 2 & 0 \\ -3 & 0 & 5 \end{pmatrix} = \begin{pmatrix} \frac{5}{2} & 0 & -\frac{3}{2} \\ 0 & 1 & 0 \\ -\frac{3}{2} & 0 & \frac{5}{2} \end{pmatrix}$

Hence the given Doubly Stochastic Centro-Symmetric matrices in $M_3(R)$ is an abelian group with respect to addition.

5. THEOREM

A Doubly Stochastic Centro-Symmetric group G into G' is a Doubly Stochastic Centro-Symmetric group homomorphism with respect to multiplication such that f(ab) = f(a).f(b) for all a, b∈G where f(a) = A^2 and f(b) = B^2

PROOF

f(ab) = $(AB)^2$ = (AB) (AB) = A(BA)B

= A(AB)B where AB = BA

= $A^2 B^2$ = f(a) f(b)

5.1.1 EXAMPLE

$A = \begin{pmatrix} 2 & 0 & -1 \\ 0 & 1 & 0 \\ -1 & 0 & 2 \end{pmatrix}$ $B = \begin{pmatrix} 3 & 0 & -2 \\ 0 & 1 & 0 \\ -2 & 0 & 3 \end{pmatrix}$ and ab $= \begin{pmatrix} 8 & 0 & -7 \\ 0 & 1 & 0 \\ -7 & 0 & 8 \end{pmatrix}$ then

f(a) $= A^2 = \begin{pmatrix} 5 & 0 & -4 \\ 0 & 1 & 0 \\ -4 & 0 & 5 \end{pmatrix}$

f(b) $= B^2 = \begin{pmatrix} 13 & 0 & -12 \\ 0 & 1 & 0 \\ -12 & 0 & 13 \end{pmatrix}$ f(a)f(b)$= \begin{pmatrix} 113 & 0 & -112 \\ 0 & 1 & 0 \\ -112 & 0 & 113 \end{pmatrix}$ f(ab) $= \begin{pmatrix} 113 & 0 & -112 \\ 0 & 1 & 0 \\ -112 & 0 & 113 \end{pmatrix}$

∴f(ab) = f(a) f(b)

5.1 THEOREM

A Doubly Stochastic Centro-Symmetric group G into G' is a group homomorphism with respect to addition such that f(a+b)= f(a)+f(b), for all a, b∈G where f(a) = A/2 and f(b) = B/2

PROOF

f(a+b) = $\frac{A+B}{2} = \frac{A}{2} + \frac{B}{2}$ = f(a) + f(b)

2.2.1 EXAMPLE

$A = \begin{pmatrix} 2 & 0 & -1 \\ 0 & 1 & 0 \\ -1 & 0 & 2 \end{pmatrix}$ $B = \begin{pmatrix} 3 & 0 & -2 \\ 0 & 1 & 0 \\ -2 & 0 & 3 \end{pmatrix}$ and A + B $= \begin{pmatrix} 5 & 0 & -3 \\ 0 & 2 & 0 \\ -3 & 0 & 5 \end{pmatrix}$ Then f(a)

$= \frac{A}{2} = \begin{pmatrix} 1 & 0 & -\frac{1}{2} \\ 0 & 1 & 0 \\ -\frac{1}{2} & 0 & 1 \end{pmatrix}$ f(b) $= \frac{B}{2} = \begin{pmatrix} \frac{3}{2} & 0 & -1 \\ 0 & 1 & 0 \\ -1 & 0 & \frac{3}{2} \end{pmatrix}$

f(a + b) $= \frac{A+B}{2} = \begin{pmatrix} \frac{5}{2} & 0 & -\frac{3}{2} \\ 0 & 1 & 0 \\ -\frac{3}{2} & 0 & \frac{5}{2} \end{pmatrix}$

∴ f(a+b) =f(a)+f(b)

6. THEOREM

A Doubly Stochastic Centro-Symmetric matrix in M_3(R)is a Doubly Stochastic Centro-Symmetric ring with respect to addition and multiplication.

PROOF

Axiom-1   We know thatM_3(R) is a Doubly Stochastic Centro-Symmetric abelian group with respect   to   addition   from   theorem   1.5   and   1.6. **Axiom-2**   It is also satisfies the associative property with respect to multiplication from theorem 1.3 **Axiom -3**

Let A $=\begin{pmatrix} a & 0 & 1-a \\ 0 & 1 & 0 \\ 1-a & 0 & a \end{pmatrix}$

B $=\begin{pmatrix} b & 0 & 1-b \\ 0 & 1 & 0 \\ 1-b & 0 & b \end{pmatrix}$ and

C $=\begin{pmatrix} c & 0 & 1-c \\ 0 & 1 & 0 \\ 1-c & 0 & c \end{pmatrix} \in M_3(R)$ then

A . (B + C) $=\begin{pmatrix} a & 0 & 1-a \\ 0 & 1 & 0 \\ 1-a & 0 & a \end{pmatrix}.\begin{pmatrix} b+c & 0 & -b-c+2 \\ 0 & 1 & 0 \\ -b-c+2 & 0 & b+c \end{pmatrix}$

$=\begin{pmatrix} 2ab+2ac-b-c-2a+2 & 0 & -2ab-2ac+2a+b+c \\ 0 & 2 & 0 \\ b+c-2ab-2ac+2a & 0 & -b-c+2ab+2ac-2a+2 \end{pmatrix}$

$\frac{1}{2}[A.(B+C)] = \begin{pmatrix} ab+ac-\frac{b}{2}-\frac{c}{2}-a+1 & 0 & -ab-ac+a+\frac{b}{2}+\frac{c}{2} \\ 0 & 1 & 0 \\ \frac{b}{2}+\frac{c}{2}-ab-ac+a & 0 & -\frac{b}{2}-\frac{c}{2}+ab+ac-a+1 \end{pmatrix}$

A.B+A.C

$=\begin{pmatrix} 2ab-b-a+1 & 0 & a-2ab+b \\ 0 & 1 & 0 \\ b-2ab+a & 0 & -b-a+2ab+1 \end{pmatrix}+\begin{pmatrix} 2ac-c-a+1 & 0 & a-2ac+c \\ 0 & 1 & 0 \\ c-2ac+a & 0 & -c-a+2ac+1 \end{pmatrix}$

$\frac{1}{2}[A.B+A.C] = \begin{pmatrix} ab+ac-\frac{b}{2}-\frac{c}{2}-a+1 & 0 & -ab-ac+a+\frac{b}{2}+\frac{c}{2} \\ 0 & 1 & 0 \\ \frac{b}{2}+\frac{c}{2}-ab-ac+a & 0 & -\frac{b}{2}-\frac{c}{2}+ab+ac-a+1 \end{pmatrix}$

$\Rightarrow \frac{1}{2}[A.(B+C)] = \frac{1}{2}[A.B + A.C]$ and also

(A + B) .C $=\begin{pmatrix} a+b & 0 & -a-b+2 \\ 0 & 2 & 0 \\ -a-b+2 & 0 & a+b \end{pmatrix}.\begin{pmatrix} c & 0 & 1-c \\ 0 & 1 & 0 \\ 1-c & 0 & c \end{pmatrix}$

$\frac{1}{2}[(A+B).C] = \begin{pmatrix} ac+bc-\frac{a}{2}-\frac{b}{2}-c+1 & 0 & -ab-ac+a+\frac{b}{2}+\frac{c}{2} \\ 0 & 1 & 0 \\ -ac-bc+c+\frac{a}{2}+\frac{b}{2} & 0 & -\frac{a}{2}+ac-\frac{b}{2}+bc-c+1 \end{pmatrix}$

A.C   +   B.C

$=\begin{pmatrix} 2ac-c-a+1 & 0 & a-2ac+c \\ 0 & 1 & 0 \\ c-2ac+a & 0 & -c-a+2ac+1 \end{pmatrix}+\begin{pmatrix} 2bc-c-b+1 & 0 & b-2bc+c \\ 0 & 1 & 0 \\ c-2bc+b & 0 & -b-a+2ab+1 \end{pmatrix}$

$\frac{1}{2}[A.C+B.C] = \begin{pmatrix} ac+bc-\frac{a}{2}-\frac{b}{2}-c+1 & 0 & -ab-ac+a+\frac{b}{2}+\frac{c}{2} \\ 0 & 1 & 0 \\ -ac-bc+c+\frac{a}{2}+\frac{b}{2} & 0 & -\frac{a}{2}+ac-\frac{b}{2}+bc-c+1 \end{pmatrix}$

$\Rightarrow \frac{1}{2}$ [(A + B).C] $=\frac{1}{2}$ [A.C + B.C]. Hence a Doubly Stochastic Centro-Symmetric matrix in $M_3(\text{R})$ is a Doubly Stochastic Centro-Symmetric ring with respect to addition and multiplication.

6.1 EXAMPLE

Let a = 2 , b = 3 and c = 4 then

$$A = \begin{pmatrix} 2 & 0 & -1 \\ 0 & 1 & 0 \\ -1 & 0 & 2 \end{pmatrix}$$

$$B = \begin{pmatrix} 3 & 0 & -2 \\ 0 & 1 & 0 \\ -2 & 0 & 3 \end{pmatrix}$$

$$C = \begin{pmatrix} 4 & 0 & -3 \\ 0 & 1 & 0 \\ -3 & 0 & 4 \end{pmatrix}$$

From example 1.6.1, the given Doubly Stochastic Centro-Symmetric matrices in $M_3(\text{R})$ is an abelian group with respect to addition.

Next from example 1.4.1, the given Doubly Stochastic Centro-Symmetric matrix in $M_3(\text{R})$ is an abelian group with respect to multiplication.

Next we will show that

(i) $\frac{1}{2}$ [A.(B + C)] $= \frac{1}{2}$ [A.B + A.C]

(ii) $\frac{1}{2}$ [(A + B) . C] $= \frac{1}{2}$ [A.C + B.C]

(i) A.(B + C) $= \begin{pmatrix} 2 & 0 & -1 \\ 0 & 1 & 0 \\ -1 & 0 & 2 \end{pmatrix} . \begin{pmatrix} 7 & 0 & -5 \\ 0 & 1 & 0 \\ -5 & 0 & 7 \end{pmatrix}$

$\frac{1}{2}$ [A.(B + C)] $= \begin{pmatrix} \frac{19}{2} & 0 & -\frac{17}{2} \\ 0 & 1 & 0 \\ -\frac{17}{2} & 0 & \frac{19}{2} \end{pmatrix}$

A.B + A.C $= \begin{pmatrix} 8 & 0 & -7 \\ 0 & 1 & 0 \\ -7 & 0 & 8 \end{pmatrix} + \begin{pmatrix} 11 & 0 & -10 \\ 0 & 1 & 0 \\ -10 & 0 & 11 \end{pmatrix}$

$\frac{1}{2}$ [A.B + A.C] $= \begin{pmatrix} \frac{19}{2} & 0 & -\frac{17}{2} \\ 0 & 1 & 0 \\ -\frac{17}{2} & 0 & \frac{19}{2} \end{pmatrix}$

$\Rightarrow \frac{1}{2}$ [A.(B + C)] $= \frac{1}{2}$ [A.B + A.C] and

(ii)　　　(A + B).C $= \begin{pmatrix} 5 & 0 & -3 \\ 0 & 1 & 0 \\ -3 & 0 & 5 \end{pmatrix} . \begin{pmatrix} 4 & 0 & -3 \\ 0 & 1 & 0 \\ -3 & 0 & 4 \end{pmatrix}$

$\frac{1}{2}$ [(A + B).C] $= \begin{pmatrix} \frac{29}{2} & 0 & -\frac{27}{2} \\ 0 & 1 & 0 \\ -\frac{27}{2} & 0 & \frac{29}{2} \end{pmatrix}$

$$\text{A.C} + \text{B.C} = \begin{pmatrix} 11 & 0 & -10 \\ 0 & 1 & 0 \\ -10 & 0 & 11 \end{pmatrix} + \begin{pmatrix} 18 & 0 & -17 \\ 0 & 1 & 0 \\ -17 & 0 & 18 \end{pmatrix}$$

$$\tfrac{1}{2}[\text{A.C} + \text{B.C}] = \begin{pmatrix} \frac{29}{2} & 0 & -\frac{27}{2} \\ 0 & 1 & 0 \\ -\frac{27}{2} & 0 & \frac{29}{2} \end{pmatrix}$$

$$\Rightarrow \tfrac{1}{2}[(\text{A} + \text{B}).\text{C}] = \tfrac{1}{2}[\text{A.C} + \text{B.C}]$$

Hence the given Doubly Stochastic Centro-Symmetric matrices in $M_3(\text{R})$ is a doubly stochastic ring with respect to addition and multiplication.

7. THEOREM

A Doubly Stochastic Centro-Symmetric matrix in $M_3(\text{R})$ is a Doubly Stochastic Centro-Symmetric Field with respect to addition and multiplication.

PROOF

Axiom-1 We know that, $M_3(\text{R})$ is a Doubly Stochastic Centro-Symmetric abelian group with respect to addition and multiplication from theorem 1.3, 1.4, 1.5, 1.6.

AXIOM-2 Also we know that,$M_3(\text{R})$ is a Doubly Stochastic Centro-Symmetric abelian group has a unity element with respect to addition and multiplication from theorem 1.3, 1.4, 1.5, 1.6.

AXIOM-3 From theorem 1.3, 1.4 $M_3(\text{R})$ is a Doubly Stochastic Centro-Symmetric abelian group, each non-zero element has its multiplicative inverse.

AXIOM-4 From theorem 3.1 $M_3(\text{R})$ is a Doubly Stochastic Centro-Symmetric abelian group, it also satisfies distributive laws.

4.1.1 EXAMPLE

Let a = 2, b = 3 and c = 4 then

$$\text{A} = \begin{pmatrix} 2 & 0 & -1 \\ 0 & 1 & 0 \\ -1 & 0 & 2 \end{pmatrix}$$

$$\text{B} = \begin{pmatrix} 3 & 0 & -2 \\ 0 & 1 & 0 \\ -2 & 0 & 3 \end{pmatrix}$$

$$\text{C} = \begin{pmatrix} 4 & 0 & -3 \\ 0 & 1 & 0 \\ -3 & 0 & 4 \end{pmatrix}$$

From example 1.4.1, 1.6.1, the given Doubly Stochastic Centro-Symmetric matrices in $M_3(\text{R})$ has a commutative element with respect to addition and multiplication. From example 1.4.1, 1.6.1, the given Doubly Stochastic Centro-Symmetric matrices in $M_3(\text{R})$ has a unity element with respect to addition and multiplication. From example 1.4.1, the given Doubly Stochastic Centro-Symmetric matrices in $M_3(\text{R})$ has a multiplicative inverse.From example 3.1.1, the given Doubly Stochastic Centro-Symmetric matrices in $M_3(\text{R})$ satisfies a distributive laws.

CONCLUSION

In this paper, the algebraic notion of Doubly Stochastic Centro-Symmetric Matrix is interpreted. The properties of the group is examined by using various axioms and arrived at a conclusion

that Doubly Stochastic Centro-Symmetric matrix forms the group, ring and field. Also by using numerical examples, it has been verified and produces a strong impact on Doubly Stochastic Centro-Symmetric matrix, that one can proceed this idea to further algebraic properties.

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THE IMPACT OF INFORMATION TECHNOLOGY ON SOCIETY

Dr. Eram Khan
Assistant Professor, Poona College of Arts, Science & Commerce

ABSTRACT:
The advent of information technology (IT) has ushered in a transformative era for society, fundamentally reshaping communication, access to information, and economic structures. IT has revolutionized how individuals interact and exchange information, provided unprecedented access to knowledge through digital platforms, and significantly altered business operations and productivity. In healthcare and education, IT innovations have enhanced patient care, expanded learning opportunities, and streamlined administrative processes.However, the rapid advancement of IT has also introduced several challenges. Privacy and security concerns have escalated as data breaches and cyberattacks become more prevalent. The digital divide remains a critical issue, highlighting disparities in technology access and opportunities.Balancing innovation with ethical considerations and promoting equitable access will be essential for leveraging IT's transformative potential while managing its associated risks.

INTRODUCTION

Definition of Information Technology
Information Technology (IT) refers to the use of computers, software, networks, and other electronic systems to manage, process, and distribute information. IT encompasses a wide range of technologies and practices that facilitate the collection, storage, retrieval, and communication of data. It includes:

- **Hardware**: Physical devices such as computers, servers, and networking equipment.

- **Software**: Programs and applications that perform tasks, from operating systems to business applications and database management systems.

- **Networks**: Systems that connect hardware and enable communication between devices, including local area networks (LANs), wide area networks (WANs), and the internet.

- **Data Management**: Processes and tools for organizing, storing, and analyzing data to support decision-making and operational efficiency.

- **Cybersecurity**: Measures and technologies designed to protect data and systems from unauthorized access, attacks, and breaches.

- **Support and Services**: IT servi

Importance of IT in Modern Society

Information Technology (IT) is integral to modern society, profoundly influencing various aspects of daily life and organizational operations. Its importance can be highlighted in several key areas:

Enhanced Communication: IT has revolutionized communication through digital platforms such as email, social media, and instant messaging. These technologies facilitate real-time interactions, connect individuals globally, and support collaboration in both personal and professional contexts.

Economic Growth: IT drives economic development by fostering innovation, automating processes, and enhancing productivity. E-commerce platforms, digital marketing, and data analytics have transformed business operations, enabling companies to reach global markets and optimize their performance.

Healthcare Advancements: IT has improved healthcare through electronic health records, telemedicine, and health informatics. These advancements enhance patient care, streamline administrative processes, and support medical research and diagnostics.

Educational Opportunities: IT has expanded educational access and flexibility through online learning platforms, digital classrooms, and educational software. These tools provide diverse learning opportunities, making education more accessible to a broader audience.

Efficiency and Productivity: IT tools and systems improve efficiency and productivity in various sectors. Automation of routine tasks, advanced data analytics, and collaborative technologies streamline workflows and enhance organizational performance.

Innovation and Development: IT drives technological innovation and development. Emerging technologies such as artificial intelligence, blockchain, and quantum computing are reshaping industries, creating new opportunities, and addressing complex challenges.

Social Connectivity: Social media platforms and online communities foster social connectivity and engagement. They enable individuals to share experiences, collaborate on projects, and build networks, enhancing social interactions and community building.

Purpose of the Paper

The paper aims to offer insights into how IT continues to shape modern society, the challenges that need to be addressed, and the future opportunities and directions for technological development. It seeks to contribute to a deeper understanding of IT's role and its implications for individuals, organizations, and society as a whole.

Positive Impacts

Enhanced Communication and Connectivity:

Global Reach: IT has enabled instant communication across the globe through email, social media, and video conferencing, fostering international collaboration and personal connections.

Social Networks: Platforms like Facebook, Twitter, and LinkedIn help people maintain relationships, share experiences, and build professional networks.

Access to Information and Education:

Educational Resources: Online courses, e-books, and educational videos make learning more accessible and flexible, providing opportunities for lifelong education.

Knowledge Sharing: The internet offers a vast repository of information on virtually any subject, facilitating research and self-learning.

Economic Growth and Innovation:

Business Efficiency: IT improves business operations through automation, data analytics, and digital marketing, leading to increased productivity and new market opportunities.

Startup Ecosystem: The IT sector fosters innovation and entrepreneurship, leading to the creation of new products, services, and companies.

Healthcare Advancements:

Improved Patient Care: Electronic health records, telemedicine, and health apps enhance patient care and management, making healthcare services more efficient and accessible.

Medical Research: IT supports complex medical research, leading to advancements in treatments, diagnostics, and personalized medicine.

Increased Productivity:

Automation of Tasks: IT automates repetitive tasks, allowing workers to focus on more complex and creative activities, thus enhancing overall productivity.

Collaborative Tools: Technologies like cloud computing and project management software facilitate teamwork and streamline workflows.

Negative Impacts

Privacy and Security Concerns:

Data Breaches: The collection and storage of personal information increase the risk of data breaches and cyberattacks, potentially leading to identity theft and financial loss.

Surveillance: The use of surveillance technologies can infringe on personal privacy and civil liberties, raising ethical and legal concerns.

Digital Divide:

Inequality: Disparities in access to technology create a digital divide, affecting disadvantaged communities and limiting their opportunities for education, employment, and social participation.

Skill Gaps: Unequal access to IT resources can exacerbate skill gaps and hinder career advancement for individuals in under-resourced areas.

Job Displacement:

Automation: The automation of tasks through IT can lead to job losses and require workers to adapt to new skill requirements, impacting certain industries and employment sectors.

Economic Disruption: Rapid technological changes can disrupt traditional industries and business models, leading to economic uncertainty and instability.

Information Overload:

Cognitive Overload: The sheer volume of information available online can overwhelm individuals, making it challenging to process and discern relevant information.

Misinformation: The ease of spreading false information and fake news online can mislead the public and impact decision-making and societal trust.

Ethical and Social Issues:

Algorithmic Bias: AI and machine learning systems can perpetuate biases and inequalities if not designed and monitored properly, affecting fairness and inclusivity.

Digital Addiction: Excessive use of digital devices and social media can lead to addiction, impacting mental health, social relationships, and overall well-being.

CONCLUSION

The impact of Information Technology (IT) on society is both profound and multifaceted, driving transformative changes across various domains while also presenting notable challenges.

Positive Transformations: IT has revolutionized communication, making it faster and more global, and has democratized access to information, enabling widespread education and knowledge sharing. It has catalyzed economic growth through innovation and efficiency, enhanced healthcare through advanced technologies, and improved the overall quality of life by increasing convenience and accessibility.

Challenges and Concerns: However, the rapid advancement of IT also brings significant challenges. Privacy and security concerns are paramount, with the risks of data breaches and surveillance impacting individuals and organizations. The digital divide highlights inequalities in technology access, potentially exacerbating social and economic disparities. Job displacement due to automation and the potential for information overload pose further issues, while ethical and environmental concerns underscore the need for responsible technology use and development.

Future Directions: Looking ahead, the future of IT promises continued innovation with advancements in AI, quantum computing, and 5G technologies. Addressing the negative impacts requires a balanced approach, focusing on improving security, bridging the digital divide, and managing environmental effects. Proactive measures in regulation, policy development, and ethical considerations will be essential to harness the full potential of IT while mitigating its risks.

In conclusion, while IT holds immense potential for driving progress and improving various aspects of society, it is crucial to navigate its complexities thoughtfully. By addressing the challenges and embracing responsible practices, society can maximize the benefits of IT and ensure that its advancements contribute positively to the global community.

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BRIDGING DISCIPLINES: HOW A MULTIDISCIPLINARY APPROACH ENHANCES INNOVATION IN RESEARCH

Dr. Seema S. Ghosh

HOD, History Department, Siddharth College of Arts, Science and Commerce

This article provides a comprehensive examination of how a multidisciplinary approach enhances innovation in research. Multidisciplinarity refers to the integration of multiple academic disciplines to address complex issues that cannot be fully understood or resolved within the confines of a single field. This approach is increasingly critical in contemporary research due to the multifaceted nature of modern problems. For example, tackling climate change requires knowledge from environmental science, economics, political science, and engineering.

Key Characteristics of Multidisciplinary Research

Diverse Perspectives: Integrates various viewpoints and methodologies from different fields. For example Singapore has become a "smart nation" by strategically involving professionals from technology, urban planning, data analytics and policy to work together at the right time on the right tasks.

Collaborative Efforts: Involves teamwork among experts with different specializations.

Holistic Solutions: Aims to provide comprehensive solutions by addressing problems from multiple angles.

Historical Context: Historically, academic disciplines were developed in isolation. This isolated approach worked well for more straightforward problems but became limiting as issues grew in complexity. The rise of interdisciplinary research in the 20th century marked a shift towards more integrative approaches. For instance, the development of space exploration technology required advances in physics, engineering, and computer science, highlighting the necessity for cross-disciplinary collaboration.

Interdisciplinary Collaboration

Interdisciplinary collaboration involves blending expertise from different fields to address complex issues. This framework is based on several key theories:

Collective Intelligence: This theory suggests that groups with diverse skills and knowledge can solve problems more effectively than individuals. The synergy of multiple disciplines often leads to innovative solutions.

Boundary Spanning: Refers to the act of bridging different disciplines to integrate various forms of knowledge. Researchers who engage in boundary spanning are often more successful in creating novel solutions.

Innovation Theories: Several theories illuminate how multidisciplinary approaches drive innovation:

While the Open Innovation theory of Chesbrough (2003) emphasizes the importance of external ideas and technologies in the innovation process, multidisciplinary teams often incorporate external expertise, leading to more innovative outcomes.

The Disruptive Innovation theory of Christensen (1997) focuses on how innovations that start in niche markets can eventually disrupt established industries. Multidisciplinary research can create such disruptive innovations by combining disparate technologies and ideas.

Benefits of a Multidisciplinary Approach

Enhanced Problem-Solving Capabilities: Combining expertise from various disciplines can lead to more effective problem-solving. For example, addressing global health issues such as pandemics requires insights from epidemiology, public health, economics, and sociology. By integrating these perspectives, researchers can develop more comprehensive strategies for disease prevention and control. The COVID-19 pandemic highlighted the importance of multidisciplinary approaches. Effective responses required collaboration between virologists, public health officials, economists, and policymakers. This integration led to the rapid development of vaccines, implementation of public health measures, and strategies for economic recovery.

Increased Creativity and Innovation: Exposure to diverse disciplines fosters creativity by providing new perspectives and approaches. Research by Scott Page (2007) demonstrated that diverse groups outperform homogeneous ones in problem-solving tasks. This principle applies to research, where multidisciplinary teams can generate innovative solutions by combining different methodologies and viewpoints. The development of Artificial Intelligence (AI) showcases the role of creativity in multidisciplinary research. AI research combines computer science, cognitive psychology, neuroscience, and linguistics to create technologies that mimic human intelligence. This integration has led to advancements in machine learning, natural language processing, and robotics.

Improved Research Outcomes: Multidisciplinary research often leads to more practical and impactful outcomes. For example, the development of wearable health technologies requires expertise in engineering, data science, and health sciences. By integrating these disciplines, researchers create devices that monitor health metrics, provide real-time feedback, and improve patient outcomes. Smartwatches and Health Monitoring Smartwatches exemplify how multidisciplinary collaboration leads to innovative products. Engineers design the hardware, data scientists develop algorithms to analyze health data, and healthcare professionals ensure that the technology meets medical standards. This integration results in devices that offer valuable health insights and contribute to preventive care.

Healthcare and Biomedical Research has resulted in a lot of innovations which are invaluable for man. The Human Genome Project (HGP) is a landmark example of multidisciplinary collaboration. Initiated in 1990, the HGP involved geneticists, bioinformaticians, statisticians, and researchers from various fields. The project aimed to map the entire human genome, and its success was due to the integration of diverse expertise. The key achievements were:

Genome Mapping: The project completed the sequencing of the human genome, providing a comprehensive blueprint of human genetic material.

Biomedical Advancements: The HGP led to new insights into genetic diseases, personalized medicine, and genomic research.

The problem of handling and analyzing vast amounts of genetic data required collaboration between biologists and computational scientists. Addressing ethical issues related to genetic information involved input from ethicists and legal experts.

Another area which has benefited is that of personalized medicine which uses genetic information to tailor treatments to individual patients. This approach integrates genomics, pharmacology, and data analytics. By analyzing patients' genetic profiles, researchers can predict drug responses and minimize adverse effects. The key developments were the study of Pharmacogenomics which involved studying how genetic variations affect drug metabolism and efficacy. It also resulted in treatments that specifically target genetic mutations associated with

diseases. Personalized medicine has led to targeted therapies for cancer, such as HER2-targeted treatments for breast cancer, improving patient outcomes.

The coming together of Environmental Science and Engineering has helped in Sustainable Urban Development. Sustainable urban development integrates urban planning, environmental science, and engineering to create eco-friendly cities. This approach addresses issues such as energy efficiency, waste management, and green spaces. It has also led to the Green Building Design where architects and engineers work together to design energy-efficient buildings using sustainable materials. Another outcome of such collaboration is the concept of Urban Green Spaces: Environmental scientists and urban planners collaborate to incorporate parks and green areas into city designs.

Renewable energy technologies, such as wind and solar power, require collaboration between physics, engineering, environmental science, and economics. This integration leads to advancements in energy efficiency and sustainability. In the case of Wind Turbines: Engineers design and optimize turbine technology, while environmental scientists assess the impact on ecosystems. While researchers work on improving the efficiency of photovoltaic cells in solar panels, economists evaluate the cost-effectiveness of solar energy. Large-scale solar farms integrate technological innovations with environmental and economic considerations to provide sustainable energy solutions.

The integration of technology and social sciences has resulted in Human-computer interaction (HCI) research which blends computer science, psychology, and design to create user-friendly technology. This multidisciplinary approach is crucial for developing interfaces that are intuitive and effective. User Experience (UX) Design: combines design principles with psychological insights to improve user interactions with technology. Usability Testing: Involves testing technology with users to identify and address usability issues. Smartphones are examples of such successful applications: The design of smartphone interfaces incorporates insights from HCI research to create user-friendly devices that are widely adopted.

Cyber-security research integrates computer science, behavioral science, and law to address complex security threats. This multidisciplinary approach is essential for developing effective strategies to protect digital information. The main components include Behavioral Analysis user behavior is analyzed in terms of identification of potential security risks. Legal frameworks have been developed to address cybercrime and protect privacy. Development of advanced security protocols, such as multi-factor authentication, involves collaboration between computer scientists and legal experts.

Challenges in Multidisciplinary Research

Communication Barriers: Effective communication is crucial in multidisciplinary research, as different fields often use distinct terminologies and methodologies. Misunderstandings can hinder collaboration and progress. Certain strategies need to be developed in order to overcome communication barriers: It is also important to develop a common terminology and establish a shared vocabulary to facilitate understanding between disciplines. Securing funding for multidisciplinary projects can be challenging due to the diverse nature of the research. Traditional funding models often prioritize single-discipline projects.

Certain strategies need to be in place for improve funding including the creation of funding programmes that specifically support multidisciplinary research. At the same time, cross-disciplinary grants will definitely lead to collaboration between different fields. Certain strategies need to be in place for effective multidisciplinary research. Building collaborative networks is also important because researchers from different disciplines can enhance collaboration and knowledge exchange. Institutions can support these networks through various

initiatives which will help build strategies to build collaborative networks. An increasing number of interdisciplinary conferences need to be organised to bring together researchers from various fields to share ideas and collaborate. Research platforms need to be developed for facilitate networking and collaboration among multidisciplinary researchers.

A multidisciplinary approach significantly enhances innovation by integrating diverse perspectives and expertise. The benefits of improved problem-solving, creativity, and research outcomes underscore the value of such approaches. While challenges exist, the potential for ground-breaking discoveries and solutions makes a compelling case for embracing multidisciplinary research.

As research problems become increasingly complex, the need for multidisciplinary approaches will continue to grow. By fostering collaboration and integrating knowledge from various fields, researchers can advance understanding and address global challenges more effectively.

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ABOUT THE EDITOR

Dr. (Mrs.) Pratima Singh is the Principal of Chandrabhan Sharma College of Arts, Science & Commerce affiliated to University of Mumbai. She has 20 years of academic and 6 years of corporate and consultancy experience. She is a Doctorate in commerce and has been associated with teaching of Banking, Auditing and Direct taxation at undergraduate and post graduate level. She has been recognized as post graduate teacher by University of Mumbai. Her research work includes Minor research projects submitted to University of Mumbai She has presented many papers at National and International Conferences. She has published research papers in various national and international journals of repute.

She is member of the Board of Studies of the University of Mumbai in the subject of Financial Markets. She is been part of Syllabus revision committee of university of Mumbai for post graduate level. She has to her credit books authored on Direct taxation and Accountancy & Financial Management for undergraduate level. She is also a member of Indian Commerce Association.

ABOUT THE BOOK

Multidisciplinary research is essential for addressing most of the issues arising in today's world. In recent years, the nature of research problems has become multi-dimensional involving knowledge of numerous disciplines and subjects. This Book explores new advances in multidisciplinary research in Various Fields. It talks about the Impact of climate change to sea ice ecosystem, Impact of waste plastic material on the Environment. It also talks about the New Educational Policy 2020 and also about Inclusion and Equality in it. It further tries to make us realize the need and importance of Leadership among the Hotel management Students and how to enhance the Graduates in Hotel Management. This edited book also looks into various aspects such as ICT, Self Help Groups, IOT, Knowledge Acquisition etc.

The content of this book will be of interest to a broad spectrum of scientists, academicians, and research students working in interdisciplinary fields. The collection of chapters in the volume is intended to foster interest and participation of researchers in multidisciplinary research and to stimulate new research.

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