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### CONTENTS

#### *Research Papers*

<b>CRITICAL EVALUATION OF TRADITIONAL AND ONLINE THEORIES OF CONSUMER BEHAVIOR: REVIEW AND SETTING STAGE FOR FUTURE RESEARCH</b>	1 – 13
Dr Ritu Sharma and Anuradha Yadav	
<b>THE CRUCIAL MOTIVATIONAL FACTORS OF TEACHERS' ORGANIZATIONAL COMMITMENT AND JOB SATISFACTION</b>	14 – 17
Cheki Gyeltshen and Dr. Nimisha Beri	
<b>BIOMETHANATION POTENTIAL OF FLOATING VEGETATIVE MAT IN LOKTAK LAKE OF MANIPUR, INDIA</b>	18 – 26
R S Khoiyangbam and Lakshmi Thoudam	
<b>FOOD AND DIET: A STUDY ON TWO MODEL JAILS OF PUNJAB</b>	27 – 34
Dr. Tejpal Singh Gill	
<b>DR. B. R. AMBEDKAR AND HIS PERSPECTIVES ON EDUCATION</b>	35 – 41
C. Anjaneyulu	
<b>A SNAP SHOT ABOUT MUDRA (MICRO UNITS DEVELOPMENT REFINANCE AGENCY) - ANOTHER FACE OF INCLUSION IN KERALA</b>	42 – 45
Benny C	
<b>SOFTWARE RELIABILITY GROWTH MODEL BASED ON EXPONENTIAL ORDER STATISTICS DISTRIBUTION</b>	46 – 50
V. S. Akilandeswari, V.Saavithri	
<b>EMPRICIAL STUDY ON IBM SECURITY GUARDIUM BIGDATA IN GENERAL DATA PROTECTION REGULATION</b>	51 – 54
Dr. T. Logeswari	
<b>IMPACT OF FOOD SUPPLEMENT ON THE NUTRITIONAL STATUS OF TUBERCULOSIS PATIENTS</b>	55 – 59
Dr. B. Babitha and G. Siva Teja	
<b>EXOGENOUSLY - APPLIED TRIACONTANOL PROMOTES GROWTH, PHYSIOLOGICAL ACTIVITIES AND YIELD CHARACTERISTICS OF <i>CORIANDRUM SATIVUM</i> L.</b>	60 – 63
Akil A. Khan	
<b>CHEMICAL TREATMENT OF DAIRY EFFLUENTS USING FERRIC SULFATE AND ALUM AS COAGULANT : AN ANALYSIS</b>	64 - 68
Dr. Yogesh. M. Dabhi	
<b>A REVIEW OF LEADERSHIP STYLES &amp; THEIR EFFICIENCY FOR SERVICE SECTOR</b>	69 - 73
Stuti Pandit and Kuldeep Kumar	

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**CRITICAL EVALUATION OF TRADITIONAL AND ONLINE THEORIES OF CONSUMER BEHAVIOR: REVIEW AND SETTING STAGE FOR FUTURE RESEARCH**

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**ABSTRACT**

*While a large number of consumers in the India are shopping through Internet, research on what drives consumers to shop online and why the traditional way of shopping is fading, has been fragmented. This paper therefore proposes a framework to critically evaluate online theories of consumer behavior and traditional theories of consumer behavior. The framework uses the construct of consumer behavior Models in Marketing as a basis and extended by the exogenous factors like (Behavioral factors, Socio-cultural Factors, Perceived behavior factors, Technological Factors etc.) and applies it to the online and Traditional shopping context. The review shows that attitudes toward online shopping and intention to shop online are not only affected by ease of use, usefulness, and enjoyment, but also by exogenous factors like consumer traits, situational factors, product characteristics, previous online shopping experiences, and trust in online shopping.*

*Keywords: Consumer Behavior, Online shopping, Traditional shopping, Online Factors*

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**INTRODUCTION**

Human behavior encompasses every thought, feeling or action by people. This implies that every thought, motive, sensation and decision that is made every day, is classified as human behavior. **Belch & Belch (1990: 91)** provide a link between human behavior and consumer behavior, by stating that consumer behavior has been defined as the study of human behavior in a consumer role.

Consumer behavior, according to **Walters (1974: 6)**, represents specific types of human actions, namely those concerned with the purchase of products and services from marketing organizations.

**Schiffman (2007)** described Consumer Behavior as “the behavior that consumers display in searching for, purchasing, using, evaluating, and disposing of products and services that they expect will satisfy their needs.”

**Solomon et al, (2006)** “Consumer behavior is the study of the process involved when individuals or groups select, purchase, use or dispose of products, services, ideas or experiences to satisfy needs and desires. ”

**Kotler (1994)** described “Consumer behavior is the study of how people buy, what they buy, when they buy and why they buy.”

In today’s world, consumers’ product and service preferences are constantly changing. Marketing managers must understand these desires in order to create a proper marketing mix for a well-defined market. So it is critical that marketing managers have updated knowledge of consumer behavior. Due to development of technology, internet has increased the popularity of online shopping (**Lian & Lin, 2008**). Indeed, a substantial growth and steady increase in online sales has stimulated great interest in understanding buyer behavior in the digital marketplace (Hassan, 2010). **Cheung, Chan and Limayem (2005)** reported that online buyer behavior had become an emerging area of research with an increasing number of publications every year.

**THEORETICAL APPROACH TO THE STUDY OF CONSUMER BEHAVIOR**

Consumer behavior describes how consumers make purchase decisions and how they use and dispose of the purchased goods or services. The study of consumer behavior also includes factors that influence purchase decisions and product use.

There is process that consumers follow when they decide to purchase new or expensive goods. This traditionally is a 5-stage process called the consumer decision-making process. The 5 stages are: need recognition, information search, and evaluation of alternatives, purchase, and post purchase behavior.

The consumer will spend a lot of time researching a high number of potential options before they buy or purchase something. A buyer will speak with trusted friends, family, colleagues, and read reviews and ratings online and in consumer magazines. This decision making process will last longer because the consumer is spending a large amount of money.

A number of different approaches have been adopted in the study of decision making, drawing on differing traditions of psychology. In this paper theories are categorized under five distinguished groups. Each of these five groups posits alternate, and emphasizes the need to examine quite different variables. These main groupings are

1. Theories based on Behavior & Behavioral Factors
2. Theories based on Socio-Cultural Factors
3. Theories based on Perceived Behavior (i.e. Perceived Benefit, Perceived Risk)
4. Theories based on Technological Factors
5. Theories based on Neural Factors

### THEORIES BASED ON BEHAVIOR AND BEHAVIORAL FACTORS

There two main types of shopping stores in the market are the traditional brick & mortar store or physical store where sellers and shoppers interact face to face and the other is online shop or logical store or Internet shop, where sellers and shoppers do not have face to face contact, rather they use the new technology, via the Internet as their communications, sales and marketing channels for buying and selling products.

As the focus of this study is on consumer behavior model towards the online shopping, the flow of literature review will start with analysis of traditional theories of consumer behavior towards online consumer behavior.

**Lian & Lin, (2008)** studied Development of the Internet has increased the popularity of online shopping. Indeed,

**Hassan, (2010)** a substantial growth and steady increase in online sales has stimulated great interest in understanding buyer behavior in the digital marketplace

**(Hansen, Jensen, & Solgaard, 2004; Hsu, Yen, Chiu, & Chang, 2006; Lim & Ting, 2013b)** examined closely the literature in this field reveals that most studies have applied traditional theories of buyer behavior while studying online buying. But traditional theories cannot be applied without modification, as the Internet's distinct characteristics as a purchasing medium have to be taken into account.

### REVIEW OF TRADITIONAL MODELS OF CONSUMER BEHAVIOR

**Runyon & Stewart (1987: 695)**, discussed Traditional models of consumer behavior, it is important to note that the models proposed are viewed as being an incomplete description of consumers, where different models may be appropriate for different marketing situations. Despite the above view, models of consumer behavior provide valuable input to consumer behavior, since they attempt to provide insights into why human beings, and therefore consumers, rationalize purchase decisions.

To provide a clearer understanding of consumer behavior, four traditional models are discussed together. The models of consumer behavior discussed below are the Marshallian economic model, the Pavlovian learning model, the Sociological model and the Veblenian social-psychological model.

#### THE MARSHALLIAN ECONOMIC MODEL

According to the Marshallian economic model, Consumers follow the principle of maximum utility based on the law of diminishing marginal utility. The consumer wants to spend the minimum amount for maximizing his gains. Economic man model is based on:

*Price effect:* Lesser the price of the product more will be the quantity purchased.

*Substitution effect:* Lesser the price of the substitute product, lesser will be the utility of the original product bought.

*Income effect:* When more income is earned, or more money is available, more will be the quantity purchased. This model, according to behavioral scientists, is not complete as it assumes the homogeneity of the market, similarity of buyer behavior and concentrates only on the product or price. It ignores all the other aspects such as perception, motivation, learning, attitudes, personality and socio-cultural factors. It is important to have a multi disciplinary approach, as human beings are complex entities and are influenced by external and internal factors. Thus, price is not the only factor influencing decision-making and the economic model according to scientists has shortcomings.

#### THE VEBLENIAN SOCIAL-PSYCHOLOGICAL MODEL

The Veblenian social-psychological model of human behavior is based on the findings of Thorstein Veblen, who received his training as an orthodox economist and evolved as a social thinker through the influence of the science of social anthropology.

According to this model, man is perceived to be a so-called "social animal", where man conforms to norms of its larger culture and to more specific standards of subcultures and face-to-face groups in which humans operate



(Kotler, inGould; 1979: 41). In essence this implies that human behavior and needs are molded by present group memberships.

Based on the theory of the model, Veblen hypothesized that, for the so-called leisure class, a great portion of economic consumption is influenced and motivated by prestige seeking and not on needs or satisfaction. Veblen placed specific emphasis on emulative factors that would influence people when purchasing conspicuous products, for example cars and houses or even less expensive items, such as clothes.

The model is criticized, as it is perceived by more modern perspectives to be overstated. For example, not all people consider the leisure class to be a frame of reference and many people aspire to the social class immediately above their current social class. In addition to the above, more affluent people of the society would rather under spend than overspend on conspicuous items since they would rather "fit in" than "stand out".

### THE PAVLOVIAN LEARNING MODEL

The well-known Pavlovian theory of learning has its origin in the experiments of the Russian psychologist, Pavlov, who conducted his experiments by ringing bell each time before feeding a dog. Pavlov soon discovered that he could induce the dog to salivate by ringing the bell regardless of whether or not food was offered to the dog. From this experiment, Pavlov could conclude that learning occurred due to a process of association and that a large component of human behavior was conditioned in this way.

Experimental psychologists, focusing on rats and other animals and eventually human beings, continued Pavlov's mode of research. The objective of laboratory experiments was to explore phenomena such as learning, forgetting and the ability to discriminate. The result of the research led to a stimulus-response model of human behavior, based on four central concepts, namely drive, cue, response and reinforcement.

**The four central concepts of the Pavlovian theory are briefly discussed below.**

**a) Drive:** In the Pavlovian learning model, drive, also referred to as "needs "or "motives", implies strong stimuli internal to the individual, which activate action. Psychologists distinguish two types of drives, namely primary physiological and learned drives. Primary physiological drives refer to basic individual factors, such as hunger, thirst, pain, cold and sex. Learned drives, which are derived socially, include factors such as Cooperation, fear and acquisitiveness.

**b) Cue:** According to the model, a drive is very general and a particular response is impelled only in relation to a particular configuration of cues. Cues are furthermore perceived as weaker stimuli in the individual and the environment and will determine where, when, and how a subject responds. As an example, an advertisement for coffee may act as a cue, which stimulates the thirst drive. The response will be influenced by this cue as well as other cues, for example time of day and availability of other thirst-quenchers.

**c) Response:** Response implies the reaction to the configuration of the cues. It should, however, be noted that the exact configuration of cues will not necessarily generate the same response. The same response depends on the degree to which the experience was rewarding.

**d) Reinforcement:** A rewarding experience will result in the reinforcement of a particular response. It is therefore implied that the tendency is formed where the same response will be repeated when the same configuration of cues appears. If, however, a learned response or habit is not reinforced, the habit may eventually be extinguished, since the strength of the habit decreases.

Important to note is that, in contrast to extinction, forgetting occurs when learned associations weaken due to non-use and not because of the lack of reinforcement Sociological Model of Consumer Behavior

### SOCIOLOGICAL MODEL OF CONSUMER BEHAVIOR

This theory is concerned with the society. A consumer is a part of the society and he may be a member of many groups in a society. These groups influence his buying behavior. Primary groups of family friends and close associates exert a lot of influence on his buying. A consumer may be a member of a political party where his dress norms are different. As a member of an elite organization, his dress requirements may be different, thus he has to buy things that conform to his lifestyles in different groups.

**Foxall, G.R. and Oliveira-Castro, J.M. and James, V.K. and Schrezenmaier, T.C. (2011)** found that in the supermarkets there is little interaction between staff and customers so relationship with customer is much weaker than expected. The previous theories studied cognitive behavior of consumers. This model is taking alternative approach to consumer behavior that influences the situational variables and behavioral psychology of consumers. In behavior theory author took reinforcement and punishment theory for responses of consumers in a particular situation.

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**REVIEW OF CONTEMPORARY MODEL OF CONSUMER BEHAVIOR**

The shortcomings of models of Traditional Models led to more complex models of consumer behavior appearing in the early 1960s. According to Runyon & Stewart (1987: 698), models of consumer behavior, in contrast to models of human behavior, attempted to describe and systemize the entire purchasing process, thereby providing a guide for further study and research on the subject of consumer behavior. This section will focus on the definition of models of consumer behavior; the purpose and advantages thereof and finally, discuss a number of models of consumer behavior together with the importance thereof in understanding consumer behavior.

**THE NICOSIA MODEL**

The Nicosia Model (1966) described Model consists of four 'fields', beginning with the communication of information to affect the consumer's attitude followed by a search and evaluation process, a decision, and outcomes in terms of behavior, consumption, storage, experience and feedback.

According to **Runyon & Stewart (1987: 699)**, the Nicosia model provides sophisticated attempt to show the interrelationship between attributes of the consumer, the consumer decision-making process, the marketing communication of an organization and feedback of the response of the consumer to the organization.

**Schiffman & Kanuk (1987: 653)** provide a simplistic explanation of the model by stating that it is interactive in design, where the organization attempts to influence consumers through marketing actions and the consumers in return influence the organization through their purchase actions (or lack of action if products are not purchased).

Limitations of the Nicosia model according to Runyon & Stewart (1987: 701) are the questionable assumptions that the consumer has no prior knowledge or experience of the product, as well as inadequate understanding of subfield two, the influences and interrelationships among the consumer attributes.

A final limiting factor is that, for repetitive decisions (considered a significant part of consumer purchases); the operation of the model is ambiguous.

**Engel, Blackwell & Kollat (1978: 548)** criticize the Nicosia model by claiming that the model never received the necessary elaboration and empirical support nor has it been revised to reflect changes.

**THE HOWARD MODEL (1994)**

The Howard model has been revised a number of times from the early 1970s to the current version published in 1994. It should be noted that the original model.

According to Engel et al. (1978: 553), was based on revisions from the Howard-Sheth model. The model indicates the revisions that reflect insights gained from testing the Howard-Sheth model, as well as contributions of other authors who often approached consumer behavior from different theoretical perspectives.

Howard model portrays the consumer decision process, comprising six interrelated concepts, namely Information (F), Brand recognition (B), Attitude (A), Confidence (C), Intention (I) and Purchase (P). The six interrelated concepts will be briefly discussed to provide greater clarity on the Howard model.

Although price and availability are considered important influencing factors of the purchase process, these variables change often and Information (F) can therefore bypass the thinking process by directly influencing Intention (I).

**THE ENGEL, BLACKWELL, MINIARD MODEL**

The Engel, Blackwell. Miniard model has its origin in decades of work on the subject of consumer behavior by Engel, Kollat, Blackwell, and Miniard. These authors were responsible for the evolution of the model from 1968 to its present form, namely the eighth edition of their book on the subject of consumer behavior.

According to the EBM model, the consumer decision-making process is influenced and shaped by a number of factors and determinants, categorized in three broad categories, namely individual differences, environmental influences and psychological processes. The three categories will be discussed below, based on the discussion provided by Engel et al. (1995: 147-154), together with the components associated with each category, in an attempt to explain the consumer behavior and decision processes suggested by the EBM model.

Differences noted between the 1986 version of the EBM model and the 1995 version, include the variables influencing the decision process being reduced from three in the 1986 version (individual characteristics, social influences, and situational influences) to two in the 1995 version (environmental influences including the situation, previously shown separately -, and individual differences).

## THEORIES BASED ON SOCIO-CULTURAL FACTORS

**Tyler Grim (2016)** explained differences between traditional stores and online shopping behavior of consumers. They explain how fuel prices, Traffic and Parking area for any retail stores can be a disadvantage factors for traditional shopping behavior of customers. In online shopping except of these entire of consumer can get a variety of product with cash on delivery and after sale services option. So growing numbers of Internet users make consumers happy while doing online shopping because they are saving their time both side in doing shopping as well as doing payment.

**Gefen, (2000)** Reputation is closely related to familiarity with the store, which researchers have also identified as an antecedent of trust. Familiarity deals with an understanding of current actions of the store, while trust deals with beliefs about the future actions of other people.

**Ajzen, 1991; Fishbein & Ajzen, (1975)** explained that traditional theories of buyer behavior (e.g. theories of reasoned action and planned behavior) suggest that a person's behavior is determined by his or her intention to act in a certain manner, and that intention, in turn, is determined by how his or her attitude is shaped (based on perceptual beliefs) for the behavior.

**(Kotler, 1968; Hellier, Geursen, Carr, & Rickard, 2003)** The outcome of an action is said to equip people with experience that influences the likelihood of the action being repeated in future. In addition,

**(Chiou & Droge, 2006; Doney & Cannon, 1997)** the experience gained has also been seen to influence the creation of trust, which can also affect the prospect of the behavior being repeated.

**(Dennis, Merrilees, Jayawardhena, & Wright, 2009)** The conceptual links between attitude, intention, actual behavior, experience, and trust are supported by a number of prominent marketing and consumer behavior scholars.

**Davis, Bagozzi and Warshaw's (1989)** studied that TAM (Technology Acceptance Model) does not include social norms (SN) as a determinant of behavior intention (BI), which is an important determinant, theorized by Theory of Reasoned Action TRA and Theory of Planned Behavior (TPB).

**Mathieson (1991) and Yi, Jackson, Park, and Probst (2006)** argued that human and social factors could play a role in the adoption of technology using TPB model. Therefore, the TAM could be extended with constructs from the TPB to incorporate the social factors that could explain technology adoption.

**Chau and Hu (2002)** noted that TPB social norm and behavior intention to use finding was negative and did not support that social norm would influence behavior intention.

**Venkatesh and Davis (2000)** that subjective norm was likely to have a significant influence on behavioral intention to use in a mandatory environment, whilst the effect could be insignificant in a voluntary environment. Since, this study is voluntary;

**Davis, Bagozzi and Warshaw (1989)** explained that social norms scales had a very poor psychometric standpoint, and might not exert any influence on consumers' behavior intention, especially when the information system application like single platform E-payment System was fairly personal while individual usage was voluntary.

## THEORIES BASED ON TECHNOLOGICAL FACTORS

### Technological Acceptance Model

**Davis (1989)** used TAM to explain computer usage behavior. The goal of Davis' (1989) TAM is to explain the general determinants of computer acceptance that lead to explaining users' behavior across a broad range of end-user computing technologies and user populations. The basic TAM model included and tested two specific beliefs: Perceived Usefulness (PU) and Perceived Ease of Use (PEU). Perceived Usefulness is defined as the potential user's subjective likelihood that the use of a certain system (e.g.: single platform E-payment System) will improve his/her action and Perceived Ease of Use refers to the degree to which the potential user expects the target system to be effortless (Davis, 1989). The belief of the person towards a system may be influenced by other factors referred to as external variables in TAM.

**Justin Paul (2017)** studied about The entry of multinational firms is likely to increase competition and provide better deals to consumers in emerging markets such as India, China and Brazil. He examined the factors determining the consumers' preferences for shopping at large malls in an emerging market as compared to small outlets (in particular, young consumers' preferences). In his result he found that mostly young consumers prefer to shop in large malls because of the availability of the latest, well-known brands and discounted prices, which implies that service quality is not a primary factor.

**Chung-Hoon Park, Young-Gul-Kim (2003)** developed and empirically validated a model of consumers' relational purchasing behavior in an online shopping context. The key affecting factors of user interface quality, product and service information quality, security perception and site awareness were found to have significant effects on consumer's site commitment. Furthermore, authors investigated whether information satisfaction and relational benefit play a significant mediating role on consumers' relationship purchasing behavior. In an online shopping context, the information feature of a shopping site was validated to be an important factor determining consumers' site loyalty and decision-making in terms of whether or not they will shop at the store. This emphasizes the importance of product information quality and user interface design in the online shopping site development. Other attributes of an online store were also found to influence a consumer's perceived relational benefits from online shopping. Service information quality was found to be the most important factor among them.

**Dan J. Kim, Donald L. Ferrin, H. RaghavRao, (2007)** provides several contributions. First, in order to uncover the role of trust, risk and their antecedents in B-to-C Internet commerce, this study develops a holistic trust-based consumer decision model to describe the decision-making process that a consumer uses when making a purchase from a given site. In this study author described that a consumer's trust directly and indirectly affects his or her purchasing intention. A consumer's trust has a strong positive effect on the purchasing intention as well as a strong negative effect on a consumer's perceived risk.

**RaffaeleFilieri a, Zhibin Lin,(2017)** explained that that young Chinese customer's Smartphone repurchase intention is mainly determined by mianzi, perceived quality, brand popularity, and design appeal. Furthermore, findings also highlight that subjective norm, perceived quality and design appeal affect Chinese people's mianzi. Display Omitted This study investigates young Chinese consumers' repurchase intention of Smartphone. The study developed a new framework including aesthetic, functional, branding, socio-cultural influences. Subjective norm, perceived quality and design appeal influence young Chinese consumers' mianzi. Mianzi, perceived quality, design appeal predict repurchase intentions.

**Parasuraman and Colby, (2001)** ,Technology readiness (TR) refers to people's propensity to embrace and use of new technologies for accomplishing goals in home life and at work.

**Phan, (2003)**, A number of business organizations have employed the Internet channel as part of their marketing strategy; they fear that if they do not keep up with new developments in technology, they might lose the business to competitors.

**Goodhue et al. (1995)**, Task-technology Fit (TTF) emphasizes individual impact. Individual impact refers to improved efficiency, effectiveness, and/or higher quality. Goodhue et al. (1995) assumed that the good fit between task and technology is to increase the likelihood of utilization and also to increase the performance impact since the technology meets the task needs and Constant technological change simultaneously,

**Lai, (2006; 2007; 2010; 2016)** creates threats to established business models, while also offering opportunities for novel service offerings. Web page design characteristics were also found to affect consumers' decisions to buy online. **Ho and Wu [20]** found that homepage presentation is a major antecedent of customer satisfaction.

**(Lovelock, (2001); Lai, (2007)** Leading firms often seek to shape the evolution of technological applications to their own advantage. With the advanced and dynamic growth of technologies, how fast the consumers are accepting these technologies depends on a number of factors such as availability of technology, convenience, consumers' need, security etc. This paper analyzed the technology adoption models and theories leading to the theoretical framework for an integrated E-payment system known as the "single platform E-payment System" of the technology acceptance for Card, Internet and Mobile wants of users more closely.

**Lai (2016)**, the design and security are the stimulus that represent the system and features capabilities while, the perceived ease of use and perceived usefulness are the organism that represents the motivation to use the system that leads to consumers' respond to use the system.

## THEORIES BASED ON PERCEIVED BEHAVIOR

**Robert N. Stone, Kjell Grønhaug, (1993)** examined the construct of perceived risk, as used in consumer and marketing research. Findings show that the risk dimensions proposed in the literature (i.e. financial, psychological, social, performance, physical and time-related risk) capture a very high fraction of perceived overall risk, and that a parsimonious structure of the risk concept exists as the other risk dimensions are mediated through individual psychological risk. Implications are highlighted.

**Doolin, B., Dillon, S., Thompson, F., & Corner, J. L. (2005)** develops a research model of the importance of consumers' perceived risk and the Internet shopping experience in the online purchasing behavior of Internet

users. The model was tested in New Zealand Internet users. Both the perceived risk and perceived benefits of Internet shopping were found to be significantly associated with the amount and frequency of online purchases made. Loss of social interaction in Internet shopping was associated with reduced online spending. The results of the study suggest that Internet retailing Web sites should include features that enhance customer service and reduce perceived risk.

**Van der Heijden, H., Verhagen, T. & Creemers, M. Eur J Inf Syst (2003)** explored factors that influence consumer's intentions to purchase online at an electronic commerce website. Specifically, in investigation of online purchase intention using two different perspectives: a technology-oriented perspective and a trust-oriented perspective. In this study found that the trust-antecedent 'perceived risk' and the technology-antecedent 'perceived ease-of-use' directly influenced the attitude towards purchasing online.

**Featherman, (2001); Pavlou, (2001)** explained that the existing empirical evidence suggests that trust in the company negatively influences the perceived risk that is associated with buying something on the internet.

**Dowling & Staelin, (1994)** studied that perceived risk can be regarded as a consumer's subjective function of the magnitude of adverse consequences and the probabilities that these consequences may occur if the product is acquired. The more a person trusts the internet company, the less the person will perceive risks associated with online buying.

**Jarvenpaa et al., (2000)** explained that perceived risk, in turn, negatively influences the attitude towards Internet shopping. Trust in the online store may also directly influence this attitude. People develop trust in the web store through a number of factors, major one is the perceived *size* of the company, and another is their reputation. The larger the perceived size and the perceived reputation, the greater will be the trust in the company.

**Weng Marc Lim1 (2013)**, empirically validates the conceptual links established between perceived value, perceived ease of use, perceived usefulness, attitude, e-purchase intention, actual e-purchase, e-shopping experience, and trust.

**Liu, Shannon, and Gardner (2006)** conclude that online shoppers perceive online buying as providing benefits of product selection, ease/comfort of shopping, and enjoyment.

### THEORIES BASED ON NEURAL FACTORS

**Sudeep Chaterjee (2015)** explains Neuro-Marketing is an emerging interdisciplinary field that combines psychology, Neuro-sciences and economics. In this study Author took two views Brand Familiarity and Product Preferences of consumers. It is useful tool for market researchers because it resolves how emotions influences brand positioning, advertising strategy and pricing strategy. Some researchers consider neurosciences as 'Buy Button' in the brain of consumers. They think neuro-marketing provide early information about product design. However, it's evident that neuromarketing is opening up a whole new world of understanding the consumers and neuroscience helps deliver increasingly powerful, marketing insights. Any new field of study, like neuromarketing, needs research to be performed in order to establish their academic relevance.

**Karmarkar, Uma R.(2011)** Explained Neuro marketing refers to the group of techniques including eyetracking,biometrics,facialmyography (EMG) ,Electroencephalography(EEG),and functional Magnetic Resonance Imaging(fMRI) .These techniques used for taking response data from consumer without asking .EEG and (fMRI) collect data directly from brain. In EEG measurement electrodes placed directly on person's head and it describe brain waves. In (fMRI) person lie on their back inside a machine that use extremely strong magnetic waves to track change in blood flow across brain. These flows are correlated with neural activity of the area.GSR (Galvanic Skin Response) analyze provides Facial analytics method translate microexpressions.In this paper described the neuro-sciences as a more enhanced tool for reading consumer behavior towards the brand, logo, ads etc.But taking quantitative as well as qualitative tools for consumer behavior is more effective collectively.

**Zara I.A., M. Tuta, (2013)**, Neuromarketing is considered a cutting-edge science, a mix of more research fields: i.e. Neuroscience which focuses on nervous system, and predominantly on the human brain; Brain Science is a division of Neuroscience studying the connections between the brain and its structure or function. Cognitive psychology makes connection between human mind and behavior. It refers to mental activities such as memory, learning, imagery, problem solving, reasoning or decision making. Cognition occupies a major place in the human psychology. Almost everything a consumer does when searching for a product or making a decision involves activities like perceiving, remembering, learning, language process, thinking or memory.

This study gave an integrative literature on neuromarketing studies from 2007 to the present. Twelve areas of studies were identified and classified according to the topics and patterns of papers. According to findings there are two classes of studies: with direct benefits and immediate implementation and with indirect benefits which require adjustment to the specific features of each company. Neuromarketing research helps companies in their marketing campaigns and for deeper consumer insights. It represents a new frontier in understanding consumer behavior, gaining rapid credibility and adoption among marketing professionals and entrepreneurs.

**Nyoni, Thabani and Bonga, Wellington Garikai (2017)** the purpose of this study is to focus on this new discipline and to indicate the direction marketing is heading. The paper uncovers the neurological aspects of marketing research which have been largely neglected in the traditional marketing research. Explained about the human behavior as naturally emotional, the thoughts are decision makers in the brain. Neurosciences can help a lot for business people. The main difference between neuromarketing research and traditional research methods lies in the fact that with the former the subjects are not asked to express their opinion regarding a particular topic. It is also a tool that will help consumers better understand their own buying behaviors that will in turn make us more informed consumers and give us more control in our purchasing decisions. Neuromarketing companies should address both professional and ethical dilemmas in line with both local and internationally recognized neuromarketing industry standards.

### CRITICALLY ANALYZING ONLINE SHOPPING WITH TRADITIONAL SHOPPING

After identifying the factors that affect consumers' attitude and intention to shop online and placing them in our proposed framework, the next step is to investigate the differences, similarities, advantages and disadvantages of Internet shopping compared to shopping in brick-and-mortar stores, so-called traditional or real world shopping. Current retailing trends show a shift from traditional store-based retailing to an increased use of the Internet (Keen et al., 2002). In the past few years, many businesses have faced the challenge of incorporating e-commerce into their repertoire of services in order to serve their customers 24/7. However, in establishing an online presence next to their existing physical stores, retailers encounter the difficulty of not being able to use the same format for both online and traditional stores. Although online shopping incorporates many of the same characteristics as "real world shopping" (Chen and Leteney, 2000; Lohse and Spiller, 1999), consumers are in a different frame of mind and have different informational needs when shopping on the Internet or the traditional way (Burke, 2002). Therefore, it is important to first identify the analogies and differences between traditional shopping features and features of online shopping before setting up a format.

Second, retailers have to be aware of the advantages and disadvantages of online shopping compared to traditional shopping to understand consumer's motives to choose one channel over the other. Lohse and Spiller (1999) set up a table to provide an overview on how the features of a brick-and-mortar store relate to an Internet store.

In Table I we have translated these store-features to features relating to online and traditional shopping. The table shows that all traditional shopping features are also present in online shopping, but in most cases in a somewhat different form and not always on a level satisfactory to consumers.

Traditional	Online
Salesclerk service	Product descriptions, information pages, gift services, search function, clerk on the phone/e-mail
Sales promotion	Special offers, online games and lotteries, links to other sites of interest, appetizer information
Store window displays	Home page
Store atmosphere	Interface consistency, store organization, interface and graphics quality
Aisle products	Featured products on hierarchical levels of the store
Store layout	Screen depth, browse and search functions, indices, image maps
Number of floors in the store	Hierarchical levels of the store
Number of store entrances and store outlets/branches	Number of links to a particular online retail store
Checkout cashier	Online shopping basket and/or order form
Look and touch of the merchandise	Limited to image quality and description, potential for sound and video applications
Number of people entering the store	Number of unique visits to the online retail store
Sales per period	Sales per period

Source: Lohse and Spiller (1999)

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**LIMITATIONS**

As in any research studies, our study also has its limitations. First, we have set up a framework that includes 5 factors (as discussed Behavioral factors, Socio-cultural factors, Neural Factors, Technological factors and Perceived factors) considered to drive consumers to shop online. Although we based our framework on a combination of results from many different studies on the subject of online shopping, technology acceptance and the acceptance of the Internet as a shopping medium in particular, there can always be other factors of influence on consumers' intention to shop on the Internet that are not included in the literature to date, or that is addressed in other literature studies. However, we are confident that we have given an overview of the most relevant factors in this context.

A second limitation of our paper is that the data is collected from only 3 Metro cities in India. It can also implement to other part of the country. This implies that some caution should be taken in applying the findings that can be derived from other framework. Furthermore, we have defined "online shopping" as the use of online stores by consumers up until the transactional stage of purchasing.

Undoubtedly, this is not the correct definition, since shopping on the Internet is considered to be a process that goes beyond the boundaries of just browsing web stores. Finally, by selecting a specific structure for our review, we have necessarily limited the number of previous research results that were discussed in this paper.

**CRITICAL ANALYSIS**

Focus on these studies creates a link between decision making and external factors, very few studies had examined this part of the decision-making process and its relationship with problem recognition, internal search, consumption, or disinvestment.

Furthermore, the emphasis on technology as a focal research point has led to calls for focusing on the satisfaction of human needs in online consumer behavior research (Wind & Mahajan, 2002; Porter, 2001; Grant, Clarke, & Kyriazis, 2007). Such refocusing will contribute to a better understanding of choice decisions (e.g., products, retail outlets) and of the underpinnings of online consumer behavior and the decision-making process.

Search behavior is likely to be affected by how the individual interacts with and uses the Internet. Thus, to fully understand the complex interactions, psychological, socio-cultural, and environmental factors ought to be explored. Involvement, product type (e.g., experience vs. search, tangible vs. intangible), information processing, and belief systems may be important moderators that need to be considered.

This paper has adapted the Traditional, Contemporary and Online model of consumer behavior and decision making as a backdrop in reviewing the empirical research dealing with online consumer behavior and decision-making process. A review of 67 articles suggests that while the focus has been on the linkages between external search, behavioral intentions, and purchase with individual factors and online environmental factors, there are areas that are still unexplored and that offer opportunities for further investigation.

**CONCLUSION**

While a large number of consumers in India frequently shop on the Internet, research on what drives consumers to shop online has typically been fragmented. In this paper, we therefore propose a framework to increase researchers' understanding of consumers' attitude toward online shopping and their intention to shop on the Internet. The framework uses the constructs of models of traditional theories; contemporary theories and online theories of consumer behavior extended by exogenous factors affecting consumer behavior as a basis, and apply it to the online shopping context. Review shows that attitude toward online shopping and intention to shop online are not only affected by ease of use, usefulness, Webpage Design and enjoyment, but also by exogenous factors like consumer traits, behavioral factors, Neural factors, socio-cultural factors, technological factor, previous online shopping experiences, and trust in online shopping.

Online consumer behavior and decision making is still in its early stages of development. Investigations of the constructs in terms of online consumer behavior identify convergence and divergence of online and traditional consumer behavior and the decision-making process. In addition, there are a number of aspects of the online environment that need clarification. Therefore, research is required to analyze traditional theories of consumer behavior critically to upgrade theories applicable for online purchase behavior.

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**THE CRUCIAL MOTIVATIONAL FACTORS OF TEACHERS' ORGANIZATIONAL COMMITMENT AND JOB SATISFACTION**

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**ABSTRACT**

*The present paper studied on the predictors of teachers' commitment and job satisfaction in schools. Teachers are the pillars in every nation. Teachers play pivotal roles in imparting the knowledge and skills to future citizens. Commitment can be well-defined as the 'person's psychological attachment to the organization'. Organizational commitment is the crucial motivational factor in the organization so that employees work at their utmost abilities and quench their thirst of job satisfaction. Teachers who are committed generally are more successful in the workplace and they feel happy and satisfied with their job. In fact, job satisfaction shall be referred as the associations with other main aspects that includes control at work, work stress, other working conditions and well-being. Job satisfaction is about job expansion and improvement besides working culture, employee engagement, empowerment and independent work group. However, job satisfaction is considered as a critical issue for any organization be it private or public organizations. The main determination for present paper is to explore the predictors of teachers' commitment and job satisfaction which is intangible but impacts on organizational output and effectual operations at large.*

*Keywords: Organizational Commitment, Job satisfaction, psychological attachment, well-being.*

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**INTRODUCTION**

Organizational commitment is an important aspect in the educational system because it will promote the overall effectiveness of an organizational. Commitment can be defined as the 'person's psychological attachment to the organization' and indeed it is different from the job satisfaction and motivation. Commitment is considered as important feature because it covers solid attachment and bondage between working spirit and the work place. It is understandable that the workplace commitment become a hallmark for the organizational success. Therefore, the teacher's commitment has been given due importance in the past research studies and needs still to be carried out to find the crystal-clear reasons why their commitment fluctuates at different stages of their careers.

Job satisfaction shall be defined as the associations with other main aspects that includes control at work, work stress, other working conditions and well-being. Job satisfaction is about job expansion and improvement besides working culture, employee engagement, empowerment and independent work group. Job satisfaction is the setting of matters that impact on individual performance based on experience. Evans (1997) defined Job satisfaction as the degree in which teachers wants and needs are accomplished. Job satisfaction is one's attitude towards job in the view of beliefs, feelings and behaviours (Brief 1998). Job satisfaction is the pleasant emotions resulted from the evaluation of one's work (Locke 1976). Job satisfaction means to consider as the actual response to one's responsibility towards job (Cranny 1992). Through job satisfaction it gathers of individual's attitudes about likes and dislikes of the job and work environment (Spector 1994). Hoy and Miskel (1991) defined as it is the state of like and dislike that results when an educator assesses one's performance. Teachers who are satisfying with their job put in their energy, efforts to works and their performance is high (Scott, 2004). Hongying (2008) explains the job satisfaction is the totality attitude of teachers on how they perceive towards their profession and work conditions.

Cross and Billingsley (1992) conducted study on what impacts job satisfaction and organizational commitment among general teachers and special teachers in Virginia. In which the samples were randomly chosen, 558 special teachers and 589 general teachers. Both the results showed that predictors such as roles conflict, ambiguity of roles, stress, leadership styles were the main reasons affecting on teachers' job satisfaction and commitment.

Louis (1998) investigated the impacts of the secondary teachers' commitment towards performing quality work in Secondary Schools at Wisconsin on a sample of 528 teachers. It revealed that teachers' attitudes, working conditions, teachers' self-efficacy and relationships have positive effect on the work quality. The researcher concluded that the continuous opportunity should be provided to secondary teachers for their professional growth which would enhance their excitement and strong commitment towards teaching profession.

Joolideh and Yeshodhara (2009) explored on organizational commitment of Iran and India comprising of 721 secondary school teachers (Bangalore, India) and (Sanandaj, Iran.) The result showed that Iran teachers had higher organizational commitment in continuance element whereas the Indian teachers had higher in the

normative and affective components with regards to organizational commitment. Further the result revealed that there was no influence on teachers' organizational commitment by demographic variables in both the countries.

Zembylas, et al. (2004) studied on job satisfaction on a sample of 461 teachers in Cypriot discovered that they have joined in teaching profession owing to taking the advantage of the benefits in this profession. Such as, salary, the hours, and holidays ultimately these increase the satisfaction of teachers.

Douglas (2010) conducted the study on school climate and commitment of teachers in Alabama comprising of 1353 samples and found that the professional teacher and collegial leadership were the predictors of teacher commitment and there was neither direct nor indirect association the teacher commitment with the deformity of the work place.

Klassen, et al. (2010) and Goker (2012) the job stress has an adverse relation to satisfaction of job for teachers of North America, and the cultural aspect of collectivism impacted on satisfaction of job of teachers in Korea. Therefore, the study concluded the cultural context impacts on the articulation of motivational beliefs in the varied situations. Especially for teachers, it is important to emphasize the collective motivation and Teachers' collective efficacy (TCE) as a basis of individual's satisfaction towards job.

Gupta and Gehlawat (2013). Studied on organizational commitment as (dependent variable), job satisfaction and work motivation as (independent Variables) for 480 Secondary teachers working both in government and private schools of Rohtak, Haryana. They discovered from the study that organizational commitment has effects on teachers' job satisfaction based on the type of school they work in. The teachers working in government schools with high motivation level are found to be more committed towards their work. Whereas, teachers of private schools have no significance difference on organizational commitment whether they have high or low motivation level. It was suggested that organizational commitment can be enhanced with suitable educational implications of motivation among teachers.

Ayele (2014) conducted the study on 159 samples to discover the relationships between teachers' commitment and satisfaction of job in Hadiya. It revealed that the teachers with high level of job satisfaction were directly connected with strong organizational commitment. Basically, teachers' job satisfaction is being influenced more by the external factors (promotion, school policy, administration, income, supervision and work conditions) than the internal factors (recognition, responsibility, achievement work itself and advancement). It is suggested based on the findings from their study that the Department of Zone Education and other relevant agencies to provide all sorts of facilities to facilitate teachers of secondary schools with proper working conditions to meet their job satisfaction.

Zahoor (2015) investigated about the relationships between the job satisfaction and wellbeing among government and private school teachers. The sample was randomly chosen which comprised of 100 teachers, (of these 50 from government schools, and 50 from private schools). The result showed there is significant differences on the well-being and job satisfaction among the teachers of government and private schools.

Collie, et al. (2016) studied on a sample of 485 Canadian teachers that perception on independence supports the need satisfaction positively, and then the need satisfaction predicts the job-related insights. On top of this, the study revealed that the motivation and well- being play vital roles on how the job satisfaction is associated with the need satisfaction and then the individual characteristics impact the least on teacher's beliefs and perception at work place.

Rosenholtz and Simpson (2018) concluded from their studies that the beginner teachers (N=1,213), commitment is being influenced by the organization management and support system they receive, while the experienced teachers are being influenced by the qualities of organization which truly affects their main teaching roles. At the same time, the researchers found that teachers of midcareer have minimum commitment to their careers and depend on independent task.

## ANALYSIS

Sr. no	Author (s)/ Year	Country	Findings
1	Cross and Billingsley (1992), Douglas (2010), Rosenholtz and Simpson (2018)	Virginia. Alabama Turkey	➤ <b>Showed that predictors such as roles conflict, ambiguity of roles, stress, leadership styles were the main reasons affecting on teachers' job satisfaction and commitment.</b>
2	Louis (1998)	Wisconsin	➤ <b>The opportunity should be provided to</b>

			secondary teachers for their professional growth which would enhance their excitement and strong commitment towards teaching profession.
3	Joolideh & Yeshodhara (2009)	Bangalore in India) and (Sanandaj in Iran).	➤ Revealed that there was no influence on teachers' organizational commitment by demographic variables in both the countries.
4	Gupta and Gehlawat (2013).	Rohtak, Haryana	➤ They discovered from the study that organizational commitment has effects on job satisfaction of teachers based on the category of school they are working.
5	Zembylas, et al. (2004)	Cypriot	➤ Salary, the hours, and holidays ultimately these increase the satisfaction of teachers.
6	Klassen, et al. (2010) and Goker (2012)	North America	➤ Emphasize the collective motivation and Teachers' collective efficacy (TCE) as a basis of individual's satisfaction towards job.
7	Ayele (2014)	Hadiya	➤ The teachers' job satisfaction is being influenced more by the external factors (promotion, school policy, administration, income, supervision and work conditions) than the internal factors (recognition, responsibility, achievement work itself and advancement).
8	Collie, et al. (2016)	Canada	➤ The motivation and well- being play vital roles on how the job satisfaction.

## CONCLUSION

The findings of the study specified that the quality of supervision, locality, stress, roles conflict, leadership styles, work hours and promotion had significant positive influence on teachers' job satisfaction and organizational commitment. Furthermore, the stimulation and well- being play vital roles on enhance the teachers' organizational commitment and to fetch the satisfaction of the work.

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**BIOMETHANATION POTENTIAL OF FLOATING VEGETATIVE MAT IN LOKTAK LAKE OF MANIPUR, INDIA**

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**ABSTRACT**

Water impoundment for hydropower generation led alteration and deterioration in the lake ecosystem have been the vital challenge faced by the lake management in Loktak for quite some time. Of late, control and cleaning measures of the aquatic weeds and floating vegetative mat (phumdis) has taken the centre-stage. In the current investigation, biogas production potential of phumdi was assessed at a bench scale experiment in the laboratory. Phumdi was anaerobically co-digested with cattle dung at different substrate ratio, maintaining the total solids content at 12 %. The experiment was carried out in two batches of 30 days each, the first batch was operated on fresh phumdi and in the second batch the phumdi was chemically treated with 0.03 % NaOH prior to the digestion. The results obtained in the study are quite encouraging. The cumulative biogas yields in the 30 days period from the digesters (with 230 mL substrate) ranged between 488 mL (digester with phumdi alone) and 2114 mL (digester with 40:60, phumdi: cattle dung) in the first batch digestion. It was observed that the biogas yield improved significantly when the phumdi was pre-treated chemically. Corresponding cumulative biogas yield in the second batch digestion ranged between 697 mL (digester with phumdi alone) and 3224 mL (digester with 80:20, phumdi: cattle dung). The gaseous content of the biogas was analysed for CH<sub>4</sub>, CO<sub>2</sub> and N<sub>2</sub>O at the end of the second batch digestion. The results revealed a CH<sub>4</sub>:CO<sub>2</sub> ratio of 2.9:1.0. The calculated biogas generation potential for 1 m<sup>3</sup> of phumdi in Loktak Lake would be equivalent to ~230 m<sup>3</sup>.

**Keywords:** Biogas, floating islands, Loktak Lake, methane, NaOH treated substrate

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**INTRODUCTION**

Floating islands, locally called as *phumdi* in the Loktak have fascinated us since ancient times. Floating vegetative masses are quite common in tropical wetlands and are also known to occur in all continents, with the exception of Antarctica (Sculthorpe, 1967; Gopal *et al.*, 2003). Structurally, they are made up of dead organic matter and live biomass. Presence of aerenchyma, light spongy tissues and the gases accumulation during decomposition kept them floating. *Phumdi* proliferation in the Loktak is partly attributed to the enrichment of nutrients, which fuelled the growth of the aquatic weeds. The fate of the built-up chemicals could be traced back, in a wide scale of catchment erosion, agricultural runoffs, untreated sewage and wastes disposal in the feeder streams of the lake (Khoiyangbam, 2011<sub>a</sub>). People, on the other hand, had failed the century old, natural mechanism of aquatic weed control in the lake with the advent of Ithai barrage in early eighties. Prior to that, free-floating aquatic weeds – precursor of *phumdi*, were seasonally flushed down by water courses that drain into the Manipur River. Difficulties faced due to uncontrolled growth of *phumdi* include blocking lake-access points, interference with recreation and navigation, damaging fishing implements by drifting *phumdis*, etc. Moreover, unmanaged *phumdis* are potent factors for ecological succession of the wetland from open water to marshes and swamps. Hence, to tackle the worsening *phumdi* menace, the state government had been relentlessly searching for ideas and innovations, before finally, zeroing down on K-Pro Infra Work Private Limited, a Delhi based company, to take up the challenging task of cleaning *phumdi* in Loktak Lake. Measuring by its spatial and volumetric enormity, the task of *Phumdi* removal in Loktak is bound to become a gigantic exercise, and management of the extruded wastes, a vexed issue for which there can be no easy panacea. Anaerobic digestion is a natural process responsible for the overall decomposition of organic matter under anaerobic condition (Khoiyangbam *et al.*, 2011<sub>b</sub>). So far, anaerobic digestion technologies have been successfully applied for the treatment of industrial, agricultural and municipal wastes. Worldwide, numerous aquatic weeds have been experimented for their biogas generating potential and the results are quite encouraging. However, literatures pertaining to anaerobic digestion of floating islands in general and *phumdi* in Loktak in particular are very scanty and almost non-existent. Taking in consideration these points in view, the present study was conceptualised and designed with a modest attempt to explore the biomethanation potential of *phumdi* on a bench scale laboratory trial.

**MATERIAL AND METHODS**

**Loktak Lake and phumdi:** Loktak Lake is situated between the coordinates of 24°35'45"–24°29'30" N and 93°50'30"–93°46'16" E. Its water spread covers an area of 288 km<sup>2</sup>, at an altitude of about 778 m amsl. It is the largest fresh water wetland in northeast India. The presence of thick vegetative floating mat locally called "*phumdi*" is a characteristic feature of the landscape. *Phumdis* are buoyant spongy heterogeneous mass of dead



and live organic matters. A small but significant portion of *phumdi* remains protruded above the water that supports a luxurious growth of herbs. Currently, excessive and uncontrolled growth of *phumdi* is critically impairing and impacting the lake ecosystem and thus consequently affecting the local communities depending on it.

**Collection of phumdi and cattle dung:** Freshly extracted phumdi biomass was collected from the temporary lakeside dumps maintain by the Loktak Development Authority (LDA), at the foothill of Sendra hillock. Cattle dung was collected from nearby private cowsheds. Measurement of the moisture content and total solids content (TS) was carried out by subjecting 100 g each of the biomass to oven drying at 104<sup>0</sup> C. The volatile solids content and ash fraction was measured by igniting 2 g each of dry matter in a muffle furnace at 550<sup>0</sup> C for 6 hours.

**Physical and chemical treatment of phumdi:** The phumdi (air dried biomass) was chopped with a knife into pieces (~3 mm) before anaerobic digestion. In addition to the physical treatment, the phumdi used as substrate in second batch digestion was subjected to chemically treatment with 0.03 % NaOH solution by soaking it overnight. On the following day, the phumdi was retrieved and washed continuously with running water to neutralize the alkali and the biomass was latter air dried.

**Set-up of the bench scale digestion:** The experimental set-up of the biomethanation unit consists of: (i) eighteen small (500 mL) batch-fed plastic bottle digesters, (ii) a water-bath for maintaining the temperature of the digesters at 35° C (mesophilic range) and (iii) the gas measuring assembly. The gas measurements were done by the water (saline solution) displacement method (Kumar and Biswas, 1982). Gas produced from each digester was intercepted separately through rubber tubing in an inverted water-filled measuring cylinder. The volume of the water displaced by the biogas was recorded after every consecutive 12 hour. After every reading the measuring cylinders were refilled with the water for subsequent measurement.

**Substrate admixture ratio (Phumdi: Cattle dung):** Co-digestion of phumdi and cattle dung was carried out in six different substrate combinations (Table 1). The substrates were mixed thoroughly and homogenised before feeding into the digesters. The TS content in the substrate admixture was adjusted at 12 % for all the treatments by adding appropriate amount of water. Anaerobic digestion for all the treatments was carried out in three replicates.

Table-1: Ratio of *phumdi* and cattle dung

Treatment	Phumdi (%)	Cattle dung (%)
T <sub>1</sub>	100	0
T <sub>2</sub>	80	20
T <sub>3</sub>	60	40
T <sub>4</sub>	40	60
T <sub>5</sub>	20	80
T <sub>6</sub>	0	100

**Measurement of Chemical oxygen demand (COD):** COD in the substrates was measured by titrimetric method. The biomass was digested in the KjelTRON Automatic COD Digester (KDIGC 6AC). The measurement of the COD was made for all the treatments before and after the digestion.

**Biogas sample collection and analysis:** Biogas samples were extracted from the digesters by using an airtight syringe and hypodermic needle. The biogas were injected into pre-evacuated glass containers (80 mL) and transported to the Indian Agricultural Research Institute (IARI), New Delhi for analysis. To avoid contamination and dilution, the gas samples were injected a little bit higher than that of the atmospheric pressure. The butyl rubber stoppers of the container were sealed by glue. The CH<sub>4</sub> and CO<sub>2</sub> concentration in the biogas was quantified by diluting the biogas samples five times with N<sub>2</sub> and injecting into a gas chromatograph (Shimadzu, GC-8A, fitted with FID and Porapak Q column). Each injected sample, before reaching the detector, passed through the methaniser, where the samples were subjected to catalytic reduction by H<sub>2</sub> over the Pt-catalyst. The retention time of CH<sub>4</sub> and CO<sub>2</sub> was 2.0–2.5 and 4.5–5 min, respectively. The N<sub>2</sub>O concentration

in the biogas was analyzed using a Gas Chromatograph (Hewlett Packard 5890 Series II), fitted with an ECD and stainless steel column (Porapak N). Concentration of the individual gas in the sample was determined by calculating it from the standard curve obtained by injecting their respective standard gas.

## RESULTS AND DISCUSSION

### Physical characteristics of the substrates

The substrates (*phumdi* and cattle dung) used in the experiment was repeatedly evaluated for some important physical characteristics. The air dried *phumdi* was soft, spongy, fibrous and dark brown in colour. The moisture and total solids content in the air dried *phumdi* was  $70.0 \pm 0.5$  % and  $30.0 \pm 0.5$  % (Fig.1). Further, ignition of the dry *phumdi* showed that it is made up of  $25.0 \pm 0.5$  % volatile solids and  $5.0 \pm 0.5$  % by ash. The cattle dung (dropping of cow) was semi-solid and light brown in colour. The TS content in the cattle dung was  $15.0 \pm 0.5$  %. The volatile solids content and ash fraction in the dry matter was  $12.0 \pm 0.5$  % and  $3.0 \pm 0.5$  %, respectively.

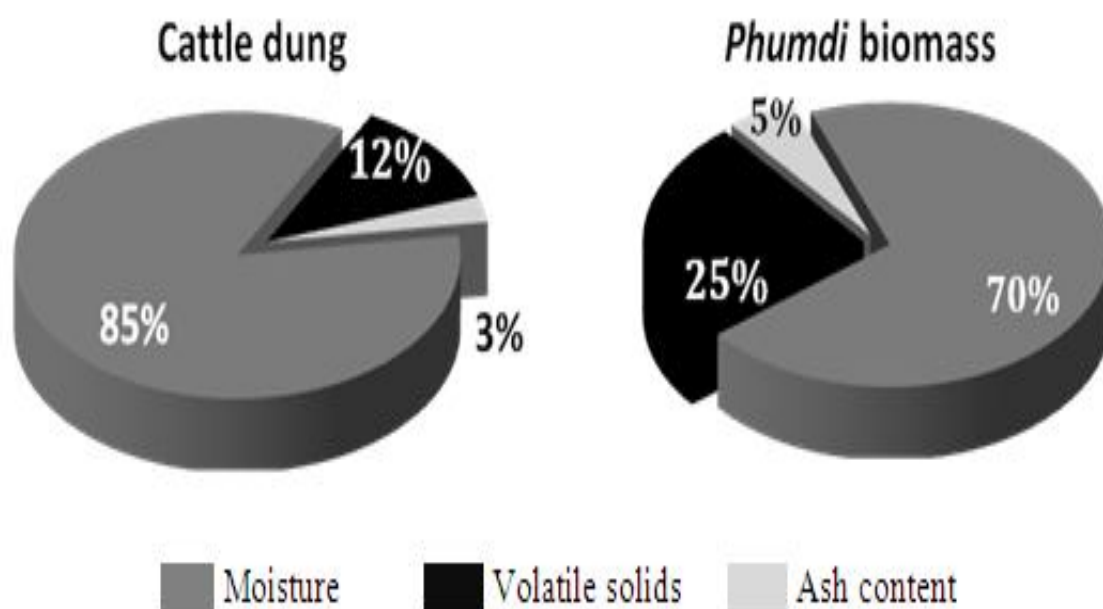


Fig-1: Some physical characteristics of the substrates

### Biogas production in the different treatments

The day to day variation in biogas generation, observed during the 30 days incubation period are graphically depicted in figure 2, for the first batch digestion (with untreated *phumdi*) and in figure 3, for the second batch digestion (chemically pre-treated *phumdi*). A wide variation in the gas production rates were observed within and between the treatments in both the experiments. In a biogas digester, the gas formed through digestion of substrate may escape into the headspace by two routes, through inter-phase gas diffusion and through ebullition as gas bubbles. During the digestion, the newly formed gas tends to accumulate in numerous miniscule gas bags that remains embedded within the substrate. With time, these gas bags grew in sizes, until it could no longer be retained by the substrate anymore and thus escapes into the headspace as bubbles. In a digester charged with the substrate strength of 12 % TS, as in the case of the current experiment, gas bubble formation and entrapment is highly expected. To force expel the entrapped gas, the digesters were agitated by shaking, before any gas measurements were made. However, the efficacy and extent of such agitation needs further verification. The observed inconsistency in the day to day records of gas production was probably attributed and affected by the gas bubbles entrapment and their erratic nature in release. The overall per day gas generation rates ranged between  $0 \text{ mL d}^{-1}$  and  $350 \text{ mL d}^{-1}$  in the first batch digestion. Corresponding, minimal and maximal per day gas generation rates obtained in the second batch digestion was  $0 \text{ mL d}^{-1}$  and  $144 \text{ mL d}^{-1}$ .

### Consequences of temperature shock

It may be noted that there was an overall dip in the gas production on the 21<sup>st</sup> day of the first batch incubation. This pattern of sudden fall in the digester performances was observed in all the digesters, irrespective of the treatments. The obvious reason behind this was the long duration power cut-off in the university campus in the intervening night of 20<sup>th</sup> and 21<sup>st</sup> day. During the episode the water bath temperature and hence, the digester temperature switched from mesophilic range (from experimental setup temperature of  $35^{\circ} \text{C}$ ) to psychrophilic range (below  $15^{\circ} \text{C}$ ) and this has brought the digester performance to a standstill. Biological methanogenesis

has been reported at temperatures ranging from  $2^{\circ}\text{C}$  in marine sediments to over  $100^{\circ}\text{C}$  in geothermal areas (Zinder, 1993), but they thrive best at temperatures of about  $35^{\circ}\text{C}$  (mesophilic) and  $55^{\circ}\text{C}$  (thermophilic). Bacterial activity slows down, resulting substantial decrease in gas generation, ceasing more or less completely below  $10^{\circ}\text{C}$  (Khoiyangbam, 2011).

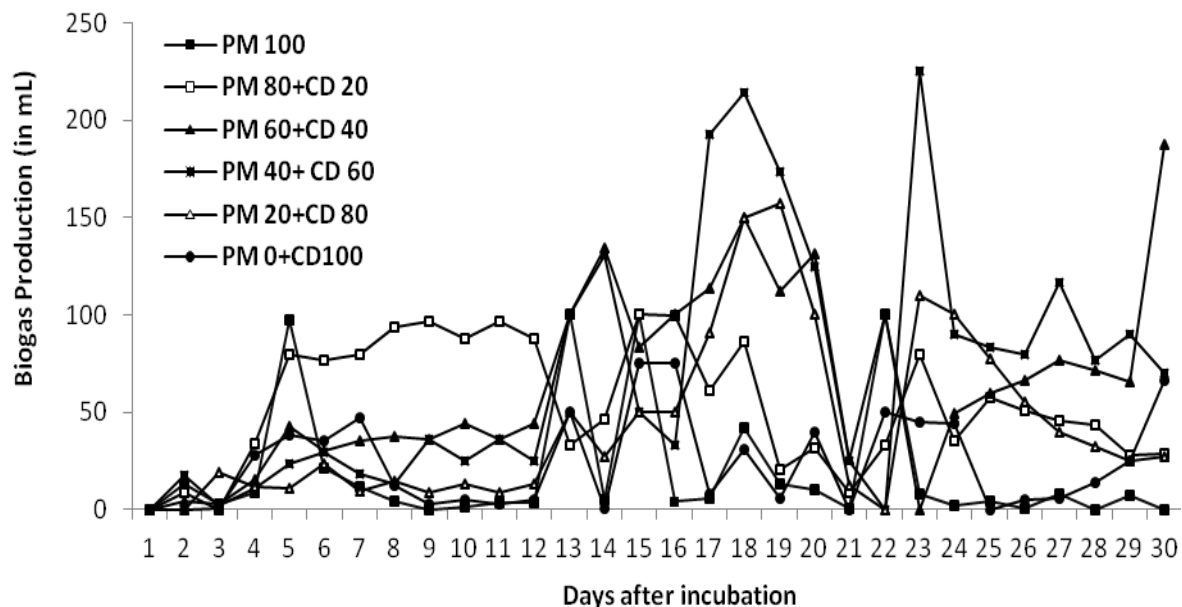


Fig-2: Variation in daily biogas production in the first batch digestion

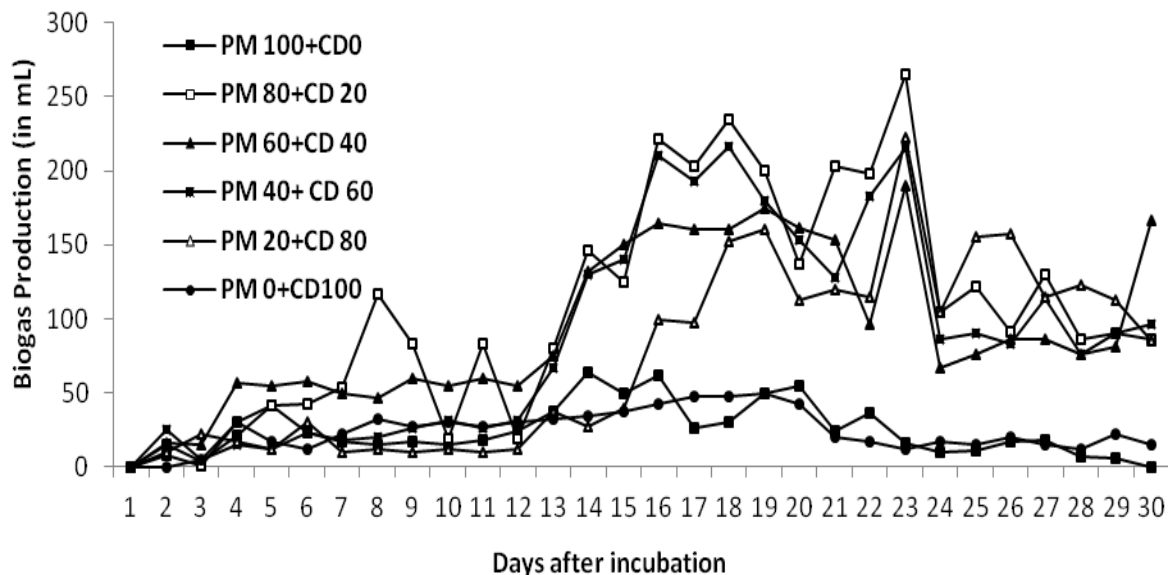


Fig-3: Variation in daily biogas production in the second batch digestion

### Influence of co-digestion

A comparative analysis of the cumulative gas yields reveals that biogas production from the *phumdi* and cattle dung was quite low when the substrates were digested alone. For instance, the total gas yield from the digester fed with *phumdi*, during the 30 days incubation period was 488 mL (chemically untreated) and 697 mL (chemically pre-treated). Similar gas yield records of its counterpart digesters, operated alone on cattle dung amounts to 718 mL and 738 mL in the two digestion batches. However, the rates and trends of gas production was found consistently higher and improved when *phumdi* and cattle dung was digested together. The gas productions have also shown to vary with variation in the ratio of the two combining substrates. In the first batch experiment, the highest biogas yield (2114 mL in 30 days) was achieved in the digester fed with the substrate combination ratio of 40:60 (*phumdi*: cattle dung). In second batch digestion, with the *NaOH* pre-treated *phumdi*, the highest biogas yield (3224 mL in 30 days) was attained in the substrate combination of 80:20 (*phumdi*: cattle dung). Monnet (2003) claimed that co-digestion results in more efficient digestion of

certain organic wastes probably due to the synergistic effects of the mixed digestion process. Other advantages include easier handling of the mixed wastes, the use of common access facilities, balance in C:N ratio, adjustment of moisture content, *etc.* (Mata-Alvarez *et al.*, 2000; Callaghan *et al.*, 1999). Fernandez *et al.*, (2005) viewed co-digestion as one of the advantages of the anaerobic technology where several wastes with complementary characteristics can be digested together.

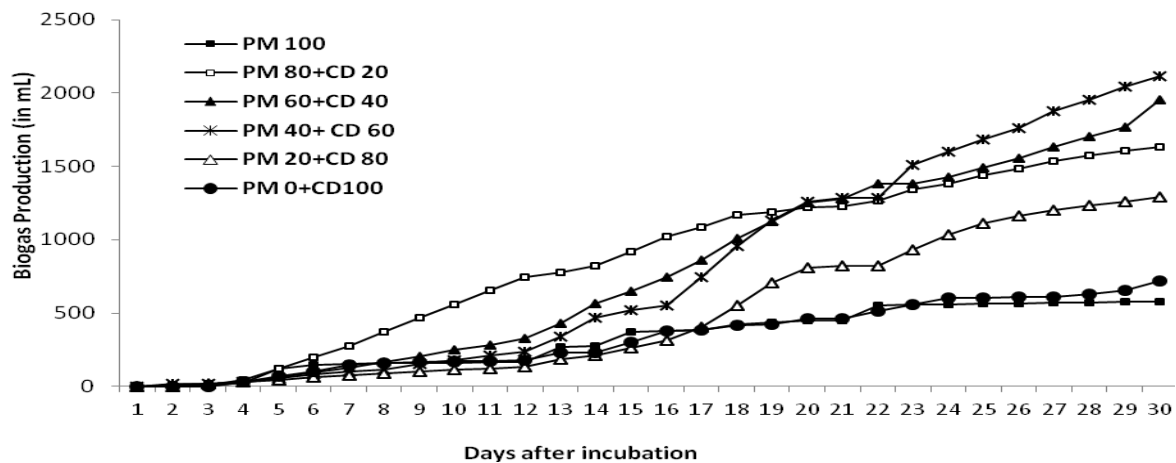


Fig-4: Cumulative gas productions in different treatments

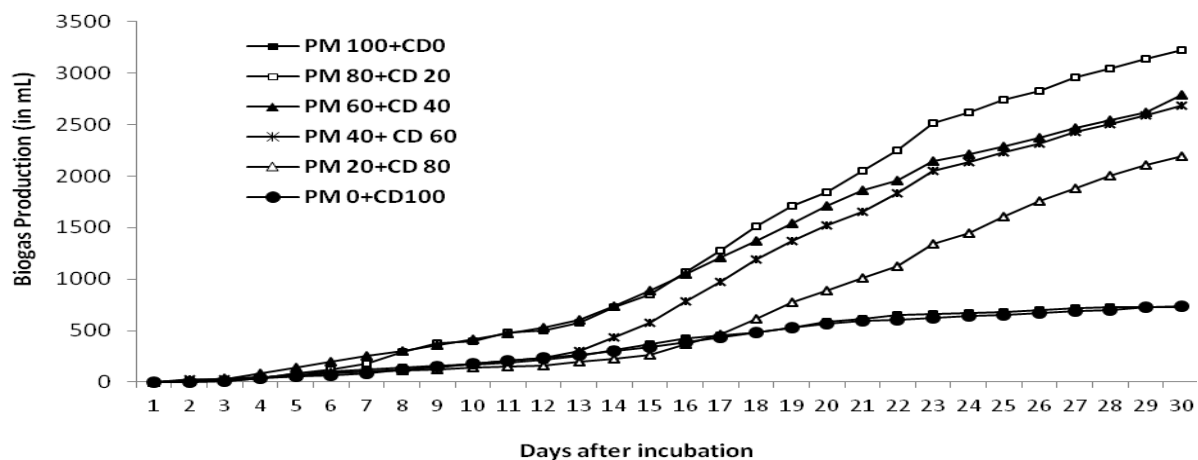


Fig-5: Cumulative gas productions in different treatments

### Biogas production during different day intervals

Another interesting feature seen in the graphs (Fig. 6 & 7) is the steady increase in the gas production rates with passage of days, after incubation. These increasing trends were witnessed at least up to the 20<sup>th</sup> day, in most of the treatments and thereafter the gas production rates gradually tappers down towards the end of the experiment. As seen in the graphs, per day incremental gain of gas production in the first 8 days was very minimal for all the treatments, indicating a microbial activity lag phase. In the post lag phase, the gas production showed a progressive improvement, represented by steeper slopes in the graph.

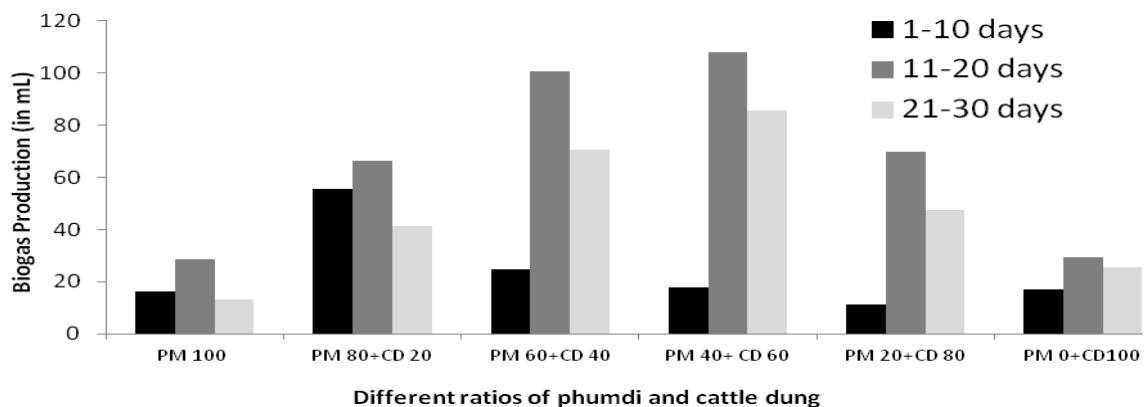


Fig-6: Gas production in the three 10-days (incubation) intervals

A time scale analysis of gas production for the 30 days incubation period, revealed maximum gas production between the 11<sup>th</sup> – 20<sup>th</sup> days (Fig. 5 & 6). For instance, the amount of gas generated in the digester with 40:60 (*phumdi*: cattle dung) in the first batch digestion was 23.8 mL, 67.1 mL and 47.2 mL respectively during 1-10<sup>th</sup>, 11-20<sup>th</sup> and 21-30<sup>th</sup> days intervals. Corresponding amount of gas obtained in the second batch digestion in the three respective ten-day intervals was 17.7 mL, 134.8 mL and 106.3 mL respectively.

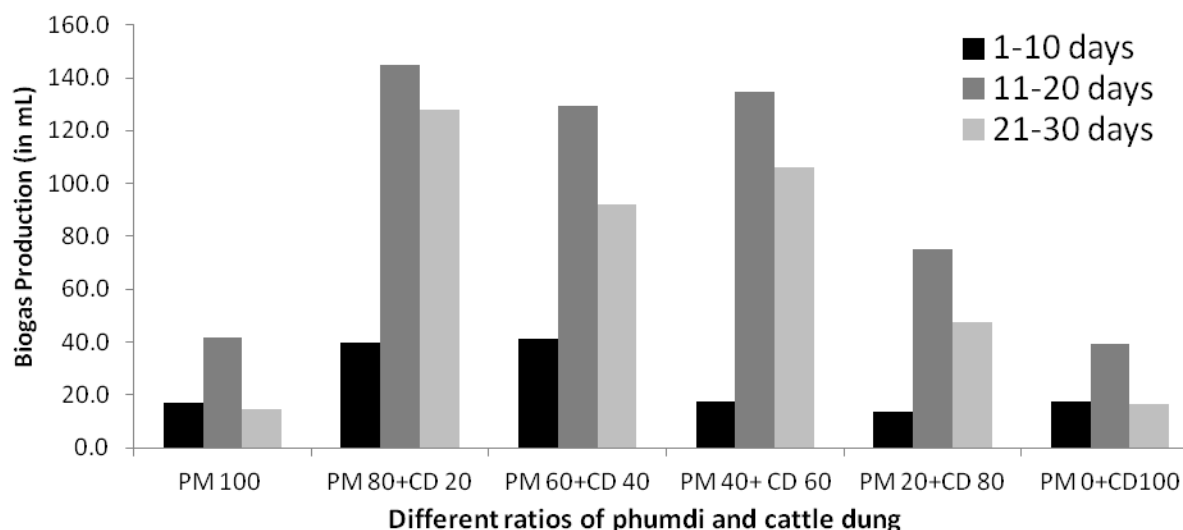


Fig-7: Gas production in the three 10-days (incubation) intervals

#### Pre-treatment of substrate and its influence on gas yield

The comparative analysis of biogas yield between the set of digesters operated on *NaOH* pre-treated *phumdi* and/or cattle dung and the set of digesters operated on untreated *phumdi* and/or cattle dung as feedstock is graphically illustrated in figure 8. The first set of digesters outperformed their respective counterparts in the second set. The increase in biogas yields in the different treatments ranged from 1.5 to 1.6 times in favour of the digester with *NaOH* pre-treated *phumdi*.

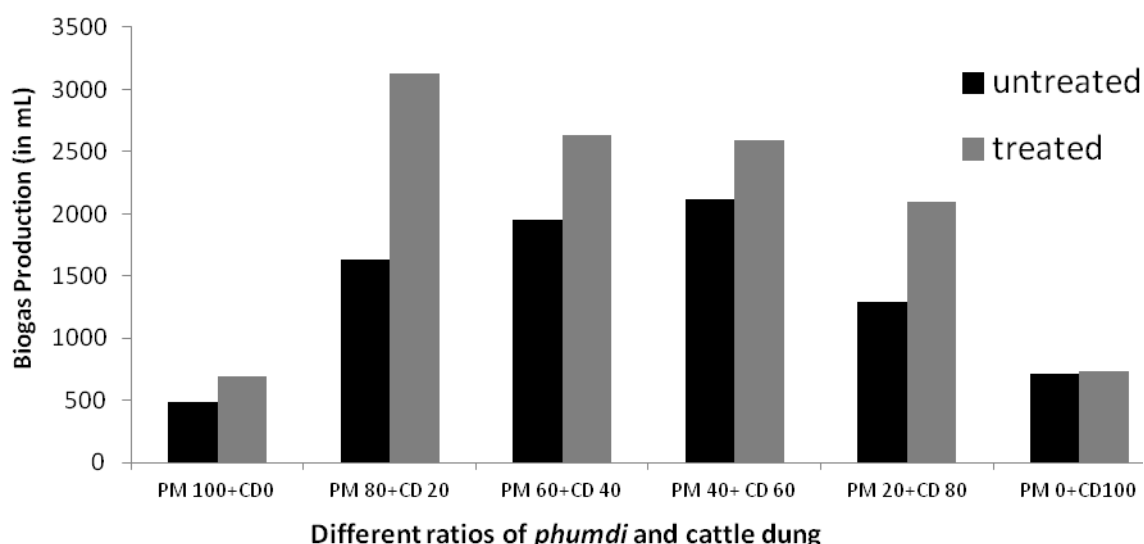


Fig-8: Comparison of biogas yields from the untreated and treated biomass

Dhar and Tandon (1987) in an experiment observed that microbial digestibility improves to 31 to 42 %, when plant residues were treated with an alkali (1 % *NaOH* for 7 days) as a supplement to cattle dung. In the current study, the *phumdi* biomass was pre-treated with an alkali (0.03% *NaOH*) and was co-digested with cattle dung. The improvement in the gas yield might have been attributed to the improvement in the digestibility of the lignocelluloses compounds in the *phumdi*. *Phumdi* biomass used in the experiments also had undergone size reduction (physical treatment) prior to the digestion and also the chemical treatment. Though particle size is not that important a parameter as temperature or pH, it still has influence on anaerobic gas production because smaller particles provide larger surface area for microbial activity. Sharma *et al.*, (1988) found that out of five particle sizes (0.088, 0.40, 1.0, 6.0 and 30.0 mm), maximum quantity of biogas was produced from raw materials of 0.088 and 0.40 mm particle size.

### COD reduction during the digestion

The values of *COD* of the substrates, before and after the digestion are depicted in figure 9 (first batch digestion) and figure 10 (second batch digestion). A considerable reduction in *COD* was achieved in both the 30 days incubation periods. The *COD* of the feed substrates used in the first batch digestion, ranged between 60800 and 96000 mg L<sup>-1</sup>. The values of *COD* in the digesters at the end of the experiment ranged between 11000 and 49000 mg L<sup>-1</sup>. In the second batch experiment, the *COD* in the feedstock ranged between 48000 and 90880 mg L<sup>-1</sup>. The amount of *COD* recorded at the end of the digestion ranged between 10300 and 56200 mg L<sup>-1</sup>.

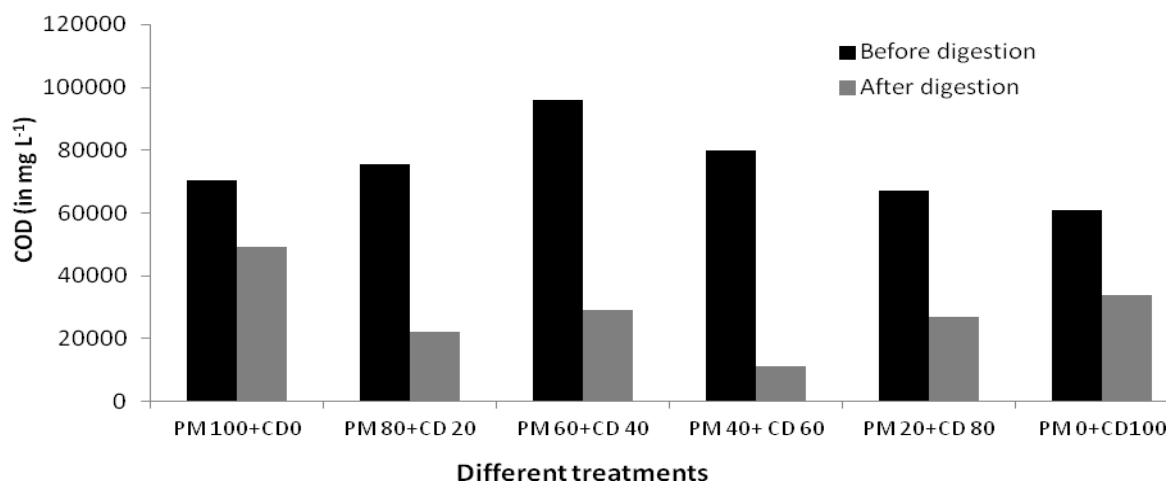


Fig-9: Comparison of *COD* before and after the digestion (I<sup>st</sup> Batch)

*COD* is one of the important parameters in anaerobic digestion. Anaerobic digestion can convert a greater portion (> 50 %) of *COD* present in the slurry to biogas (Wilkie *et al.*, 2000). A study conducted by Bhadouria and Sai (2011) found approximately 50 % reduction in *COD* during the utilisation of dairy effluents in biogas generation. Doraisamy *et al.*, (2013) suggested that higher percentile reduction in *COD* may be correlated to a higher retention time as the *COD* reduction increases with increasing hydraulic retention time.

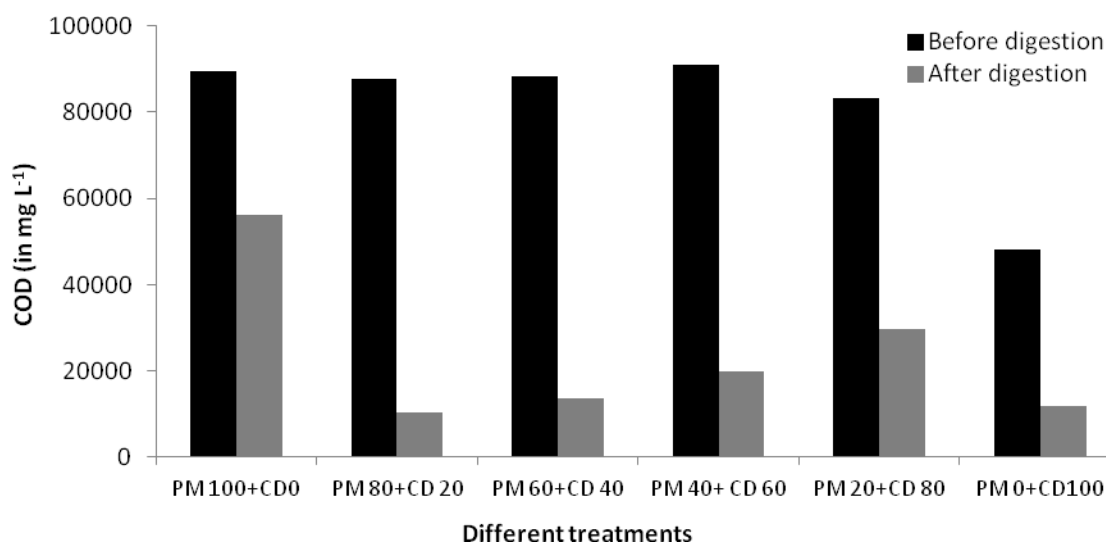
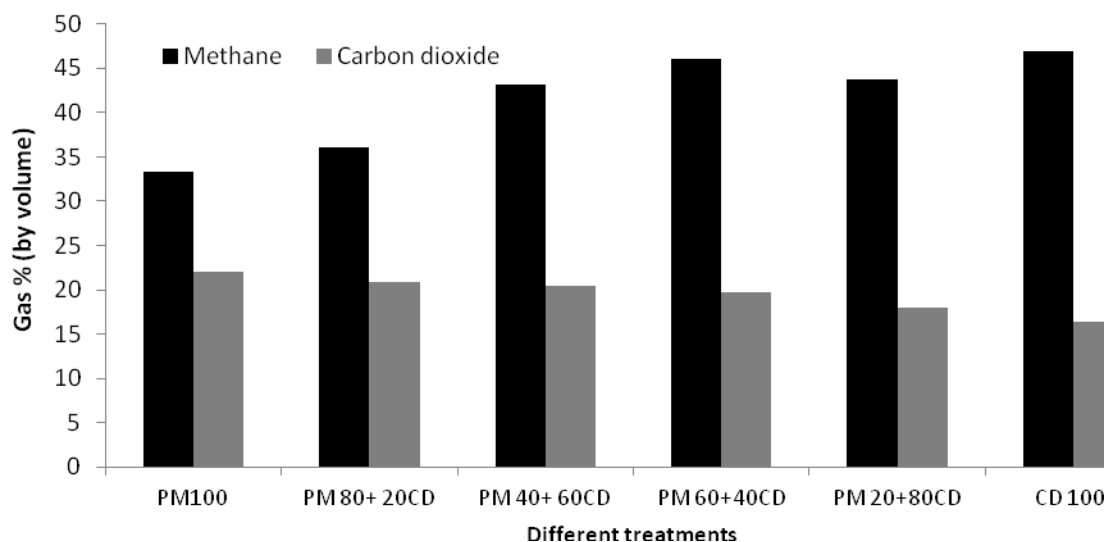


Fig. 10: Comparison of *COD* before and after the digestion (II<sup>nd</sup> Batch)

### Gaseous composition of the biogas

The biogas obtained in the experiment was analysed for the content of CH<sub>4</sub>, CO<sub>2</sub> and N<sub>2</sub>O by extracting gas samples at the end of the second batch digestion. The results revealed that the biogas contains more CH<sub>4</sub> compared to CO<sub>2</sub> as expected (Fig.11). The average methane to carbon dioxide ratio in the biogas was 2.1:1, thus reflecting a good quality fuel. It is noteworthy to mention here that the CH<sub>4</sub> content in the biogas was recorded highest in the digester operated on cattle dung alone, despite the fact that the digester was one of the least performing one in terms of total gas yield. In contrast, the biogas yield as well as the CH<sub>4</sub> content in the biogas was recorded quite low for the digester operated on *phumdi* alone. The concentrations of N<sub>2</sub>O in the biogas was present in trace levels ranging between 0.44 and 1.24 ppm, and were below the detectable levels in two of the mixed-fed digesters.

Fig-11: CH<sub>4</sub> and CO<sub>2</sub> concentrations in the biogas

## CONCLUSION

Worldwide, anaerobic digestion processes have been suitably adopted as technology for treatment of solid and liquid wastes besides the technology being accepted as a source of clean and renewable energy. A number of wastes are increasingly tested for its potentiality of anaerobic digestion and the technology still remains an emerging and engaging area of study. Prolific growth of aquatic weeds in Loktak Lake, particularly uncontrolled infestation of *phumdi* has become a matter of great concern because of its impacts on the well-being of the lake ecosystems and peoples living around. The on-going *phumdi* cleaning initiative taken up by the lake management turned out to be a time, money and resource intensive gigantic exercises. Equally important is attending to the staggering amount of terrestrially exported *phumdi* wastes. If technologically developed, anaerobic digestion could offer one of the appropriate options for treatment and conversion of *phumdi* into energy. The results of the laboratory scale study revealed that *phumdi* can be used as a substrate for biogas generation. Better yields of biogas were achieved when *phumdi* was co-digested with cattle dung and when the *phumdi* was chemically pre-treated with alkali. However, in order to develop and translate this 'highly potential' and 'highly promising' technology into a 'highly viable and performing' technology there is need for further research and technical innovations. This certainly appears to be within the realm of possibility.

## ACKNOWLEDGEMENTS

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**FOOD AND DIET: A STUDY ON TWO MODEL JAILS OF PUNJAB**

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**ABSTRACT**

*The concept of Modern/ Model jails has emerged towards the end of the 20<sup>th</sup> century as the prison reformists have been pushing the idea to do away with traditional jails, which were sans facilities and were more of dungeons. Food is the basic necessity for every prisoner and every prisoner must have three meals a day; a light meal in the morning before the beginning of the work, a midday meal; and an evening meal before the prisoners are rested. So, adequate provisions have been made in Model Prison Manual (2003) and Punjab Prison Manual (1996). In the present study the two modern jails have been selected : Kapurthala and Faridkot modern jails in order to study the perspective of prisoners in domains of food and diet being served in jails.*

*Keywords: prisoners, jails, food, diet, hygiene, meals*

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**[1] INTRODUCTION**

The term 'PRISON' means a place of confinement or involuntary restriction on body generally checking the movements of a person, convicted for committing an offence or offences. The prison is an Ancient institution of punishment which was used by the Athens to chain a criminal or detain an offender. The Romans were first among the Societies to use prisons as a form of punishment before them prison was more a place to detain the culprits than to punish them. The use of imprisonment as punishment is a relatively recent happening. Earlier, communities used to punish offenders through corporal punishments, fines, or banishment; people were kept in jail till punishment was carried out by way of fine or corporal punishment. Imprisonment as punishment came into vogue by the end of eighteenth century, thus is barely two centuries old.

In 1996, the Supreme Court categorically stressed on the need of bringing uniformity in administrative practices of jail administration and also to improve the living conditions of the inmates. The need for such guidelines was also emphasised by the All India Committee on Jail Reforms (1980-83). Consequently, a Model Prison Manual Committee was constituted by the BPR&D with the permission of MHA in 2000. After series of discussions and deliberations of the working groups the committee came out with a 'Model Prison Manual for the Superintendence and Management of Prisons in India (2003).

The lacunas of the Prison Manual-2003 needed to be addressed keeping in mind the misuse of certain provisions of leave and special leave and replacing these terms with parole or furlough with defined process to avail these. The Union Home Minister has approved the revised Model Prison Manual-2016 consisting of 32 chapters to bring uniformity in laws governing the jail administration.

**Food Provision:** Food is necessity for every prisoner to survive and therefore adequate provisions have been made in Model Prison Manual (2003) and Punjab Prison Manual (1996). An average male prisoner needs appx 2000 to 2400 calories per day and an average female prisoner also needs appx 2400 calories. However, A pregnant and nursing female and a prisoner doing heavy work needs more calories (3100 calories). Required nutrients have been indicated in the manual (see Annexure-1) Page 62 of the jail manual 2003. The scale of diet is decided by the State government and cannot be changed except under the special circumstances that too with the approval of IG, Prisons on the recommendations of the Medical officer.

Every prisoner shall have three meals a day; a light meal in the morning before the beginning of the work, a midday meal; and an evening meal before the prisoners are rested. On the occasions of festivals the prisoners may be served extra dish and similarly on the days of their fast they may be served dish of their liking. Variety in the food has to be ensured by issuing different pulses and vegies.

**[2] AIM**

The aim of the present study is to assess and examine the gravity of violation of norms within modern jails with special reference to food being served within jails in the light of guidelines of Model Jail Manual (2003)

**[3] RESEARCH METHODOLOGY AND STATISTICAL TOOLS**

In the present study the two modern jails have been selected : Kapurthala and Faridkot modern jails in order to study the perspective of prisoners in domains of food and diet being served in jails. The total sample of 300 prisoners were selected (150 from each modern jail). The study was done with the help of well structured questionnaire. Statistical tools like mean, median, standard deviation and p-value was used to analyse the data and results was done accordingly.

**[4] RESULTS AND DISCUSSION****Table-1: Are you provided with three meals in a Day (Breakfast, Lunch and Dinner)?**

	q11			Total	Chi-Square	p-value
	Yes	No	Don't Know			
Kapurthala	29	121	0	150	5.22	.022*
	19.3%	80.7%	0.0%	100.0%		
Faridkot	15	135	0	150		
	10.0%	90.0%	0.0%	100.0%		
Total	44	256	0	300		
	14.7%	85.3%	0.0%	100.0%		

Source: Culled from Primary Data p-value  $\leq 0.05$  is significant denoted as\*, p-value  $\leq 0.01$  is significant denoted as\*\*, p-value  $> 0.05$  is not significant denoted as ns.

The overall analysis of the Table 1 is indicating that 85.3 % of the respondents stated that they **were not provided** with three meals in a day, whereas 14.7 % of the respondents stated that they **were provided** with three meals in a day.

However, 90.0 % of the respondents of Faridkot jail and 80.7 % of the respondents of Kapurthala jail **were not provided** with three meals in a day in the jails. The **difference** of opinion was 9.3 % between the responses of two jails.

Nonetheless, 19.3 % of the respondents of Kapurthala jail and 10.0 % respondents Faridkot jail stated that they **were provided** with three meals in a day.

Statistically significant difference in the responses of two Jails was seen indicating that more of the respondents of Faridkot jail than Kapurthala jail stated that they **were not provided** with three meals in a day.

**Table-1.1 : Variable wise effects**

Variable	Kapurthala Jail	Faridkot jail
Age	NS	NS
Gender	NS	NS
Type of Convict	NS	NS
Qualification	NS	NS
Profession	NS	NS

Source: Combined responses and significance have been drawn from the primary data.

Non-significant effects of all the variables in Kapurthala and Faridkot jails were seen, however majority of the respondents of the Kapurthala jail and Faridkot jail **were not provided with three meals in a day**.

**Finding:** - Majority of the respondents stated that they were not provided with three meals in a day.

**Observation:** The query has been raised keeping in mind the culture of the state as it is usual practice to eat thrice a day which turns out to be habit later. Prisoners expressed that they are not provided with three meals in a day rather are provided with two meals. The practice is altogether different as any prisoner can go to the kitchen and prepare some stuff for himself, there are as such no restrictions though going by norms food is provide twice a day. Prisoners can get the eatables from the canteen. Besides, prisoners are served tea twice a day, once with biscuits.

**Table-2: Are you satisfied with the Scale of diet?**

	q13			Total	Chi-Square	p-value
	Yes	No	Don't Know			
Kapurthala	89	58	3	150	1.784	.410
	59.3%	38.7%	2.0%	100.0%		
Faridkot	100	48	2	150		
	66.7%	32.0%	1.3%	100.0%		
Total	189	106	5	300		
	63.0%	35.3%	1.7%	100.0%		

Source: Culled from Primary Data p-value  $\leq 0.05$  is significant denoted as\*, p-value  $\leq 0.01$  is significant denoted as\*\*, p-value  $> 0.05$  is not significant denoted as ns.

The overall analysis of the Table 2 is indicating that 63.0 % of the respondents were **satisfied with the Scale** of diet provided to the inmates in the jails; whereas 35.3 % of the respondents **were not satisfied with the Scale** of diet provided to the inmates in the jails.

However, 66.7 % of the respondents of Faridkot jail and 59.3 % of the respondents of Kapurthala jail **were satisfied with the Scale** of diet provided to the inmates in the jails. The **difference** of opinion was 7.4 % between the responses of two jails.

Nonetheless, 38.7 % of the respondents of Kapurthala jail and 32.0 % respondents of Faridkot jail were **satisfied with the Scale** of diet provided to the inmates.

Statistically non-significant difference in the responses of two Jails was seen however majority of the respondents were **satisfied with the Scale** of diet.

**Table-2.1: Variable wise effects**

Variable	Kapurthala Jail	Faridkot jail
Age	SIG	NS
Gender	HSIG	NS
Type of Convict	NS	HSIG
Qualification	HSIG	HSIG
Profession	NS	NS

Source: Combined responses and significance have been drawn from the primary data

**Significant effects** of three variables; Age, Gender and Qualifications were found in Kapurthala jail signifying that more of senior in age, female and illiterate respondents were satisfied with the scale of diet provided to the prisoners.

Nonetheless, Type of Convict and Profession variable had shown **non-significant effects** on responses in Kapurthala jail however, majority of the respondents were satisfied with the scale of diet provided to the prisoners.

In Faridkot jail, **non-significant effects** were seen in all the variables, **except** Type of prisoner and Qualification variable, however, majority of the respondents were satisfied with the scale of diet provided to the prisoners.

**Significant effects** of Type of prisoner and Qualifications variables have reflected that more of Convicted respondents than under trials and more of respondents with higher qualifications of Faridkot jail were satisfied with the scale of diet provided to the prisoners.

**Finding:** + Majority of the respondents were satisfied with the scale of diet provided to the prisoners.

**Observation:** As per the manual, a male prisoner is supposed to be provided with 2320-2730 kcal per day and a female prisoner supposed to be given 1900-2830 kcal per day and the States have the right to decide the menu. A State spends Rs.139.22/ (Nagaland) per day to Rs.31.31/ (Delhi) per day. The raw material for food is supplied by the authorities by estimation rather than by scale weighing. Often, diet complaints are received and mal nutrition has been reported by the inmates.

**Table-3: Are you satisfied with the quality of food provided in the prison?**

	q14			Total	Chi-Square	p-value
	Yes	No	Don't Know			
Kapurthala	67	83	0	150	6.896	.009**
	44.7%	55.3%	0.0%	100.0%		
Faridkot	45	105	0	150		
	30.0%	70.0%	0.0%	100.0%		
Total	112	188	0	300		
	37.3%	62.7%	0.0%	100.0%		

Source: Culled from Primary Data p-value  $\leq 0.05$  is significant denoted as\*, p-value  $\leq 0.01$  is significant denoted as\*\*, p-value  $> 0.05$  is not significant denoted as ns.

The overall analysis of the Table 3 is indicating that 62.7 % of the respondents **were not satisfied** with the **quality of food** provided in the jails, whereas 37.3 % of the respondents **were satisfied** with the quality of food provided in the jails.

However, 70.0 % of the respondents of Faridkot jail and 55.3 % of the respondents of Kapurthala jail **were not satisfied** with the **quality of food** provided in the jails. The **difference** of opinion was 14.7 % between the responses of two jails.

Nonetheless, 44.7 % of the respondents of Kapurthala jail and 30.0 % respondents Faridkot jail **were satisfied** with the quality of food provided in the jails.

Statistically significant difference in the responses of two Jails was seen indicating that more of the respondents of Faridkot jail than Kapurthala jail stated that they **were not satisfied** with the quality of food provided in the jails.

**Table-3.1: Variable wise effects**

Variable	Kapurthala Jail	Faridkot jail
Age	NS	NS
Gender	NS	NS
Type of Convict	NS	NS
Qualification	NS	NS
Profession	NS	NS

Source: Combined responses and significance have been drawn from the primary data

Non-significant effects of all the variables in Kapurthala and Faridkot jails were seen, however majority of the respondents of the Kapurthala jail and Faridkot jail **were not satisfied** with the quality of food provided in the jails.

**Finding:** -- Majority of the respondents were not satisfied with the quality of food provided in the jails.

**Observation:** Quality of food in the prisons remains a big issue for both administrators and the inmates. Quality of food is a relative term which varies from person to person; therefore it is next to impossible to satisfy everyone on the issue of food quality. Food remains a general complaint among the prisoners. Reported complaints are that poor quality of food grains infested with maggots are cooked and served to the prisoners. "In the very first week of the its operation, the Model prison of Faridkot has been beset by problems. The inmates alleged that despite the jails doctors having certified the food being served not fit for human consumption, they were being given the very same food. The prisoners alleged that there was a lack of basic facilities and worm-infested food was being served at the much hyped modern jail. When complaints regarding poor quality of food were not heard by jail officials, some 600 inmates went on a hunger strike." (November 18, 2011, Indian Express)

**Table-4: Do you feel that food is served on scheduled time to the prisoners?**

	q15			Total	Chi-Square	p-value
	Yes	No	Don't Know			
Kapurthala	110	34	6	150	9.095	.011*
	73.3%	22.7%	4.0%	100.0%		
Faridkot	101	49	0	150		
	67.3%	32.7%	0.0%	100.0%		
Total	211	83	6	300		
	70.3%	27.7%	2.0%	100.0%		

Source: Culled from Primary Data p-value  $\leq 0.05$  is significant denoted as\*, p-value  $\leq 0.01$  is significant denoted as\*\*, p-value  $> 0.05$  is not significant denoted as ns.

The overall analysis of the Table 4 is indicating that 70.3 % of the respondents opined that **food was served on scheduled time** to the prisoners, whereas 27.7 % of the respondents opined that **food was not served** on scheduled time to the prisoners.

However, 73.3 % of the respondents of Kapurthala jail and 67.3 % of the respondents of Faridkot jail stated that **food was served on scheduled time** to the prisoners. The **difference** of opinion was 10.0 % between the responses of two jails.

Nonetheless, 32.7 % of the respondents of Kapurthala jail and 22.7 % respondents Faridkot jail opined that **food was not served on scheduled time** to the prisoners.

Statistically significant difference in the responses of two Jails was seen indicating that more of respondents of Kapurthala jail than Faridkot jail found that **food was served on scheduled time** to the prisoners.

**Table-4.1: Variable wise effects**

Variable	Kapurthala Jail	Faridkot jail
Age	HSIG	HSIG
Gender	SIG	HSIG
Type of Convict	HSIG	NS
Qualification	HSIG	NS
Profession	NS	SIG

Source: Combined responses and significance have been drawn from the primary data

**Significant effects** of four variables; Age, Gender, Type of Convict and Qualifications were found in Kapurthala jail signifying that more of senior in age, female, convicted and illiterate respondents stated that the **food was served on scheduled time** to the prisoners.

Nonetheless, Profession variable had **shown non-significant** effects on responses in Kapurthala jail however, majority of the respondents agreed that food was served on schedule time to the prisoners.

In Faridkot jail, non-significant effects were seen in all the variables, except Gender variable, however, no clear trend of responses was registered.

Significant effects of Gender variable have reflected that more of female respondents than male respondents of Faridkot jail stated that the food was served in time to the prisoners.

**Finding:** + Majority of the respondents stated that food was served on scheduled time to the prisoners.

**Observation:** The IG (Prisons) is supposed to prescribe the time for food servings but more appropriately it is left to the local jail authorities to fix such schedule for the prisoners. Every prisoner is given at least 20 minutes to eat the meal but this practice is applied with flexibility. Often, it is ensured that everyone gets the food. Generally, prisoners wielding influence enjoy special relaxations in the timings. At times, they take health grounds as the reason to have food at their will. Food is served twice a day in both the jails; once early in the day at 8 a.m and other time early in the evening at 4 p.m. Besides, Tea is served twice a day; once in the early morning and other times in the evening with biscuits.

**Table-5: Are you satisfied with the food serving system adopted in the jail?**

	q17			Total	Chi-Square	p-value
	Yes	No	Don't Know			
Kapurthala	81	66	3	150	5.858	.053
	54.0%	44.0%	2.0%	100.0%		
Faridkot	97	53	0	150		
	64.7%	35.3%	0.0%	100.0%		
Total	178	119	3	300		
	59.3%	39.7%	1.0%	100.0%		

Source: Culled from Primary Data p-value  $\leq 0.05$  is significant denoted as\*, p-value  $\leq 0.01$  is significant denoted as\*\*, p-value  $> 0.05$  is not significant denoted as ns.

The overall analysis of the Table 5 is indicating that 59.3 % of the respondents **were satisfied with the food serving system** adopted in the jails, whereas 39.7 % of the respondents **were not satisfied with the food serving system** adopted in the jails.

However, 64.7 % of the respondents of Faridkot jail and 54.0 % of the respondents of Kapurthala jail were **satisfied with the food serving system** adopted in the jails. The **difference** of opinion was 10.7 % between the responses of two jails.

Nonetheless, 44.0 % of the respondents of Kapurthala jail and 35.3 % respondents of Faridkot jail **were not satisfied with the food serving system** adopted in the jails.

Statistically non-significant difference in the responses of two Jails was seen however, majority of respondents of Kapurthala and Faridkot jail were **satisfied with the food serving system** adopted in both the jails.

**Table 5.1: Variable wise effects**

Variable	Kapurthala Jail	Faridkot jail
Age	SIG	HSIG
Gender	HSIG	NS
Type of Convict	NS	NS
Qualification	HSIG	NS
Profession	NS	NS

Source: Combined responses and significance have been drawn from the primary data

**Significant effects** of three variables; Age, Gender and Qualifications were found in Kapurthala jail signifying that more of senior in age, female and illiterate respondents were **satisfied with the food distribution** system adopted in both the jails.

Nonetheless, Type of Convict and Profession variables had **shown non-significant** effects on responses in Kapurthala jail however, majority of the respondents were **satisfied with the food serving** system adopted in both the jails.

In Faridkot jail, **non-significant effects** were seen in all the variables, except Age variable, signifying majority of the respondents were **satisfied with the food serving** system adopted in both the jails.

**Significant effects** of Age variable were visible reflecting that more of senior in age respondents were **satisfied with the food serving** system adopted in both the jails.

**Finding:** + Majority of the respondents were satisfied with the food serving system adopted in both the jails.

**Observation:** Food serving goes by practice followed in both the jails. There was time when prisoners used to queue up to help self to get the food from the tables where it was placed. Since, the practice often ended in quarrels and fights so it has been done away with and has been replaced with a practice where they are served food in their barrack or cells only.

**Table-6: Are you satisfied with the Meal Menu of the Prison?**

	q20			Total	Chi-Square	p-value
	Yes	No	Don't Know			
Kapurthala	77	61	12	150	4.315	.116
	51.3%	40.7%	8.0%	100.0%		
Faridkot	94	49	7	150		
	62.7%	32.7%	4.7%	100.0%		
Total	171	110	19	300		
	57.0%	36.7%	6.3%	100.0%		

Source: Culled from Primary Data p-value  $\leq 0.05$  is significant denoted as\*, p-value  $\leq 0.01$  is significant denoted as\*\*, p-value  $> 0.05$  is not significant denoted as ns.

The overall analysis of the Table 6 is indicating that 57.0 % of the respondents **were satisfied with the Menu of the Prison**, whereas 36.7 % of the respondents **were not satisfied with the Menu of the Prison**.

However, 62.7 % of the respondents of Faridkot jail and 51.3 % of the respondents of Kapurthala jail **were satisfied with the meal menu of the prisons**. The **difference** of opinion was 11.4 % between the responses of two jails.

Nonetheless, 40.7 % of the respondents of Kapurthala jail and 32.7 % respondents of Faridkot jail **were not satisfied with the meal menu of the prisons**.

Statistically non-significant difference in the responses of two Jails was seen however, majority of respondents of both **Faridkot and Kapurthala jail were satisfied with the Meal Menu of the prisons**.

**Table 6.1: Variable wise effects:**

Variable	Kapurthala Jail	Faridkot jail
Age	HSIG	NS
Gender	HSIG	HSIG
Type of Convict	NS	SIG
Qualification	HSIG	NS
Profession	HSIG	NS

Source: Combined responses and significance have been drawn from the primary data

**Significant effects** of the four variables; Age, Gender, Qualifications and Profession were found in Kapurthala jail signifying that more of senior in age, female, illiterate and unemployed respondents **were satisfied with the Meal Menu of the prison.**

Type of Prisoner variable has shown non-significant effects on the responses, however, majority of the employees and unemployed respondents were satisfied with Meal Menu whereas farmers and businessmen were not satisfied with the Menu.

In Faridkot jail, **significant effects** were seen in two variables, Gender, and Type of Prisoner signifying that more of female and convicted respondents **were satisfied with the Menu.**

Further, in Faridkot jail, **Non-significant effects** of Age, Qualification and Profession variables were visible, however, majority of the respondents were satisfied with Meal Menu.

**Finding:** + Majority of the respondents were satisfied with meal menu of the prisons.

**Observation:** Meal menu is decided by the Food Committee of the jails which comprises of prisoners on the basis of their interest in the cooking and the management of the kitchen. Normally, seasonal vegetables are preferred for cooking. Pulses also cooked on certain days.

## [5] CONCLUSION

It is one of the major complaints of the prisoners that quality of food and diet is below standards. The raw-food and food is maggot infested and is not cooked properly. Some of the staff has been suspended for not caring for the food & diet standards. Drinking problem.....

Kitchens/Mess in the jails can be run on cooperative basis giving chance to the inmates to decide about their dietary and food quality and quantity. Out-sourcing can also be considered as an alternative to the cooking with quality to be ensured through medical staff of the jail.

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**DR. B. R. AMBEDKAR AND HIS PERSPECTIVES ON EDUCATION****C. Anjaneyulu**

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**ABSTRACT**

*Dr. B. R. Ambedkar is a reference book for knowledge. As a philosopher, historian, economic analyst, educationist, and father of Indian Constitution Ambedkar had assumed an extraordinary part to make present-day India. One could make himself/herself perfect when he/she would comprehend the perspectives of Ambedkar. The reason is such Ambedkar's life itself is a case of education, of the agitation, and of the organization. In this paper significantly I have focussed on Dr. Ambedkar's perspectives on education. The reason is that education is the only best way to enhance human values in unequal society. There are numerous other individuals, for example, Gandhi, Tagore, and Aurobindo Ghosh who also gave their valuable thoughts on education for an individual's all-round development. However, Ambedkar was the person who understands a point that without giving a reason-based education for all instead of religious-based education; it is difficult to make a man's overall improvement. In this paper, we shall examine Ambedkar's innovative perspectives on education and its related areas, for instance, curriculum. And finally, I conclude with a point that though the government is implementing Ambedkar's thoughts in the education system, still there is an essential necessity of the application of his thoughts in the present day education system.*

*Keywords: Education, Individual's all-round development, Curriculum.*

**1.0. INTRODUCTION**

Dr. Bhimrao Ramji Ambedkar is a reference book of knowledge. One may get information about the social structure of India when he/she could experience Ambedkar's perspectives on Indian culture. One may unmistakably comprehend Indian economy when he/she could comprehend the Ambedkar's thoughts on the Indian economy. What else remains, as a rationalist, a history specialist, an educationist, and the father of Indian Constitution Ambedkar had assumed an extraordinary part to make present-day India. One could make himself/herself consummate in the event that he/she would comprehend the perspectives of Ambedkar. The reason is such Ambedkar's life itself is a case of education, of the agitation, and of the organization. His student life shows us how a learner ought to be. His teaching life helps us how an educator ought to be. His struggle is for elevating cognizance of socially downtrodden and untouchables. And his battle for equivalent open doors for all individuals not on the premise of religion, caste-based hierarchy, ethnographical societies, and gender orientation yet on the premise of equality. Whatever point he had raised through his fortnightly, lectures, speeches, opinions on education, and through as a member of round-table meetings and parliament it would be only for the general people who are 'socially handicapped' in Indian culture with the name of backward classes, and with the name of untouchables, and with the name of gender. And it would be only for their social identity and equality in all aspects, for instance, the right to receiving an education.

In this paper significantly I have focussed on Dr. Ambedkar's views on education. The reason is that education has the capacity to eradicate discriminations which are strongly settled in society. And, education is the only way to improve human values in unequal society. There are numerous other individuals such as, Gandhi, Tagore, and Aurobindo etc., who also gave their valuable thoughts on education for individual's overall improvement, however, Ambedkar was the person who understands that without giving reason based training for all as opposed to religious-based training, it is difficult to make a man's all-round advancement. In a manner of speaking, whatever Ambedkar had fought, or suggested on different issues such as grants for education, compulsory education for children, hostel facilities for students, women empowerment, advanced education, teacher and student relationship and their obligations, and curriculum for modern education would inspire or wake up the awareness of socially oppressed individuals. And also, his recommendations would permit them to get equivalent open doors and would give them a social identity in the general public. One couldn't see this vision in other thinkers about whom I had said above. Directly one could see Ambedkar's philosophy and his perspectives on education in his 'Works and Speeches' (Vol. 2 & Vol. 3) (hereafter, W & S). In particular, we come to know by the readings of his recommendations and opinions on education in his writings such as 'On Grants for Education', 'On the Bombay University Act', and his significant replies to the questionnaire of 'University Reforms Committee.' However by implication also one can get the philosophy of Ambedkar on education by studying his life, and by the perusing of his works. Along these lines, it is essential to know his innovative thoughts on education for a better society. We would see all these imperative angles in further sections.

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## **2.0. AMBEDKAR'S BACKGROUND AND HIS EDUCATION**

It is sensible to give a brief background about Ambedkar since childhood impressions would play as a crucial role in a man's further life. Such type of impressions he had in his life, which makes him as a fighter against social disorders. He was born in untouchable Mahar family on April 14, 1891, in Madhya Pradesh. During his education in India, he had experienced a few revolting impressions which turn him to see the cruelty of the deeply settled caste system. It makes him as an iron will powered man to fight against ostensible disparities. He had finished his matriculation and B.A from Elphinstone School and college with the financial assistance of the king of Baroda. In India, amid the education period of time, Ambedkar had encountered the agonies of untouchability, and inclination in choosing fascinating subjects, for example, Sanskrit. He joined Columbia University in 1913 for higher studies. Amid the time of his M.A and Ph.D. at Columbia University, he shaped his personality as flawless with the assistance of famous educationist and savant John Dewey. There, Ambedkar unmistakably observed the contrast between the educational frameworks of India and America. In India, he saw by his own experience that the training framework intended to support segregations among individuals instead of to empower rational thought. In America, the instructional framework supports reason-based training as opposed to segregations. Ambedkar was inspired by this idea and he chose to utilize this technique to modify the education system in India. He had thought that it would be the correct strategy to destroy segregations in the society, and to elevating the consciousness of socially downtrodden classes, and also to provide equal opportunities. In Baroda, where he had joined for the job, he had confronted a similar issue of untouchability despite the fact that he was an extraordinary researcher. As working an educator in different colleges, for instance, Sydenham college, Ambedkar had been faced the problem of untouchability by the students and co-faculty. All these impressions could make Ambedkar as a person who battled his whole life for setting up social equality in society with the assistance of the right method of education.

## **3.0. THE SIGNIFICANCE OF EDUCATION**

As John Dewey said education is not for preparing life but life itself is an education. Ambedkar life itself is the best example of an education. Therefore, one cannot refute the significance of education in an individual's life. For Ambedkar, the correct method of education is the only best way to elevate the consciousness of socially weaker classes. When the system of education does not make capable of self-respect, do not teach equality between individuals, and do not bring moral values in an individual that arrangement of education would not at all right method of education. He said that that sort of instruction would stop the all-round progress of society. So better it should be singed. The correct method of education, for him, is 'to moralize and socialize the people' (Ambedkar, W & S Vol.2, 1982, p.39). For this, Ambedkar had suggested a triple word formula that 'Educate, Agitate, and Organize'. This formula was clearly proved by his life. He realized his condition in the unbalanced society through education. He agitates mentally to overcome all obstacles which are intentionally stopping the growth of socially weaker sections. And finally, he had established colleges and political parties to uplift weaker sections in the society. And one more interesting point we can observe that he rejects the possibility of favouritism in giving training where it is just for upper-class individuals. He asserted that 'education is something which ought to be brought within the reach of everyone' (Ambedkar, W & S, Vol.2, P.40). And, he was completely against to the idea of commercialization of education. He recommended that education should not cost full since the majority of people in India are not financially empowered. Therefore, education should be cheapened and come to in all conceivable approaches to every single one. With the help of above few points, we can clearly understand the significance of education in an individual's life and how Ambedkar gives importance to education.

## **4.0. THE AIM OF EDUCATION**

The aim of education was clear to him that it ought to develop the self-respective nature in an individual and to elevate consciousness about individual freedom. As indicated by him, education ought to act as an instrument to bring all-round improvement in every individual who is oppressed. The following points explain the aims of education as per Ambedkar's view:

### **4.1. Education for Social Identity**

His reasonable self-experience of untouchability in the Indian culture made him as a person who questions the authority of *Hindu* religion where the solid layers existed among individuals. The traditional education framework can just support to that social layers instead of reasonable intuition which inspires cognizance of the individual to identify themselves in the unequal society. As a disciple of John Dewey, Ambedkar unequivocally trusts that the only rationalistic thought and advanced education could provide social identity to depressed individuals in the Indian society.

#### 4.2. Education for Social Inclusion

Ambedkar knows extremely well that unless we can't stop the religious, caste, social and ethnic-based education which is originating from tradition, India couldn't accomplish the social advance where there is no inclination of all aspects what I have mentioned above. As per Ambedkar, disparity principle based education can't make a man as a self-regarded, cognisant about his living rights and individual freedom rather than inferiority, slavery, and unskilled ness. This is the motivation behind why Ambedkar emphasized the importance of modern education where would the reason plays a key role. He emphatically trusted that social inclusion would possible when Indian people should realize the importance of biased- less education. Equal opportunities for all and their protection with the help of law only would create such a helpful environment for social inclusion. Therefore he had created such a helpful environment with the help of fundamental rights in the Indian Constitution for the people who are socially avoided, suppressed and demoralized. For instance, Article-17 helps to dodge social exploitations. He believes that providing education for all is the only best way to protect individuals from the exclusion of social, financial and political. Therefore, he strongly suggests to the people that educate, agitate, and organize.

#### 4.3. Education for Equality

According to him, education ought to teach equality, and make the equivalent environment for all people to get equal opportunities and for their overall development. He recognised that making disparities among people is the one which is a great snag to social growth. And he showed clearly that how the rule of disparity in *Hindu* caste framework halting the growth of suppressed people as well as losing their choice of equal rights to get opportunities. To bring depressed classes to the level of equality he suggested a principle that 'the only remedy is to adopt the principle of inequality and to give a favoured treatment to those who are below the level' (Ambedkar, W & S, Vol.2, p.42). This positive discrimination or special treatment principle in the education system, he hopes, would eradicate all these dishonestly set up standards. For equality, Ambedkar toiled his whole life. All constitutional provisions which are protecting depressed classes from social discriminations are only the fruits of Ambedkar's struggle.

#### 4.4. Education for Power

Ambedkar was the person who knows extremely well the value of education and its significance to get the identity and the power in the public arena. He said, 'we must have a Government in which the men in power will give their undivided allegiances to the best interest of the country...it is only a government which is of the people, for the people and by the people that will make this possible' (Thorat, & Kumar, 2008, p.133). He believes that through legitimate education only suppressed classes would get socially and politically equal power. For that accomplishment, he acts as a lifetime delegate for the depressed classes to teach them through his lectures, and fortnightly papers such as *Mooknayak* and *Bahiskrit Bharat*. His collaborations with individuals, and establishes educational societies, and political parties, for instance, *The Scheduled Castes Federation*, would tell us his vision to give energy to individuals who are socially feeble. Also, one more important thing is that he had made a number of arrangements in Indian Constitution for providing power to socially impaired individuals, for instance, Article 330.

#### 5.0. THE RELATIONSHIP BETWEEN TEACHER AND STUDENT

Ambedkar's life as a student and as an instructor is the best case for all students and educators. Episodes had taken place in his life are the best examples to know how an educator ought to be, and how a student ought to be. A Brahmin educator, who had surname Ambedkar, had treated Bhimrao as a son. Dr. Bhimrao Ambedkar received Ambedkar as his surname, for the graciousness of his teacher. By this case, one could clearly comprehend Ambedkar's view on the relationship between a teacher and student. A teacher, for him, should be kind, tolerable, impartial, favorable to the student and play a key role in his growth. Another episode in his life demonstrates to us how a teacher ought to be that when Ambedkar passed his matriculation examination in uncomfortable and difficult conditions in the year 1907, his instructor K. A. Keluskar introduced a book which was about Buddha's biography. This book made Ambedkar as a man who sees the world with the eye of reason, and society as a whole. Plainly an instructor ought to empower a student as a rational being and ought to make student as a man who serves for society well-being. An instructor ought to set up appropriate conditions to student's physical, mental and social development and advancement. In his student life, Ambedkar had seen such kind of environment at Columbia University where he makes himself as an intellectual researcher and an educationist under the considerable effect of famous educationist and scholar John Dewey. Ambedkar suggests that a teacher should always connect with research, upgrade everyday realities and design new techniques in education framework to hone student's reasoning power and to turns him towards right decision making. An instructor ought to work for the student to build up the attitudes of argumentative, and to make clear based conclusions, and to experience a society beyond the eye of religion, culture, and caste-based suppositions or

convictions. Ambedkar, as a student and as an educator, invested a greater part of the energy in his life to destroy the disparities in society, and to educate individuals to accomplish the condition of equality. As an educator, he had suggested to the students that they ought to educate and create a new modern India where there are no social discriminations and exploitations among the people.

#### **6.0. FREE AND COMPULSORY EDUCATION**

As we have seen in preceding paragraphs, Ambedkar himself is against to commerciality of education. For him, introducing business values in the education system is nothing but intentionally halting certain individuals to receive education, and to strengthening. He had keenly analyzed the financial and social status of India. Therefore, he strongly recommended that education should be cheapened (free availability) for all with free of cost. Cheapened for all in the sense, at least it should be free for school level education. Today we are enjoying the fruits of Ambedkar's struggle that free and compulsory education for each of the 6-14 years boy/girl. He emphasized free education to all since we have diverse groups in India which are socially discouraged and monetarily poor. In the event that education is business, India could never achieve a certain condition of society where there are no social boundaries to individual development in all measurements. Each youngster has the right to receive free education on the premise of equivalent open doors for all as opposed to on the premise of religion, caste, societal position, and geological differences. For this accomplishment, Ambedkar had fought with a great deal to give adequate assets to school level education by the legislature. He underlined, to lessen the dropouts from primary schools and secondary schools the best arrangement is that the government should mind and spend more money on school level education. In his view, a kid dropping from school is nothing but what we have effectively spent on him/her is a misuse of cost. He gives a justifiable explanation behind spending adequate money on primary education that 'to spend more money on primary education if nothing else at least for the purpose of seeing that what he spends bears some fruit ultimately' (Ambedkar, W & S, Vol.2 p.40). And likewise, he suggests that rather than providing a scholarship to the student (he thought, it is simply wasting money), it is ideal to provide hostel facilities to the students. The reason is that he said, 'The depressed class parents are too poor, too ignorant, to understand that the help given by government is really the help for the education of the child' (Ambedkar, W & S, Vol.2, p.44). And additionally, he expected that the boy/girl of the oppressed class might be grown-up in a malevolent arrangement of the environment. Ambedkar's claim is correct in the light of the fact that providing hostels with good facilities to a boy/girl would help the student for all-round development. His vision of right to education for all brought into the form of Act (RTE) on April 1, 2010, by the Indian government. His concerns about children, and their educational care, and protection from mistreatment we can understand through other safeguards such as Articles 23, 24 and 45 which mainly concern for children protection and their all-round growth. These are the main and few focuses I have taken from Ambedkar's perspectives on free and compulsory education.

#### **7.0. ON WOMEN EDUCATION AND STRENGTHENING**

Disparities in social status among caste are one confinement, and disparities among gender are another confinement to social progress. In India, these two are so-called problems. Backward classes and untouchables treated like animals, so to speak, lesser than animals. But, the position of women in those days, in the era of Ambedkar, was exceptionally poor than depressed class. They were treated not as an animal but as an artifact which satisfies the needs of men. Education, those days, was just for upper layer individuals that as well, just for men not for women. Government's activities were likewise extremely poor. One can unmistakably comprehend the condition of those days how the educational framework was, and how the poor condition of girl's education was. If one could take a gander at what Ambedkar had raised to the Minister for Education on twelfth March 1927 that 'the Government of India on the progress of education goes on at the rate at which it is going on today it will take 40 years for boy and 300 hundred years of girls of school going age to be brought under education' (Ambedkar, W & S Vol.2, P.39). It is one of the cases of how those days a girl's condition was. Ambedkar as a man who not just works for expelling inconsistencies from social hierarchical layers, he likewise tries to inspire the cognizance of women in the society. We can say without hesitation that Ambedkar is a feminist from the feminist perspective. He had explained very clearly in his writings '*The Women and The Counter Revolution*' how a woman was degraded in the period of Manu. A woman has no right to get the property, education, etc. A wife has no right to bring an action in a court of law against her husband. Ambedkar said that the condition of a woman was better in pre-Manu days. She was a free and equal partner of a man (Ambedkar, W & S, 1987, Vol.3). He opined that unless women would be taught social progress is unthinkable; since an educated woman could make an educated family. Therefore, he addressed many issues related to women and their strengthening in his writings, and through his speeches. While addressing women of depressed classes on 18 July 1927, he stressed the importance of cleanness, female education, and family planning. He tries to motivate women to fight against anti-women practices, for instance, child marriages. And also, he unequivocally insists that a girl

has an equivalent right to get education like a boy. He believes women empowerment would plausible when they would develop the qualities of leadership, financial freedom along with a man. Some of the constitutional provisions are the best examples to know how Ambedkar thinks about women's strengthening. Articles 15, 15(3), 16, and 39(a & b) etc., are the some of the safeguards which prohibit the disparities on the ground of sex in different domains such as in the matter of getting education, in the matter of public employment, in the matter of payment for equal work, and in the matter of getting seats in elections. These are the only few examples. There are a number of other safeguards which protect the dignity of women.

### **8.0. ON HIGHER EDUCATION**

Worked as an educator, Ambedkar had a perfect vision of advanced education. He had wilfully worked for discouraged classes and for their enlightenment. Along these lines, he strongly proposed that education must be cheapened in all conceivable ways. What's more, his thoughts on advanced education are that education ought to be suited to adults, and it should inspire the mental endeavours of the individuals. He says 'that it is scientific, detached and impartial in character' (Ambedkar, W & S, Vol.2 p.296). For him, education should make learner's brain as logical and helps to detach from superstitions and religious doctrines, and finally, it should be far from partiality. And also, advanced education should develop a logical state of mind as well as it should be beyond the mere theories and facts. That means that it ought to set up a person as a critical thinker, and a perceiver of the value of truth which underlies in the concept. Advanced education ought to urge the learner to differentiate 'what may fairly be called a matter of fact and what is certainly a mere matter of opinion' (Ambedkar, W & S, Vol.2, p.296). The reason is that he had observed the prejudices in the orthodox educational framework where individuals had a feeling on the sacred writings and took after as indicated by their sentiments instead of reality. In this manner, he had envisioned that advanced education should beat these all biases. Furthermore, it ought to urge the learner to analyze and take a look at into it with a profound eye before accepting or rejecting any hypothesis or recommended thought. Ambedkar had an opinion that education ought to energize unique research limits in researcher that the analyst must be equipped for assessing confirmation to follow or condemn contentions. And the student should ready to give his/her own responses. The government has to take responsibility to create such an environment for an individual through advanced education. And also, one all the more intriguing thing he said in regards to universities that universities should take the responsibility of undergraduate levels for their proper functioning. The reason is that healthy relations and good communications between these two levels deliver ability-full personalities to the society. He said, 'If freedom for the teacher can be obtained then freedom for the learner will follow' (Ambedkar, W & S Vol.2, p.311). Ambedkar unequivocally stressed that advanced education, particularly universities, ought to maintain the top-notch libraries. Along with these, character improvement in a student is one of the principal elements of advanced education. Consequently, Ambedkar believes that these qualities of advanced education would make genuine democratic India.

### **9.0. EDUCATIONAL GRANTS FOR ADVANCED EDUCATION**

Dr. Ambedkar had examined the poor condition of advanced education in India especially in the case of Science and Technology. The enrolment and sustaining of depressed classes in Science and Technology courses were very poor. He said, 'The status and condition of the Scheduled Castes will be improved only when the representatives of the Scheduled Castes come to occupy Executive posts...' (Thorat & Kumar, 2008, p.224). Therefore, Ambedkar had suggested to the government of India that to improve the status of depressed classes government should give financial assistance to depressed classes for sustaining in advanced education particularly in the Science and Technology courses. And also, the government should provide facilities to empower their skills through training. If following points would observe, one could understand easily that how Ambedkar gives importance to Science and Technology courses and its importance to depressed classes. His proposals are;

- 1) An annual grant of 2 lakh rupees for scholarship for SC students who take Science & Technology courses,
- 2) One lakh rupees for SC students who take Science and Technology courses in foreign countries,
- 3) Provisions for SC students in the School of Mines,
- 4) The grant of free-ships
- 5) Apprenticeships in government printing presses and Railway workshops.

### **10.0. THE MEDIUM OF INSTRUCTION**

Ambedkar explicitly recommended that medium of guideline ought to be in 'vernacular'. Be that as it may, he couldn't obviously pronounce which dialect could be better for common intercourse since India has more than

twenty dialects. He said, 'It cannot be solved unless Indian public opinion decides...' (Ambedkar, W & S Vol.2, p.312). Like other thinkers such as Gandhi, it is clear for Ambedkar that mother language for primary and secondary levels is best since a kid could have more acquainted with native language to get information, and to build up the understanding limit with effortlessness. For advanced education, he might not be preferred mother tongue despite the fact that he gives the opinion in his timeframe that unless colleges receive vernacular as the medium of instruction, the spread of education would be impossible. He might give preference to a language which helps to communicate and get knowledge in international level.

### 11.0. CURRICULUM

The educational curriculum is the one which plays an essential role in a person's life to make capable and to build up the great character and social behavior. Ambedkar had recommended that educational programs ought to be far from religious sentiments and it ought to persuade student towards sane thought. Scientific methods should be followed in educational programs instead of unimportant convictions and superstitions. He opined that science and technology, agriculture, fine arts, and music should make a university as a full-fledged university (Ambedkar, W & S Vol.2, P. 311). He had recommended a very interesting point that the four years postgraduate degrees for social sciences. These four years was partitioned into two phases: two years for M.A degree and two years for a Ph.D. degree. And educational modules ought to consider students' major interests. In the view of Ambedkar, student's acumen should not construct just in the light of the composed examinations but rather likewise oral examinations. The reason is that he may be pondered those just composed examinations would not be mastery student. And likewise, he had preferred vocational based education should be adequate than theory based since it would supportive to the weaker sections of the society for their social and financial development. As indicated by Ambedkar, an educational program which has these characteristics could make an equivalent situation among the general population for their multifaceted development.

### CONCLUSION

So far we have discussed Ambedkar's perspectives on education. Many years passed into the time cycle after the independence of India. However still today also we are remembering and revisiting of Ambedkar and his works to get inspiration for working against disparities which have been continuing and troubling social growth. Today, we are getting opportunities in different sectors, for instance, employment. This possibility has been taking place because of Babasaheb's struggle and his advanced thoughts on different issues in society, for instance, social incongruences. We are all must owe to Ambedkar forever. As we have seen in the above paragraphs Ambedkar was the one true thinker among others who worked for depressed classes, and for their progressive life. His views on education at different levels have been taking an important place in day to day changes in the education system. Free and compulsory education, right to receive education, hostel facilities for socially depressed pupils, reservations according to social backwardness, and scholarships to students are few progressive changes in today's education system in India. Along with these, some other happiest progressive changes have been taking place in different aspects, for instance, the social identity of depressed classes. But still, discriminations have been continuing at different levels such as gender, religion, caste etc., which problems are deeply rooted. And, one another indigestible problem has been facing Indian education system that is the commercialization of education which is completely against to Ambedkar's vision. Already we have seen that Ambedkar had strongly recommended that education should be available with free of cost in all possible ways. Instead of that, today's governments have been opening doors to corporate education which intentionally creates a huge gap among people. Anyhow, if we would follow strictly the visions and principles of Dr. Ambedkar we could get a chance to see our India without discrimination.

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## A SNAP SHOT ABOUT MUDRA (MICRO UNITS DEVELOPMENT REFINANCE AGENCY) - ANOTHER FACE OF INCLUSION IN KERALA

Benny C

### ABSTRACT

*Micro Units Development Refinance Agency (MUDRA) is a development finance agency that will promote and finance those micro industrial units in the country. MUDRA scheme was launched in 2015 envisaging that this scheme will prove as game changer. Under this scheme loan in three categories i.e. Shishu, Tarun and Kishore was provided to individuals and firms without any collateral security or third party guarantee.*

*Keywords: Financial Inclusion, Loan, Micro Units, Micro Finance, Yojana*

### INTRODUCTION

The Union Budget presented by the Hon'ble Finance Minister ShriArunJaitley, for FY 2015-16, announced the formation of MUDRA Bank. Accordingly MUDRA was registered as a Company in March 2015 under the Companies Act 2013 and as a Non Banking Finance Institution with the RBI on 07 April 2015. MUDRA was launched by the Hon'ble Prime Minister ShriNarendraModi on 08 April 2015 at a function held at VigyanBhawan, New Delhi.Prathan Mantri MUDRA (Micro Unit of Developmentand Refinance Agency) Yojana is a potential step of promotion of financial inclusion in India.Financial inclusion is widely recognized as one of the most important engines of economic development. Its contributions to GDP, individual and social welfare, and business creation and expansion – particularly small and medium enterprises – have been amply documented. The benefits of financial inclusion for the poor are extremely significant. Indeed, access to formal financial institutions allows poor households to expand consumption, absorb disruptive shocks, manage risks and invest in durable goods, health and education. The evidence further demonstrates that deeper financial intermediation helps improve income distribution. Financial inclusion is indispensable for development. Financial inclusion is making available financial services, particularly banking services to poor. Overall financial inclusion level of India is very low but the states in the south are having good financial inclusion. For increasing financial inclusion general literacy campaign together with financial literacy, branch penetration, deposit and loan penetration are required .Setting up of the MUDRA Bank was announced as part of the Union Budget proposals for financial year 2015-16, while its conceptual vision was announced earlier by the Indian Prime Minister as part of PM MUDRA Yojana a scheme for funding the unfunded. To remove the financial difficulties faced by micro and small business units the government of India launched a scheme on 8th April 2015 called Micro Unit Development and Refinance Agency, or MUDRA to „funding the unfunded“. MUDRA is still not a fully-fledged bank and is in its initial stages. Mudra Bank will associate with local coordinators and provide finance to “Last Mile Financiers” of small/micro businesses. It is envisaged that the measures to be taken up by MUDRA shall be targeted towards mainstreaming skilled workers educated youth and entrepreneurs, apart from NCSBS, who lie between the very poor small borrowers like farmers, low income households, and migrant work force at one end and very poor small borrowers like low income households, farmer, migrant work large industrial credit seekers force at the other end of financing spectrum. It is not a direct lending institution but provides loans at low rates to banks, microfinance institutions and non-banking financial institutions, which then provide credit to MSMEs or informal enterprise sector.

### REVIEW OF LITERATURE

Gupta & Chotia (2014) conducted a study on the level of financial inclusion in 28 states and 6 union territories of India. The study revealed a positive relationship between GDP, Human Developmental Index (HDI) and financial inclusion i.e., the states with high financial inclusion is also having high GDPand HDI Sahu (2013) studies financial inclusion level of the states in India and also on the relation between financial inclusion and socio economic variables. He found that only Chandigarh and Delhi was having medium level of financial inclusion. All other states in India are categorized under low financial inclusion states. India for the development of financial inclusion, financial education is to be improved and banks should take banking as an opportunity for increasing the financial inclusion rather than a business prospective.Rudrawa and Uttarwar(2016)mentioned PMMY can bring a grate progress among the people if the financial facilities arranged at the lower level. But it should be with less legal formalities. There for the lower level people can avile the finance easily; MUDRA will play a critical role for the development of entrepreneurship and help to develop employment.

### OBJECTIVES OF THE STUDY

a) To know about Micro Units Development Refinance Agency



- b) To know about the products offered by the MUDRA
- c) To evaluate the performance of MUDRA Scheme in Kerala

### **RESEARCH METHODOLOGY**

The study is based on secondary sources of data/ information. Different books, Economic survey, newspapers and relevant websites have been consulted in order to make the study an effective one.

### **MUDRA AN OVERVIEW**

Micro Units Development & Refinance Agency Limited (MUDRA) and Pradhan Mantri MUDRA Yojana (PMMY) were launched on 08 April 2015 by the Hon'ble Prime Minister, Shri Narendra Modi. The guidelines of PMMY issued by Department of Financial Services (DFS), GOI indicated that all banks are required to lend to micro enterprises engaged in manufacturing, processing, trading and service sector activities, for a loan upto ` 10 lakh. Further, it was also advised that the loan may be given in three categories, i.e. Loan upto ` 50,000 under Shishu; ` 50,000 to ` 5 lakh under Kishor; and ` 5 lakh to ` 10 lakh under Tarun. Also, it was envisaged that more focus will have to be given for the Shishu category. A target of ` 1,22,188 crore was set for F.Y. 2015- 16.

It was decided that MUDRA will monitor the progress of PMMY. The National Bank for Agriculture & Rural Development (NABARD) was also advised to closely monitor the progress of RRBs, as RRBs are under supervisory domain of NABARD. In order to make the monitoring more effective, a dedicated portal [www.mudra.org](http://www.mudra.org). in was put in place to capture the data on the performance under PMMY on a weekly basis to have consolidated data of nationwide disaggregated retail transactions details, including data on new entrepreneurs, women entrepreneurs, SC/ST, Minority, MUDRA card etc. The data so collected was analyzed and reported to GOI. The progress was closely followed up with the banks for improvement, if any. A team of officers at 'Mission Mudra' was constituted and placed with DFS for an overall supervision and follow up of the programme on behalf of GOI. Subsequently, it was also decided that the MUDRA loans given by MFIs also needs to be captured as most of the MFIs are MUDRA partners. Accordingly, MFIN was given the responsibility for following up with the NBFC- MFI and getting their data on the portal. Similarly, Sa-Dhan was made responsible for collecting the data and onboarding the same for the non NBFC MFIs. In order to give a boost to the lending under PMMY, especially for Shishu category loans, a credit campaign was carried out from 1st September 2015 to 2nd October 2015. The campaign culminated in mega credit camps in different locations in the country from 25th September 2015 to 02nd October 2015. In order to enhance the awareness of the programme, MUDRA carried out a month long publicity campaign, on behalf of DFS, through print media and Radio. The credit campaign resulted in lending to 22.50 lakh borrowers as against a target of 25 lakh borrowers and lent ` 4120 crore.

### **ROLE OF MUDRA**

- Registration of micro finance institution entities
- Accreditation and rating of micro finance institutions
- Laying down policy guidelines for micro enterprises financing business
- Laying down responsible financial practices to ward off over indebtedness and ensure proper client protection principles and methods of recovery
- Development of standard set of covenant governing last mile lending to micro enterprises
- Promoting right technology solutions for financial delivery to the last miles
- Supporting development and promotional activities in the sector.
- Creating a good architecture of last mile credit delivery to micro business

### **MUDRA CARD**

Mudra card is an innovative product designed for the purpose of providing flexibility and easy accessibility of credit. Mudra card would be a overdraft limit which could be operated by a Rupay based debit card. The card could be issued directly by the banks or in association with MFI's. The Mudra Card would be co branded card between MUDRA, the banks and the MFI's. MUDRA would provide credit guarantee and credit enhancement support to the product

### **PRODUCTS**

Refinance product for the micro units having loan requirement up to Rs 10 lakh with special focus on micro credit. MUDRA will be providing refinance to micro business funded under Pradhan Mantri MUDRA

yojana. The other products are for development support to the sector. The bouquet of offerings of MUDRA is depicted below. The offerings would be targeted across the spectrum of beneficiary segments.

Under the aegis of Pradhan Mantri MUDRA Yojana, MUDRA has already created its initial products. The interventions have been named “Shishu”, “Kishor” and “Tarun” to signify the stage of growth and funding needs of the beneficiary micro units and also provide reference point for the next phase of graduation to look forward to

- Shishu: Covering Loan Up to Rs 50000/-
- Kishor: Covering Loans Above Rs 50000 And Up to Rs 500000
- Tarun: Covering Loans Above Rs 500000 lakh And Up to Rs 10 lakh

It would be the endeavor of MUDRA that at least 60% of the credit goes to shishu

Category units and the balance to kishor and Tarun categories.

#### **Table showing the loan sanction and disbursement of PRADHAN MANTRI MUDRA YOJANA in KERALA From 2015-2018**

The following tables make clear the growth of Mudra schemes and its product. The growth of three years are mentioned below. With the passage of each year the demand for Mudra products also increased.

	SHISHU(Amounts Rs.in Crore)		
	2015-2016	2016-2017	2017-2018
<b>NO of Sanctions</b>	707492	775022	2035426
<b>Sanctioned Amount</b>	1430.63	1827.67	3219.71
<b>Disbursement</b>	1414.08	1782.74	3167.46

	KISHOR(Amounts Rs. in Crore)		
	2015-2016	2016-2017	2017-2018
<b>NO of Sanctions</b>	107975	189329	225274
<b>Sanctioned Amount</b>	2251.71	3063.00	4033.16
<b>Disbursement</b>	2194.29	3007.96	3971.94

	TARUN(Amounts Rs.in Crore)		
	2015-2016	2016-2017	2017-2018
<b>NO of Sanctions</b>	4183	17909	29105
<b>Sanctioned Amount</b>	344.43	1397.95	2207.09
<b>Disbursement</b>	318.88	1349.75	2143.16

Source: www.mudra.org

#### **CONCLUSION**

The study conclude with major point behind the financial inclusion is to cover all segments of the population under monetary administration. MUDRA plays an important role in achieving the success of financial inclusion. MUDRA is framed to accomplish the objective of “FUNDING THE UNFUNDED”. To create an inclusive, sustainable and value based entrepreneurial culture these kind of schemes are necessary. Within the frame work and overall objectives of development and growth of Shishu, Kishor and Tarun units, the products being offered by MUDRA at the rollout stage have been designed to meet requirements of different business activities as well as business segments.

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## SOFTWARE RELIABILITY GROWTH MODEL BASED ON EXPONENTIAL ORDER STATISTICS DISTRIBUTION

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### ABSTRACT

In this paper, Exponential Order Statistics distribution is created and its parameters are estimated by unconstrained optimization technique. Software reliability growth Model is developed based on this distribution. A dataset is assumed to follow Exponential Order Statistics distribution. Maximum likelihood values at all orders are estimated and for the maximum out of it, software failure detection is done for the corresponding dataset.

**Keywords:** Exponential distribution, Order Statistics, Unconstrained Optimization Technique, Non-Homogeneous Poisson Process (NHPP), Statistics Process Control (SPC).

### 1. INTRODUCTION

Software Reliability [6] is defined as the probability that a software system operates with no failure occurring for a specified time on specified operating conditions. Assessing software reliability and thereby maintaining software quality during software development and software usage is most important. Software Reliability Growth Models (SRGM) can be used to test software reliability. These models detects the software failure which can be eradicated and hence increasing the life time of the software which in turn increases the reliability of the software too.

If a random variable  $X$  is exponentially distributed, it has the probability density function

$f(x) = be^{-bx}$  where  $x \geq 0$ ,  $b > 0$ ,  $b$  is the rate or inverse scale parameter. Its corresponding cumulative distribution function is  $F(x) = 1 - e^{-bx}$ . Let us suppose that  $(X_1, \dots, X_n)$  are  $n$  jointly distributed random variables. The  $X_i$ 's are arranged in increasing order is its corresponding order statistics. Thus  $X_{1:n} \leq X_{2:n} \leq \dots \leq X_{n:n}$ . An attractive expression for the joint density of the order statistics[5] corresponding to independent and identically distributed sample from an absolutely continuous distribution with density  $f(x)$  is

$$f_{X_{1:n}, \dots, X_{n:n}}(x_1, x_2, \dots, x_n) = n! \prod_{i=1}^n f(x_i), -\infty < x_1 < x_2 < \dots < x_n < \infty \text{ Non-Homogeneous Poisson Process (NHPP)}$$

models are also termed as fault counting models. Depending on the specification, the models can be categorized as finite and infinite failure models. In this model, the number of failures follows NHPP distribution. Based on the NHPP assumptions, the failure intensity function  $\lambda(x)$  is defined as  $\lambda(x) = af(x)$  where 'a' is the expected number of failures and  $f(x)$  is the probability density function of  $X$ . Mean value function is  $m(x) = aF(x)$  where

$$F(x) \text{ is the cumulative distribution function of } X \text{ and } a = \frac{n}{F(x_n)}.$$

Monitoring the failure occurrence process using the time chart is straightforward [7]. To calculate the control limits of the  $X_r$ -chart, the exact probability limits will be used. If  $\alpha$  is the accepted false alarm risk then the upper control limit,  $UCL_r$ , the central line,  $CL_r$  and lower control limit,  $LCL_r$  can be easily calculated using

$$F(UCL_r, r, \lambda) = 1 - \alpha / 2$$

$$F(CL_r, r, \lambda) = 0.5$$

$$F(LCL_r, r, \lambda) = \alpha / 2$$

if the random variable is taken as representing inter failure time of a device, a control chart for such a data would be based on 0.9973 probability limits of the times between failures. These limits and the central line are respectively the solutions of

$$F(UCL_r, r, \lambda) = 0.99865$$

$$F(CL_r, r, \lambda) = 0.5$$

$$F(LCL_r, r, \lambda) = 0.00135$$

If the plotted point falls below the LCL, it indicates that the process average or the failure occurrence that may have increased which results in a decrease in the failure time. This means that process may have deteriorated and thus actions should be taken to identify the causes, which may be removed.

Goel and Okumoto [9] presented Goel and Okumoto imperfect debugging model which is a stochastic model based on Non-Homogeneous Poisson Process (NHPP). Akilandeswari V.S., Poornima R. and Saavithri V. developed a software reliability growth model based on Lehmann-type Laplace distribution-I[2]. Akilandeswari V.S., Poornima R. and Saavithri V. used Lehmann-Type Laplace distribution Type II (LLD-II)[1] SRGM to test Software Reliability which had a better fit for software failure data than Goel-okumoto, Weibull, Exponential Geometric, Pareto III, Lehmann-Type Laplace distribution Type I (LLD-I)distributions. Akilandeswari V.S., Poornima R. and Saavithri V developed Lehmann-Type Laplace distributions –Type I and Type II[3,4] software reliability growth models too.

In this paper, software reliability growth model is developed in section 2 with its parameter estimation. In section 3, software failure data analysis is performed and paper is concluded in section 4.

## 2. SOFTWARE RELIABILITY GROWTH MODEL

### 2.1 Exponential or Goel-Okumoto Order Statistics SRGM

Let  $X_1, X_2, \dots, X_n$  be random variables representing a sample of size  $n$  cumulative time between failures. Let  $X_{1:n}, X_{2:n}, \dots, X_{n:n}$ , be the original random variables so that  $X_{1:n} \leq X_{2:n} \leq \dots \leq X_{n:n}$ .

The probability density function of Goel-Okumoto (or) Exponential  $r^{\text{th}}$  order statistics is given by

$$f_{r:n}(x) = r \binom{n}{r} b(e^{-bx})^{n-r+1} (1 - e^{-bx})^{r-1} \quad \dots (2.1)$$

where  $x \geq 0, b > 0, 1 \leq r \leq n$ ,

The cumulative distribution function is

$$F_{r:n}(x) = \sum_{i=r}^n \binom{n}{i} (e^{-bx})^{n-i} (1 - e^{-bx})^i \quad \dots (2.2)$$

### 2.2 Parameter estimation

Method of Maximum likelihood is used to estimate the parameter  $b$ .

The likelihood function of Goel – Okumoto order statistics is

$$l = \prod_{i=1}^n r \binom{n}{r} b [e^{-bx_i}]^{n-r+1} [1 - e^{-bx_i}]^{r-1} \quad \dots (2.3)$$

The log – likelihood function is

$$\log l = \log \left[ \prod_{i=1}^n r \binom{n}{r} b [e^{-bx_i}]^{n-r+1} [1 - e^{-bx_i}]^{r-1} \right] \quad \dots (2.4)$$

Using unconstrained optimization technique, the maximum of ‘log  $l$ ’ is found.

## 3 SOFTWARE FAILURE DATA ANALYSIS

### 3.1 NHPP model for Goel – Okumoto order statistics SRGM

The mean value function for this SRGM, from (2.2), is

$$m(x) = a \left[ \sum_{i=r}^n \binom{n}{i} (1 - e^{-bx})^i (e^{-bx})^{n-i} \right] \quad \dots (2.5)$$

The intensity function, from (2.1), is

$$\lambda(x) = abr \binom{n}{r} (e^{-bx})^{n-r+1} (1 - e^{-bx})^{r-1} \quad \dots (2.6)$$

Here, the expected number of failures, using (2.2), is given by

$$a = \frac{n}{\sum_{i=r}^n \binom{n}{i} (1 - e^{-bx_n})^i (e^{-bx_n})^{n-i}}$$

### 3.2 Control Mechanism

#### Dataset1

##### 3.2.1 Cumulative time between failures

Failure Number	Time between failure times in CPU units	Cumulative time between failures
1	5.5	5.5
2	1.83	7.33
3	2.75	10.08
4	70.89	80.97
5	3.94	84.91
6	14.98	99.89
7	3.47	103.36
8	9.96	113.32
9	11.39	124.71
10	19.88	144.59
11	7.81	152.4
12	14.59	166.99
13	11.42	178.41
14	18.94	197.35
15	65.3	262.65
16	0.04	262.69
17	125.67	388.36
18	82.69	471.05
19	0.45	471.5
20	31.61	503.11
21	129.31	632.42
22	47.6	680.02

##### 3.2.2 Maximum likelihood values for Goel Okumoto order statistics distribution at all possible values of $r$

$r$	Maximum Likelihood Value
1	-141.9897
2	-145.6434
3	-153.0241
4	-161.8277
5	-171.3666
6	-181.3337
7	-191.5572
8	-201.9232
9	-212.3441
10	-222.7430
11	-233.0439
12	-243.1639
13	-253.0054
14	-262.4467
15	-271.3277
16	-279.4291
17	-286.4356

$r$	Maximum Likelihood Value
18	-291.8709
19	-294.9678
20	-294.3766
21	-287.3644
22	-266.5676

3.2.2 gives maximum likelihood values for Goel Okumoto Order Statistics at different values of  $r$ .

It is inferred from 3.2.2 that maximum likelihood value is obtained when  $r = 1$ .

Thus Goel Okumoto order statistics SRGM program is run for  $r = 1$ . It gives the following output.

3.2.1 gives the cumulative time between failures.

Parameter,  $b = 1.9445 \times 10^{-4}$

Expected number of failures,  $a = 23.2687$

3.2.3 gives the mean value function at all failure numbers and its successive differences.

### 3.2.3 Successive differences of mean value function

Failure Number	Mean value function $m(x)$	Successive differences of $m(x)$
1	0.5411	0.1772
2	0.7183	0.2637
3	0.9821	5.8301
4	6.8122	0.2751
5	7.0872	1.0044
6	8.0917	0.2236
7	8.3153	0.6238
8	8.9391	0.6815
9	9.6206	1.1127
10	10.7333	0.4119
11	11.1452	0.7336
12	11.8788	0.5431
13	12.4219	0.8442
14	13.2661	2.4379
15	15.7040	<b>0.0013</b>
16	15.7053	3.1453
17	18.8506	1.3164
18	20.1670	<b>0.0060</b>
19	20.1729	0.3916
20	20.5645	1.1490
21	21.7135	0.2865
22	22	-

Control limits,

$$UCL = 23.2373$$

$$LCL = 0.0314$$

$$CL = 11.6344$$

Figure 3.1 gives the Mean value chart for Goel-Okumoto Order Statistics SRGM when  $r = 1$ . From the graph it is found that failures of the corresponding software are detected at failure numbers 15 and 18 when Goel-Okumoto Order statistics SRGM is used.

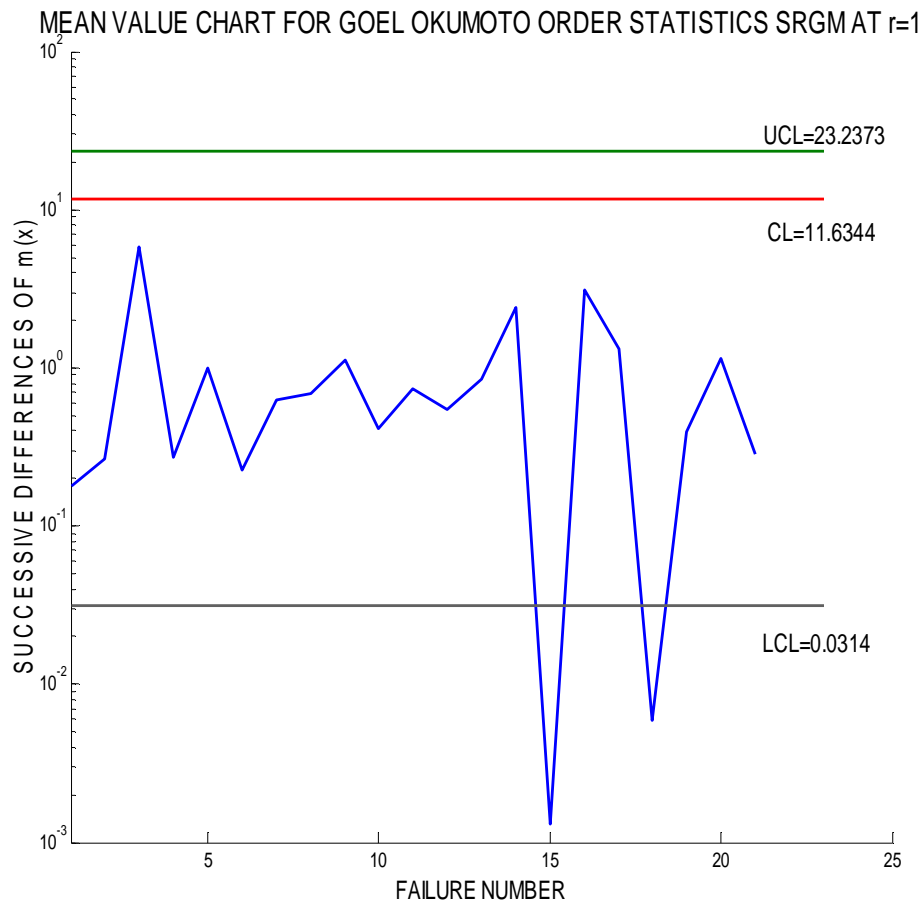


Figure-3.1

#### 4. CONCLUSION

Here Exponential Order Statistics Software reliability growth model is developed and it is tested for a dataset. Parameters are estimated using unconstrained optimization technique and maximum likelihood values at all orders are evaluated. The maximum out of this is found to be at the I order and hence the software failure detection is done for I order statistics of Exponential distribution and it is detected at two failure points 15 and 18.

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## EMPRICIAL STUDY ON IBM SECURITY GUARDIUM BIGDATA IN GENERAL DATA PROTECTION REGULATION

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### ABSTRACT

*To develop data reliability security within and external companies, a new kind of software information significantly in 2018 corporate spending plans. Gartner estimated that worldwide enterprise security spending will reach \$96 billion this year -- an 8% increase over last year. Security services will report for more than partly of all security expenses, with infrastructure protection a distant second. The major expenses enlarge over last year belongs to identity and access management. In this research paper, the study of proficiently recognize safety and fulfillment risk connected with GDPR-related data using cloud-based data discovery, data classification, and vulnerability scanning with IBM Guardium Big Data to secure the data with clouds..*

**Keywords:** GDPR, SIEM, BIGDATA

### I. INTRODUCTION

There's also a budge among IT leaders in the direction of endpoint finding and reaction as well as user entity and deeds analytics, according to Gartner. That development will disturb fixed markets such as endpoint security platforms and security information and event management (SIEM). Nevertheless, SIEM, along with protection testing and IT outsourcing, will be among the fastest-growing security sub segments driving growth in the infrastructure security and protection services. In addition to cyber attacks, data breaches and the budge to digital business strategies, the research firm cited U.S. seclusion and protection laws, together with the Health Insurance Portability and Accountability Act and the National Institute of Standards and Technology as well as the European Union's impending General Data Protection Regulation (GDPR), to be surrounded by the most important reasons for enlarged venture security spending in 2018. GDPR, according to TechTarget's study, is on the wide initiatives radar screen for 8% of North American companies as they prepare for the impact of the regulation's May 25 debut[2]. Generally, a huge part of protection expenses is determined by an organization's effect in the way of protection breaches as extra high-profile cyber attacks and data breaches involve organizations worldwide.

### II. LITERATURE SURVEY

Big data and business analytics peak the record of wide business initiatives this year, according TechTarget's "2018 IT Priorities Survey" of North American companies[1]. Specifically, their premeditated software purchases consist of cloud-based applications, business analytics and intelligence, big data processing and management, data integration, artificial intelligence and data visualization[1].



Figure-1: Big Data Security Spending shows strong gains

More than the precedent two years, increases in protection costs have risen radically, and by 2020, Gartner predicted that approximately double as many organizations (60%) will spend in various data security tackle to assist reinforce data integrity security, as well as data thrashing prevention, encryption, and data-centric audit and protection tools. Forrester surveys point out that 74% of global enterprise protection knowledge decision-makers place a elevated or grave main concern on civilizing protection monitoring, and a good part of them have implemented or are growing their accomplishment of protection in sequence managing and security analytics.

Security software spending is up compared to last year

	2017	2018	INCREASE
Security services	\$53.1 B	\$57.7 B	8.7%
Infrastructure protection	\$16.2 B	\$17.5 B	8.0%
Network security equipment	\$10.9 B	\$11.7 B	7.3%
Consumer security software	\$4.6 B	\$4.7 B	2.2%
Identity and access management	\$4.3 B	\$4.7 B	9.3%

Figure-2: Increase of Security Software Expenditure

This tech-infused big business representation is now approaching under analysis, as the observance limit for the European Union's General Data Protection Regulation (GDPR) fast approaches[3]. On May 25, the EU will begin to implement GDPR necessities for companies collecting or dealing out the data of group income in its 28 member countries. The guideline effusive describes how companies can make use of that data, and they must be set to "forget" that data at the demand of users.

#### Some significant highlights of the newer directive

- Article 17 spells out the "right to be forgotten" -- also known as the right of erasure.
- Article 32 outlines methods to use in pursuit of data processing security, including anonymizing and encrypting personal data to ensure a level of security "appropriate to the risk."
- Article 33 includes detailed requirements for handling data breaches
- Article 37 calls for designation of a data protection officer (DPO).

Software that can assist in complying with GDPR includes data ingestion, data pipeline, data preparation, data analysis and data lake tools, add to that list data protection tools that cover, anonymize and scuttle data.

### III. NEED OF IBM SECURITY GUARDIUM

IBM Guardium prevents leaks from databases, data warehouses and Big Data environments such as Hadoop, ensures the truth of in order and automates conformity reins crosswise diverse environments. It protects ordered and amorphous information in databases, big data environments and file systems aligned with intimidation and ensures conformity. It provides a scalable dais that enables incessant monitoring of ordered and amorphous data transfer as well as enforcement of policies for perceptive data way in enterprise-wide. A protected, federal audit warehouse joint with an included workflow computerization dais streamlines compliance confirmation actions crosswise a wide selection of mandates. It leverages amalgamation with IT management and other protection managing solutions to give inclusive information security across the venture.

They are proposed to allow constant monitoring of various database and document-sharing infrastructures, as well as enforcement of policies for sensitive data access across the enterprise, utilizing a scalable platform. A federal audit warehouse considered to make the most of protection, combine with an integrated conformity workflow computerization application, enables the products to streamline compliance validation activities across a wide variety of mandates. IBM Security Guardium is intended to assist preserve significant data. Guardium is a broad data security dais that enables protection teams to routinely analyze what is happening in sensitive-data environments to help diminish risk, protect sensitive data from internal and external threats, and seamlessly adapt to IT changes that may impact data security. Guardium helps ensure the integrity of in order to data centers and computerize conformity controls [4].

The IBM Guardium yield afford a straightforward, vigorous answer for preventing data leaks from databases and archive, serving to make sure the reliability of in order to the data center and automating conformity controls.

- Guardium Automatically locate databases and discover and classify sensitive information within them.
- Automatically fine record vulnerabilities and configuration flaws.
- Ensure that configurations are locked down after recommended changes are implemented.

- Enable high visibility at a granular level into database transactions that involve sensitive data.
- Track activities of end users who access data indirectly through enterprise applications.
- Monitor and enforce a wide range of policies, including sensitive data access, database change control, and privileged user actions.
- Create a single, secure centralized audit repository for large numbers of heterogeneous systems and databases.
- Automate the entire compliance auditing process, including creating and distributing reports as well as capturing comments and signatures.

**Efficient areas of Guardium's database security result**

- ✓ Vulnerability assessment.
- ✓ Data discovery and classification..
- ✓ Data protection..
- ✓ Monitoring and analytics.
- ✓ Threat prevention.
- ✓ Access management.
- ✓ Audit and compliance.
- ✓ Performance and scalability.

IBM Guardium Data Protection for Databases provides computerized perceptive data finding and categorization, real-time data group monitoring and cognitive analytics to find out abnormal bustle approximately perceptive data. It protects against unconstitutional information way in by knowledge usual user way in patterns and can present real-time alerts on distrustful actions. It can vigorously chunk way in or quarantine user IDs to guard beside internal and external intimidation and also helps update and computerize compliance workflows. The creation is built on a scalable architecture that provides full visibility on data activity across all major databases [5].

- Uncover internal and external risks
- Enforce security policies in real time
- Create a repository for all data

**Key features of IBM Guardium Data Protection for Databases includes**

- Monitor and audit all data activity
- Enforce security policies in real time
- Accelerate compliance workflows and audit activities
- Support heterogeneous environments
- Leverage the rest of the IBM Security Guardium solution

**IV. BENEFIT OF GUARDIUM**

Guardium supports the discovery and classification of sensitive data to allow the creation and enforcement of effective access policies Information about key security concepts used in Guardium data activity monitoring [5].

- Policies and Rules- A security policy contains an ordered set of rules to be applied to the observed traffic between database clients and servers. Each rule can apply to a request from a client, or to a response from a server. Multiple policies can be defined and multiple policies can be installed on a Guardium system at the same time.
- Workflows-Workflows consolidate several database activity monitoring tasks, including asset discovery, vulnerability assessment and hardening, database activity monitoring and audit reporting, report distribution, sign-off by key stakeholders, and escalations.
- Auditing-Guardium provides value change auditing features for tracking changes to values in database tables.

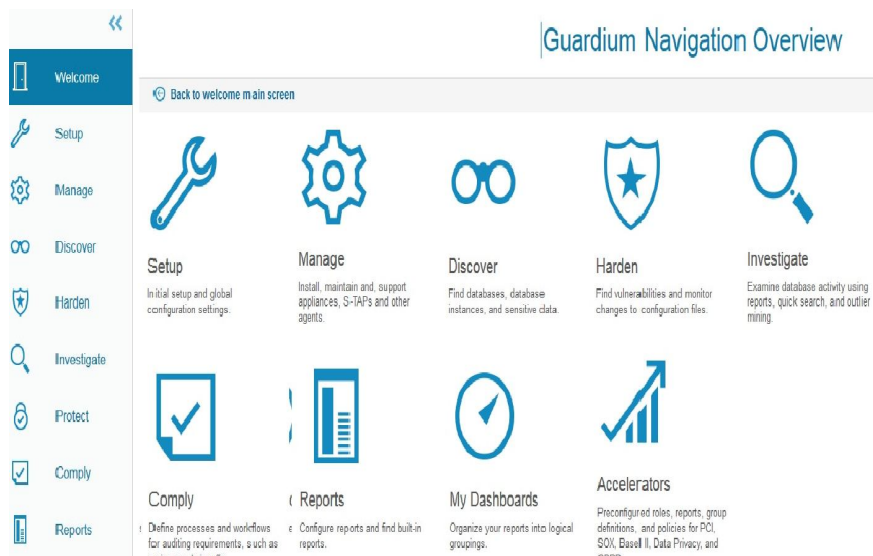


Figure-3: Overview of Guardium

### Address Structured Data Security Challenges

IBM Security Guardium Data Protection for Databases provides a holistic data security platform for structured data in databases and data warehouses on major operating systems.

### Protect Critical Data



Figure-4: Security of data

- Guardium enables complete protection for sensitive data via real-time capabilities including monitoring, alerting, blocking and quarantining, along with compliance automation to streamline operations and reduce risk of audit failure.
- Data privacy and security are the most pressing concerns that any organization must face. Previously within the European Union each country required different levels of compliance, the newly announced General Data Protection Regulation (GDPR) expands and standardizes data protection rules across the whole European Union. The Guardium GDPR accelerator provides predefined reports based on GDPR groups and policies.

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**IMPACT OF FOOD SUPPLEMENT ON THE NUTRITIONAL STATUS OF TUBERCULOSIS PATIENTS****Dr. B. Babitha<sup>1</sup> and G. Siva Teja<sup>2</sup>**Assistant Professor<sup>1</sup> and Research Scholar<sup>1</sup>, Acharya Nagarjuna University, Guntur**ABSTRACT**

*Tuberculosis is one of the major diseases leading to increased morbidity and mortality globally and nationally. Micronutrient deficiency has been related to the increased instances of the disease where immunity gets compromised and it can be reversed by nutrient supplementation. In the present study, 15 patients with Pulmonary Tuberculosis from Pinnamaneni Siddhartha Hospital, Gannavaram, Andhrapradesh in India have participated and their nutritional status has been calculated where micro nutrient deficiencies were observed. The objectives are as following- To see the effect of supplement by assessing the weight, BMI, hemoglobin, neutrophil and eosinophil levels before and after supplementation. A nutrient supplement was given to them for 30 days and the follow up was done for 30 more days. Measurement of weight, BMI, estimation of hemoglobin, neutrophil and eosinophil levels were done before and after supplementation. There has been significant increase in all the 4 parameters, weight increased by 3.53 kg on average, BMI increased by 2, hemoglobin increased by 2.42 gm per dl, neutrophil and eosinophil count increased by 9% and 4.7% respectively. This shows that proper micronutrient intake reduces the severity of the tuberculosis and other associated morbidities.*

*Keywords: Eosinophils, Hemoglobin, Neutrophils, Supplementation, Tuberculosis*

**INTRODUCTION**

Tuberculosis (TB) is caused by infection with gram positive, aerobic, non motile, non capsulated, non spore forming, acid fast bacilli of several species of *Mycobacteria* : *Mycobacterium tuberculosis* (M.TB), *M. bovis* , *M. africanum* or *M. microti*. It continues to be a scourge to human kind (Snider, 1994). In India alone, TB remains the leading infectious cause of death, killing close to 50, 00,000 people a year. India has far more cases of TB than any other country in the world; about 2 million new cases each year (Khatri and Frieden, 2002) and one report estimates more than 80% of all TB cases to be that of pulmonary TB (Pondey and Khuller, 2004).

Malnutrition and infection thus pose a serious threat to the health of under privileged population in developing countries. Micro Nutrient deficiency is probably the most frequent cause of secondary immuno-deficiency, infection related morbidity. Zinc deficiency is known to cause Cell Mediated Immunity and compromise neutrophil functions since Zinc primarily affects CMI, hypozincemia could possibly enhance susceptibility to TB. In animal models, it has been demonstrated to result in decreased phagocytosis, reduced number of circulatory T cell and reduced PPP reactivity (Murray *et al.*, 1990). The main objective was undertaken in the current study- the effect of supplement by assessing the weight, hemoglobin, neutrophil and eosinophil levels before and after supplementation.

**MATERIALS AND METHODS**

Fifteen patients (12 men and 3 women) with tuberculosis from Pinnamaneni Siddhartha Hospital, Gannavaram, Andhrapradesh in India were purposively selected for the study. There was no control group because all are interested to take food supplement. Assessment of nutritional status was done followed by estimation of hemoglobin, neutrophil and eosinophil levels. Then nutrient supplement was given for 30 days, followed up by 30 more days. Then estimation of hemoglobin, neutrophil and eosinophil levels and weight were done after supplementation. The weight was measured in kilogram using the procedure described by Jellifee (1966) using the scales. Body mass index was calculated using height weight data and patients were classified into different degrees of nutritional status using the cutoff levels suggested for Asians (IOTF/WHO, 2000).

Dietary assessment was done using frequency of food consumption and dietary intake survey was conducted for three days in a week, two week days and one weekend day. The data was collected in the combination of 24 hour recall method, type of food preparation, actual ingredients and quantities used were recorded. The data collected on the food was converted into raw foods (ICMR, 1996).

The hemoglobin in the blood was estimated using Cyanmethemoglobin method by (Crosby *et al.*, 1954). Estimation of WBC (Neutrophils and Eosinophils) was done by Differential Counting Method of WBC (Buttarelli *et al.*, 2008).

Each patient was given 50gm of nutrient supplement consisting of 25gm of soya bean, 15gm of groundnut and 5gm of sugar twice a day for a period of 30 days and keen follow up was done for another 30 days under medical supervision. The food supplement was rich in calories (233Kcal) and protein (14 gm).

The changes on the hemoglobin and WBC count of each group before and after supplementation were observed and statistically analyzed using paired T-test. Data was expressed as mean and standard deviation. Statistical significance of difference between the anthropometric and biochemical parameters was performed.

## RESULTS AND DISCUSSION

### General Dietary pattern of the subject

The diet survey was done on three day menu. The data related to menu follow a usual south Indian meal pattern. From the menu it was clear that rice was a stable food. They used to have breakfast between 8:00-8:30 am. And mostly rice with curd or chutney, idly /Dosa /puri/ chapathi. Around 10:00 A.M. to 11:00 A.M. less frequently they had lunch at that time –rice, dhal, chutney, non-vegetarian or vegetable curry, and curd/butter milk. At 2.00 P.M. they had mini lunch sometimes or else skip it. In the evening time they took tea / coffee, bajji, samosa /pakodi. They had dinner around 7:30 P.M. to 8:30 P.M. with rice, vegetable curry, chutney, and curd /butter milk.

**Table-1: General dietary intake of the patients**

Meal	Time	Menu
Break fast	8:00 A.M. to 8:30 A.M.	Rice –curd /idly/dosa/puri
Mid morning	10:00 A.M. to 10:30 A.M.	Rice ,dhal, chutney, vegetable curry butter milk
Lunch(optimal)	2:00 P.M.	Rice with vegetable curry
Dinner	7.30 to 8.30 P.M.	Rice , chutney, vegetable curry butter milk

### Nutrient intake of the subject

The mean nutrient intakes of the subjects were shown in table 2. Mean energy intake was 1836 kilo calories and the deficit when compared to RDA was 36.1%. The mean protein intake was 48.85gms and there was deficit of 45.7% when compared to RDA. The mean intake of fat was 22.46 gm and the deficit was 26.3%. The mean intake of the Carbohydrates was 236.83 gm with a deficit of 48.69%. The mean intake of Calcium was 248.55 mg and deficit was 37.8 %. The mean intake of Iron was 26.18 mg and deficit was 40.7%. The mean intake of carotene, Thiamin, Riboflavin, Niacin and vitamin C are lower than the Recommended Dietary Allowances.

### Anthropometric status of the subjects after supplementation

The mean anthropometric values were shown in table 3. The initial mean values of weight were 51.13 kg and after supplementation for 30 days there was variation in their average weights which was 54.66 kg. The 't' values were highly significant at 99% ( $P < 0.0001$ ) level between the initial and final weight of the subjects after supplementation. The initial value of the BMI was 23.10. After supplementation it was 25.1. There was a significant difference was observed at 95% ( $P < 0.0005$ ).

**Table-2: Mean nutrient intake of the subjects**

Nutrients	Mean $\pm$ SD	RDA	%deficit
Energy(K.cal)	1836 $\pm$ 321	2875	36.1
Protein (gm)	48.85 $\pm$ 12.50	90	45.7
Fat (gm)	22.46 $\pm$ 5.39	30	26.3
CHO(gm)	236.83 $\pm$ 33.9	400	40.7
Iron (mg)	26.18 $\pm$ 6.016	28	6.5
Calcium (mg)	248.55 $\pm$ 48.6	400	37.8
Carotene(mg)	29.59 $\pm$ 60.26	2400	98.76
Vitamin C (mg)	0.872 $\pm$ 9.52	40	97.8
Folic acid (mg)	95.9 $\pm$ 26.74	100	4.1
Niacin(mg)	11.03 $\pm$ 3.00	18.0	38.7
Riboflavin (mg)	0.872 $\pm$ 0.530	1.60	43.5
Thiamin (mg)	0.804 $\pm$ 0.59	1.40	42.5



**Table-3: Impact of supplementation on anthropometric values of the subjects**

Attribute	Mean $\pm$ SD		't' value
	Initial	Final	
Weight	51.13 $\pm$ 7.38	54.66 $\pm$ 6.16	3.707*
Height	149.4 $\pm$ 5.05	149.4 $\pm$ 5.05	-
BMI	23.10 $\pm$ 2.93	25.1 $\pm$ 2.47	0.0014**

\*Significant at 99% (P< 0.0001), \*\* Significant at 95% (P< 0.0005)

### Bio chemical parameters

The mean biochemical values of after supplementation are shown in table 4. The initial mean of hemoglobin levels were 8.033gm and after supplementation it was increased to 10.42gm. There was highly significant difference at 99% (P< 0.0001) level between the initial and final hemoglobin levels of the subjects after supplementation. The initial mean values of neutrophils and eosinophils were 67 and 5. After supplementation it was 76 and 9.7 respectively.

**Table-4: Impact of supplementation on biochemical values of the subjects**

Biochemical parameters with normal values	Mean $\pm$ SD		't' Value
	Initial	Final	
Hb level (gm/dl) (13.7 – 17 gm/dl)	8.033 $\pm$ 1.92	10.42 $\pm$ 1.78	7.13*
Neutrophils (%) (40-75%)	67 $\pm$ 10	76 $\pm$ 12	0.001*
Eosinophils (%) (1-6%)	5 $\pm$ 1	9.70 $\pm$ 5.70	0.0006*

\*\*Significant at 99% (P< 0.0001)

There was highly significant difference at 99% (P< 0.0001) level between the initial and final neutrophils and eosinophil count of the subjects after supplementation.

### DISCUSSION

The present study clearly showed that all the nutrient intake of the subjects seems to be deficient when compared with RDA. In concurrent with the study conducted in Pokhara, Nepal discovered that about one-fifth of TB patients did not consume sufficient amount of calories as per RDA. The statistical significant difference was observed between mean BMI at registration and recent BMI and mean weight at registration and recent weight (Lal M. Gurung *et al.*, 2018). The results of biochemical parameters are in agreement with Rao and Gopalan (1966). In the present study revealed that the weight and selected biochemical parameters were increases after food supplementation.

### CONCLUSION

The present study clearly showed that all the nutrient intake of the subjects seems to be deficient as per the RDA. The factors like nutrient deficiency, poor nutrition, poverty, malabsorption, chronic diseases have greater influence on the active and latent Tuberculosis infection. Hence, maintaining a proper food habit in balanced way, nutrient supplementation along with the treatment helps for recovery of the disease.

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**EXOGENOUSLY - APPLIED TRIACONTANOL PROMOTES GROWTH, PHYSIOLOGICAL ACTIVITIES AND YIELD CHARACTERISTICS OF *CORIANDRUM SATIVUM* L.****Akil A. Khan**

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**ABSTRACT**

*Coriander (Coriandrum sativum L.) leaves are rich source of Vitamins C, K and proteins and small amounts of various nutrients. Coriander is an essential bearing medicinal herb that contains numerous medicinal properties. The spicy herb is explored for its curative role in various types of disorders including digestive, respiratory and urinary systems. It is considered as curative agents due to its properties of diaphoretic, diuretic, carminative and stimulant. Hence, it was hypothesized that triacontanol (TRIA), a potent plant growth promoting substance for various medicinal and agricultural crops, could enhance production of essential oil of coriander. The plants were sprayed with deionized water (Control),  $10^{-8}$ ,  $10^{-6}$  and  $10^{-5}$  M of TRIA at 30 days after sowing. The present study indicated that the foliar application of TRIA applied on coriander plants enhanced growth characters, enzymatic activities, and yield attributes including essential oil content. Of the four concentrations,  $10^{-6}$  M of TRIA proved to be the significantly optimum for all studied parameters.*

**INTRODUCTION**

Triacontanol (TRIA), a long chain primary alcohol ( $C_{30}H_{61}OH$ ), has been recognized as a pivotal plant growth regulator for a number of crops (Reis and Houtz 1983; Reis 1991; Naeem et al. 2012). TRIA has improved growth, yield, quality and physiological processes of several medicinal plants (*Artemisia annua*, *Coriandrum sativum*, *Cymbopogon flexuosus*, *Mentha arvensis*, *Papaver somniferum*) as reported by various workers (Misra and Srivastava 1991; Srivastava and Sharma 1991; Khan et al. 2007; Aftab et al. 2010). Its efficiency has also been proved for high yield in a number of horticultural crops like barely, rice, tomatoes, maize, lettuce, cucumber, potatoes, cauliflower, brinjal, chillies, opium and hyacinth bean as reported by various workers (Reis and Houtz 1983; Reis 1991; Naeem et al. 2009, 2012).

Coriander (*Coriandrum sativum* L.; Apiaceae family) is widely adapted to a variety of climate and soil types in India. It occupies 0.42 million ha with an annual production of 0.25 million tons of seed and is mainly grown during the winter season on the northwestern plains of the country. The productivity of coriander seed is 595 kg ha<sup>-1</sup> in India, which is very low. One of the main reasons for the low productivity is that this crop is grown in areas characterized by light soils with medium fertility (Diederichsen 1996; Kumar et al. 2008). The plant reaches up to 50 cm. The flowering stem, which is slender and smooth, reaches a height of 20-120 cm. The fruits are nearly globular, 3-4 mm in diameter and are yellow-brown when ripe. The fruits consist of two halves, single-seeded mericarps (The Wealth of India 2001). The coriander plant yields two primary products that are used for flavoring purposes: the fresh green herb and the spice (The Wealth of India 2001). Keeping the economical as well as medicinal importance of coriander in mind, a study was conducted to find out the growth promotive effect of TRIA on physiological activities and plant productivity including essential oil content.

**MATERIALS AND METHODS****Experimental setup**

A simple pot experiment was conducted in the natural growth environment of the net house. Prior to seed spreading, each pot was maintained with 5 kg soil and manure in ratio of 4:1. The soil was maintained at proper moisture to ensure better growth of the plants. The seeds were sown directly at a depth of 2 cm in each earthen pot. TRIA was applied as foliar spray at 10 days interval on plants to find out the best performance of plant. The plants were sprayed with deionized water (control),  $10^{-8}$  M,  $10^{-6}$  M and  $10^{-5}$  M of TRIA at 30 days after sowing (DAS). Each treatment was replicated four times. Plants were sampled at 70 days after planting (DAP). The pots were watered as and when required.

**Growth characteristics**

The growth parameters viz. shoot and root lengths, fresh and dry weights of plants were determined at 70 DAP. Potted plants from each pot were evacuated carefully to measure various growth parameters. Water content of the plant was excluded using drying oven at 80° C for one day to record dry weight of the plants.

**PHYSIOLOGICAL PARAMETERS****Total chlorophyll and carotenoids contents**

Total content of chlorophyll and carotenoids in the leaves was estimated using the method of Lichtenthaler and Buschmann (2001). The contents were expressed as mg g<sup>-1</sup> FW.

**Nitrate reductase activity**

The activity of nitrate reductase was estimated by the intact tissue assay method of Jaworski (1971). The optical density of colour developed was read at 540 nm using a spectrophotometer. The NR activity was expressed as  $\text{nM NO}^- \text{g}^{-1} \text{FW h}^{-1}$ .

**Carbonic anhydrase (CA) activity**

The activity of CA was measured in the fresh leaves selected randomly, using the method described by Dwivedi and Randhawa (1972). The activity of CA was expressed as  $\mu \text{M CO}_2 \text{kg}^{-1} \text{leaf FW s}^{-1}$ .

**Estimation of nitrogen, phosphorus and potassium content**

The prepared aliquot (peroxide-digested material) was used to estimate N, P and K content. Leaf-N, P and K content were expressed in terms of percent dry weight. The content of N and P were estimated according to the method of Lindner (1944) and Fiske and Subba Row (1925), respectively. Potassium content was analyzed using a flame-photometer.

**Yield and quality parameters**

Umbels were threshed and cleaned. The number of fruits per umbel was recorded. Afterward, 100 seed-weight and seed-yield per plant were calculated accordingly. Yield parameters were recorded at the time of harvest (90 DAS). The essential oil was extracted from dried seeds and determined gravimetrically according to the method of Guenther (1972). The content of essential in the leaves was extracted by distillation method for 3 h, using a Clevenger's apparatus.

**RESULTS AND DISCUSSION****Effect on growth parameters**

The effect of the TRIA sprays was significant on shoot and root lengths, and plant fresh and dry weights. Of the selected spray concentrations,  $10^{-6}$  M of TRIA proved to be the best concentration compared to other spray treatments (Table 1). It was effective in increasing the values of all the growth attributes over the control. The applied treatment increased the shoot length, root length, plant fresh weight, and plant dry weight by 25.0, 34.9, 38.5 and 50.6% respectively, when compared to the control (Table 1). However,  $10^{-5}$  M TRIA gave significantly lower values in comparison to  $10^{-6}$  M TRIA, but it proved significantly better than the control.

**Effect on physiological and biochemical parameters**

All the physiological and biochemical attributes were significantly affected by the application of TRIA. Exogenous application of TRIA improved the total content of chlorophyll and carotenoids significantly. However, it was noticed that spray at  $10^{-6}$  M of TRIA caused considerable improvement, by increasing the content of total chlorophyll and carotenoid by 20.4 and 15.5% respectively than that of control (Table 2). TRIA applied through leaves also increased the carbonic anhydrase (CA) activity. TRIA at  $10^{-6}$  M improved the CA activity by 29.5% compared to the control (Table 2). There was a significant improvement in nitrate reductase (NR) activity due to TRIA application, compared with the control (Table 2). TRIA at  $10^{-6}$  M recorded 24.5% higher value for NR activity over the control (Table 2). Leaf analysis revealed the enhanced contents of N, P and K due to TRIA application. Foliar applied TRIA at  $10^{-6}$  M increased the leaf-N, P and K content by 23.5, 19.4 and 28.5% respectively, over the control (Table 3).

**Yield and quality characteristics**

As expected, seed-yield was also found maximum in plants treated with TRIA. Foliar application of TRIA at  $10^{-6}$  M of was proved the best for the yield characteristics. The application  $10^{-6}$  M of TRIA enhanced the number of umbels per plant, fruits per umbel, 100 seed-weight and seed-yield maximally, surpassing the control by 40.0, 20.6, 15.6 and 50.5% respectively (Table 4). This treatment also resulted in the highest essential oil content over the control by 18.1% (Table 4).

**DISCUSSION**

The observed increase in shoot and root lengths, fresh and dry weights in plants treated with TRIA could be ascribed by its pivotal roles in plants. TRIA rapidly elicits a secondary messenger which moves rapidly throughout the plant resulting in stimulation of growth (dry weight increase) and water uptake (Ries and Wert 1988). The growth promoting effects of TRIA on various parameters especially those on shoot and root lengths, fresh and dry weights have been reported by various workers (Misra and Srivastava 1991; Sharma et al. 2006; Khan et al. 2007; Naeem et al. 2009; Aftab et al. 2010) in various medicinal plants.

The present study reveals that there is a significant enhancement recorded in the content of chlorophyll and carotenoid, owing to application of TRIA. The earlier researchers suggested that TRIA directly activates the genes that control photosynthesis. These genes in turn activate the enzymes controlling the chemistry of

photosynthesis (Houtz et al. 1985; Trewanes and Gilory 1991). Similar effects of TRIA were obtained in several crops plants have also been recorded by various workers (Srivastava and Sharma 1990; Misra and Srivastava 1991; Naeem et al. 2009, 2012). A significant increase in activities of CA and NRA in plants treated with  $10^{-6}$  M TRIA over the control. Such a response of the plants to the applied TRIA is expected because TRIA plays pivotal role in many physiological processes in plants. Enhancement of CA activity in treated plants might have been responsible for the enhanced rate of  $\text{CO}_2$  fixation and hence have resulted in significant increase in fresh and dry weights of treated plants. Such a response at concentration of TRIA ( $10^{-6}$  M) has also been reported by Ries and Houtz (1983), Srivastava and Sharma (1990), Misra and Srivastava (1991), Kumaravelu et al. (2000) and Naeem et al. (2009). The ultimate culmination of enhancement of CA and NR activity has increased overall growth and yield of treated plants as observed in Table 3.

Leaf-N and leaf-P contents were found significantly maximum in plant treated with  $10^{-6}$  M of TRIA. Enhancement in leaf-nutrients, particularly N, due to TRIA application could be attributed to the compositional or chemical change in plants leading to alterations in nitrogen concentration (Knowles and Ries 1981). Presumably, increased uptake of nutrients enhanced photosynthesis and improved translocation of photosynthates and other metabolites to the sinks that might have contributed to the improved yield of TRIA treated plants. These findings are in accordance with data on TRIA effects reported regarding plant nutrient elements (Ries and Houtz 1983; Khan et al. 2007; Naeem et al. 2009). This sustained increase in the above mentioned parameters of the treated plants which is expected to culminate in maximization of number of umbel, number of fruits per umbel, 100 seed-weight and seed-yield would have a positive effect on the essential oil content. Thus, it may be suggested that spray of TRIA ( $10^{-6}$  M) on coriander plant would be highly effective for biomass production with increased essential oil content.

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**Table-1: Effect of different foliar concentrations of triacontanol (TRIA) on growth characteristics of *Coriandrum sativum* L. Means within a column followed by the same letter(s) are not significantly different ( $p \leq 0.05$ ).**

Treatments (M)	Shoot length (cm)	Root length (cm)	Fresh weight per plant (g)	Dry weight per plant (g)
Control	75.53 <sup>d</sup>	14.56 <sup>bc</sup>	20.60 <sup>d</sup>	8.54 <sup>c</sup>
TRIA 10 <sup>-8</sup>	84.45 <sup>c</sup>	16.75 <sup>b</sup>	23.82 <sup>c</sup>	10.57 <sup>b</sup>
TRIA 10 <sup>-6</sup>	97.43 <sup>a</sup>	19.65 <sup>a</sup>	28.53 <sup>a</sup>	12.86 <sup>a</sup>
TRIA 10 <sup>-4</sup>	94.40 <sup>b</sup>	17.24 <sup>ab</sup>	26.14 <sup>b</sup>	11.40 <sup>ab</sup>
LSD at 5%	3.00	2.40	2.20	1.90

**Table-2: Effect of different foliar concentrations of triacontanol (TRIA) on physiological and biochemical parameters of *Coriandrum sativum* L. Means within a column followed by the same letter(s) are not significantly different ( $p \leq 0.05$ ).**

Treatments (M)	Total chlorophyll content (mg g <sup>-1</sup> FW)	Total carotenoid content (mg g <sup>-1</sup> FW)	CA activity [ $\mu\text{mol}(\text{CO}_2) \text{ Kg}^{-1}(\text{FW}) \text{ S}^{-1}$ ]	NR activity (nM NO <sup>2-</sup> g <sup>-1</sup> FW h <sup>-1</sup> )
Control	1.540 <sup>c</sup>	0.453 <sup>c</sup>	238.4 <sup>d</sup>	354.5 <sup>d</sup>
TRIA 10 <sup>-8</sup>	1.710 <sup>b</sup>	0.485 <sup>b</sup>	270.5 <sup>c</sup>	398.6 <sup>c</sup>
TRIA 10 <sup>-6</sup>	1.854 <sup>a</sup>	0.523 <sup>a</sup>	308.7 <sup>a</sup>	441.3 <sup>a</sup>
TRIA 10 <sup>-4</sup>	1.730 <sup>b</sup>	0.480 <sup>b</sup>	283.0 <sup>b</sup>	405.2 <sup>b</sup>
LSD at 5%	0.123	0.030	4.40	3.76

**Table-3: Effect of different foliar concentrations of triacontanol (TRIA) on leaf-N, P and K content of *Coriandrum sativum* L. Means within a column followed by the same letter(s) are not significantly different ( $p \leq 0.05$ ).**

Treatments (M)	Leaf-N content (%)	Leaf-P content (%)	Leaf-K content (%)
Control	2.340 <sup>d</sup>	0.237 <sup>d</sup>	2.282 <sup>d</sup>
TRIA 10 <sup>-8</sup>	2.630 <sup>c</sup>	0.256 <sup>c</sup>	2.260 <sup>c</sup>
TRIA 10 <sup>-6</sup>	2.890 <sup>a</sup>	0.283 <sup>a</sup>	2.932 <sup>a</sup>
TRIA 10 <sup>-4</sup>	2.835 <sup>b</sup>	0.243 <sup>b</sup>	2.890 <sup>b</sup>
LSD at 5%	0.035	0.012	0.021

**Table-4: Effect of different foliar concentrations of triacontanol (TRIA) on yield characteristics of *Coriandrum sativum* L. Means within a column followed by the same letter(s) are not significantly different ( $p \leq 0.05$ ).**

Treatments (M)	Umbel number per plant	Fruits per umbel	100 seed-weight (g)	Seed yield (g/plant)	Essential oil content (%)
Control	7.0 <sup>b</sup>	17.0 <sup>c</sup>	0.675 <sup>d</sup>	0.925 <sup>d</sup>	0.160 <sup>c</sup>
TRIA 10 <sup>-8</sup>	7.7 <sup>b</sup>	18.0 <sup>bc</sup>	0.696 <sup>c</sup>	1.120 <sup>c</sup>	0.173 <sup>c</sup>
TRIA 10 <sup>-6</sup>	9.8 <sup>a</sup>	20.5 <sup>a</sup>	0.780 <sup>a</sup>	1.392 <sup>a</sup>	0.189 <sup>a</sup>
TRIA 10 <sup>-4</sup>	8.0 <sup>a</sup>	19.0 <sup>b</sup>	0.715 <sup>b</sup>	1.340 <sup>b</sup>	0.145 <sup>b</sup>
LSD at 5%	1.30	0.26	0.014	0.032	0.028

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**CHEMICAL TREATMENT OF DAIRY EFFLUENTS USING FERRIC SULFATE AND ALUM AS COAGULANT : AN ANALYSIS**

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**ABSTRACT**

*As countries around the world, including India, having introduced strict ecological standards and stringent controls expected to be implemented in the near future, it is essential that control measures be implemented and complied in totality to minimize the dangerous impact of effluent coming out for textile industries. Thus the use of conventional dairy industries wastewater treatment processes becomes drastically challenged. Dairy processes not only consume large amounts of energy and water but they also produce substantial waste water loaded with various contaminants, high concentration of organic materials etc.*

*Coagulation and Flocculation technique can be effectively used to treat this waste. The present research work was carried out to determine the scale of pollution due to dairy effluents and understand the capability of Ferric sulphate and Alum as coagulating agents to treat dairy effluents. The results obtained showed significant decrease for individual parameters varied in the wide range between 20.9 and 97.2%. Use of Ferric sulfate and Alum as coagulating agent in treating dairy effluents will reduce water and soil pollution to a great extent and make industry sustainable.*

*Keywords: Dairy Industry Effluent, Coagulation, Ferric Sulfate, Alum, Pollution*

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**INTRODUCTION**

Dairy industry is expected to grow very rapidly and dairy effluent discharge without any proper treatment in natural water bodies, may lead to environmental problems (Porwal et al., 2015). The importance of the problem of liquid waste management continues to grow especially in the dairy industries that generate a huge organic pollution which can cause physico-chemical and biological degradation of the aquatic ecosystem by the presence of undesirable substances like nitrogen, phosphorus, carbon materials, microorganisms (FAO, 1998). Approximately 65 % of the dairy factory losses enter wastewater streams and these can have a major impact on the environment (EPA, 1997).

These dairy industries generate different types of waste including: wastewater from the production line (cleaning of equipment and pipes) cooling water, domestic wastewater, the acid whey and sweet. These are most polluting effluent by its biochemical composition rich in organic matter like lactose, protein, phosphorus, nitrates, nitrogen. It is 60 to 80 times more polluting than domestic sewage (Hamdani, 2001).

Experience of many plants which process raw materials of animal origin indicate that the best results of efficient technological wastewater treatment are achieved with combination of physical methods (i.e. screens, sieves, sedimentation tanks or flotation units) with chemical treatment.

The chief aim of the investigations presented in this publication was to substantiate the competence of the Ferric sulfate and Alum applied as coagulant for treatment of dairy plant wastewater.

**MATERIALS AND METHODS**

Raw wastewater samples were collected at random from industrial dairy plant. This dairy plant manufactures a range of dairy products in a semi hydrated or dehydrated form (i.e. butter, ghee, sweetened milk and milk powders) where technological wastewater is a mixture of two streams coming from powder plant and various processing units. Two fat traps A and B are the part of the effluent treatment plant of the dairy. After removal of fats both the streams are equalized in equalization tank and then it is supplied to the anaerobic digester. The samples of wastewater are collected from this point i.e. digester inlet. Prior to use the effluent samples were stored at 4<sup>0</sup> C in a refrigerator to avoid any physicochemical change (APHA, 2005). The parameters of raw wastewater samples were determined in accordance to Gujarat pollution control board limits and these were COD (chemical oxygen demand), BOD (biological oxygen demand), TDS (total dissolved solids) and pH value. The same characteristics were determined for wastewater samples collected after coagulation process. The standard jar testing procedure was employed in a lab test of coagulation process of examined wastewater. Visual evaluation of coagulation process of examined wastewater samples was focused on floc formation and sedimentation. The influence of coagulant both on wastewater color as well as removal of turbidity was also studied.

## RESULTS AND DISCUSSION

Table:1 shows the average values of the determined parameters of the raw wastewater originated from dairy plant. The values are typical for dairy industry effluents and indicated relative high variability between examined samples. The value of Biological Oxygen Demand (BOD) and Chemical Oxygen Demand (COD) were rather high, this mean that the wastewater has pollution potentials and therefore should be treated before discharge into the environment. High load of organic pollutants resulted in values of BOD<sub>5</sub>, COD and other wastewater characteristics and correspond well with literature data (Sarkar *et al.*, 2006; Briao and Granhen, 2007).

**Table-1: Physico-chemical characteristics of examined raw wastewater**

Parameters (unit)	No. of Samples	Range	Average value
pH	80	6.8-8.2	7.6
Turbidity (NTU)	80	15-30	22
TDS (mg/L)	80	2400-4180	3440
COD (mg/L)	40	1500-2900	2200
BOD <sub>5</sub> (mg/L)	40	750-1980	1110

The biggest problem in the chemical treatment of wastewater is the selection of the chemicals, which must be added to the wastewater in order to separate the dispersed pollutants. The problem nearly always cumulates in finding a suitable coagulant as this must be easy to handle store and prepare. Another key question is always coagulant dose selection ensuring the required degree of the pollutants removal. Iron-based coagulant in the form of ferrous sulfate ( $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ ), ferric sulfate ( $\text{Fe}_2(\text{SO}_4)_3$ ), ferric chloride ( $\text{FeCl}_3$ ) and the mixture of  $\text{Fe}_2(\text{SO}_4)_3$  and  $\text{FeCl}_3$  are also commonly used in water treatment. In the present study ferric sulfate ( $\text{Fe}_2(\text{SO}_4)_3$ ) and Alum are investigated for the coagulation study of dairy industry waste water. The performance of coagulants was primarily based on pH, TDS, BOD, COD and turbidity of treated water. As the best and optimum pH values for the coagulation study with alum and ferric sulfate are given by various workers, in the present work the coagulation study with alum and ferric sulfate is carried out at constant pH (Lee, 1998).

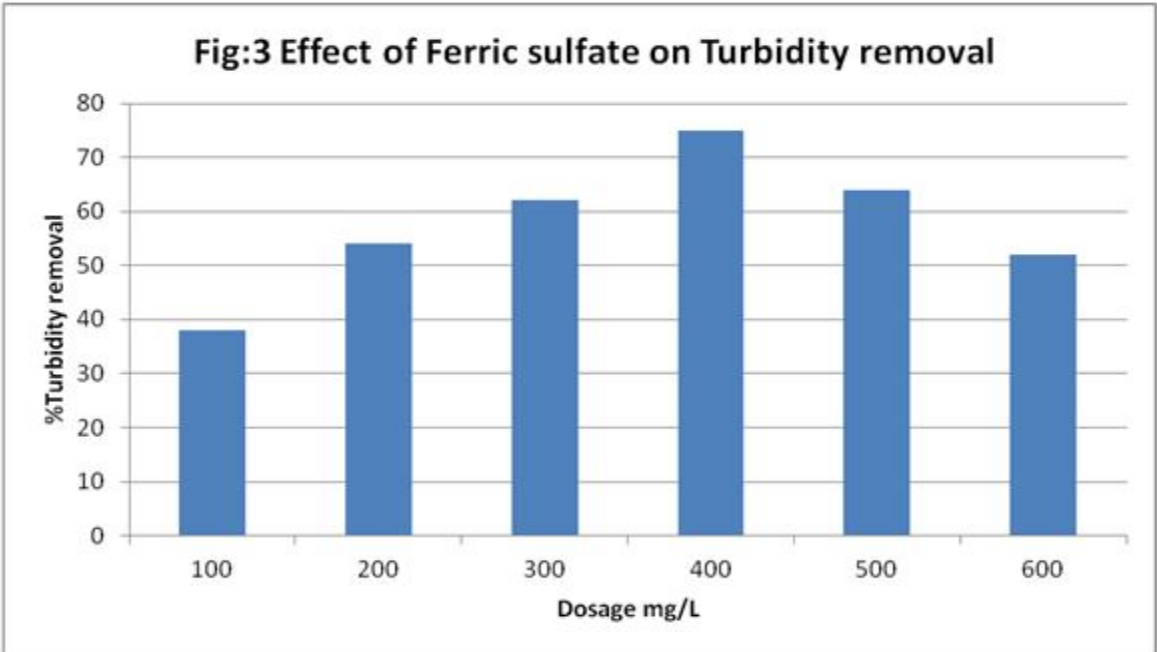
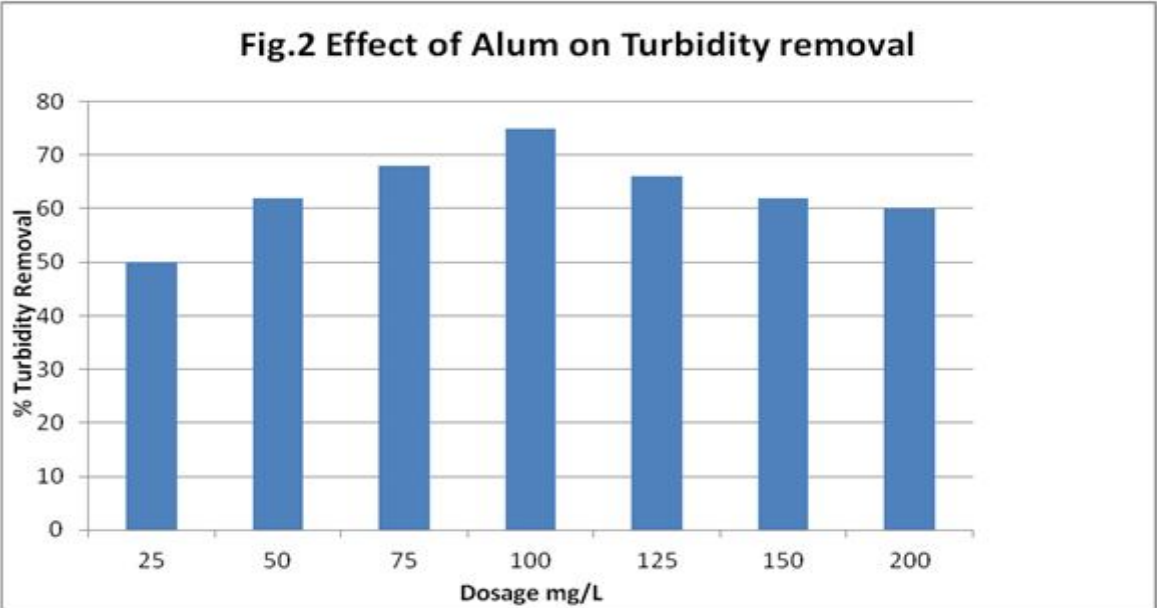
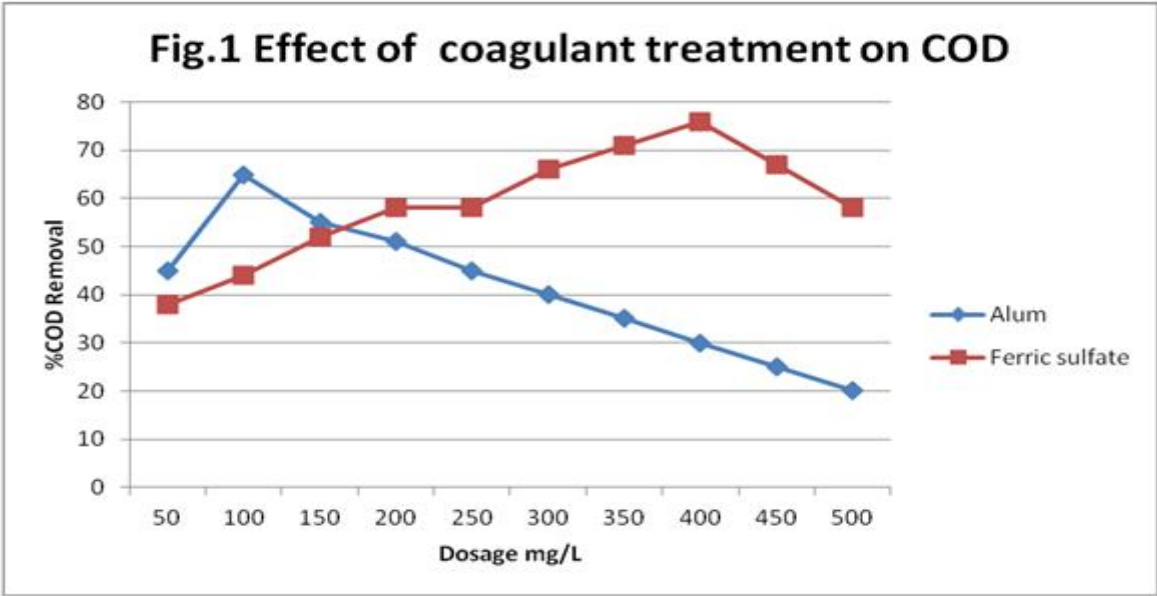
In a physical/chemical process for dairy industry wastewater both the alum and ferric sulfate acted on almost all characteristics. The effluent has a pH value of 7.6, which makes it alkaline. The turbidity of 22 NTU shows that the colloidal matter in the wastewater was high and by implication, the wastewater contains high solids concentration. The total dissolved solids were 3440 mg/l which is not within the Gujarat Pollution Control Board limits for effluent discharge in Gujarat.

### COAGULATION WITH ALUMINUM SULFATE

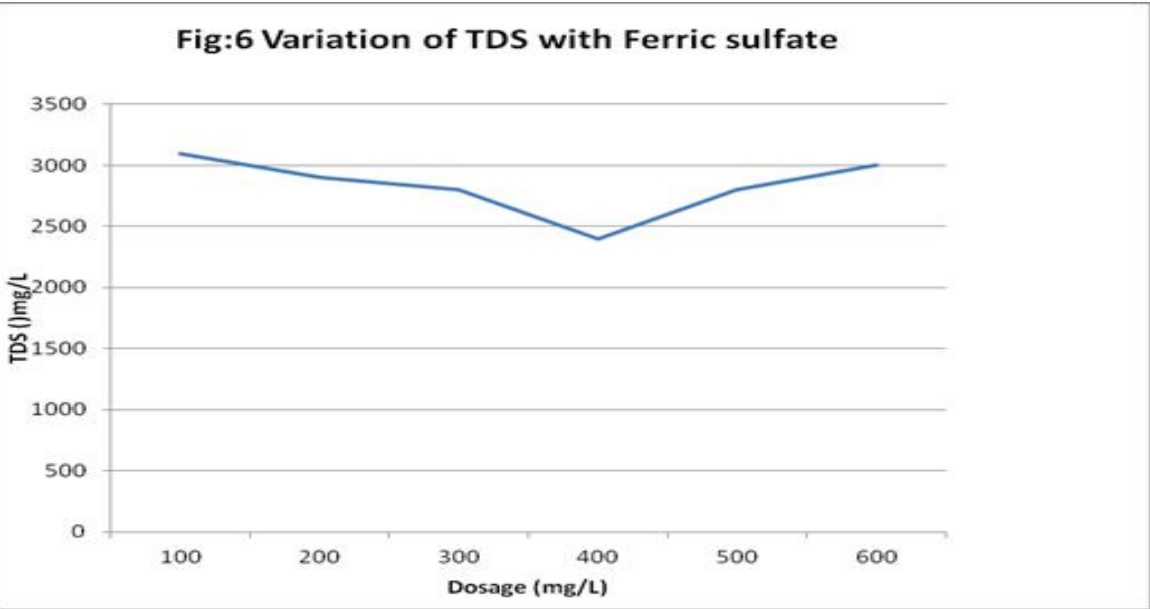
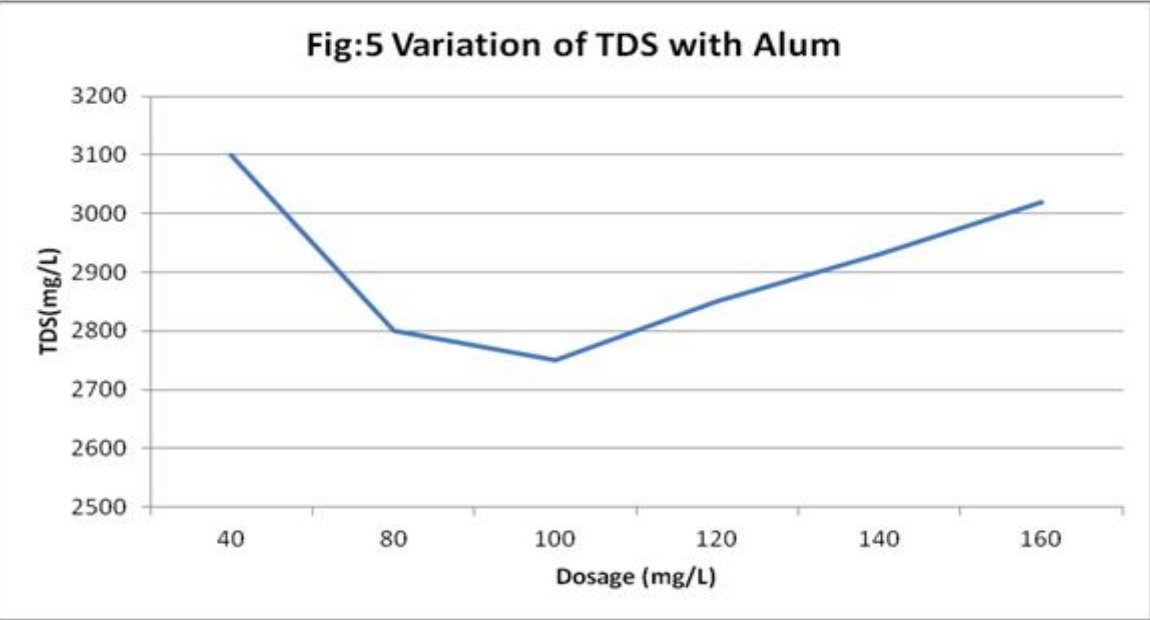
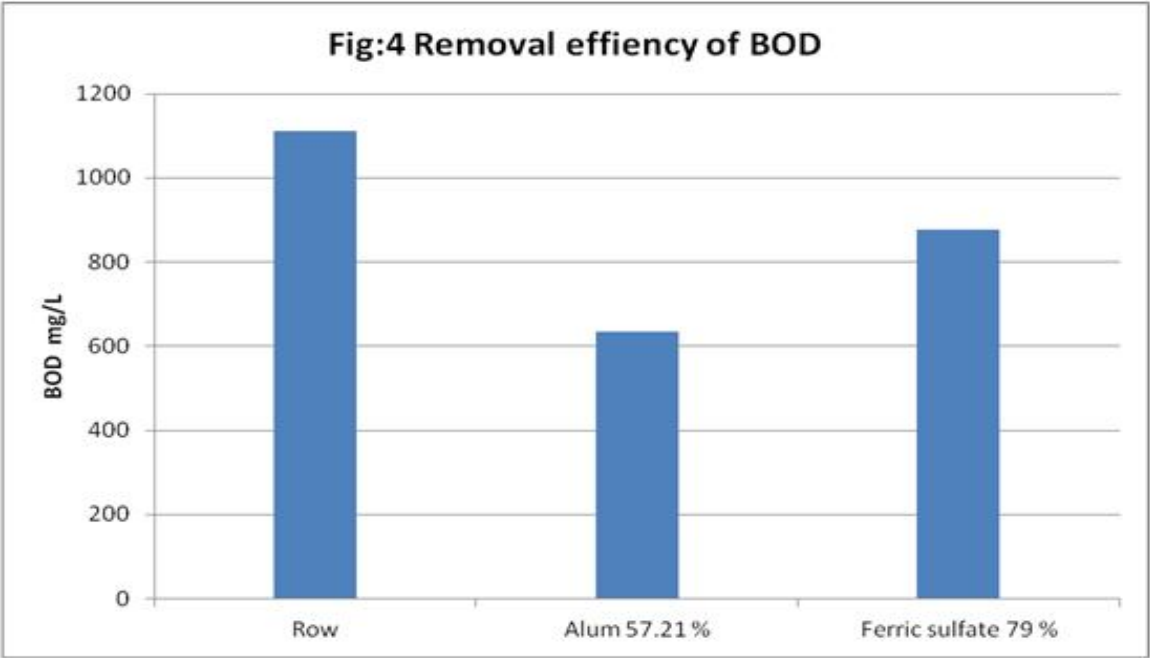
Results of coagulation studies with alum shows the optimum dose of alum to be 100 mg/l. Alum dose is varied from 25 to 500 mg/L. The turbidity, after treatment is around 5.5 even at optimal conditions. Varying alum concentration keeping pH constant 4.5 was applied for the treatment of wastewater. Alum was found to be effective coagulant in reducing solids, organics and nutrients in the dairy industry effluent to reuse it in irrigation (Al-Mutairi, 2004). Increase in alum concentration increases removal efficiency of COD. The slope of curve in low alum dosages was higher in which a reduction in case of raise in concentration could be observed. In this way, by considering COD as removal objective, 100 mg/L is selected to apply to the process. In terms of turbidity the process of increase in turbidity removal can be observed by increment of coagulant concentration, although the removal efficiency is almost steady due to alum dosage increment in high concentration of coagulant. In this case, dosage of 100 mg/L for alum reveals the best results for turbidity removal.

### COAGULATION WITH FERRIC SULFATE

Results of coagulation studies with ferric sulfate shows the optimum dose of 400 mg/L at pH 4.5. The turbidity, after treatment is around 5.5 even at optimal conditions. Application of both the coagulants resulted in achieving high removal efficiencies for almost all wastewater characteristics as can be seen in Figures 1-6. The varying concentration of solids in tested wastewater, together with the size of particulate materials and the differences in particle charge are the main factors influencing the parameter. Markedly reduction of individual pollutants concentrations was observed in each analytical variant corresponding well with other literature data. Aysegul Tanik *et al* investigated  $\text{FeCl}_3$ ,  $\text{FeSO}_4$  and alum as coagulants for the chemical treatability of dairy wastewater originating from a dairy and dairy products plant at Istanbul (Tanik, 2002). Maximum overall COD removal efficiencies were obtained as 72 per cent, 59 per cent and 54 per cent for  $\text{FeCl}_3$ ,  $\text{FeSO}_4$  and alum, respectively.







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**CONCLUSION**

Results obtained in our study indicate however that the discharge of coagulated wastewater to municipal sewage system would not be possible without correction of some parameters. For example the achieved values of COD (1361 and 528 mg/l) and BOD<sub>5</sub> (635.03 and 233.1 mg/l) in coagulated wastewater with alum and ferric sulfate respectively, still exceeded discharge limits (COD-250 and BOD-100 mg/l respectively).

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**A REVIEW OF LEADERSHIP STYLES & THEIR EFFICIENCY FOR SERVICE SECTOR**

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**ABSTRACT**

*The study aims to emphasize the need and importance of an effective leadership style. There has always been a need to have leaders who can shake up the world of work and give dynamic results. The study also suggests how various organizations and industries can implement strategies to attain effective leadership style so that the set targets can easily be achieved. Leaders who are capable and have a vision are always relied upon. This study aims to discover ways to produce leaders who could make valuable changes in the work of work and make it even more effective. The leadership styles organizations opt have a lot to do with the development of a team that not only work for the growth and development of an organization but also sets new standards of success. The study gives an overview of how effective leadership positively affects the performance of an organization and that too to a great extent. Studies reveal that transformational leadership has always been considered the most effective one as far as the performance of an organization is concerned. In addition the transformational style of leadership contributed equally in the development the personal and professional growth of an individual.*

*Keywords: Transformational leadership, Organization, Growth, Leadership styles, Leadership, Team Members*

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**INTRODUCTION**

Leadership has always been one of the favorite areas of interest for most researchers as it has a lot to do not only with the performance of an organization but it also affects all other relevant factors. There have been multiple ways leadership is defined ever since it has been discovered as one of the major aspects that eventually contributes in the performance of an organization. Most researchers have argued the fact that leadership style has a direct link with the smooth functioning of an organization and its growth in coming time. There has always been a lot of discussion on whether or not the leadership style changes the ways organizations work and/or whether or not it helps organizations attain positive results. Though, it is altogether a different scenario that there is still no agreement on the effectiveness of the various leadership styles.

There is no argument about the fact that leadership is one of the most important aspects that decide the growth and development of any organization. Leaders are the people who help and guide all others around them in setting targets that can be achieved in given time. They not only motivate their team members and help them highlight their qualities but also guide them in facing their fears head on. Good and effective leaders always motivate the team members and assign them responsibilities according to their capabilities. They encourage their subordinates and guide them to contribute their bit. No doubt, the management sets targets and makes them time bound but it is leaders who make strategies, implement plans, keep track of time, guide each team members keeping their strengths and weakness in consideration and eventually achieve organizational goals.

The process that involves making team members realize their full potential with enthusiastic approach towards the goals, keeping the integrity alive till the end is leadership (Ngambi et al., 2010; Ngambi, 2011 & Jeremy et al. 2011). The art of leadership also involves motivating all involved in such an enthusiastic manner that they step forward and give their best to achieve the goals that eventually highlights each one's contribution and that too making the deal mutually beneficial. Many researchers have time and again proven the fact the type of leadership style affect the achievement of goals at each step (Jeremy et al., 2011).

Obiwuru et al. (2011) found that the interest of the team members altogether depends upon the leadership style which affects the level of commitment on part of team members. The art of motivating and encouraging a certain group of people towards set goals is leadership. The effective leaders also make sure that they make the achievement of goals beneficial for all involved. Ismail et al. (2009) have reported the fact that opting transformational leadership always helps leaders enhance the motivation level and the skill set of the team members. It also helps create an environment that facilitates the team members attain their individual goals which eventually help them adopt strategies that are even better as compare to the old ones (Azka et al., 2011).

The organizational set their goals and the leaders instill the qualities that give confidence to the team members' to work with the zeal for the growth and development of the organization.

**REVIEW OF LITERATURE**

The upgraded techniques of development get affected by the style of leadership and the growth thereafter depends upon it (Nonaka and Takeuchi, 1995; Senge et al., 1994). Howell and Avolio (1993) reported that

transformational style of leadership actually encourages creativity, information and advancement that proves beneficial for the performance of the organization. Bass (1999) have opined that leaders themselves should analyze their performance as it proves helpful in the long run. Fowler & O'Gorman (2005) have argued the fact that the way leaders perceive organizational style of leadership has a direct link with the advancement of this style of leadership.

The random effects model of leadership certainly affects the performance of the organization but at an average level (DanismanSahin & TosuntasBetulSuel, 2015). The leadership style and the publication have been found to be the moderate variables in the studies conducted in this regard. AlsabbaghMouaz and Khalil Abdul Hamid Al (2016) in a study evaluated the influence of leadership style on organizational learning. The study was conducted on 154 workers in administrative and academic system of the university and two different scales were used for the purpose.

In a study on leadership Bass & Avolio (2004) scale was used to determine the Leadership Styles and Jerez-Gomez et al, (2005) scale was to measure the organizational learning. They found a significant impact of contingent reward as a transactional leadership dimension on organizational learning and a significant impact of Individualized consideration as a transformational leadership dimension on organizational learning. No significant relationship was found in leadership styles and organizational learning.

RijalSapna (2010) opined that development of learning organization depends upon transformational leadership and organizational culture. There have been less than a couple of studies that have actually studied how transformational leadership and organizational culture influence the learning organization. This study was an attempt to make a comparison between the data collected from the pharmaceutical sector of India and Nepal. They found that the transformational leadership and organizational culture positively influence the development of learning organization.

The attitude of employees that has a direct link with the level of commitment and positive state of mind towards an organization does get affected by the style of leadership (JahajLiridon, DemiriVisar, MaxhariHimoza and VelinLiridon,2017). No doubt, an organization in any sector cannot make progress if it doesn't get the support and give their best. These factors, in the long run make an organization able to compete against their competitors in the world of work. There has always been an emphasis on effective leadership that takes them ahead and enables them to achieve the set organizational goals. The study examined the various aspects of leadership style and its influence on the performance.

Factors like the structure of an organization and research areas that can contribute in the development of the concerned organization in one way or another are the outcomes of leadership style and/or leader (Cohen and Levinthal, 1990; Van den Bosch, Volberda and de Boer, 1999). No doubt, an organization has to become accustomed to the ongoing trends and the environmental changes that demand a certain level of flexibility on part of employees as well, a right kind of leadership facilitates them. Zahra and George (2002) opined that leaders who are aware of the organizational culture easily appraise the attitude of the employees so that to set short term goals to accomplish long term ones. Argyris and Scho'n (1996) found that transformational leadership promotes and facilitates learning that takes employees in the right direction enabling individual growth as well as the development of the organization.

Ahmed Maha and Mohamad Saad Mohamad (2016) conducted a research to study the link between leadership style, organizational culture, and organizational learning capacity. There was a significant correlation between transformational and transactional leadership style and organizational learning capacity.

### **SIGNIFICANCE OF STUDY**

There have been a number of studies that clearly support the importance of leadership for the development and growth of an organization but at the same time there are many other researches that have clearly refute the idea that leadership style makes any difference at all. We certainly can't deny that the fact that leaders in one way or another affect the motivation level of employees and play a vital role in keeping them one minded towards the set targets/goals. The literature and countless studies regarding this concept till date have clearly neglected the importance of leadership or leadership styles but there have been many arguments that leadership styles influence the performance of the employees and the organization in itself. The current study is yet another attempt to identify and explore whether the leadership or leadership styles have any relationship with the performance of an organization or not and to what extent.

### **OBJECTIVES OF THE STUDY:**

1. To identify and acknowledge various styles of leadership.

2. To study the influence of leadership on workforce (e.g., achievement motivation, level of commitment and self esteem)
3. To evaluate the effect of leadership styles in terms of individual performance as it eventually affects the performance of the organization.

### **RESEARCH METHODOLOGY**

The current study is a review of studies that have been conducted to measure how and to what extent leadership styles contribute in enhancing the performance of an organization. The information has been collected from journals, articles, reports and other published /unpublished documents that are available.

### **RESULTS & DISCUSSION**

#### **Transformational leadership: A multifaceted approach**

##### **A. Career advancement and personal growth**

The transformational leadership style has a lot to do with the personal growth of the team members as the leaders motivate the members, enable them to enhance their skill set, guide them in every possible manner, share responsibility and enable them to accept and to work on their weaknesses. Team members have dynamic leaders to look up to and to follow as the assigned tasks that usually come along with a baggage of responsibilities provide equal opportunities of growth and that too within the organization.

Transactional leaders facilitate a work environment wherein employees develop altogether a new aspect of looking at issues that need immediate attention. They motivate and encourage their team members to set personal goals that are time bound and that go hand in hand with their professional goals. Modeling behavior of team members and enabling them to do what benefits the organization in the best possible manner, encouraging and giving a right direction to their suggestions, giving clarity about the vision that a particular organization follows, and making the team members learn by setting examples, transactional style of leadership involves it all.

##### **B. Styles of leadership to opt from**

The work environment offers manifold styles of leadership that have their own advantages and disadvantages. It certainly depends upon the many other factors. Organizations usually choose the style of leadership that can be relied upon and the one that gives the desired results.

There are participative leadership, autocrat leadership, transactional leadership, transformational leadership and the Laissez-Faire leadership.

The autocrat leaders make decisions on their own without getting input from the team members. They impose their decisions on all the team members and keep the control in their own hands. There are certain organizations that find autocrat type of leadership suitable for them though the organizations that believe in team work discard this style of leadership.

The Laissez-Faire leadership style is usually for organizations where they have experienced employees are able to work on their own and who require little or no guidance at all. Though, even in such organizations there are always some such employees who need supervision. The lack of leadership at times can result unexpectedly.

The transactional leaders believe in motivating their team members and also keep their individual growth in consideration. They offer incentives to their team for achieving goals that are mutually agreed upon. The team follows their directions and also takes the feedback in a positive manner as later on they choose to claim for rewards too.

In transformational leadership style leaders encourage their team member to achieve the given targets. The management believes in transparent communication with their employees and to keep them in high spirits. They assign responsibilities according to the skill set of the employees so that they get the best results.

Participative leadership is called the democratic leadership. The team members are free to come up with suggestions but the final decision always comes from the leader. The leaders let their team know the fact that their input actually helps the organizations achieve their goals. Such leadership enables the team members adapt to changes that occur due to the ongoing developments in the world of work.

### **LEADERSHIP STYLES & OUTCOMES**

Along with the leadership styles there are many other relevant factors that limit the work performance to a great extent. The work environment and situational factors, the opportunities and threats that the work environment offer, attitude of the workers and the zeal to learn and many more factors are there that decide the

success or failure of the leadership styles. Therefore, we can't argue the growth and development of an organization solely depends upon the leadership style.

## **CONCLUSION**

There are managers who adopt leadership style that instead of keeping their team members on their toes all the time enable them to work with the right kind of approach. The attitude of employees in any organization resembles job satisfaction and their level of self esteem. The questions that whether leaders or leadership styles affect the performance of an organization or not is still an issue of debate and there have many researchers who have expressed their opinions on the basis of studies conducted. The style of leadership that not only works for the achievement of common goals but have equal concern for personal growth of members involved is transformational style of leadership (Bass, 1999; Bass and Avolio, 2000). The leaders who choose to opt transformational leadership style always encourage the team spirit that too in terms of mutually beneficial goals, transparent communication and encouraging the spirit of trust (Senge, 1990; Slater and Naver, 1995).

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