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Editorial

The Impact of COVID-19 on Higher Education in Northeast India

College and university campuses are bustling educational cum cultural hubs where teachers, students and researchers of different culture and localities gather. The Covid-19 disease caused by human SARS coronavirus-2 was first reported in December 2019 near Wuhan, Hubei, China (Kang *et al.*, 2020). The infection then spread around the globe. On July 29, 2016, there were 16,739,530 confirmed cases and 660,407 fatalities in 188 countries (Johns Hopkins University & Medicine, 2020). Due to the virus's proliferation, numerous industries have been quarantined. This lockdown has impacted people's lives in areas like manufacturing and services, including education. The coronavirus outbreak (Covid-19) has severely harmed the foundations of this unique environment, raising ramifications for higher education.

While online education may be a viable option for continuing college and university activities, the outcome may be unsatisfactory. Recent research shows various causes for disrupting student education in north-eastern India. North-eastern Indian pupils have a weak network that hinders teacher-student contact. Constant lock-up produces mental tension. As the epidemic continues, students' worries about their future plans grow. Students can not afford the essentials for effective online learning. The COVID-19 detention has disproportionately impacted college students (Odriozola-González, 2020). Educational institutions have taken steps to use digital resources in the classroom. Academic activities evolve rapidly, causing teachers and students to adapt. An interactive environment is a communication setting that facilitates information acquisition. Increased involvement can enhance pupils' motivation and focus. In a typical classroom, teachers can use tactics like reverse classroom, random questions, and group reporting. In an online course, however, teacher input is the main method of teaching. The study found that platform availability has the greatest impact on user satisfaction, not personal characteristics (Chen *et al.*, 2020). A student's academic life has changed because of the

surge in COVID-19 infections in India and the mandated lockdown. Bhaumik's research found that online classes were only 35.2% as effective as in-person classes (Bhaumik & Priyadarshini, 2020). It has been shown that outbreaks promote anxiety and sadness among students and healthcare staff (Naser *et al.*, 2020). Exams have been postponed in India, as has university admission (The Times of India, 2020).

The COVID-19 coronavirus outbreak has infected over 1.5 billion children and young adults globally. Many parents who have access to the internet and technology are turning to online schooling to keep their children educated at home. The delay in lifting the coronavirus lockdown is affecting children's learning, according to a Oneindia survey. The largest barrier is students' Internet access. Because most parents can't afford to go online, or their children live in remote regions, in many cases, the family can not own a smartphone (Adnal, 2020). Although the internet network provides a channel for educational activities, there are numerous problems that cause interruptions in education. UNESCO used the phrase "educational disruption" to characterise the current problem (Karalis, 2020). For many students in Northeast India, basic resources are scarce. Student life in north-eastern India is disrupted by online learning, emotional discomfort, future aspirations, lack of communication, and resources. To ensure that a student's academic life is not interrupted, the areas listed in this study should be assessed and analysed. Ignoring these concerns can lead to serious issues that can negatively impact a student's life. Sadly, despite efforts to create a friendly distance learning environment, school closures have been linked to actual learning losses.

Efforts to understand these impacts are ongoing, but early data from other countries like Belgium and the UK shows both loss of learning and a rise in inequality. Unfortunately, students with fewer parents lose more, as evidenced by research showing that children from more affluent households had more parental support during the shutdown period.

Outside-the-classroom learning deficiencies may lead to long-term issues. Decreases in test scores have historically been connected to job losses. However, higher student achievement leads to higher future income and more school years, which contribute to an 8-9 percent boost in lifetime earnings. In the absence of action, the COVID-19 pandemic's loss of learning might negatively impact many student's futures. These losses may decrease access to further education, employment involvement, and future income.

To avoid long-term effects, India and other middle-income countries must develop learning recovery programmes, preserve educational expenditures, and prepare for future shocks by "better building-in." India has started broadcasting video classes on TV and using online distant learning platforms to help remote education and learning. Organisations have created online professional development and peer-to-peer teacher learning options for the COVID-19 problem. India has also launched efforts to educate teachers, administrators, students, and parents about the COVID-19 safe and long-term education standards. To address these issues and establish a more robust system, the three main objectives are to develop learning recovery programmes, preserve education funds, and prepare for future shocks. All pupils in northern India can be studied to assess their problems.

REFERENCES

- Adnal M. 2020. The impact of Covid-19 lockdown on children (2020). Oneindia. Retrieved August 5, 2020, from: <https://www.oneindia.com/india/how-covid-19-pandemic-affects-children-s-learning-3084926.html>
- Bhaumik R., Priyadarshini A. E-readiness of senior school learners to online learning transition amid COVID-19 lockdown. *Asian Journal of Distance Education*. 2020;15(1):1-13. doi: 10.5281/zenodo.3891822.
- Chen T., Peng L., Yin X., Rong J., Yang J., Cong G. Analysis of user satisfaction with online education platforms in China during the COVID-19 pandemic. *Healthcare Journal*. 2020 doi: 10.3390/healthcare8030200.
- Johns Hopkins University & Medicine (2020). Coronavirus COVID-19 global cases by the center for systems science and engineering at Johns Hopkins.
- Kang L., Li Y., Hu S., Chen M., Yang C., Yang B.X. The mental health of medical workers in Wuhan, China dealing with the 2019 novel coronavirus. *The Lancet. Psychiatry*. 2020;7(3):e14.
- Karalis T. 2020. Planning and evaluation during educational disruption: Lessons learned from COVID-19 pandemic for treatment of emergencies in education. *European Journal of Education Studies*. 2020 doi: 10.5281/zenodo.3789022.
- Naser Y.A., Dahmash E.Z., Al-Rousan R., Alwafi H., Alrawashdeh H.M., Ghoul I. Mental health status of the general population and healthcare professionals and university students during 2019 coronavirus disease outbreak in Jordan: A cross-sectional study. *Wiley Online Library*. 2020 doi: 10.1002/brb3.1730.
- Odrizola-González P., Planchuelo-Gómez Á., Irurtia M.J., de Luis-García R. Psychological effects of the COVID-19 outbreak and lockdown among students and workers of a Spanish university. *Psychiatry Research*. 2020;290 doi: 10.1016/j.psychres.2020.113108.
- The Times of India. 2020. COVID-19 lockdown: Delayed academic plans and uncertainty-anxiety grips CBSE class 12 students. (2020, May 9). *Economic times*. *Indiatimes*. Retrieved August 5, 2020, from: <https://economictimes.indiatimes.com/news/politics-and-nation/covid-19-lockdown-delayed-academic-plans-and-uncertainty-anxiety-grips-cbse-class-12-students/articleshow/75642141.cms>

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Review Article

Endocrine Disruptors Stress Responses in Aquatic Environment: Consequence on Fish Reproductive Physiology: A Review

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ABSTRACT

Endocrine disruptor chemicals (EDCs) are mostly synthetic molecules from industrial origin that are present in the environment and promote adverse modifications of endocrine homeostasis in animals. EDCs raise serious concerns about their potential health impact. Endocrine-disrupting compounds can alter biological function in organisms at environmentally relevant concentrations and are a significant threat to aquatic biodiversity. At the molecular level, the EDCs can affect the expression of steroid and sex hormone related enzymes by binding to the nuclear receptors. Fishes are generally considered to be the most feasible organisms for pollution monitoring in aquatic systems. Fish carrying high loads of EDCs in their body tissue potentially suffer impaired health. The fish endocrine system is fundamentally similar to that of mammals, and fish reproduction may be a relevant indicator on the mechanism of endocrine disruption by chemical compounds. Fish are good indicators of the toxicity of endocrine disrupting chemicals. In the present communication, a detailed analysis of endocrine disruptors in aquatic systems, their impact on animals has been done through the literature available in recent years.

Keywords: Endocrine disruptors, Aquatic animals, Hormone receptor, Fish reproduction.

INTRODUCTION

Endocrine-disrupting chemicals (EDCs) are a heterogeneous group of substances that are able to interfere with the hormonal-signalling pathways and alter metabolic and reproductive functions. Endocrine disruption chemical is an exogenous substance or mixture which can be natural or manmade that alters functions of the endocrine system in an organism or its progeny or its subpopulations (Söfiker and Tyler, 2012; Schug and Birnbaum, 2020; Meli *et al.*, 2020). The group of molecules recognised as EDCs are highly hetero-

geneous and includes synthetic chemicals such as Polychlorinated biphenyls (PCBs), Polybrominated biphenyls (PBBs), Polycyclic aromatic hydrocarbons (PAHs), plastics, pesticides, Dichlorodiphenyltrichloroethane (DDT), fungicides and pharmaceutical agents. The US Environmental Protection Agency (US-EPA) has defined Endocrine disruptor Compound as “exogenous agents that interfere with the production, release, transport, metabolism, binding, action, or elimination of the natural hormones in the body responsible for the maintenance of homeostasis and the regulation of developmental processes.”. Many

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animal studies provided evidence that several of these chemicals can disturb sexual development and differentiation. Natural chemicals found in human and animal food (*e.g.*, phytoestrogens, including genistein and coumestrol) can also act as endocrine disruptors (Söffker and Tyler, 2012; Dickerson and Gore, 2007; Diamanti-Kandarakis *et al.*, 2009; Schug and Birnbaum, 2020; Gassman, 2017).

Exposure to Endocrine-disrupting chemicals is associated with deleterious health effects for animals and humans and affects not only endocrine and reproductive organs but also immune and central nervous systems through several mechanisms, including *oxidative* stress (Diamanti-Kandarakis *et al.*, 2009; Söffker and Tyler, 2012; Meli *et al.*, 2020). EDCs enable an organism to develop and reproduce. Widespread use of pesticides for agriculture or domestic purposes damage the non-target organisms, including fish of commercial importance. The investigation of the effects of pesticide on fish has diagnostic significance in evaluation of adverse effects of pesticides to human health since fish have an important role in food chain (Porte *et al.*, 2006; Diamanti-Kandarakis *et al.*, 2009; Patisaul *et al.*, 2017).

Chemical Nature of Endocrine Disrupting Chemicals

The source of exposure to EDCs is diverse & globally very wide. Both natural & man-made EDC's are considered to cause endocrine disruption. The group of endocrine disruption (EDCs) is diverse, and this can be classified into different categories and have different sources.

The group of known EDs is extremely heterogeneous. The EDs can be classified in two categories:

- 1) Those that are synthesized. These can be grouped as follows:
 - a) synthetic substances used as industrial lubricants and solvents, and their by-products: *e.g.* polychlorinated biphenyls (PCBs), Polybrominated diphenyl ethers (PBDE) and dioxins *e.g.* 2,3,7,8tet-rachlorodibenzo-p-dioxin (TCDD), decabromodi- phenylethane (DBPDE).
 - b) plastics: bisphenols – *e.g.* bisphenol A (BPA) and bisphenol S (BPS)
 - (c) plasticizers: *e.g.* phthalates
 - (d) pesticides: *e.g.* atrazine, cypermethrin, dichlorodiphenyltrichlorethane (DDT), dieldrin, methoxychlor (MTX) and its metabolites *e.g.* 2,2-

Table 1. List of some Common Endocrine-Disrupting Chemicals with their source and use

EDCs (compound)	Source /Use
Polychlorinated Biphenyl (PCB)	Electrical coolant and other uses
Polybrominated Diphenyl Ethers (PBDE)	Flame retardants
Polycarbonate Plastics, Bisphenol A(BPA) & Bisphenol S(BPS)	Plastics, thermal receipts
Decabromodiphenyl Ethane (DBPDE)	Industrial lubricants and solvents
Polyvinyl chloride (PVC), Phthalates	Plastics, fragrances
Vinclozolin (VCZ), Dicarboximid, Hexachlorbenzene (HCB)	Fungicides
Atrazine, Dichlorodiphenyltrichlorethane (DDT), Endosulphan	Pesticides
Dioxin (2,3,7,8-tetrachlorodibenzo-p-dioxin)	Formed in industrial processing
Ethinylloestradiol (EE), Diethylstilbestrol (DES), Anti- inflammatory drugs (NSAID) & Acetaminophen.	Drug industry
Phytoestrogens (Genistein)	Naturally prevail

- bis(p-hydroxyphenyl)-1,1,1-trichloroethane (HPTE), endosulphan
- e) fungicides: e.g. vinclozolin (VCZ), dicarboximid, hexachlorbenzene (HCB)
- f) and drugs: e.g. diethylstilbestrol (DES) and ethinyloestradiol (EE) as well as non-steroidal anti-inflammatory drugs (NSAID) and acetaminophen
- 2) Those that occur naturally.
- a) natural chemicals such as phytoestrogens e.g. genistein (Diamanti-Kandarakis *et al.*, 2009; Chmelíková *et al.*, 2018; Schug and Birnbaum, 2020).

Some potent Endocrine disrupting chemicals along their sources are represented in Table (Diamanti-Kandarakis *et al.*, 2009; Chmelíková *et al.*, 2018; Schug and Birnbaum, 2020; Buoso *et al.*, 2020; Hamid *et al.*, 2021).

Mode of action of Endocrine Disruptors

Endocrine-disrupting chemicals (EDCs) are a special group of compounds that can bind to the endocrine receptors to activate, block, or alter natural hormone synthesis and degradation by a number of mechanisms resulting in abnormal hormonal signals that can increase or inhibit normal endocrine functioning. EDCs are structurally similar to many hormones and function at extremely low concentrations, and many have lipophilic properties (Schug and Birnbaum, 2020; Whirlledge and Cidlowski, 2019; Buoso *et al.*, 2020). EDCs are capable of mimicking natural hormones and exerting similar modes of action, transport, and storage within tissues. EDCs have high tendency and potency to activate or antagonize nuclear hormone receptors family. Endocrine-disrupting chemicals were originally thought to exert actions primarily through nuclear hormone receptors, including estrogen receptors (ERs), androgen receptors (ARs), progesterone receptors, thyroid receptors (TRs), and retinoid receptors, among others. The estrogens are a group of steroid hormones produced by enzymatic modification of cholesterol. EDCs can mimic the estrogens and alter the sig-

nalling pathways of estrogen hormone by binding to estrogen receptors and either activating or inhibiting transcriptional response. They disrupt normal development via interaction with estrogen receptors. Some Endocrine-disrupting chemicals act as estrogen mimics, others have variable estrogenic activity, and some act as selective estrogen receptor modulators. They may interrupt sexual development and modification or alteration (Porte *et al.*, 2006; Welshons *et al.*, 2013; Buoso *et al.*, 2020; Whirlledge and Cidlowski, 2019; La Merrill *et al.*, 2020).

Impacts of Endocrine disruptors on aquatic ecosystem

Endocrine disrupting chemicals are a ubiquitous issue of concern in our aquatic systems. The potency of EDCs varies considerably, to persist and move in the environment. Current research indicates that EDCs are found in complex mixtures in surface, ground, and finished water. Endocrine disrupting chemicals enter aquatic ecosystems through discharged effluents, mainly from wastewater treatment plant and diffuse run off from land, and affect a wide range of aquatic biota, including fish. Fish play an integral role in the aquatic ecosystem food web, and any effects that change the population structure of fish may also alter community and food web dynamics (Kavlock *et al.*, 1996; Johnson *et al.*, 2000; Diamanti-Kandarakis *et al.*, 2009; Söffker and Tyler, 2012). Fishes can biomagnify contaminants, fishes are potentially useful sentinels of aquatic environmental degradation. Fishes are a major protein food source for humans, with a high economic value in the aquaculture industry. The use of pharmaceuticals, pesticides, and fertilizers for maintaining and increasing fish health and growth also contributes to EDCs pollution in the water body. Fish carrying high loads of EDCs in their body tissue potentially suffer impaired health and can deliver high concentrations of EDCs to their consumers. Fish are particularly vulnerable to exposure to EDCs and the uptake occurs via multiple routes including directly from the water via the gills, skin and drink-

ing (gut), through the diet and by means of sediment contact.^[1,14,15,17] Some EDCs have been shown to bio-concentrate in fish and to bio-accumulate in fish species that occupy higher trophic levels. Effects of EDCs have been studied on many aspects of fish physiology, most commonly on features relating to growth, development and reproduction. EDCs can also have effects on fish behavior (Welshons *et al.*, 2003; Porte *et al.*, 2006; Clark and Grant, 2010; Söffker and Tyler, 2012).

Sex steroid hormones play vital roles in almost all aspects of reproduction, including mediating sexual differentiation, gonadal growth, and reproductive behaviors. Some of the most potent sex steroids EDCs are receptor agonists and they include the synthetic estrogen. EDCs disrupting sex steroid action and affecting sexual development and reproduction in fishes. Natural steroid estrogens are widespread in the aquatic environment and they too (obviously) are potent as estrogen receptor agonists.^[19,20,21]

In fish evidence for endocrine disruption in both male and female populations is extensive. Fish carrying high loads of EDCs in their body tissue potentially suffer impaired health and can deliver high concentrations of EDCs to their consumers. The validity of molecular biomarkers of stress and exposure to different types of pollution in fish is proved in a broad number of studies. EDCs have been implicated in the complete or partial feminization of male fish, induction of vitellogenin or other egg-related proteins in male fish and juveniles, decreases in gamete quality or quantity (fecundity) and changes in sexual and mating behaviors (Tollefsen *et al.*, 2007; Coe *et al.*, 2008; Hamid *et al.*, 2021). Endocrine disrupting chemicals induces production of female proteins in males – vitellogenin (VTG), and alterations in germcell development – production of oocytes in the testis of fish exposed to EDCs. In female population EDCs induces androgenic responses include masculinized secondary sex characters in female fish exposed to industry effluents. Widespread feminization of fish in the United Kingdom

has been attributed to the estrogenic properties of municipal sewage effluent (Ankley and Johnson, 2004; Coe *et al.*, 2008).

Numerous compound having EDCs properties that are found in the environment cause abnormalities in growth and development in fishes. In the reproductive system, chlorinated pesticides can result in abnormal stimulation of reproductive tract development and function in females and decrease overall fertility. One of the most efficient and important agents, organophosphorous pesticides have been used throughout the world to control pests in agricultural crops, forests, and wetlands for more than four decades. DDT is a persistent pesticide, whose compound structure permit and several different isomeric forms have been implicated as a potent endocrine disrupting chemical. Observed effects of DDT on fish reproductive physiology have ranged from subtle changes in basic physiology of species to permanently altered sexual differentiation (Welshons *et al.*, 2003; Ankley and Johnson, 2004; Porte *et al.*, 2006; Coe *et al.*, 2009; La Merrill *et al.*, 2020; Schug and Birnbaum, 2020).

In fish many laboratory studies have shown effects of EDCs on reproductive behaviour in individuals, with a predominant focus on estrogen in males. Examples include disruption of nest building in adult male three-spined stickleback exposed to EDCs, where a reduced gluing frequency, delayed onset of nest building or reduced care for the nest (Coe *et al.*, 2009; Clark and Grant, 2010). In sand gobies exposure of adult fish to industrial effluents was shown to reduce the ability of male to gain and keep a nest and reduced their display of sexual behaviours (Coe *et al.*, 2009; Daley *et al.*, 2009; Clark and Grant, 2010; Johnson *et al.*, 2020). Similarly, adult male fathead minnows exposed to EDCs showed reduced care for the spawning site (Coe *et al.*, 2009; Daley *et al.*, 2009). Recent studies on female Zebra fish exposed to EDCs showed diminished courting response towards males and had lower reproductive success than unexposed females.^[17,20,23] These findings suggest that changes in sexual behaviour of fishes exposed to endocrine disrupting compounds

can have important consequences on the dynamics of the population, as female reproductive capability plays a key role in its maintenance.

CONCLUSION

Endocrine-disrupting substances are a compound, either natural or synthetic, which, through environmental or inappropriate developmental exposures, alters the hormonal and homeostatic systems that enable the organism to communicate with and respond to its environment. Endocrine disruptors; when they enter the aquatic ecosystem; not only interfere with the aqua fauna but also with terrestrial and aerial animals linked directly or indirectly with water for food and other ecological interactions. The food chain and food web are responsible for transferring these chemicals to animals of different trophic levels. Several developmental, neurological, reproductive, metabolic, and immune disorders are the consequent effect of EDCs exposure to animals and humans. Endocrine-disrupting chemicals can alter biological function in organisms at environmentally relevant concentrations and are a significant threat to aquatic biodiversity, but there is little understanding of exposure consequences for populations, communities and ecosystems.

REFERENCES

- Ankley, G.T. and Johnson, R.D., 2004. Small fish models for identifying and assessing the effects of endocrine-disrupting chemicals. *ILAR journal*, 45(4), pp.469-483.
- Buoso, E., Masi, M., Racchi, M. and Corsini, E., 2020. Endocrine-Disrupting Chemicals (EDCs) Effects on Tumour Microenvironment and Cancer Progression: Emerging Contribution of RACK1. *International Journal of Molecular Sciences*, 21(23), pp.9229-9255.
- Chmelíková, E., Markéta, S., Michal, J. and Němeček, D., 2018. Endocrine disruptors: General characteristics, chemical nature and mechanisms of action. A review. *Medical Journal of Cell Biology*, 6(4), pp.135-139.
- Clark, L. and Grant, J.W., 2010. Intrasexual competition and courtship in female and male Japanese medaka, *Oryzias latipes*: effects of operational sex ratio and density. *Animal Behaviour*, 80(4), pp.707-712.
- Coe, T.S., Hamilton, P.B., Hodgson, D., Paull, G.C. and Tyler, C.R., 2009. Parentage outcomes in response to estrogen exposure are modified by social grouping in zebrafish. *Environmental science & technology*, 43(21), pp.8400-8405.
- Coe, T.S., Hamilton, P.B., Hodgson, D., Paull, G.C., Stevens, J.R., Sumner, K. and Tyler, C.R., 2008. An environmental estrogen alters reproductive hierarchies, disrupting sexual selection in group-spawning fish. *Environmental science & technology*, 42(13), pp.5020-5025.
- Coe, T.S., Söffker, M.K., Filby, A.L., Hodgson, D. and Tyler, C.R., 2010. Impacts of early life exposure to estrogen on subsequent breeding behavior and reproductive success in zebrafish. *Environmental science & technology*, 44(16), pp.6481-6487.
- Daley, J.M., Leadley, T.A. and Drouillard, K.G., 2009. Evidence for bioamplification of nine polychlorinated biphenyl (PCB) congeners in yellow perch (*Perca flavescens*) eggs during incubation. *Chemosphere*, 75(11), pp.1500-1505.
- Diamanti-Kandarakis, E., Bourguignon, J.P., Giudice, L.C., Hauser, R., Prins, G.S., Soto, A.M., Zoeller, R.T. and Gore, A.C., 2009. Endocrine-disrupting chemicals: an Endocrine Society scientific statement. *Endocrine reviews*, 30(4), pp.293-342.
- Diamanti-Kandarakis, E., Bourguignon, J.P., Giudice, L.C., Hauser, R., Prins, G.S., Soto, A.M., Zoeller, R.T. and Gore, A.C., 2009. Endocrine-disrupting chemicals: an Endocrine Society scientific statement. *Endocrine reviews*, 30(4), pp.293-342.

- Dickerson, S.M. and Gore, A.C., 2007. Estrogenic environmental endocrine-disrupting chemical effects on reproductive neuro-endocrine function and dysfunction across the life cycle. *Reviews in Endocrine and Metabolic Disorders*, 8(2), pp.143-159.
- Gassman, N.R., 2017. Induction of oxidative stress by bisphenol A and its pleiotropic effects. *Environmental and molecular mutagenesis*, 58(2), pp.60-71.
- Hamid, N., Junaid, M. and Pei, D.S., 2021. Combined toxicity of endocrine-disrupting chemicals: A review. *Ecotoxicology and Environmental Safety*, 215, p.112136.
- Johnson, R.A., Harris, R.E. and Wilke, R.A., 2000. Are pesticides really endocrine disruptors?. *WMJ: Official Publication of the State Medical Society of Wisconsin*, 99(8), pp.34-38.
- Kavlock, R.J., Daston, G.P., DeRosa, C., Fenner-Crisp, P., Gray, L.E., Kaattari, S., Lucier, G., Luster, M., Mac, M.J., Maczka, C. and Miller, R., 1996. Research needs for the risk assessment of health and environmental effects of endocrine disruptors: a report of the US EPA-sponsored workshop. *Environmental health perspectives*, 104(suppl 4), pp.715-740.
- La Merrill, M.A., Vandenberg, L.N., Smith, M.T., Goodson, W., Browne, P., Patisaul, H.B., Guyton, K.Z., Kortenkamp, A., Cogliano, V.J., Woodruff, T.J. and Rieswijk, L., 2020. Consensus on the key characteristics of endocrine-disrupting chemicals as a basis for hazard identification. *Nature Reviews Endocrinology*, 16(1), pp.45-57.
- Meli, R., Monnolo, A., Annunziata, C., Pirozzi, C. and Ferrante, M.C., 2020. Oxidative stress and BPA toxicity: An antioxidant approach for male and female reproductive dysfunction. *Antioxidants*, 9(5), pp. 405-428.
- Patisaul, H.B., Gore, A.C. and Crews, D., 2017. Environmental endocrine disruption of brain and behavior. *Hormones, Brain and Behavior*. Elsevier, pp.63-88.
- Porte, C., Janer, G., Lorusso, L.C., Ortiz-Zarragoitia, M., Cajaraville, M.P., Fossi, M.C. and Canesi, L., 2006. Endocrine disruptors in marine organisms: approaches and perspectives. *Comparative Biochemistry and Physiology Part C: Toxicology & Pharmacology*, 143(3), pp.303-315.
- Schug, T.T. and Birnbaum, L.S., 2020. ENDOCRINE-DISRUPTINCHEMICALS. *Environmental Toxicants: Human Exposures and Their Health Effects*, pp.535-554.
- Söffker, M. and Tyler, C.R., 2012. Endocrine disrupting chemicals and sexual behaviors in fish—a critical review on effects and possible consequences. *Critical reviews in toxicology*, 42(8), pp.653-668.
- Tollefsen, K.E., Harman, C., Smith, A. and Thomas, K.V., 2007. Estrogen receptor (ER) agonists and androgen receptor (AR) antagonists in effluents from Norwegian North Sea oil production platforms. *Marine Pollution Bulletin*, 54(3), pp.277-283.
- Vickers, N.J., 2017. Animal communication: when i'm calling you, will you answer too?. *Current biology*, 27(14), pp.R713-R715.
- Welshons, W.V., Thayer, K.A., Judy, B.M., Taylor, J.A., Curran, E.M. and Vom Saal, F.S., 2003. Large effects from small exposures. I. Mechanisms for endocrine-disrupting chemicals with estrogenic activity. *Environmental health perspectives*, 111(8), pp.994-1006.
- Whirledge, S. and Cidlowski, J.A., 2019. Steroid hormone action. In *Yen and Jaffe's Reproductive Endocrinology* (pp. 115-131). © Elsevier, Hardcover ISBN: 9780323479127.

Review Article

Synthetic strategies of Layered double hydroxide 2D materials: A short review

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ABSTRACT

LDHs have received considerable research in the realm of transition-metal catalysis owing to their unique electronic and structural properties. More significantly, their applications in electro-catalysis such as splitting of water and production of dihydrogen from sustainable sources are remarkable. Moreover, during the last decade, their application has also been investigated in other fields of chemistry. This review intends to provide overview of synthetic strategies of LDHs in the last two decades.

Key words: Transition-metal catalysis, Layered double hydroxide, Electro-catalysis

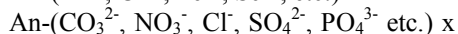
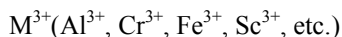
INTRODUCTION

Catalysis is undoubtedly an exciting field in chemistry and has played a significant role in the development of synthetic organic chemistry, pharmaceuticals, and other relevant fields of chemistry. By realizing the importance of catalysts in synthetic organic chemistry, in the last three decades, enormous efforts have been directed to develop high-performance catalysts and explored their application as catalysts in different organic reactions. Recently, concentrated attention has been focused on the development of catalysts based on low-cost transition metals and their application in the large-scale synthesis of value-added organic products. Of these, layered double hydroxides (LDHs) have gained considerable research interest due to their widespread application in numerous fields such as electro catalysis, material science, and transition-metal catalysis. Moreover, recently, LDHs were found application in the preparation of CO₂ adsor-

bents (Luet *et al.*, 2017; Luet *et al.*, 2017; Lvet *et al.*, 2019; Song *et al.*, 2014; Han *et al.*, 2015; Wang *et al.*, 2018), ion exchange hosts (Yu *et al.*, 2017; Liu *et al.*, 2014; Ma *et al.*, 2012), retardant additives (Zhitova *et al.*, 2019; Cai *et al.*, 2019), polymer / LDH nanocomposites (Huang *et al.*, 2019), drug delivery hosts (Liu *et al.*, 2019), and had also been applied as cement additives (Ma *et al.*, 2010). The major advantage of LDHs is that the structural and electronic properties of LDHs can easily be tuned by facile modification of their surface/interface structures.

LDH is considered a unique class of 2D material, comprised of cationic brucite-like layers, and has an interlayer region where charge compensating anions and solvation molecules usually reside. It can be represented by the formula $[M^{2+}_x M^{3+}_x (OH)_2]_{x+n} [A_{n-}]_{x/n} \cdot 2H_2O$ where M^{2+} (Mg²⁺, Ni²⁺, Co²⁺, Fe²⁺, Zn²⁺, Cu²⁺ etc.)

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is normally 0.2-0.4. Metal cations prefer to reside at the center of edge-sharing the octahedral and OH⁻ occupy the vertex position and play a crucial role in the formation of 2D sheets. A fraction of octahedrally coordinated M²⁺ ions are replaced by M³⁺ ones resulting in a positive charge on the host layer. Moreover, the OH groups of the host layers are connected to the anion or H₂O molecule by H-bonds. For example, the crystal structure of MgAl–CO₃–LDH is shown in Figure.

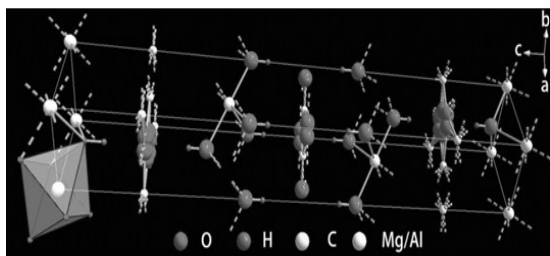


Figure 1. Schematic representation of the structure of MgAl–CO₃–LDH layered double hydroxide

In this review, we have highlighted the recent progress in the structure designing and exfoliation of LDHs and summarised various methods of preparation of LDHs nanosheets.

THE SYNTHETIC PROCEDURE OF LDHs

During the past few decades, considerable efforts have been directed to develop various procedures for preparing LDHs and exploring their potential in numerous fields. The synthetic methods of 2D LDHs can be broadly divided into two classes namely-the “top-down” and “bottom-up” approaches. Generally, the top-down method relies on physical shear force or chemical intercalation to achieve the interaction between adjacent layers which resulting mono or few-layered nanosheets. On the contrary, the bottom-up method depends on the direct preparation of 2D LDH nanosheets via chemical synthesis.

Direct synthesis or bottom-up method

The bottom-up approach is considered to be a suitable method for the direct synthesis of 2D nanosheets (Hur *et al.*, 2010). To this end, the various mechanical and chemical process that involves the application of laser beam on metals in aqueous solution, utilization of layer growth inhibitor in a microemulsion, and use of a special reactor to create a reaction environment, etc are the most notable.

PHYSICOCHEMICAL APPROACH

Pulsed laser ablation

Hur and co-workers, for the first time, introduced the pulsed laser ablation for the synthesis of LDH (Hur *et al.*, 2010). Interestingly, by applying this strategy, ultrathin nanosheets can be prepared without any chemical or heat treatment. The method is applicable for the synthesis of silver particles (Phuoc *et al.*, 2007), ZnO particles (Sasaki *et al.*, 2004), Au-Ag alloy (Kazakevich *et al.*, 2006; Compagnini *et al.*, 2008), and other stable phases depending on the properties of target materials and surrounding liquids. The method comprises two steps. First is the laser ablation of a metal target for trivalent cations in deionized water at room temperature using Q-switched Nd:yttrium aluminum garnet laser and the second is for bivalent source from the previously prepared trivalent metallic colloid by laser ablation over another metal target. Zn-Al, Co-Fe, Co-Al, and Mg-Fe were formed by controlling the ablation time, the wavelength to the thickness of the exfoliated 2D nanosheets. The lateral sizes of these LDHs are approximately 300, 100, 100, and 200 nm respectively. All these colloidal nanosheets were found to be stable without any formation of lamellar structure specially Mg-Fe and Co-Fe LDH layers have extremely large lateral sizes as compared to that of regular LDHs prepared on a TEM grid. TEM images of Mg-Fe LDHs showed a rolling and folding morphology with a thick-

ness of nearly 0.5 nm

Later on, Miller *et al.* applied pulsed laser ablation in liquid (PLAL) to synthesize a series of Ni-Fe LDHs with intercalated nitrate ion and water having formula $[\text{Ni}_{1-x}\text{Fe}_x(\text{OH})_2](\text{NO}_3)_y(\text{OH})_{x-y}\cdot n\text{H}_2\text{O}$ (Hunter *et al.*, 2014). Fe or Ni powder was firstly mixed in 10 mL aqueous metal nitrate solutions using a magnetic stirrer. For bimetallic LDHs, one type of metal was used as the ablation target and the nitrate salt of the other metal was dissolved in the precursor solution. Nanoparticles were formed by rapid cooling of a plasma consisting of the elements for the solid ablation target and the surrounding liquid. After the completion of the process, the LDH nanoparticle suspension was separated from the metallic ablation target using a strong magnet. By varying the ablation target, type of metal ions, and their concentration, as well as laser pulse energies, the composition of LDH with mixed metal, can be controlled. From powdered XRD measurement, it was found that iron-rich nanoparticles are poorly crystalline while the nickel-rich nanoparticles are more close to LDH structure. Mossbauer and X-ray absorption spectroscopic data indicated the incorporation of iron as Fe^{3+} to replace Ni^{2+} ion partially in Ni-Fe LDHs. TEM study indicates the lateral sizes ranged from ~ 7 -22 nm. This method is useful for the preparation of ultrathin LDH layers with a uniform size.

Microwave irradiation

Microwave irradiation is one of the most convenient methods to synthesize nanomaterials with uniform size. Xu and co-workers exploited this method to prepare Zn-Co LDH nanosheet which was found to be more convenient than the liquid exfoliation method (Qiao *et al.*, 2015). The aforesaid material was prepared by dissolving zinc nitrate hexahydrate, cobalt nitrate hexahydrate, and urea in deionized water and then transferred to a round-bottomed flask followed by microwave irradiation at 900 watts. XRD analysis

showed peaks at 003, 006, and 113 peaks which clearly indicate the presence of Zn and Co and it has been observed that the intensity of the peak increases with the increase of microwave power. Moreover, the AFM image disclosed that with an increase in reaction time, the lateral size increases. Peak-force-model atomic force microscopy (PF-AFM) study reveals that the thickness of the obtained nanosheets is ~ 2 nm

Chemical approach

Yan *et al.* devised a single-step method for the large-scale synthesis of Mg-Al LDHs (Yan *et al.*, 2012). To prepare this LDH, $\text{Mg}(\text{NO}_3)_2\cdot 6\text{H}_2\text{O}$, $\text{Al}(\text{NO}_3)_3\cdot 9\text{H}_2\text{O}$, and urea were allowed to dissolve in 100 mL 30% H_2O_2 to yield a solution containing 0.01 M Mg^{2+} ion and 0.005 M Al^{3+} ion followed by heating at 150°C in Teflon tube for 24 hrs. After the required time, a translucent colloidal suspension was obtained. A closer inspection of reaction parameters revealed that the percentage of H_2O_2 has discernable effects on reaction yields. With an increase in the percentage of H_2O_2 the yield increases. Moreover, it has been observed that upon the addition of H_2O_2 , the 003 XRD peak shifted to a low angle which in turn indicated that the interlayer spacing of Mg-Al LDHs was expanded. Furthermore, on the increasing concentration of H_2O_2 to 30%, a semi-transparent colloidal suspension was obtained which can be kept for several weeks in the air without the formation of a precipitate. Finally, the author has analyzed the material with the help of scanning electron microscopy (SEM) which showed the hexagonal morphology of the Mg-Al LDHs with a size of 5-10 μm .

In a seminal work, Hu *et al.* developed a facile one-step synthesis of LDH monolayer in a reverse microemulsion (Hu *et al.*, 2006). The reaction involves $\text{Mg}(\text{NO}_3)_2\cdot 6\text{H}_2\text{O}$ and $\text{Al}(\text{NO}_3)_3\cdot 9\text{H}_2\text{O}$ into an oil phase of isooctane with sodium dodecyl sulphate as surfactant and 1-butanol as co-surfactant. The pH of the solution was adjusted to 10 by adding NaOH. For the growth of

LDH, the aqueous phase containing the nutrients dispersed in the oil phase forms droplets surrounded by dodecyl sulphate groups. Both the diameter and thickness can be effectively controlled as the droplets provided limited space for the nutrients for the formation of LDH platelets. The XRD patterns of the gel-like materials presented two broad reflections at $2\theta = 7.5^\circ$ and 20° , while the strong basal plane Bragg's reflection of LDHs was missing indicating a lack of organized layered structure of the sample. Upon drying the pattern showed a gradual growth of a $2\theta = 3^\circ$ Bragg reflection suggesting that the sample gains some structural order. The AFM topology revealed an isolated oval object which has a uniform height distribution of around 1.5 nm and diameter distribution centered around 40 nm.

Chemical exfoliation of parent LDH crystals

Chemical exfoliation is another effective strategy to prepare 2D nanosheets from parent LDH crystals. The method provides scope for controlling the growth rate and chemical composition of LDHs and hence considered as one of the most convenient methods for the preparation of 2D nanosheets.

Synthesis of layered precursor compounds

The prime objective of the top-down process is to obtain multilayered parent compounds of high quality. It is a solution-based process to prepare LDH crystal and may be classified as coprecipitation, homogeneous precipitation, and topochemical oxidation. Coprecipitation involves the precipitation of a solution containing divalent and trivalent metal salts under alkaline conditions or at constant pH, e.g. by adding sodium hydroxide or sodium carbonate (Reichle *et al.*, 1986; Ehlsissen *et al.*, 1993; Xu *et al.*, 2001). Homogeneous precipitation usually utilizes a reagent such as urea or hexamethylenetetramine (HMT) and serves as a source of the alkaline medium as upon hydrolysis of these release ammonia at a controlled rate. This method generally leads to high crystallinity LDHs due to the

homogeneous nucleation procedure (Nobuo *et al.*, 2004; Cai *et al.*, 1994), whereas the topochemical oxidation process involves a topochemical oxidative intercalation starting from brucite like divalent metal hydroxide (Bitsianes *et al.*, 1955). Ma *et al.* (Ma *et al.*, 2007) introduced a new process of synthesizing transition metal bearing LDHs brucite like Co^{2+} - Fe^{2+} hydroxides by using $\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$ and $\text{FeCl}_2 \cdot 4\text{H}_2\text{O}$ via HMT hydrolysis under a nitrogen atmosphere. By applying a topochemical approach the product was then transformed to $\text{Co}_{2/3}\text{Fe}_{1/2}(\text{OH})_2$ LDH by intercalation with I_2/CHCl_3 . On filtration and rinsing with anhydrous ethanol repeatedly a brownish product was obtained. The topochemical process was also used to prepare Co^{2+} - Co^{3+} LDH which cannot be prepared by the previous two methods as there is no stable dissociated Co^{3+} or $\text{Co}(\text{OH})_3$ in an aqueous solution (Ma *et al.*, 2008).

Lee *et al.* developed a novel synthesis of hydrotalcite-like Co^{2+} or Ni^{2+} - Fe^{3+} LDHs using a one-pot topochemical oxidation route where anthraquinone-2-sulphonate anions (AQS2) served as a mild oxidant and helped the oxidation of Fe^{2+} into Fe^{3+} to form the LDH phase and were intercalated into the interlayer space of the LDH during slow precipitation (Lee *et al.*, 2012). Another way is the refluxing CoCl_2 or NiCl_2 - FeCl_2 -AQS2-HMT solution with a stoichiometric ratio 2:1 of Co or Ni/Fe under nitrogen atmosphere for three hours. A brown and dark yellow solid precipitate was obtained for the Co-Fe LDHs and Ni-Fe LDH respectively. The average lateral size of both samples was found to be 0.5 μm and the thickness was around 70 nm. The diffraction peaks of XRD patterns showed a hydrotalcite-like phase similar to those in a-Co-AQS2-LDH phase (Lee *et al.*, 2009).

Ion intercalation/exchange

Ion intercalation/exchange is another convenient method for synthesizing LDH with the desired ion and can regulate the properties of materials (Ma *et al.*, 2016., Wang *et al.*, 2009., Sene *et al.*, 2015; Ma *et al.*, 2017). As counter

ions are used to balance the parent layered change, ion intercalation occurs spontaneously. A plethora of organic molecules like glucose (Lv *et al.*, 2016), carbon dots (Liu *et al.*, 2017), and ethylene glycol (Wang *et al.*, 2016) can also be intercalated in addition to inorganic anions like alkoxide, molybdate, polyoxometallates, etc. Intercalating ions between LDH host layers expand the interlayer spacing for convenient transport of ions/electrons and also facilitate the subsequent exfoliation of LDHs into ultra-thin nanosheets (Liu *et al.*, 2006).

Exfoliation

Monolayered or few-layered nanosheet-shave drawn considerable interest in catalysis and have made many breakthroughs in synthetic organic chemistry and electro-catalysis. The formation of monolayered or few-layered nanosheets can be achieved through exfoliation of bulk LDH with weak interlayer forces which increase catalytically relevant active sites of the material. Therefore, in the last few years, the great impetus has been given to the development of efficient methods for the exfoliation of bulk LDH. Of these, soft chemical exfoliation and plasma exfoliation are the most notable.

Soft chemical exfoliation in liquid/solvent

Adachi-Paganoet *et al.* (Adachi-Pagano *et al.*, 2000) presented an elegant method for the exfoliation of LDH by preparing dodecylsulphate (DS-) intercalated Zn^{2+}/Al -DS—LDH and tried delaminating it in various organic solvents. They found that the LDH could be exfoliated in butanol, pentanol, and hexanol and remains stable for a long time. Zn^{2+}/Al -DS—LDH can be partially delaminated in other solvents such as water, methanol, ethanol, propanol, and hexane. Thereafter, Venugopal *et al.* had successfully applied such an exfoliation method to different types of divalent and trivalent LDHs including Mg-Al LDHs, Ni-Al LDHs, and Zn-Al LDHs intercalated with sodium dodecylsulphate or sodi-

um dodecyl benzene sulphonate (Venugopal *et al.*, 2006). The author has demonstrated that higher exfoliation yield can be achieved by lowering M^{2+}/M^{3+} in LDHs and they have also revealed that solvent plays a significant role during the exfoliation process. They have reported that alcohols such as 1-butanol, 1-octanol are the best solvent for the exfoliation of the aforementioned LDHs.

Besides alcohol, a non-polar solvent, toluene was also found to be suitable dispersant of DS- intercalated LDH (Naik *et al.*, 2011). On stirring in toluene and sonicating for 5 minutes, DS- intercalated $Mg_{0.67}/Al_{0.33}$ LDH and $Co_{0.67}/Al_{0.33}$ LDHs were rapidly exfoliated into monolayers with a clear transparent dispersion showing a clear tindal scattering effect. The whole mechanism was based on molecular dynamics simulation. The treatment with the solvents disrupts the Van-der Waals force between chains linked to adjacent host layers for the LDH having long-chain surfactant molecules. Thus, DS- converted the hydrophilic LDHs into hydrophobic which promotes solvation with non-polar solvents such as toluene.

Hibino and Jones, for the first time, reported creating a desirable interlayer environment to perform liquid exfoliation in formamide (Hibino *et al.*, 2001). For this purpose, different amino acid anions including glycine, serine, and L-aspartic acid were allowed to insert in the galleries of Mg_n/Al_k -LDHs, and polar solvents like water, ethanol, acetone, formamide, ethylene glycol, and diethyl ether, are used as dispersants. The study disclosed that glycine and formamide combination provides the best result. The author has noticed that upon mixing 0.03 g Mg_3/Al -glycine LDH in 10 mL formamide under stirring conditions, rapid exfoliation occurred in a few minutes. They also studied Mg-AL LDHs with various amino acids to create an interlayer suitable for solvation of formamide that could break the H-bonding network and helps in delamination.

Delamination of Co-Al LDHs in formamide was studied by Liu *et al.* (Liu *et al.*, 2006) to prepare hexagonal Co-Al-Co₃ LDH platelets of 4 μm in lateral size by following the urea method. It was then converted to Cl⁻-LDH by treating with a NaCl-HCl mixed solution (Iyi *et al.*, 2008). Later by an anion exchange process with salts like NO³⁻, ClO⁴⁻, acetate, lactate, dodecylsulphate, and oleate, Co-Al LDHs intercalated with anions. 0.1 g of the latter was then mixed with 100 mL formamide and agitated vigorously in a mechanical shaker at a speed of 160 rpm for two days. A pink transparent suspension was obtained containing a nanosheet with a lateral size upto 2 μm . AFM showed a flat morphology with an average thickness of ~ 0.8 nm which can be explained as the sum of the crystallographic thickness of the LDH layer (0.48nm) and an absorbed monolayer of formamide molecules (~ 0.3 nm) (Li *et al.*, 2005) indicating the unilamellar structure of the exfoliated nanosheets.

Synthesis of Co-Ni LDHs from brucite like Co-Ni hydroxide with bromine as an oxidizing agent was reported by Liang *et al.* A variety of inorganic and organic anionic forms of Co-Ni LDHs were prepared by the subsequent ethanol assisted anion exchange process. By varying the Co-Ni ratio different colors can be inserted into translucent suspensions of nanosheets. Delamination of LDH could be possible in an aqueous solution as reported by Iyi and co-workers. They added aqueous zwitterion solution into ClO⁴⁻ intercalated Mg-Al LDH and successfully obtained transparent colloidal suspension (Iyi *et al.*, 2013).

Monohara *et al.* (Manohara *et al.*, 2010) prepared formate intercalated Ni-Al LDHs by formamide hydrolysis which could be delaminated in water. Osmotic swelling of the formate ion in water leads to the exfoliation of the metal hydroxide layers into lamellar particles. This is a green alternative to the traditional exfoliation method using organic solvents. However, the incorporation of anions with high hydration enthalpy in the interlayer of LDH leads to a loss in en-

thalpy.

Partial delamination in dimethyl sulphoxide and N-methylpyrrolidone was studied by Zhao *et al.* (Zhao *et al.*, 2011). LDH with nitrate ions intercalated with organic molecules with an average thickness of the platelets ~ 13.2 nm can be partially exfoliated in DMSO. AFM study revealed the thickness of the LDH platelets decreased to 1.8 to 5.3 nm during delamination. They also reported that N-methylpyrrolidone (NMP) leads to the formation of transparent LDH suspension. The mechanism of exfoliation of LDHs using DMSO and NMP was similar to that of formamide.

Plasma exfoliation

During the last decade, the concept of plasma exfoliation, introduced by Langmuir, has emerged as a powerful idea in the realm of material chemistry and has gained considerable research interest recently (Langmuir *et al.*, 1928; Shim *et al.*, 2016; Wang *et al.*, 2013; Girshick *et al.*, 1989; Moshrefi *et al.*, 2018; Mangolini *et al.*, 2005). This technology was used to exfoliate layered compounds including graphite (Wang *et al.*, 2017), black phosphorous (Lu *et al.*, 2014), and LDHs (Wang *et al.*, 2017). The plasma helps to cleave the interlayer anions and diminished the interaction between the host layers resulting in exfoliation and simultaneously it creates multivacancies in exfoliated LDH sheets. Wang *et al.* exploited this method for the exfoliation of ultrathin Co-Fe LDH nanosheets. Later on, they used N₂ plasma to exfoliate the bulk Co-Fe LDHs into ultrathin nanosheets (Wang *et al.*, 2018). To achieve this outcome, they first prepared Co-Fe LDHs by hydrothermal reaction followed by treatment of N₂ plasma for 60 minutes. With the help of different analytical techniques, they showed the successful exfoliation of Co-Fe LDHs and the formation of ultrathin nanosheets with numerous atomic-sized holes having more exposed edge sites.

CONCLUSION

In this article, we have tried to present a brief overview of recent developments in the synthesis of LDH nanosheets. Generally, these approaches can be broadly divided into two classes namely bottom-up and top-down strategies. We have put efforts to incorporate the current literature which describes the synthesis of LDH nanosheets using both bottom-up and top-down strategies. Within the short span of time, considerable development in the field has been witnessed. In our view, LDHs will be an emerging area of research in the near future as they are chemically precise materials that can offer chemists, biologists, and materials scientists a new avenue for research exploration.

REFERENCES

- Adachi-Pagano, M., Forano, C., Besse, J.-P. 2000. Delamination of layered double hydroxides by use of surfactants, *Chem. Commun.* 91-92.
- Bitsianes, G., Joseph, T.L. 1955. Topochemical aspects of iron ore reduction. *JOM* 7, 639-645.
- Cai, H., Hillier, A.C., Franklin, K.R., Nunn, C.C., Ward, M.D. 1994. Nanoscale imaging of molecular adsorption. *Science* 266, 1551-1555.
- Cai, Z., Bu, X., Wang, P., Ho, J.C., Yang, J., Wang, X. 2019. Recent advances in layered double hydroxide electrocatalysts for the oxygen evolution reaction. *J. Mater. Chem. A* 7, 5069-5089.
- Compagnini, G., Messina, E., Puglisi, O., Cataliotti, R.S., Nicolosi, V. 2008. Spectroscopic evidence of a core-shell structure in the earlier formation stages of Au-Ag nanoparticles by pulsed laser ablation in water. *Chem. Phys. Lett.* 457, 386-390.
- Ehlsissen, K.T., Delahaye-Vidal, A., Genin, P., Figlarz, M., Willmann, P. 1993. Preparation and characterization of turbostratic Ni/Al layered double hydroxides for nickel hydroxide electrode applications. *J. Mater. Chem.* 3, 883-888.
- Girshick, S.L., Chiu, C.-P. 1989. Homogeneous nucleation of particles from the vapor phase in thermal plasma synthesis, *Plasma Chem. Plasma Process.* 9, 355-369.
- Han, N., Zhao, F., Li, Y. 2015. Ultrathin nickel-iron layered double hydroxide nanosheets intercalated with molybdate anions for electrocatalytic water oxidation. *J. Mater. Chem. A* 3, 16348-16353.
- Huang, L., Zou, Y., Chen, D., Wang, S. 2019. Electronic structure regulation on layered double hydroxides for oxygen evolution reaction. *Chin. J. Catal.* 40, 1822-1840.
- Hu, G., Wang, N., O'Hare, D., Davis, J. 2006. One-step synthesis and AFM imaging of hydrophobic LDH monolayers. *Chem. Commun.* 3, 287-289.
- Hunter, B.M., Blakemore, J.D., Deimund, M., Gray, H.B., Winkler, J.R., Müller, A.M. 2014. Highly active mixed-metal nanosheet water oxidation catalysts made by pulsed-laser ablation in liquids. *J. Am. Chem. Soc.* 136, 13118-13121.
- Hur, T.-B., Phuoc, T.X., Chyu, M.K. 2010. New approach to the synthesis of layered double hydroxides and associated ultrathin nanosheets in de-ionized water by laser ablation. *J. Appl. Phys.* 108, 114312-114317.
- Hibino, T., Jones, W. 2001. New approach to the delamination of layered double hydroxides. *J. Mater. Chem.* 11, 1321-1323.
- Iyi, N., Sasaki, T. 2008. Decarbonation of MgAl-LDHs (layered double hydroxides) using acetate-buffer/NaCl mixed solution. *J. Colloid Interface Sci.* 322, 237-245.
- Iyi, N., Ishihara, S., Kaneko, Y., Yamada, H. 2013. Swelling and gel/sol formation of perchlorate-type layered double hydrox-

- idesin concentrated aqueous solutions of amino acid-related zwitterionic compounds. *Langmuir* 29, 2562–2571.
- Li, L., Ma, R., Ebina, Y., Iyi, N., Sasaki, T. 2005. Positively charged nanosheets derived via total delamination of layered double hydroxides. *Chem. Mater.* 17, 4386–4391.
- Kazakevich, P.V., Simakin, A.V., Voronov, V.V., Shafeev, G.A. 2006. Laser induced synthesis of nanoparticles in liquids. *Appl. Surf. Sci.* 252, 4373–4380.
- Langmuir, I. 1928. Oscillations in ionized gases, *Proc. Natl. Acad. Sci.* 14, 627–637.
- Lee, J.-H., O'Hare, D., Jung, D.-Y. 2012. Topochemical oxidation of transition metals in layered double hydroxides by anthraquinone-2-sulfonate. *Bull. Korean Chem. Soc.* 33, 725–727.
- Lee, J.H., Du, Y., O'Hare, D. 2009. Growth of oriented thin films of intercalated α -cobalt hydroxide on functionalized Au and Si substrates. *Chem. Mater.* 21, 963–968.
- Liu, Y., Wang, N., Pan, J.H., Steinbach, F., Caro, J. 2014. In situ synthesis of MOF membranes on ZnAl-CO₃ LDH buffer layer-modified substrates. *J. Am. Chem. Soc.* 136, 14353–14356.
- Liu, Z., Dong, C.-L., Huang, Y.-C., Cen, J., Yang, H. 2019. Modulating the electronic structure of ultrathin layered double hydroxide nanosheets with fluorine: an efficient electrocatalyst for the oxygen evolution reaction. *J. Mater. Chem. A* 7, 14483–14488.
- Liu, W., Xu, S., Liang, R., Wei, M., Evans, D.G., Duan, X. 2017. In situ synthesis of nitrogen-doped carbon dots in the interlayer region of a layered double hydroxide with tunable quantum yield. *J. Mater. Chem. C* 5, 3536–3541.
- Liu, Z., Ma, R., Osada, M., Iyi, N., Ebina, Y., Takada, K., Sasaki, T. 2006. Synthesis, anion exchange, and delamination of Co–Al layered double hydroxide: assembly of the exfoliated nanosheet/polyanion composite films and magneto-optical studies. *J. Am. Chem. Soc.* 128, 4872–4880.
- Lv, L., Yang, Z., Chen, K., Wang, C., Xiong, Y. 2019. 2d layered double hydroxides for oxygen evolution reaction: from fundamental design to application. *Adv. Energy Mater.* 9, 180–193.
- Lu, X., Hao, G.-P., Sun, X., Kaskel, S., Schmidt, O.G. 2017. Highly dispersed metal and oxide nanoparticles on ultra-polar carbon as efficient cathode materials for LiO₂ batteries. *J. Mater. Chem. A* 5, 6284–6291.
- Lu, X., Zheng, L., Zhang, M., Tang, H., Li, X., Liao, S. 2017. Synthesis of core-shell structured Ru@Pd/C catalysts for the electrooxidation of formic acid. *Electrochim. Acta* 238, 194–201.
- Lv, L., Xu, K., Wang, C., Wan, H., Ruan, Y. 2016. Intercalation of glucose in NiMn-layered double hydroxide nanosheets: an effective pathway towards battery-type electrodes with enhanced performance. *Electrochim. Acta* 216, 35–43.
- Lu, W., Nan, H., Hong, J., Chen, Y., Zhu, C. 2014. Plasma-assisted fabrication of monolayer phosphorene and its Raman characterization. *Nano Res.* 7, 853–859.
- Ma, R., Takada, K., Fukuda, K., Iyi, N., Bando, Y., Sasaki, T. 2008. Topochemical synthesis of monometallic (Co²⁺–Co³⁺) layered double hydroxide and its exfoliation into positively charged Co(OH)₂ nanosheets. *Angew. Chem. Int. Ed.* 47, 86–89.
- Mangolini, L., Thimsen, E., Kortshagen, U. 2005. High-yield plasma synthesis of luminescent silicon nanocrystals. *Nano Lett.* 5, 655–659.
- Ma, R., Liang, J., Liu, X., Sasaki, T. 2012. General insights into structural evolution of layered double hydroxide: underlying aspects in topochemical transformation from brucite to layered double hydroxide. *J. Am. Chem. Soc.* 134, 19915–19921.

- Ma, R., Liang, J., Takada, K., Sasaki, T. 2010. Topochemical synthesis of Co-Fe layered double hydroxides at varied Fe/Co ratios: unique intercalation of triiodide and its profound effect. *J. Am. Chem. Soc.* 133, 613–620.
- Ma, R., Liu, Z., Takada, K., Iyi, N., Bando, Y., Sasaki, T. 2007. Synthesis and exfoliation of Co^{2+} - Fe^{3+} layered double hydroxides: an innovative topochemical approach. *J. Am. Chem. Soc.* 129, 5257–5263.
- Ma, L., Wang, Q., Islam, S.M., Liu, Y., Ma, S., Kanatzidis, M.G. 2016. Highly selective and efficient removal of heavy metals by layered double hydroxide intercalated with the MoS_4^{2-} ion. *J. Am. Chem. Soc.* 138, 2858–2866.
- Moshrefi, M.M., Rashidi, F. 2018. Hydrogen production from methane decomposition in cold plasma reactor with rotating electrodes. *Plasma Chem. Plasma Process.* 38, 503–515.
- Ma, L., Islam, S.M., Liu, H., Zhao, J., Sun, G., Li, H., Ma, S., Kanatzidis, M.G. 2017. Selective and efficient removal of toxic oxoanions of As(III), As(V), and Cr(VI) by layered double hydroxide intercalated with MoS_4^{2-} . *Chem. Mater.* 29, 3274–3284.
- Manohara, G. V., Kunz, D. A., Vishnu Kamath, P., Milius, W. Breu. 2010. Homogeneous Precipitation by Formamide Hydrolysis: Synthesis, Reversible Hydration, and Aqueous Exfoliation of the Layered Double Hydroxide (LDH) of Ni and Al. *Langmuir* 26, 15586–15596.
- Naik, V.V., Ramesh, T.N., Vasudevan, S. 2011. Neutral nanosheets that gel: exfoliated layered double hydroxides in toluene. *J. Phys. Chem. Lett.* 2, 1193–1198.
- Nobuo, I., Taki, M., Yoshiro, K., Kenji, K. 2004. A novel synthetic route to layered double hydroxides using hexamethylenetetramine. *Chem. Lett.* 33, 1122–1123.
- Phuoc, T.X., Soong, Y., Chyu, M.K. 2007. Synthesis of Ag-deionized water nanofluids using multi-beam laser ablation in liquids. *Opt. Lasers Eng.* 45, 1099–1106.
- Qiao, C., Zhang, Y., Zhu, Y., Cao, C., Bao, X., Xu, J. 2015. One-step synthesis of Zinc-Cobalt layered double hydroxide (Zn-Co-LDH) nanosheets for high-efficiency oxygen evolution reaction. *J. Mater. Chem. A* 3, 6878–6883.
- Reichle, W.T. 1986. Synthesis of anionic clay minerals (mixed metal hydroxides, hydrotalcite). *Solid State Ionics* 22, 135–141.
- Sasaki, T., Liang, C., Nichols, W.T., Shimizu, Y., Koshizaki, N. 2004. Fabrication of oxide base nanostructures using pulsed laser ablation in aqueous solutions. *Appl. Phys. A* 79, 1489–1492.
- Sene, S., Bégu, S., Gervais, C., Renaudin, G., Mesbah, A. 2015. Intercalation of benzoxaborate anions in layered double hydroxides: toward hybrid formulations for benzoxaborole drugs. *Chem. Mater.* 27, 1242–1254.
- Shim, J., Oh, A., Kang, D.-H., Oh, S., Jang, S.K. 2016. High performance 2D rhenium disulfide (ReS_2) transistors and photodetectors by oxygen plasma treatment. *Adv. Mater.* 28, 6985–6992.
- Song, F., Hu, X. 2014. Exfoliation of layered double hydroxides for enhanced oxygen evolution catalysis. *Nat. Commun.* 5, 4477–4486.
- Venugopal, B.R., Shivakumara, C., Rajamathi, M. 2006. Effect of various factors influencing the delamination behavior of surfactant intercalated layered double hydroxides. *J. Colloid Interface Sci.* 294, 234–239.
- Wang, D.-Y., Costa, F.R., Vyalikh, A., Leuteritz, A., Scheler, U. 2009. One-step synthesis of organic LDH and its comparison with regeneration and anion exchange method. *Chem. Mater.* 21, 4490–4497.

- Wang, C., Zhou, Y., He, L., Ng, T.-W., Hong, G. 2013. In situ nitrogen-doped graphene grown from polydimethylsiloxane by plasma enhanced chemical vapor deposition, *Nanoscale* 5, 600–605.
- Wang, C., Zhang, X., Sun, X., Ma, Y. 2016. Facile fabrication of ethylene glycol intercalated cobalt-nickel layered double hydroxide nanosheets supported on nickel foam as flexible binder-free electrodes for advanced electrochemical energy storage. *Electrochim. Acta* **191**, 329–336.
- Wang, K., Xu, M., Gu, Y., Gu, Z., Liu, J., Fan, Q.H. 2017. Low-temperature plasma exfoliated N-doped graphene for symmetrical electrode supercapacitors, *Nano Energy* 31, 486–494.
- Wang, Y., Yan, D., El Hankari, S., Zou, Y., Wang, S. 2018. Recent progress on layered double hydroxides and their derivatives for electrocatalytic water splitting. *Adv. Sci.* 5, 18000641800096.
- Wang, Y., Zhang, Y., Liu, Z., Xie, C., Feng, S., Liu, D., Shao, M., Wang, S. 2017. Layered double hydroxide nanosheets with multiple vacancies obtained by dry exfoliation as highly efficient oxygen evolution electrocatalysts, *Angew. Chem. Int. Ed.* 56, 5867–5871.
- Wang, Y., Xie, C., Zhang, Z., Liu, D., Chen, R., Wang, S. 2018. In situ exfoliated, N-doped, and edge-rich ultrathin layered double hydroxides nanosheets for oxygen evolution reaction, *Adv. Funct. Mater.* 28, 1703363-1703370.
- Xu, R., Zeng, H.C. 2001. Synthesis of nanosize supported hydrotalcite-like compounds $\text{CoAl}_x(\text{OH})^{2+}_{2x}(\text{CO}_3)_y(\text{NO}_3)_{x-2y} \cdot n\text{H}_2\text{O}$ on $\gamma\text{-Al}_2\text{O}_3$, *Chem. Mater.* 13, 297–303.
- Yu, J., Wang, Q., O'Hare, D., Sun, L. 2017. Preparation of two dimensional layered double hydroxide nanosheets and their applications. *Chem. Soc. Rev.* 46, 5950–5974.
- Yan, Y., Liu, Q., Wang, J., Wei, J., Gao, Z. 2012. Single-step synthesis of layered double hydroxides ultrathin nanosheets. *J. Colloid Interface Sci.* 371, 15–19.
- Zhao, Y., Yang, W., Xue, Y., Wang, X., Lin, T. 2011. Partial exfoliation of layered double hydroxides in DMSO: a route to transparent polymer nanocomposites, *J. Mater. Chem.* 21, 4869–4874.
- Zhtova, E.S., Krivovichev, S.V., Pekov, I.V., Yapaskurt, V.O. 2019. Crystal chemistry of chloromagaluminite, $\text{Mg}_4\text{Al}_2(\text{OH})_{12}\text{Cl}_2(\text{H}_2\text{O})_2$, a natural layered double hydroxide, *Minerals* 9, 221–226.

Status and Achievements of Sericulture in Bodoland Territorial Area Districts (BTAD), Assam: A Study

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ABSTRACT

Sericulture, the technique of rearing silkworms for obtaining cocoons and finally raw silk is an age-old avocation among the rural masses especially the tribal community in Bodoland Territorial Area Districts (BTAD) of Assam that constitutes four districts, viz., Kokrajhar, Chirang, Baksa and Udalguri. Among the four varieties of sericulture, three, namely, eri, muga and mulberry are being practiced in this area. Sericulture is extensively practiced in comparison to muga and mulberry. Its share in employment generation and production as well as productivity are relatively more than the other two components. In this paper, an attempt is made for comparative study on the families engaged including category wise in different sub-sectors of sericulture and production of cocoon as well as raw silk of the three components of sericulture in the four districts of BTAD along with highlighting the achievements made so far by the BTC Sericulture Department. Secondary data, collected from various sources of information are arranged in tabular form and analyzed accordingly to fulfill the objectives set for the study.

Keywords: sericulture, employment, raw silk, production, BTAD

INTRODUCTION

Sericulture is an agro-based economic activity, the end product of which is silk, “the queen of fabrics” (Das, 2009). Sericulture, the technique of silk production, is an agro-based labour-intensive cottage industry providing gainful employment and generation of income to weaker sections of people in the rural and semi urban areas (Kherkatary *et al*, 2017). Since its discovery, sericulture has been playing an important role in the socio-economic life of the people. Sericulture as a whole involves a series of economic activities like cultivation of silk worm food plants, seed production, rearing of silk

worm for production of cocoons. The post cocoon activities involved reeling-spinning, twisting, dyeing, weaving, printing, finishing and processing of silk fabrics. Some unique features of the silk sector are its rural nature, agro based, ecologically and economically sustainable activity for the poor, small and marginal farmers, agriculture labour and women in particular. Many studies indicate that 60 percent of the activities in the pre-cocoon and post-cocoon sectors are carried out by women. The researchers argue that sericulture can uplift the socio-economic status of women in the society particularly in rural area.

There are generally four types of com-

mercially exploited silk i.e., mulberry, eri, muga and tasar, each of which is produced by a distinct variety of silkworm like-

1. Mulberry silkworm (*Bombyx mori*)
2. Eri/Endi silkworm (*Philosamia ricini* or *P. cynthia*),
3. Muga silkworm (*Antheraea assamensis*) and
4. Tasar silkworm (*Antheraea mylitta* or *A. Pernyi*).

Table 1. Types of Silk and Its Respective Host Plants

Name of Silkworm	Main Host Plant/plants
Muga Silkworm	Som, Soalu
Eri Silkworm	Castor, Kesseru
Mulberry Silkworm	Mulberry
Tasar Silkworm/ Oak Tasar Silkworm	Asan, Arjun, Oak

Source: Das, 2009

REVIEW OF LITERATURE

Choudhury (1992) stated that sericulture and silk production are highly labour intensive operations besides being employment-oriented involving low capital investment ideally suited to a labour abundance environment where agriculture is the mainstay. It has the inherent ability to generate regular incomes for rural mass.

FAO (1976) opines that the net profit earned from a unit land through sericulture is more than any other agricultural or commercial crops, especially in developing and underdeveloped countries where the average income is low. The product of the land is mulberry leaf, which is converted into raw silk by rearing silkworms and the extraction of silk, both of which require large labour force. The quantity of silk produced varies from 20 to 120 kg per hectare. While even ap-

proximate monetary comparisons are difficult to make, the value of silk is obviously greater than the rice, sugarcane or any other crops produced per unit area of land.

Bhattacharjee *et al* (2013) estimated that sericulture can generate employment @11 mandays per kg of mulberry raw silk production in on-farm and off-farm activities throughout the year. Again, they also estimated that one man-year employment is generated by producing one kg of Vanya silk, which means that one family in Vanya sector can get sustainable employment and livelihood if they produce just 1.0 kg of Vanya raw silk.

Pandey (2003) in his study states that the silk industry in Assam is one of the major contributors to state revenue. It is also a major source of employment particularly in rural areas. Eri contributes Rs. 31.5 crore, whereas muga contributes Rs. 40 crore, pat silk contributes Rs. 120 crores out of a total of Rs. 190 crores generated annually through the silk industry in Assam.

Borah and Mech (2001-2002) studied on socio-economic status of muga farmers by conducting a survey in six major muga growing districts of Assam covering 298 muga farmers in 2000-01. They found that the average area under sericulture plantation per farmer ranges between 1.74 to 3.23 bighas. The average income per farmer from sericulture was found in between Rs.3563 and Rs.9240.

BTAD: A Brief Profile

Bodoland Territorial Area Districts (BTAD) or Bodoland Territorial Region (BTR) popularly known as Bodoland, the gateway to the most beautiful North Eastern Region (NER) of India, is located extreme north of north bank of river Brahmaputra in the state of Assam; inhabited predominantly by the Bodo language speaking ethnic group and Bengalis, Assamese, Rabha,

Garo, Koch-Rajbongshi, Nepali, Adibasi, Santhal and other indigenous Mongoloid tribes having four districts viz. Kokrajhar, Chirang, Baksa and Udalguri. It is an autonomous administrative unit constituted under the Sixth Schedule of the Constitution of India covering an area of 8821.68 km (Provisional) that constitutes almost 11.25 percent of total land area of the state. Of this total land area, Kokrajhar occupies 3165.44 sq. km. (36.0 percent), Chirang 1974.8 sq. km. (22.0 percent), Baksa 2007.5 sq. km (23.0 percent) and Udalguri 1673.94 sq. km. (19 percent). Thus, Kokrajhar occupies the largest land area among the districts of BTR.

The geographical boundary of BTR lies between 260 7'12" N to 260 47' 50" N Latitude and 890 47' 40" E to 920 18' 30" E Longitude and is in the North Western part of Assam. Kokrajhar town, the Administrative Head Quarter lies roughly between 260 25' N Longitude and 990 16' 38" E Latitude.

Out of total population of 3151047 of BTAD, 3010953 (95.55 percent) live in rural areas and 140094 (4.45) live in urban (Census of India, 2011). If we look at the district level of BTAD, Baksa district with 98.71 per cent of rural population occupies highest followed by Udalguri with 95.48 percent. These rural populations are characterized by mass poverty, low levels of literacy, income, high level of unemployment, poor nutrition and health status. About 90 percent of the total population of BTAD are directly or indirectly dependent on agriculture and allied activities.

OBJECTIVES OF THE STUDY

1. To make a comparative study on status among the three varieties of sericulture in BTAD.
2. To investigate the total employment including category wise of seri-farmers in the four districts of BTAD.

3. To highlight the achievements of BTC sericulture department

MATERIALS AND METHODS

The study is carried out on the basis of secondary sources of information collected from different publications of the Government agencies like, Directorate of economics and Statistics, Directorate of Sericulture, (Government of Assam), Central Silk Board, Directorate of Sericulture, (BTC, Kokrajhar). Data are arranged in tabular form analyzed accordingly to fulfill the objectives set for the study.

RESULTS AND DISCUSSION

Present Status of Sericulture in BTAD

Sericulture, the technique of rearing silkworms for obtaining cocoons and finally raw silk is an age-old avocation among the rural masses especially the tribal community in Bodoland Territorial Area Districts (BTAD) of Assam. Among the four types of sericulture three viz., eri, muga and mulberry are being practiced in the four districts of Bodoland. Sericulture is extensively practiced in comparison to muga and mulberry. Its share in employment generation and production are relatively more than the other two components. The agro-climatic condition of the districts is suitable for sericulture and the availability of labour specially the women and their skill also provide scope for its expansion and development.

Table 2 shows the priority accorded to various sub sectors of sericulture in BTAD by the Department of Sericulture. On the priority basis, the first priority is accorded to eri sector, second and third priorities to muga and mulberry respectively as regards to sericulture development in the BTAD area.

Table 2. Priority accorded to Sub sectors of Sericulture in BTAD

Serial No.	Sector	Priority
1	Eri	I
2	Muga	II
3	Mulberry	III

Source: Director of Sericulture, BTC, Kokrajhar

Table 3. Nos. of Sericulture Villages and family engaged in Sericulture in BTR, 2018-19

Sl. No	Districts	Nos. of Sericulture Villages	Nos. of Families Engaged			Total
			Eri	Muga	Mulberry	
1	Kokrajhar	478	10763	624	202	11589
2	Chirang	257	6540	693	139	7372
3	Baksa	408	10831	816	492	12139
4	Udalguri	515	11978	487	739	13204
Total BTR		1658	40112 (90.54%)	2620 (5.91%)	1572 (3.55%)	44304

Source: Statistical Hand Book of BTC, Kokrajhar, 2018-19

Table 4. Category wise Seri farmers, 2015-16

District	SC			ST			Other			Total
	Eri	Muga	Mulberry	Eri	Muga	Mulberry	Eri	Muga	Mulberry	
Kokrajhar	920	40	23	12270	510	300	2146	88	53	16350
Chirang	480	26	05	6420	348	66	1122	58	11	8536
Baksa	780	25	07	10350	320	100	1808	57	17	13464
Udalguri	590	30	13	9180	380	175	1603	59	30	12060
Total BTAD	2770	121	48	38220	1558	641	6679	262	111	50410

Source: Director of Sericulture, BTC, Kokrajhar

Table 3 reveals the fact that out of the total 3066 villages (Population Census, 2011) in BTR; sericulture is being practiced in 1658 villages (Kokrajhar-478, Chirang-257, Baksa-408 and Udalguri-515) in 2018-19. The total number of families engaged in sericulture is found 44304, of this, in eri 40112 (90.54 percent), in muga 2620

(5.91 percent) and in mulberry 1572 (3.55percent). Thus, among the three components, endiculture dominates in providing employment to the rural people in the four districts of Bodoland. If we assume 3 members engaged per family then the total employment created by the sericulture industry would be 132912.

Table 5. Yield of Cocoons and Production of Silk Yarn in BTR, 2018-19

Sl. No.	Districts	Yield of Cocoons			Production of Silk Yarn		
		Eri (MT)	Muga (Lakh Number)	Mulberry (MT)	Eri Silk (MT)	Muga Silk (MT)	Mulberry Silk (MT)
1	Kokrajhar	402.48	488.50	17.50	321.98	9.77	1.75
2	Chirang	151.85	339.00	13.90	201.48	6.78	1.39
3	Baksa	401.29	584.50	59.30	321.03	11.69	5.93
4	Udalguri	445.00	387.00	60.70	356.00	7.74	8.07
Total BTAD		1500.61	1799	171.40	1200.49	35.98	17.14

Source: Statistical Hand Book of BTC, Kokrajhar, 2018-19

Table 6. Total Area covered for Food Plant

Sl.No.	Sector	Food Plant Area (in Acres)
1	Eri	38,142
2	Muga	2,379
3	Mulberry	1,333
Total		41,854

Source: Silk in BTC, Dipartment of Sericulture, Kokrajhar, 2020-21

Table 4 reveals category wise (SC, ST and Others) seri farmers in BTAD for the year 2015-16. Out of total 50410 seri farmers in BTAD, Schedule Caste seri farmers is 2770 in eri, 121 in muga and 48 in mulberries. The engagement of Scheduled Tribe in BTAD in eri- 38220, in muga 1558 and in mulberry 641. For others including general category, in eri 6679, in muga 262 and in mulberry 111. Thus, again, employment generation is more in eri sector to all categories in BTAD.

The total production of eri cut cocoon was 1500.61 (MT), muga was 1799 lakh and Mulberry cocoon was 171.40 (MT) in BTR in the year 2018-19 (Table 5). Out of the total production of silk yarn 1253.61 (MT), the contribution of eri silk was 1200.49 matric tone (95.76 percent) muga was

35.98 matric tone (2.87 percent) and mulberry silk was 17.14 matric tone (1.37 percent) in 1018-19. Again, lion's share to total silk yarn from eri sector is observed. Thus, eri sector is dominating the sericulture industry in BTR.

As on 2021-21, a total land area of 41,854 acres is covered under eri (38,142 acres), muga (2379 acres) and mulberry(1333 acres) silkworm food plant including Government and private sector in BTC as per Sector -wise breakup indicated in table 6.

Major achievements of BTC Sericulture Department

Before creation of Bodoland Territorial Council (2003-04), sericulture was considered as poor man's occupation and production of raw silk

was hardly 100 MT. However, just after establishment of the Bodoland Territorial Council on 10th February, 2003, the Department of Sericulture, BTC in association (collaboration) with Central Silk Board, Ministry of Textiles, Govt. of India prepared a “Perspective Plan” for a period of 10 years to address all the gaps and constraints and launches an Integrated Sericulture Development Project entitled “Project Thaokhri” with the financial assistance from Central Silk Board, Ministry of Textiles, Govt. of India during the year 2004-05 which was the beginning of the Golden era of Silk industry in BTC. Due to the concerted effort made by the Department of Sericulture and assistance provided by Central Silk Board and Ministry of Textiles, Government of India to streamline the sericulture sector, made a remarkable impact for overall progress in silk industry in BTC area. Some of the major achievements are-

- Established 1st Vanya Cocoon Bank at Udalguri.
- Established Eri Spun Silk Mill in Kokrajhar
- Established 1st Muga Wildlife Sanctuary in Chirang.
- Established an Automatic Silk Knitting Unit at Kokrajhar.
- Established Automatic Digital Silk Printing & Processing Unit at Kokrajhar.
- Established a Bodoland Silk Park at Kokrajhar.
- Introduced Root Trainer Technology in nursery under Soil to Silk project at Udalguri.
- Adoption of cleanliness Seri-village.
- To promote the marketing, Sericulture Department has launched Brand in the name of ‘Bodoland Silk’.
- Established a Vanya Silk Shoppe at August

Kranti Bhawan, New Delhi.

- Established Multiend Reeling & Twisting Unit at Udalguri.
- Adoption of mechanization on-farm & non-farm sector.
- Introduced mulberry plantation & established a Mulberry Grainage in BTC.
- Pupae processing unit.
- Incubation centre in Eri sector.
- Tapioca project.
- Geo Tagging and GIS mapping
- Established 5 nos. of Ambar Charkha unit under Soil to Silk project at Udalguri.
- Established CFC for Weavers at Udalguri.

CONCLUSION

BTAD can excel as a model area in Assam in silk production specially the eri silk. It can emerge as the most important opportunity in creation of employment and income generation in the four districts of BTR. Considering the high potential and suitable environment for the development of this industry, it is the time on the part of the governments: central, state, BTC Government and the concerned departments to prepare comprehensive schemes and policies so that it can attain the full commercial viability at its earliest and become a source of socio-economic development in BTR. The unemployed youths who are the main cause of creating instability in our society are to be motivated so that they can be self-employed through adoption and practice of sericulture that has been prevalent in Bodo society since time immemorial. As majority of workers engaged in sericulture specially ericulture are women, special training be imparted and facilities should be extended to them so that they would be encouraged and come for-

ward for the actual development of this industry resulting improvement in their standard of living and status in the society.

REFERENCES

- Bhattacharya, M. and Das, R. (2013). Employment of Rural Women Through Sericulture Activity, Souvenir and Compedium, Director of Sericulture, BTC, Kokrajhar.
- Borah, A. and Mech, D. (2001-2002). Annual Report (2001-02) of Central Muga Eri Research and Training Institute, CSB (Ministry of Textiles: Govt. of India), Lakhdoigarh, Jorhat, Assam, pp. 20-22.
- Choudhury, S.N. (1992). Silk and Sericulture, Directorate of Sericulture, Government of Assam, Guwahati.
- Das, M. (2009). Sericulture and Ericulture in Assam: An Economic Analysis, Tushar Publishing House, Dibrugarh, Assam.
- FAO (1976). FAO Agricultural Services Bulletin, Sericulture Manual, Published by Food and Agricultural Organization of the United Nations, Rome, pp-5.
- Kherkatary, A. and Daimari, P. (2017). Growth Pattern in Raw Silk Production and Employment Generation in Sericulture in Assam: An Economic Analysis.
- Pandey, P. (2003). "Rs. 408 lakhs Pumped in to Revive Silk Industry", The Hindu Newspaper, Retrieved from <http://www.thehindu.com/2003/10/21/stories/2003102108010500.htm>
- Silk in BTC (All About), Department of Sericulture, Kokrajhar, 2020-21
- Statistical Hand Book of BTC, Kokrajhar, 2018-19

An Ecofeminist Reading of Indira Goswami's *The Man From Chinnamasta*

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ABSTRACT

Ecofeminism, also known as ecological feminism, is a type of feminism that studies women's relationships with nature. In 1974, French feminist Françoise d'Eaubonne invented the term. This theory, in particular, highlights how patriarchal societies treat both nature and women. This method aims to deepen the bond that exists between women and nature, eventually demonstrating how both, as sensitive components of the cosmos, are exploited and mistreated by a male-dominated society. Indira Goswami's work *The Man from Chinnamasta* is chosen for this article to shed light on her as an environmentally conscious writer. The novel, originally published as *Chinnamastar Manuhto* in Assamese and translated by Prashant Goswami as *The Man from Chinnamasta*, is a novel written by Indira Goswami and released in 2005. It is based on the Kamakhya temple and is an appeal from the writer to end the age-old tradition of animal sacrifice at the shrine. *The Man from Chinnamasta* is set in colonial India near the 2,000-year-old Kamakhya Temple of the Sakti cult, and explores how humans and the environment have a continually changing connection.

Keywords

Ecofeminism, patriarchy, woman-nature relationship, oppression, emancipation, green politics.

INTRODUCTION

The current research initiative is designed to use a critical lens to perform an analytical study of the text *The Man from Chinnamasta*, authored by Indira Goswami.

MATERIALS AND METHODS

The theoretical formulation of ecofeminism will be reviewed as propounded by theorists, scholars, and writers relevant to the book by Goswami as part of the critical examination. With a close essential reading of the texts, the paper intends to use ana-

lytical, critical, and explorative approaches by incorporating inputs from feminism and ecofeminism.

RESULTS AND DISCUSSION

Indira Goswami's novel *The Man From Chinnamasta* features as its central theme the ever-increasing conflict between humans and the natural environment. It serves as an eyeopener to readers when it comes to understanding women-nature dynamics under patriarchal control. The narrative functions as a primer for understanding the presence and absence of ecology in our lives as living

in a tradition-bound Assamese society. Ecofeminism emphasizes the earth and all life on it, in its inextricable physical and mental interconnectedness. Humans, as members of this community, rely on the earth and sea, as well as the life they create, to survive. Nevertheless, they are even more fundamentally a part of it, as one component element of the living whole. As Diamond and Orenstein define ecofeminism as "a new label for an ancient wisdom" (Mies and Shiva 13). It originally gained traction in the early 1980s, with roots in feminist philosophy, environmental activism, and the late 1970s European and American peace movements. In 1980, the word was coined by Françoise d'Eaubonne (Mies and Siva 13). The 1980 'Women and Life on Earth: A Conference on Eco-Feminism,' held in reaction to the Three Mile Island nuclear catastrophe, focused on "the linkages between feminism, militarism, healing, and ecology" (Mies and Shiva 14). Most of women's poetry and literature predated the term's use in the 1960s and 1970s, and it has received greater importance thanks to philosophers Val Plumwood and Karen Warren's work. It has also been embraced by many writers, such as Arundhati Roy in Indian English Literature.

Ecofeminist analysis examines the cultural, economic, religious, political, literary, and iconographic ties between women and nature, as well as the parallels between the oppression of nature and the oppression of women. According to the Oxford Advanced Learner's Dictionary, "Ecofeminism is defined as a philosophical and political theory and movement which combines ecological concerns with feminist ones, regarding both as resulting from the male domination of society" (7). Ecofeminists argue that a woman's association with nature is accepted in two ways: as an exploited community susceptible to the violent goals of males; and as a gentle, ordinary, and submissive being, like nature. There is a behavioural predisposition to think of nature and women as second-class citizens.

Indira Goswami is an Assamese writer and is considered a luminary figure in the arena of

women's writing. Most of her writings have a universal appeal for their authentic expression and strong imagery. Goswami was born on November 14th, 1942 in Assam. She is famously known by her pen name Mamoni Raisom Goswami and more popularly as Mamoni Baideo, who is an Indian writer, poet, professor, scholar, and editor. She was the winner of the Sahitya Akademi Award (1983), the Jnanpith Award (2000), and Principal Prince Claus Laureate (2008). A celebrated writer of contemporary Indian literature, many of her works have been translated into English from her native Assamese, which includes *The Moth Eaten Howdah of the Tusker*, *Pages Stained with Blood*, and *The Man from Chinnamasta*. She was also well known for her attempts to structure social change, both through her writings and through her role as a mediator between the armed militant group the United Liberation Front of Asom and the Government of India. Her involvement led to the formation of the People's Consultative Group, a peace committee. She referred to herself as an "observer" of the peace process rather than as a mediator or initiator. In Goswami's works, a strong ecofeminist sensitivity is evident. Most of her prominent works deal with the ecological aspect in close relation to women. In her novels, *The Moth Eaten Howdah of the Tusker* (2004), *The Blue-necked God* (1976), *Pages Stained with Blood* (2001), *The Man from Chinnamasta* (2005), and the short story collection *The Shadow of Kamakhya* (2001), Goswami has shown great concern for women and nature and portrays the unexplored world of patriarchal savagery on women and nature.

The pioneer of the American environmental movement, Murray Bookchin, assures us that the domination of nature came after the domination of humans by humans. Therefore, it is important to dismantle such hierarchy and domination to ensure a secure and liberated status for both. Goswami investigates how patriarchal culture exploits both nature and women. Indira Goswami's groundbreaking novel *The Man from Chinnamasta* is an appeal from the writer to end the

age-old practice of animal sacrifice at the temple. The novel *The Man from Chinnamasta*, set in colonial India at the ancient Kamakhya Temple of the Sakti cult, explores the ever-changing interaction between man and the environment. Shakti is a concept in the Hindu religion that preaches the strength of the feminine. It refers to the divine mother, who is worshipped for her fertility. The novel has the male priest, Chinnamsta Jatadhari, as the protagonist who fights against the age-old ritual of animal sacrifice at the celebrated Kamakhya temple of Assam. Another male character, Ratnadhar, is equally sensitive and moved by the brutality inflicted on innocent animals, who could not bear the scene where a calf was taken for sacrifice and became emotional. Ratnadhar, a young artist who has been treated by him, and Dorothy Brown, an Englishwoman who comes to Jatadhari after leaving her husband, who has adopted a local woman as his mistress, are among his followers. After a terrible attack on Dorothy, a relationship develops between Jatadhari and Dorothy that becomes a source of nefarious talk among the people, and Dorothy and Jatadhari decide to leave for a while. These characters are presented in the novel as active participants in combating the heinous practice of animal sacrifice. The novel thus represents such male characters whose ecological consciousness debunks the gynocentrism of the conventional ecofeminist school of thought. Greeta Gard's proposal of queer ecofeminism seems relevant in this regard. She quotes, "We have to examine how racism, heterosexism, classism, ageism, and sexism are all related to naturism." (Loughlin 148). The perspective of queerness is an attempt to break apart the gender binaries to develop a broader understanding of nature and culture.

The female characters in Goswami's novel, *The Man from ChiChinnamasta*, are vital to grasping the woman-nature interconnectedness and receiving a sense of their intricate affinity. Bidhibala's passive existence in *The Man from Chinnamasta* while fighting the dominant males of her family makes her capable of understanding the trauma that the voiceless calf experiences right be-

fore sacrifice. Dorothy, an abandoned English woman by her unfaithful husband, and her recuperation correlate with the Brahmaputra River when she changes along its bank, demonstrating the ecological intimacy she shares with the other women, and it is expressed in the following words:

Within a week, the house was habitable. And on a full moon night in mid-January, Dorothy Brown disembarked from the boat, firmly clutching the hand of the faithful Minchi Vepin. A mantle of fog shimmered like silver dust over the leaf-littered abode of the Mother Goddess—much like scrapings from the silver pot used to make offerings of sacrificial blood to the goddess. And there was the Brahmaputra. In silent repose. (Goswami 19).

The river Brahmaputra, like the riddle of an abandoned woman desperately trying to keep her splendour, is a wonderful metaphor steeped in thousands of years of mystery. Dorothy's correspondence with Jatadhari is equally mysterious and unclear.

Goswami glorifies women's emancipation by offering a dominant formation and influence all the way through the stories of Dorothy and Bidhibala. Continued existence is the technique of attaining access and raising one's potential with the view to contributing vigorously to determining one's own life. Bidhibala has been subjected to a great deal of oppression and prejudice, and her father, as a dependable and trustworthy figure, has chosen to marry off the eleven-year-old to a forty-year-old married man. While Dorothy Brown waited a year away from her husband, Henry Brown, who was involved in an illicit relationship with a native lady. Dorothy's pregnancy news reaches the Brahmaputra's beaches, demonstrating the fragile life of a solitary woman in society. Bidhibala's father functions in the novel as an agent of patriarchy and takes the role of an oppressor, who not only oppresses but also subdues her with extreme parental brutality and renders her voiceless. There is a continuous struggle with patriarchy, and this is what binds together these

women from diverse socioeconomic and cultural backgrounds. Dorothy's shift near the river and her suppression, similar to the traditional Indian women around her, makes her a hybrid character of the colonial domain. Goswami portrays Dorothy's character this way in her novel, "Amazing! She was a white woman, but so different from the Europeans they had seen on the streets of Gauhati." (Goswami 12). Her presence is seen as a new shared space exclusive to women that transgresses all colonial boundaries to produce a unified need for liberation and show the universality of women's problems. Dorothy's status as a white woman living in a colonized land has been attributed more to her sufferings and suppression than anything else. Dorothy defines the postcolonial as a feminist space without any geographical boundaries to identify how patriarchal power relations are the only colonizing principle. Thus, both the female characters, Dorothy and Bidhibala, and their subjugation correspond to the natural elements present in the novel. Women's exploitation and marginalization go hand in hand with animal sacrifice. Moreover, Chinnamasta Jatadhari's presentation in the novel is perhaps intended to throw light on the philosophical arena inherent in the author herself and expose society's absurd nature in the words of the protagonist, Jatadhari, "No one is happy. No one. People somehow manage to string body and soul together and carry on." (Goswami 14). The author is seen seeking to highlight society's ridiculousness while also analyzing the fragility and tragedy of both women and nature in patriarchal societies.

One of the most touching elements in the novel is Goswami's projection of animal cruelty by a vicious society blinded by religious irrationality. Because of her authentic expression and truthful delineation of social ills in the novel, Goswami received numerous threats from religious fanatics. The writer's radical stance was that she disregarded any death threats and continued to use her work for reformative and progressive causes. As a realistic writer, Goswami represents truth in its utmost subtleties, and one such example is when a buffalo is

taken for sacrifice. The scene as projected by the novelist brings an active image alive in the minds of the readers—"The animal tried to break free as it was being hauled away to the slaughterhouse. They wanted to escape the death that came in the form of pilgrims. But the harbingers of doom kept tugging at it. Shoving. Yelling. Prodding." (Goswami 15). The animal's inability to break free and avoid a horrible death exemplifies how animals and the environment have always been subjugated and enslaved by people. It also connotes masculine anthropocentrism, in which men regard themselves as the centre of the world, with everything else occupying a secondary role. Goswami peculiarly presents her progressive ideology while protesting societal evil practices and the brutality of men toward animals and nature and puts forth her opinion in these words,

But humans shouldn't be replaced by animals. They drag helpless animals to the sacrifice. The Mother has never said that she would reduce the earth's abundance to ashes if she were not offered blood. According to the holy books, flowers are equally acceptable to the mother. The writings say that anyone making an offering of a thousand Karabi flowers and a thousand Kunda flowers will have all his desires fulfilled. Also, he earns the religious merit of living in the abode of the goddess. (Goswami 128).

CONCLUSION

Indira Goswami's *The Man From Chinnmasta* is a brilliant indictment of patriarchal cultures and anti-feminist ideas, as well as a stinging attack on socio-religious irrationality. Goswami's writings are notable for their absolute originality and ability to bring to light the most significant societal concerns. More importantly, as a brilliant writer, Goswami not only highlights societal issues but also adds a unique perspective on how to address them in a constructive way. Considering Goswami's philosophy of fair and equal treatment for the environment, Green politics deserves a mention here. Green politics (also known as ecopolitics) is a po-

litical theory based on ecology, nonviolence, social justice, and grassroots democracy with the goal of creating an environmentally sustainable society. It originated in the western world in the 1970s, and since then, green parties have grown and established themselves in a number of nations throughout the world, with some political success. Green politics advocates have a lot of views in common with the ecology, conservation, environmentalist, feminist, and peace movements. Green politics is concerned with civil liberties, social justice, nonviolence, and occasional forms of localism. In addition to democracy and environmental problems, it tends to promote social progressivism. The author's pleadings to foster an ecologically sustainable society mark the beauty and remarkableness of the novel. One of the major elements of green politics is increased moral sensitivity and awareness of our interactions with the nonhuman world (from the advocacy of "animal rights" and "animal welfare" to views that the Earth is "holy" and/or has inherent value); While numerous schools of thought such as Green Politics, Ecocriticism, and Ecofeminism try to present a holistic picture of nature in order to emancipate women, the women's cause becomes more dependent on when and how nature is liberated.

REFERENCES

- Baindur, Meera. *Nature in Indian Philosophy and Cultural Traditions (Sophia Studies in CrossCultural Philosophy of Traditions and Cultures)*. New York: Springer, 2015.
- Baruah, Risha. "Ecology, Culture and Postcolonialism: An Eco-critical reading of Indira Goswami's *The Moth-Eaten Howdah of the Tusker*." *Drishti The Sight* 9.1 (2020): 42–47. Web.
- Buell, Lawrence. *The Future of Environmental Criticism: Environmental Crisis and Literary Imagination*. New Jersey: Blackwell Publishing, 2005.
- "Culture and Nature: The Two Sides of the Coin | United Nations Educational, Scientific and Cultural Organization.", Unesco. Unesco, n. d. Web. 2 Sept. 2020 Das, Jyotishman.
- "Ecological Concerns in Assamese Literature: An Introduction." *International Journal of Advanced Research* 7.5 (2019): 147–49. Web.
- Goswami, Indira. *The Man from Chinnamasta*. Trans. Prashant Goswami. New Delhi, Katha, 2006.
- M. Mies and V. Shiva. *Ecofeminism*. London: Zed Books, 1993.
- Nikumoni, Hussain (ed.), Mamoni Roysamar Abha aru Pratibha. Chandra Prakashan, Guwahati. 2008.
- Smith, Bonnie G. *Women's Studies: the basics*. Abingdon: Routledge, 2013.
- Griffin, S. *Woman and Nature : Roaring inside her*. San Fransisco: Harper and Row.
- Mies,M. and Shiva ,V. *Ecofeminism* .London:Zed Books ,2014.
- Nayar, Pramod K. *Contemporary Literary and Cultural Theory*. Pearson, 2009.
- Plumwood,Val. *Feminism and Mastery of Nature*.Routledge,1993.
- Shah, Dr Sadaf. *Women and Nature: An Ecofeminist study of Indira Goswami's The Blue Necked God*.Gap Bodhi Taru , ISSN -2581 -5857,Vollume II, Issue II .Web. August 2019.
- Shiva, Vandana. *Staying Alive: Women, Ecology and Survival in India*,1988.

Opportunities and Challenges of Rural Women Entrepreneurs: A Case Study in Dibrugarh District of Assam

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ABSTRACT

Rural entrepreneurs play a crucial role in the development process of India. Women at present have broken the monopoly of men and proved themselves that they are not inferior to men. Today, the role of women is not confined to the traditional one as a mother/house wife. The role of modern women is much more than what it was previously. Different factors of rural areas induce the rural women for coming forward to perform different income generating activities. At the same time, they are also facing some challenges or barriers. This study was conducted to understand various Opportunities and challenges of rural women entrepreneurs in the district of Dibrugarh, Assam. From this study it is clear that women are performing very well in the study area. They are mainly involved in traditional economic activities and different agencies help them in their business promotion.

Key words: Rural, entrepreneurs, opportunities, challenges, agencies, activities.

INTRODUCTION

There is a growing and worldwide appreciation that the rural entrepreneurship plays a crucial role in the development process of a country. This position gets reflected in the form of their increasing number and rising proportion in the overall product manufacturing, exports, manpower employment, technical innovations, promotion of entrepreneurial skills and above all human resource development. Due to development of science and technology all over the globe, rural entrepreneurs are very much benefited and it leads to more production and distribution of different goods and services in rural areas as well as in urban areas. To bring about an equitable distribution of income and wealth by raising the productive capacity of rural people the development of rural entrepre-

neurship is a must. According to the 2014 Economic Census Report, out of total of 58 million enterprises in the country, 35 million (60%) are located in the rural areas.

A woman is the nucleus of the family, particularly, in rural areas. In rural areas, women not only collect water, fuel wood, fodder and food but also play a significant role in preserving the culture, grooming the children and shaping their destiny. Though they constitute 50% of the total population, they contribute about 75% to the development of our society while men contribute only 25%. Therefore, they are called the home makers. Now-a-days, a large number of rural women are involved in different income generating activities in Assam and most of them are the members of Self-Help Groups under National Rural Livelihood Mission.

Entrepreneurship among rural women has been a matter of recent concern. In India, men generally TAKE the lead in the entrepreneurial world. But, due to change of economic and socio-cultural environment, rural women are entering into the field of entrepreneurship development. The hidden entrepreneurial potential of rural women has gradually been changing with the sensitivity to their role and economic status in the present society.

Growth and Development of rural women entrepreneurship is important but it is not so easy in developing country like ours in which more than 70 per cent of the total population lives in rural areas and most of them live below the poverty line. There are different challenges of women entrepreneurs in rural areas. To know such challenges of rural women entrepreneurs, there is a need of research in this field. This will definitely help the rural women entrepreneurs in facing different challenges. In this study, it is an effort to find out various opportunities and challenges of rural women entrepreneurs in Dibrugarh District of Assam.

Women's entrepreneurship can make a strong contribution to the economic well-being of a society by creating new jobs for themselves and others. Women entrepreneurs face gender-based barriers in the process of starting and growing their businesses (Ramija, 2019).

Rural women are not so aware and literate for handling all the promotional, legal and other formalities involving in loan taking and establishing an Industrial Unit. They also lack confidence in their ability to run the entrepreneurship. They need training in finance, marketing, production and managerial skills (Mehta, et.al, 2011).

Lack of family support, non-cooperation of male counterparts, weak bargaining position, psychological barriers, lack of experience, lack of knowledge, lack of society support, harassment, difficulties in getting loans to set up a business, lack of awareness about credit facilities for women, lack of infrastructure facilities, strict regulations and policies, attracting customers, lack of marketing skills and unfavorable market behaviors are the major problems faced by the women entre-

preneurs (Rani, et.al, 2016).

The traditional mind set of the society and negligence of the state and respective authorities is an important obstacle for the women entrepreneurship development in India. Apart from the responsibility of the state and society, women face absence of definite agenda of life, absence of balance between family and career obligations of women, poor degree of financial freedom for women, absence direct ownership of the property to women, no awareness about capacities, low ability to bear risk, problems of work with male workers, negligence of financial institutions, lack of self-confidence, lack of professional education, mobility constraints and lack of interaction with successful entrepreneurs are major problems of women entrepreneurship development in India (Kumbhar, 2012).

Different challenges faced by the rural women entrepreneur are - lack of education, lack of entrepreneurial skills, less awareness about technology, limited access to funding, maintaining balance between business and family life, motivational factors, social attitudes etc. Rural women entrepreneurship empowers the rural women, builds self-confidence, improves living standard, influence in decision making capacity in family and community etc. (Rathee, et.al, 2017).

Lack of balance between family and career obligations of women, lack of direct ownership of the property, poor degree of financial freedom for rural women, the absenteeism of entrepreneurial skills and finance in economically rich and poor women, negligence by financial institutions, lack of self-confidence, lack of confident schedule of life, lack of education, no awareness about capacities, low risk bearing ability are the major problems of Rural Women Entrepreneurship development in India (Gautam, 2016).

The factors which influence to women entrepreneurs in business activities are - family interference, cultural and social support and entrepreneurial skill. The study recommended that policymakers should make the policies for women entrepreneurs that would be effect toward self-

leading behavior in business activities (Khalid, et.al, 2021).

The role of rural women in the Indian economic development is inevitable. The present scenario shows that women not only entered in selected profession but also capturing all profession. But rural women faces lot of problem in starting and running of business, so there is urgent need to promote women and introduce schemes for the benefit of the women and society (Sonu, 2019).

Many more research works have already done by different academicians and research scholars in India so far. Findings of a few numbers of such works are highlighted here. From the review of literature, it is observed that no such works have been done on opportunities and challenges or women rural entrepreneurs in the district of Dibrugarh, Assam. Therefore, this work is an attempt to bridge the research gap.

Objectives of the Study:

1. To study about the present scenario of rural women entrepreneurs in Dibrugarh District.
2. To understand the opportunities of rural women entrepreneurs in the study area.
3. To know various challenges of rural women entrepreneurs in the study area.

MATERIALS AND METHODS

It is a descriptive study. The paper mainly discusses about the opportunities and challenges of rural women entrepreneurs in Dibrugarh district of Assam. Required data for this study have been collected from both primary and secondary sources. A total number of 70 women entrepreneurs were selected from the entire rural areas of Dibrugarh district as respondents. There are seven Development Blocks in the district and 10 women entrepreneurs from each development block area were selected at random. Primary data are collected from the selected respondents with the help of an interview schedule. Secondary data have been collected from DIC office, Block development offices, Journals

and periodicals, Books and websites. Collected numerical data have been analysed with the help of simple statistical methods. Finally, on the basis of those information and data a conclusion is drawn to fulfil the objectives of this study.

The study primarily covers different opportunities and challenges of rural women entrepreneurs in the district of Dibrugarh, Assam. On the basis of findings, some suggestions have been forwarded to face the challenges.

STUDY AREA:

Dibrugarh district is purposively selected as the study area for this research work. It is one of the oldest and rich districts of Assam which is famous for tea. It is situated in the upper part of Assam. The climate of the district is moderate and the land is also very fertile. Dibrugarh district has one subdivision and seven development blocks which are inhabited by various groups of people. There are 1306 inhabited villages and 56 uninhabited villages in the district. The rural area covers 3,335.52 sq.km. in the district. According to 2011 Census Report of India, the total population in the district is 13,26,335, and out of which 2,43,730 live in urban areas and 10,82,605 live in rural areas. Rural population in the district is 81.62% and the total number of female population in the district is 5,32,306(49.17%). Most of the rural population are cultivators. A total number of 6,751 women are involved in different activities of household industry in Dibrugarh district.

BRIEF CONCEPTUAL ASPECTS OF THE STUDY

Entrepreneur: Entrepreneur refers to a person, who is a creator of something. In real sense, one person who is also a planner, organiser, decision maker, initiator, motivator, risk taker, coordinator, communicator, controller of an enterprise is an entrepreneur. So, it can be said that an entrepreneur possess different qualities in the field of management and control of an enterprise. Above all, an

entrepreneur has some dreams and visions to achieve something in his/her life. An entrepreneur is a catalytic agent of change and works for the good of people. An entrepreneur creates wealth, opens up employment opportunities and fosters other sectors. Thus, the entrepreneur may be considered as the engine of economic growth, job creation and prosperity in a society.

Entrepreneurship: The concept of entrepreneurship is a complex phenomenon. Entrepreneurship refers to a process of action that an entrepreneur undertakes to establish his/her enterprise. Entrepreneurship is a composite skill, the result of a mix of many qualities and traits. These includes imagination, the readiness to take risks, ability to bring together and put to use the other factors of production, capital, labour, land, as also intangible factors such as the ability to mobilise scientific and technological advances. One of the qualities of entrepreneurship is the ability to discover an investment opportunity and to organise and enterprise. It involves taking risks and making the necessary investment under conditions of risk and uncertainty.

Business: Business means 'being busy' in performing some economic activities to earn profits or gains. It implies an entrepreneurial activity engaged in sale, exchange, production and distribution of goods and services for the satisfaction of human wants, needs, desires etc. The main features of business are – creation of utility, dealing with goods and services, continuous activity, predetermined goals or objectives, economic activities, earning profits, risk and uncertainty, entrepreneurial activity, etc.

Rural Area: The Census of India (2001) defines any habitation with a population density is less than 400 per sq.km, where at least 75 percent of the male working population is engaged in agriculture and where there exists no municipality or board, as rural habitation. According to RBI, all locations with a population up to 10,000 will be considered rural, irrespective of whether village or

town. According to Planning Commission, towns with population up to 15,000 are considered rural.

Rural Entrepreneurship: Rural entrepreneurship is a process performing different activities of a rural entrepreneur which brings in overall change through innovation, new ideas for the maximum social good in rural areas. The process includes agriculture, agricultural related activities, small business, village industries, rural artisans and rural arts. It may be considered as the engine of economic development of rural areas.

Rural women entrepreneurs: Rural women entrepreneurs represent a group of rural women who have broken away from beaten track and are exploring new ventures of economic participation in rural areas. They are the planners, operators and controllers of their enterprises in rural areas. There are no special businesses, which are more suitable for rural women. Basically, rural women entrepreneurs are more likely to start a business of farming, retailing, agro based food processing industries and other service related areas. Rural women entrepreneurs are broadly classified into agricultural entrepreneurs, micro entrepreneurs, small business entrepreneurs and rural artisans.

RESULTS AND DISCUSSION

At present there are more than 400 rural women entrepreneurs in Dibrugarh district. They are playing an important role in the socio-economic development of rural areas in the district. The number of rural women entrepreneurs in Dibrugarh is growing day-by-day. It is due to various opportunities of self employment as well as limited jobs in different sectors. Agriculture is the backbone of the people living in rural areas of Dibrugarh district. Unemployment problem is a burning issue in rural areas of the district. At present some rural women are starting different business activities for their economic empowerment and livelihood. Such types of entrepreneurial activities are also generating employment opportunities for both ed-

ucated and uneducated people in rural areas of the district. Self-Help Group movement is also encouraging the rural women to participate in different entrepreneurial activities in the district. From the field survey and interview with the selected respondents of the district, it is found that rural women entrepreneurs are very much successful in earning profit from their entrepreneurial activities. It is observed that numbers of such entrepreneurs in different Development Block areas of Dibrugarh district are not equal. The number of women rural entrepreneurs in different Development block area is 50 to 75. But their economic and allied activities are almost the same. It is due to similar climatic conditions, nature and characteristics of rural people, customs and traditions in rural society, availability of natural resources, economic conditions of the villagers, caste and community, religion, nature and characteristics of the market and marketing environment, level of education, level of income in the study area.

Rural women entrepreneurs are mainly involve in some traditional nature of entrepreneurial activities like – piggery, goattery, fishery, poultry, agriculture, grocery shop, stationery shop, tailoring, weaving, knitting and cutting centre, beauty parlour, restaurant, pan shop, DTP centre, hawkers

of vegetables, etc. Different economic activities of 70 respondents are shown in the table- 1. From the table it is clear that the highest numbers of women entrepreneurs are involved in piggery and poultry firming. Goattery is also an income generating activity of the rural women entrepreneurs. Presently a limited number of women entrepreneurs are entering into some new areas of entrepreneurial activities. The table shows the total numbers of women entrepreneurs and their percentage in different entrepreneurial activities. The respondents highlighted various reasons behind their preference towards a particular entrepreneurial activity.

Opportunities of rural women entrepreneurs in the study area:

Different opportunities of rural women entrepreneurs attract the rural women to become entrepreneurs at their native place. Women of the study area have realised the potential resources of the district and have initiated various entrepreneurial activities for their economic empowerment as well as their livelihood. Handloom and handicrafts have been playing an important role in the economy of Assam. Assam is famous for tea, bamboo, cane, jute, pottery, metal works of brass

Table 1. Entrepreneurial activities of rural women in Dibrugarh district

Types of entrepreneurial activities	Respondents		Types of entrepreneurial activities	Respondents	
	Total	%		Total	%
Agriculture	5	7.14	Restaurant	2	2.86
Piggery	11	15.71	weaving	3	4.29
Goattery	9	12.86	Hawkers of vegetables	6	8.57
Poultry	11	15.71	Stationery shops	3	4.29
Fishery	2	2.86	Vermicompost	1	1.43
Knitting, cutting and embroidery	3	4.29	Computer and Xerox centre	2	2.86
Grocery Shop	2	2.86	Hawkers of fruits	2	2.86
Cloth store	3	4.29	Beauty parlour	2	2.86
Steel fabrication centre	2	2.86	Disposal plate making	1	1.43

Source: Field work.

and bell, wooden furniture, weaving and toys. The work of making Assamese Japi is very popular and Japi has huge demand in the market. Furniture of cane and bamboo of Assam is a valuable product of Assam. Ornaments of bamboo have also a global market. Eri, Pat and Muga silk are the weaving heritages of Assam.

Many women entrepreneurs have already shaped their destiny in the entrepreneurial arena. Some of the successful women entrepreneurs from Assam includes: Lalita Devi Jain (founder of Madhushree), Bipani Talukdar (founder of Assam handicraft trader Pansy Exports), Joyetta Chaudhury (founder of Delice Bakery and Confectionery Food Item Shop, Ganeshguri, Guwahati), Tanushree Hazarika (founder of Tattva Creations and the Eclectic Magazine), Jahbi Phookan (founder of Jungle Travels India, Guwahati and co-founder of Assam-Bengal vigation, Kolkata), Meghali Bora (proprietor of Megha Food Products, Jorhat), Dalimi Patgiri (innovator and producer of utensils from arecanut ‘tambul’ sheets in association with NGO Dhoriti- The Courage Within) and Laxmi Baruah (founder cum managing director of Kanaklata Mahila Urban Co-operative Bank, Jorhat). These entrepreneurs are the motivators for rural women entrepreneurs and they provide different information and guide to the rural women en-

trepreneurs. Rural women entrepreneurs can easily contact with them for any query or information related to various entrepreneurial activities.

On the other hand, government and non-governmental organisations are also extending helping hands to the rural women entrepreneurs of north east region to participate in different entrepreneurial activities. Bank and other financial institutions are also working for the benefits for rural women. They provide financial support at a subsidised rate of interest to the rural women entrepreneurs. NEDFI is one of the premier financial institutions in the North East region. It has launched a scheme called the SNEHH, i.e., Scheme for North East Handloom and Handicrafts. All Assam Jana Jagaran Society, an NGO, is also working towards helping small entrepreneurs of North East region who are working on handlooms, handicrafts and sericulture.

Under the MES Cluster Development Programme, Ministry of MSME, the Ministry contributes up to 90% of the project cost in case of soft intervention and hard intervention to women entrepreneurs and it is up to 40 % assistance in case of infrastructure development. The National Credit Fund for Women (NCFW) commonly known as Rashtriya Mahila Kosh (RMK) assists women in informal sector. RMK extends micro credit

Table 2. Factors influencing rural women entrepreneurs in Dibrugarh district

Sl No	Influencing factors	No of respondents	Percentage	Rank
1	Available market	10	14.29	2
2	Availability of local resources and infrastructural facilities	6	8.60	5.5
3	Government Schemes	15	21.43	1
4	Non-Governmental Organisations	3	4.23	10
5	Bank and Financial Institutions	5	7.14	7.5
6	Women Entrepreneurs	6	8.60	5.5
7	Government departments and agencies	5	7.14	7.5
8	Women education and training	4	5.71	9
9	Family support and motivation	7	10.00	4
10	Political Leaders	9	12.86	3

Source: Field work

through MFIs for various economic activities including setting up micro enterprises. Government of Assam has different schemes or programmes for the generation of employment and entrepreneurship development among the rural women of Assam. Some of the schemes are – Kalpataru (finance), Chief Minister Self Employment Scheme (stipend during training period), CM Special Schemes (power tiller), Handloom and Textiles (yarn), etc. In Assam, Industrial Policy 2008 and Assam IT Policy 2009, the government of Assam has made various provisions to support the women entrepreneurs. These are some opportunities for rural women entrepreneurs of the study area as well as rural women of Assam. Entrepreneurs of the study area are mainly influenced by some factors in developing their entrepreneurship. The following table – 2 highlights the main factors which influence the behaviour of rural women entrepreneurs.

From the study it is clear that majority women entrepreneurs(21.43%) are influenced by various government schemes. It is followed by available market(14.29%), political leaders (12.86%), family support and motivation(10%), availability of local resources and infrastructural facilities(5.5%), women entrepreneurs(5.5%), Bank and Financial Institutions(7.5%), Government departments and agencies(7.5%), Women education and training(5.71%), and Non-Governmental Organisations(4.23%). Opportunities for rural women entrepreneurs in the study area are summarised in few points:

1. Rural areas of the district are growing faster than urban areas and a rapid process of urbanisation is also going on in different parts of the district.
2. There are more 40 rural haats in the district and the rural entrepreneurs can sale their products in their local haats.
3. Government organises various exhibitions and melas in different parts of the districts for selling the products of rural women entrepreneurs. Women entrepreneurs can easily sale their products in such exhibitions or melas.
4. All rural roads are now well connected with urban areas of the district and therefore the rural entrepreneurs can sale their products in nearby urban areas.
5. The rural consumers are becoming more literate and value driven. Income level is also going high in rural areas, mainly non-firm income. It is more than 65 percent.
6. Fast developments in infrastructure, household electrification, rapid growth in tele-density, and media penetration is leading to the opening up of rural markets at a fast pace in the study area.
7. Increasing purchasing power and demand for and access to new goods and brands have been observed over the past decade in rural areas of the district.
8. The future of the rural markets is even brighter. Over the next decade, it is also expected that rural infrastructure will improve drastically, along with literacy, mobile and television penetration, and more income to agriculture from cash crops.
9. Information and communication technology is revolutionizing rural areas by enhancing the skills of rural women through vocational training at block level and district level.
10. Tertiary sector (like- trade, transport, food business, education, personal services, etc.) provides some new avenues to the rural women entrepreneurs since the beginning of the twenty first century in the district.
11. Various government schemes also motivate the rural women to participate in different entrepreneurial activities in the study area.

National women movement, participation of rural women in politics, connectivity with urban areas, knowledge of entrepreneurship development and use of social media are also helping the rural women in different entrepreneurial activities in the district.

Challenges of rural women entrepreneurs in Dibrugarh district

Though the rural women entrepreneurs of the study area are successful in increasing their profits, increasing the amount of investment, expanding their economic activities, generating employment opportunities, yet they are facing lots of challenges. They are mainly related to financial, managerial, marketing, transport and communication, warehousing, competition, motivation and training, socio-cultural and family issues. The following table- 3 shows that 94.29% rural women entrepreneurs are facing the challenge of socio-cultural and family related issues in the study area. It is the biggest challenge for the rural women entrepreneurs. It is followed by motivation and training(87.14%), marketing(85.71), financial(82.86), transport and communication(78.57), competition (77.14), warehouse(72.86) and managerial(61.43). They are also facing some other challenges related to different issues like labour, education, business information and knowledge, technological, legal, etc.

A day for the rural women in the study area starts early in the morning with the responsibilities of fetching water, fodder, fuel and cooking food. They take care of the children and members of the family, their health, orientation and education, looks after the family assets and livestock and attends to various income generation activities. They manage all the household matters, handle the purchases and finance, work for almost 14-16 hours a day. Unfortunately, in spite of their laudable and vulnerable roles, which cannot be substi-

tuted by machine or men, women have been neglected since generations. At the same time, the rural women are to follow different socio-cultural customs and traditions in their day-to-day life. It creates a barrier in operating different entrepreneurial activities in rural areas of the district. The major challenges faced by rural women entrepreneurs in the study area can be summarised in the following points:

1. They are unable to get rid of vicious circle of rural socio-cultural system. The unjust socio-cultural system is a major challenge for the rural women entrepreneurs in the district.
2. Out of the total number of 70 respondents, it is found that 58 respondents have their financial problem and they are very poor in financial management.
3. Competition with large business houses in terms of both quality and price of products is a major challenge for all the women entrepreneurs in the study area.
4. Rapid urbanisation in rural areas leads to changes the behaviour of rural consumers. It changes their needs and wants, living standards or lifestyles. So, the rural entrepreneurs are to change their marketing strategies frequently and unable to continue their entrepreneurial activities for a longer period.
5. Women entrepreneur in the study area has no knowledge about 4 P's of rural marketing mix, i.e, Product, Price, Promotion and Place or Physical distribution and the 4A's of rural mar-

Table 3. Challenges of rural women entrepreneurs in Dibrugarh District

SL No	Challenges	No of respondents	Percentage	Rank
1	Financial	58	82.86	4
2	Managerial	43	61.43	8
3	Marketing	60	85.71	3
4	Transport and Communication	55	78.57	5
5	Warehouse	51	72.86	7
6	Competition	54	77.14	6
7	Motivation and Training	61	87.14	2
8	Socio-cultural and Family issues	66	94.29	1

Source: Field work

keting i.e., Affordability, Availability, Awareness and Acceptability. To cope up with the modern marketing system is also a challenge among the rural women entrepreneurs.

6. Our social system also regards the salaried persons than entrepreneurs. Family members, friends, and the support system of our society do not support or encourage the rural people to establish an enterprise or to become self-employed.
7. Middlemen also exploit rural entrepreneurs. The rural entrepreneurs are heavily dependent on middlemen for marketing of their products who pocket large amount of profit.
8. Rural entrepreneurs in this area find it extremely difficult in complying with various legal formalities in obtaining licenses due to low level of education and ignorance.
9. Entrepreneurs produce a large volume of agricultural products. But due to warehouse or cold storage facility they deprive from getting reasonable price from their products.
10. Use of scientific tools and techniques in the process of production is also a challenge for the rural women entrepreneurs of the study area.

Suggestions for facing the challenges:

In order to make the rural entrepreneurs more effective and dynamic with the emerging situations of modern economic environment of business, the following measures may be adopted:

1. The rural entrepreneurs should be provided easy finance at concessional rates of interest and on easy repayment basis. The cumbersome formalities should be avoided in sanctioning the loans to rural entrepreneurs.
2. Training is essential for the development of entrepreneurs. Government and non-government agencies should train the rural women entrepreneurs in technical and managerial fields.
3. Proper encouragement and assistance should be provided to rural women entrepreneurs for setting up marketing co-operatives.
4. Rural entrepreneurs should design their prod-

ucts keeping in mind the rural environment and needs of the buyers so that consumers accept their product in the market.

CONCLUSION

Finally, it can be concluded that rural women entrepreneurs of Dibrugarh District have been playing a significant role in the development of rural economy and it can be considered as a prime mover of our state's economy. They have been contributing in the process of industrialization, employment generation, removal of socio-economic imbalances and in the fulfilment of different socio-economic objectives in Assam for more than half century. From the study, it is found that employment generation among rural women is the main success of rural women entrepreneurship in Dibrugarh district. Traditional Business and industrial activities are the main schemes or projects for most of the entrepreneurship activities.

From the study it becomes quite clear that the rural women entrepreneurs need support from their society and family members to participate in different entrepreneurial activities. They need sufficient training in different areas for effective business management. It also becomes clear that rural entrepreneurship is the answer to removal of rural poverty. The rural women need regular motivation to take up entrepreneurship as a career as well as government support and necessary assistance to face all challenges. Marketing is now a full-fledged and challenging area of each and every rural entrepreneur who desires to enter in to rural entrepreneurship. Therefore rural entrepreneurs must emphasis on market study to understand the rural market, rural market environment, rural consumer behaviour, rural marketing mix, rural market segmentation, etc. Regarding marketing strategies, entrepreneurs should consider various features of socio-cultural as well as economic factors of rural areas. Marketers supply only those products which have regular demand in rural markets and the people of rural area can also easily afford them.

Limitation of the Study

This study wants to know the opportunities and challenges of rural women entrepreneurs in Dibrugarh district. It is a micro level study, which represents a limited portion of rural entrepreneurs of Assam.

REFERENCES

- Abdul Rahman A. 2011. *Women Entrepreneurship through SHGs*, New Century Publications, New Delhi.
- Arora R., Sood S.K. 2009. *Fundamentals of Entrepreneurship and Small Business*, Kalyani Publisher, New Delhi.
- Bhandari R. 2010. *Entrepreneurship and Women Empowerment*, Alfa Publications, New Delhi.
- Bhatra B.S. & Bhatra C.S. 2007. *Entrepreneurship and Small Business Management*, Deep and Deep Publication, New Delhi.
- Desai V. 2009., *Fundamentals of Entrepreneurship and Small Business Management*, Himalaya Publishing House, Mumbai, First Edition
- Desai V. 2011. *Theories of Entrepreneurship – Nurturing, Growth, Harnessing Excellence*, Himalaya Publication, New Delhi.
- Gautam, R. 2016. Study on rural women entrepreneurship in India: Issues and Challenges, January 2016.
- Hattangadi V. 2007. *Entrepreneurship – Need of the Hour*, Himalaya Publishing House, Mumbai.
- Jack M.Kaplan, *Pattern of Entrepreneurship*, WILEY – India Pvt. Ltd, New Delhi, 2007
- Khalid, R, Environmental factors and involvement of women in entrepreneurship through self- leadership behavior, PalArch's Journal of Archaeology of Egypt/ Egyptology Vol. 17(7):2020, *Development*, S. Chand, New Delhi.
- Kumbhar, V.M, Some Critical Issues of Women Entrepreneurship in Rural India, SSRN Electronic Journal, January 2012, <https://citeseerx.ist.psu.edu/viewdoc>
- Mehta, A. et.al. 2011. Rural Women Entrepreneurship in India:- Opportunities and challenges, International Conference on Humanities, Geography and Economics (ICHGE'2011) Pattaya Dec. 2011, <http://psrcentre.org>
- Ramija, B. 2019. Rural women entrepreneurs in India, International Journal of Current Research Vol. 11, Issue, 05, pp.4128-4132, May, 2019, <https://doi.org/10.24941/ijcr.34756.05.2019>.
- Rani, J & et.al, Barriers Facing Women Entrepreneurs in Rural India: A Study in Haryana, Amity Journal of Entrepreneurship 1(1), (86-100) ©2016 ADMAA, Sinha Chaudhary Ranbir Singh University, Jind, Haryana, India, <http://amity.edu>
- Renu, R. 2017. Indian Rural Women Entrepreneurs: Challenges and Benefit, Global Academic Research Journal, Vol. V, Issue IV, June 2017, pp 32- 38. (ISSN 2347-3592)m <https://www.researchgate.net/publication/351225224>
- Sonu. 2019. Challenges for Rural Women Entrepreneurship in India, Journal of Advances and Scholarly Researches in Allied Education Multidisciplinary Academic Research.
- Taneja S. 2010. *Entrepreneur Development*, Himalaya Publishing House, New Delhi.

Review Article

Workforce diversity as a catalyst to organisational climate and productivity: research review

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ABSTRACT

Increasing globalisation, immigration, mergers and acquisition necessitates interaction of individuals from diverse socio-cultural backgrounds across organisations and sectors. Diversity and inclusions in workplace have become a significant issue and a vital area of study in recent times. Managers and executives are trained to think, decide and work in multi-cultural work setting without offending the beliefs and sentiments of a section of society. Diversity in context of culture, customs, gender and beliefs can be manifested to derive the benefits of higher productivity, competitive advantages, and positive work environment. Human resources, being the most valued asset must be handled, supervised and utilised effectively. Strengths in diversity need to be capitalised and the differences should be ignored otherwise it may turn as an impediment towards attainment of organisational goals. The present work discusses the issues of workforce diversity and the related prospects and challenges of the same in organisations. Diversity and inclusions are valued managerial keys and employees hailing from different economic, dialectal, social and cultural background with various sexual orientations must feel welcomed and included.

Keywords: diversity, inclusion, competitive advantage, multicultural, productivity.

INTRODUCTION

Diversity indicates differences. Diversity in workplace encompasses heterogenous composition of employees and workers in context of age, gender, culture, customs, ethnicity and beliefs. With increasing complexities in work, spread of organisations beyond national boundaries, different client base, it is becoming important that the employees can cater to different types of customers with utmost ease and emotional connectivity. Strengths in diversity should be highlighted as it encourages acceptance, mutual respect, and team spirit inspite of differences in social and cultural beliefs, race, gender, communication styles and so on. In a

study (Bersin, 2018), it was reported that companies adopting workforce diversity enjoys 2.3 times more cash flow per employee over a study of 3 years. In another study (Mckinsey, 2018), it was found that ethnically diverse companies perform the least ethnically diverse companies by 35 %. The reason behind this being attributed to engrossing of better talent and hence improves customer orientation, employee satisfaction and decision making. Inclusion and diversity in workplace create a positive organisational climate that promotes best talent, positive work practices with a view to promote maximum achievement of organisational objectives. A report published in Harvard Business Review concludes that diverse firms are 70 %

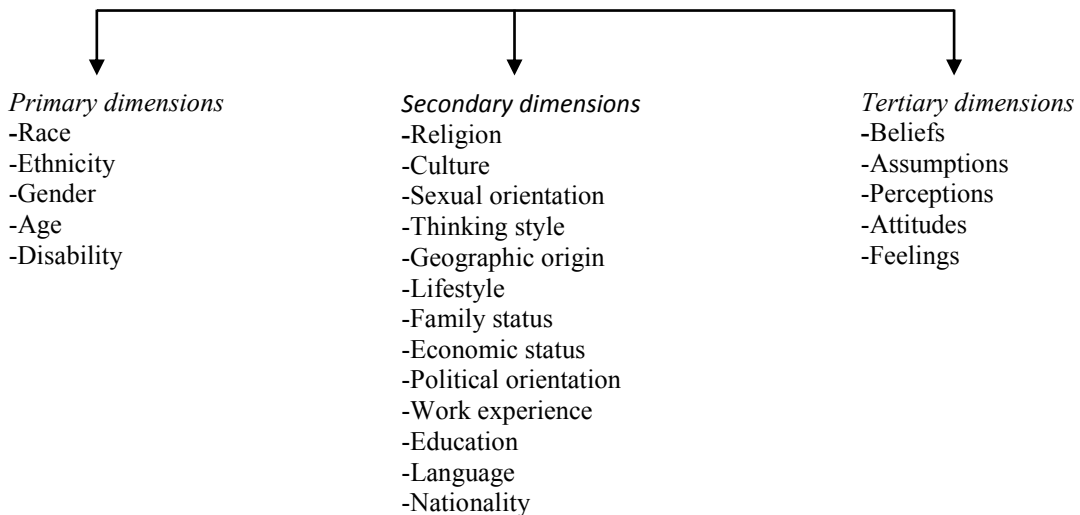
more likely to capture new markets as compared to their homogeneous counterparts.

There are many dimensions of workforce diversity: Diversity prevails in organisations under various dimensions. Differences in race, ethnicity, or culture is a strong social construct that affects important decisions in people’s life. Gender diversity is another aspect where males, females and transgender are equally welcomed and made involved. Men and women employees are working shoulder-to-shoulder in corporate houses by honouring work commitments. Age diversity is another strong component. Although awareness and increase in literacy rate is noticeably increasing but still there are many nations, states or remote places where girl child education is considered a social taboo and hence their participation in workplace is highly discouraging. In Indian context, the labour force in various towns is characterised by smaller proportion of women due to family role and obligations and a huge percentage of them still seek their husband’s permission to work after marriage. Gender diversity is more apparent in metropolitan

and cosmopolitan cities than in interior towns. The human resource policies and communication practices in organisations should use inclusive language that avoids biasness towards a single community. A conducive organisational climate should be created in organisations where employees feel secured to express their own identity in terms of sexual orientation. India is a nation flooded with multiple religious practices. There are Hindus, Christians, Muslims, Jains, Sikhs, Buddhists and Persians. So, workplace should be tolerant and liberal for varied religious observances too where employees feel comfortable to pray and meditate out of choice without being penalised.

Disability is another dimension of diversity which may be in the form of reduced mobility or deficiency of mental alertness. A little partial disability among employees may not be noticeable enough to have impacts in organisational decisions. Many a times, presence of this diversity creates an attitude formation that disabled employees are not equally productive and resourceful. As employees hail from different economic, cultural and educational background so discrepancy prevails in

Dimensions of workforce diversity in Organisations



Source: Rijamampianina & Carmichael, 2005.

their ideas, thought process and beliefs which lead to clashes and conflicts. However, differences in opinions generate creative ideas and insights. It gets to the heart of the main argument for diversity in general. Differences are not always negative. There is an art to manage the differences which can yield better outcomes of a conflicting situation. The above discussed dimensions are primary types of diversities. There is another variant of diversity which is secondary. These constitute of the factors that can be modified or changed. Factors like an employee's religious beliefs, education and training, health habits, general appearance, ethnic customs, communication style and level of income. Workforce diversity and inclusions have noteworthy implications from managerial perspective. Instead of suppressing, management is deploying various strategies to identify the differences in human resource and thereby implementing policies to encourage creativity, improving productivity, reducing labour turnover and avoiding favouritism at workplace.

MATERIALS AND METHODS

The present work is desk research aiming towards drawing conclusions on few aspects of workforce diversity in organisations in Indian context. Workforce diversity and inclusion is a common practice in multi-national firms to derive various benefits. It has been studied and understood that workplace diversity has various dimensions. Its scope is very wide as inclusions are adopted in firms in context of age, gender, cultural ethnicity, minority groups, disability and the like. Secondary data has been collected from print journals and online journals available in google scholar. Although voluminous research is available online on workplace diversity adopted in international companies but the findings presented in the existing work in regard to specific company strategies is limited to Indian companies. However, dimensions of diversity adopted in foreign companies is also encompassed under the discussion section. Wipro Sustainability

reports of two years and available literature on strategies adopted by IT firms, Tata group of companies, Infotech has been provided. While collecting secondary data, focus was put on various types of diversity, causes of this paradigm shift in welcoming diversity in firms, underlying benefits and challenges of the issue and some significant diversity strategies adopted in the Indian companies.

LITERATURE REVIEW

(Saha, *et al.*, 2008) in their study had focused on the requirements due to globalized market and benefits of workforce diversity. They stated that if an organization is not employing the diversified workforce, then it is not competitive enough and the sales managers can make their diversified workforce effective and competent by providing them training. (Jha, 2009) in her research reported that the most important asset of any organization is diversified workforce because it is good at problem solving by offering varied creative ideas and offers competitive advantages to the organization. (Mohan & Chebolu, 2007) established that culturally diversified workforce is really competent but managing such a talent requires such a leader that has an organizational vision and an attitude that are in line with culture. (Saha, 2007) reported that as a result of increased globalization the world is shrinking day by day and hence the organizations have to recruit cross cultural employees. As it might seem difficult for the employees to adapt and adjust with a new environment and culture, a manager must play the role of an active leader by providing the employees with training and interactive sessions on rituals, dressings, mannerisms and food habits of different people. (Sabharwal, 2014) reported that diversity management alone is insufficient to improve performance. Inclusive workplaces characterized by supportive leadership and empowered employees is required to translate the gains. In another study, (Prasad, 2001) it was stated that diversity management strategies or approaches have been criticized for not addressing

the exclusion of people from different identity groups and their limited access and participation in the organization. In the research work conducted (Badal & Harter, 2014), the relationship between gender diversity and financial performance at the business-unit level was examined by using more than 800 business units across two organizations from different industries. The study found that employee engagement and gender diversity independently predict financial performance at the business-unit level. However, in a study carried by (Smith *et al*, 2006; Watson *et al*, 1997), it was found that employee engagement serves as a moderator of the diversity performance relationship. The basis for such findings is the notion that men and women bring different viewpoints, diverse market insights and broader repertoire of skills for problem solving and innovation.

Similar findings are reported (Mannix & Neale, 2005; Acquavita *et al*, 2009; Badal & Harter, 2014) that diverse organizations offer opportunity for greater creativity, innovation, financial performance, organizational adaptability, better problem solving and information processing, employee retention and enhanced profit and corporate image. (Wasserman *et al*, 2008) concluded that people of all social identity groups have the opportunity to be present, to have their voices heard and appreciated, and to engage in core activities on behalf of the collective whole in organisations. (Saxena, 2014) reported that cordial relationship among the employees is one of the major ingredients for smooth functioning of an organisation. It was stated that diversity stimulates innovation and productivity and creates a positive organisational climate that can outperform competition. However, it was also reported that workforce diversity sometimes brings in language problems, attitude clash and difference in employee perception on initiatives. (Rijamampianina and Carmichael, 2005) refined diversity as the collective, all-encompassing mix of human differences and similarities along any given dimension.

RESULTS AND DISCUSSION

There are different contributing factors for this paradigm shift towards diversity in workplace. The most prominent ones are discussed here.

Growth of Service Economy:

Growth and development in an economy is not characterised by significant contributions in product sector alone but more focus is made on service sector. Sectors like tourism, hospitality, education, banking, insurance, transport, medical, consultancy etc are generating more employment and revenue in the globe. Such jobs necessitate understanding the needs and preferences of their customers and taking measures for their satisfaction. The concept of interactive marketing has gained momentum as employees are the service and satisfaction providers to customers.

Globalization of Markets:

With the emergence of globalised markets, business firms around the globe are competing for customers by offering them alternatives unavailable to them domestically. Customers are also getting alert and demand full value for their money. They insist on satisfaction of their likings and preferences and hence marketers are adopting relationship marketing programmes. Companies of national and international spread are adopting strong market segmentation and positioning strategies whereas multinational corporations are opting for strategic alliances (e.g., Maruti Company with Suzuki of Japan), (Hero Company with Honda of Japan), (Bajaj Company with Allianz SE of Germany). Either way, diversity must be created and managed to sustain competitive advantage in the market.

Mergers and Strategic Alliances:

Mergers and acquisitions are common business practices to take benefit of large-scale operations and global interactions. The problems encountered while opting for such practices is under-

lying differences in corporate cultures of two distinct entities. Hence, for successful management of mergers, acquisitions or take overs, workforce diversity must be managed effectively. The associated beliefs of the host countries and subsidiary nations, the expectation and perception of the customers towards the organisations and its services must be understood. Both executives and workers should jointly understand and capitalise on diversity factor as companies unite their efforts to offer products and services to customers in far-flung markets.

Increasing Role of Work Teams:

Various counter strategies are adopted by modern organisations to combat competition and capturing greater market share and goodwill. Focus is made on innovative practices, quality improvement, cost control, product differentiation etc. which require employees to capitalize on team spirit and proper coordination. It has been found that work teams promote greater flexibility, reduced operating costs, faster response to technological change, fewer job classifications, better response to new values (e.g., empowerment of lower-level workers, increased autonomy and responsibility) and the ability to attract and retain talent. Teams also facilitate innovation by bringing together experts with different knowledge bases and perspectives. Hence inclusion in workplace has become a necessity.

Changing Composition of Workforce:

Like other developed nations, it has been widely witnessed that there is an apparent change in the composition of employees across organisations in India. More women employees are recruited in various sectors, along with physically handicapped persons, and persons belonging to scheduled castes and scheduled tribes. Moreover, workforce, today has more mobility. The organisations are characterised by employees belonging to different geographical regions, and cultural orientations. Such differences in the workforce can be

valued and put towards the benefit of the firm where the employees must be taught to learn and value different cultures, languages, orientation, etc. so as to serve the customers belonging to different cultural and ethnic backgrounds in a better way.

Managing Labour Market:

Earlier the labour market was dominated by the male workers. Inclusion of women labourers in construction work, factory sites, road works displays the ringing diversity in various jobs. Not only in construction, but also in manufacturing, advertising, software, health, education etc, womenfolk are showing their expertise and involvement thereby adding an important dimension in workforce diversity.

Legal Requirements:

Under the provisions of the Constitution of India, certain portion of jobs in the government and public sector are reserved for scheduled castes, scheduled tribes, other backward classes, differently abled, etc. It inevitably leads to diversity in the workforce in the concerned organisations. Due to this constitutional provision, people belonging to different background apply for jobs anywhere in the nation. The reservation system in regard to job is followed not only in central and state government jobs but also in various private companies, societies and trusts in many states.

Diversity Management Practices of Indian Companies

At India's leading Infotech firm Wipro technologies, Braille signages ramps, voice enabled elevators and wheel chairs are installed to promote facilitating work environment for differently abled employees. Sunita Cherian was a then member of Wipro's corporate diversity council in 2010 who used to meet twice quarterly to provide direction to facilitate inclusion and diversity initiatives. Scope of diversity is not only limited to dimensions of age, gender, culture and socio-

economic differences but also includes persons with disabilities and people from underprivileged backgrounds. The bright side of diversity from societal perspective is that it includes many marginalised segments of society. It welcomes people across cultures, national boundaries, cross cultures, people from disadvantaged background and the like. Back in 2006, when Infotech industries faced shortage of talent in HR base, launched initiatives to attract more women into the workforce.

Gender diversity is a boon now as the IT industry is successfully operating with 35% women participation in BPO industry and more than 22% of the IT industry (NASSCOM 2013 cited in Gupta, 2015). Not only that, the council also adopted inclusion of several minorities such as lesbian, gay, bisexual and transgender (LGBT) categories. The Indian IT industry is definitely ahead on the issue of respecting diversity. Women's participation in IT workforce is second highest among all non-agricultural sectors in the country after e-commerce (67.7%) and retail (52%).

On women's day 2017, Vodafone launched two significant initiatives to increase women's participation in the workforce. The first was the Vodafone reconnect programme to bring women back into the workforce after a career break. The policy enables women to either work full-time or on flexitime. Secondly, going beyond workforce engagement, Vodafone has paved ways by adopting digital inclusion of underprivileged women (low income and remote communities) from emerging markets, especially India and Africa.

Nestle India has promoted better representation of women in the workforce both in campus recruitment as well as lateral hiring. The company runs 'Project Harmony' to increase diversity in business operations, factories, research and development centres as well as offices. Further, Tata group is always known to deliver social responsibilities and to lead several social impact issues from the front. In 2017, Tata steel announced that it is working on a roadmap to ensure 25 % repre-

sentation from diverse groups by 2020. 20% of it will be filled up by women employees and the rest will be from LGBT community. The company has adopted a 5-pillar approach to diversity and inclusion i.e., commitment, sensitization, development, infrastructure and celebration. The number of older employees has grown because of improved medical and healthcare facilities. Bharati enterprise, for example has mandated its recruitment agencies to ensure 25-30% of women candidates at the interview stage. In 2010-11, 19% of the IT business workforce used non-Indian as against 7% in 2009-2010 and 5% in 2008- 2009. Almost 7.6% of WIPRO recruitments were non-Indians across 43 nationalities. (The Imperative of Hope, Wipro sustainability report, 2010-11). Strategies have been revised and devised for greater well-being of the masses. Among the recent inclusion and diversity strategies are higher participation of women employees (35%), LGBT, underprivileged sections to bridge the employability gap, persons with disability and participation of more nationalities (more than 110 nations are included and 65% of the online personnel are locals), 16% women in management (in lower, middle and senior management) positions (Wipro sustainability report, 2017-2018). Very recently, Tata steel has targeted to have 20% women participation in its workforce from the current level of 11 %.

Advantages of workforce diversity:

- *Higher adaptability:* When employees belonging to diverse backgrounds come together in workplace, they bring with them individual differences in skills and talents. They offer ideas and show flexibility in adapting to dynamic forces of the market and customer demand channels. Heterogeneous compositions of employers provide better solutions to management problems and show alertness in allocation of resources.
- *Broader and richer reservoir of skills and experiences:* A diverse collection/assimilation of potential and experience allow a company to

assign different goals to different employees with specific skills. It helps in better division and distribution of work which helps in improving productivity.

- *Increase in productivity:* Diversity and inclusion in work environment results in higher productivity and competitive advantages. It improves employee morale and they feel encouraged to deliver more efficiently and effectively.
- *Increase in creativity:* As the team members are culturally diverse, so better results of brainstorming sessions can be achieved. Heterogeneous groups always explore the best among themselves because they cross fertilize one another and better workable solutions are offered by them. For eg., a practical problem may be perceived differently by men, women, transgender and bisexuals. Again, due to short generation gap that exists among individuals now a days can be valued which is a vibrant diversity resulting in different ways of handling similar problems. Nationals belonging to different countries perceive problems on different criteria by focusing on their individual thought process and customs.
- *Improved management solutions:* Multicultural organizations are found to be better at problem solving, possess better ability to extract expanded meanings and are more likely to display multiple perspectives and interpretations in dealing with complex issues. A diverse collection of skills and experiences (eg., languages, cultural understanding) allows a company to provide service to customers on a global basis.
- *Increase goodwill:* Individuals seeking employment are always attracted more towards companies with diverse workforce because they feel that the organizational climate will be unbiased without employee discrimination. Such firms attract fresh blood by retaining ex-

isting employees due to high employee morale as a result of workforce diversity.

Challenges of workforce diversity

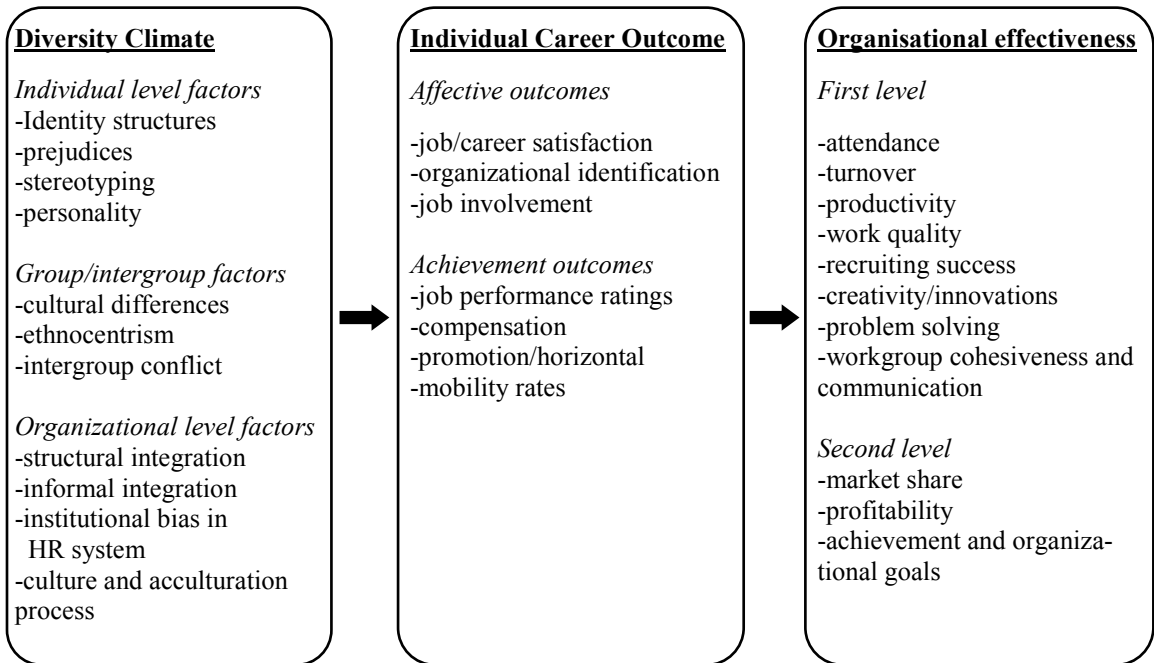
- *Diversity in the work environment can lead to communication barriers:* People belonging to different cultures speak different languages and expression. The words and phrases used in one community may mean entirely different in another community which creates misinterpretations of meanings. Although diversity welcomes varied opinions and viewpoints in workplace which enjoys a competitive advantage but may also lead to personal communication problems or jargon understanding problems which eventually leads to arguments and conflicts.
- *Negative effects of huge generation gap:* The phenomena of diversity and inclusion emphasizes on offering opportunities to both young and old. Now a days, generation gap exists after every 5 years in individuals. In an organization, age of employees ranges from an average 25 years to 60 years and sometimes more than that. Huge differences in age element denotes huge shift in uniformity of perceptions, initiatives and conclusions among employees.
- *Gender diversity is not realistic:* The concept of gender diversity is still a doubtful term in many companies. If the statistics are to be followed, the female representation in workers is very low and pathetic. LGBT categories are seldom seen to be included in Indian companies in notable percentage. If the ratio of men and women in the workforce is calculated at the entry stage of organizations, then a fair percentage is noticed but it is hardly observed that women employees are upgraded to senior management positions. Only a few women employees at the top management positions are witnessed. Organizations are not yet conditioned enough to embrace working mothers.

Table 1. Indian diversity dimensions and their organizational challenges

Diversity Dimensions	Organisational Challenges
Socio-cultural dimensions of diversity	
Caste	<ul style="list-style-type: none"> • Nepotism based on caste • Particular jobs being dominated by particular caste. • Stereotypes associated with certain castes leading to discrimination. • General category employees perceive minority as less competent.
Religion	<ul style="list-style-type: none"> • Religion impacts work culture and behaviour • Religion impacts management decisions and policy making. • Direct and indirect discrimination on ground of religion. • Stereotypes about people of a specific religion. • Harassment- religious jokes, name calling etc. • Religious observances, symbols and food habits may influence work behaviour. • Religious festivals would determine work timings, time-off.
Demographic dimensions of society	
Gender	<ul style="list-style-type: none"> • Glass ceiling • Glass elevators • Work-life balance • Unequal pay • Sexual harassment • Role stereotypes
Age	<ul style="list-style-type: none"> • Each generation has varied work values and work styles. • Challenges of Y-generation. • Age related stereotypes. • Generation-Y being hired for top positions and leadership issues
Region of Origin	<ul style="list-style-type: none"> • Regional identity leading to favouritism. • Discrimination on the grounds of region. • Cultural shock and difficulties in being accepted in other regions. • Cultural stereotypes of different regions creating prejudices.
Physical disability	<ul style="list-style-type: none"> • Physical infrastructure and faculties. • Attitude and belief of co-employees. • Stereotypes and misunderstanding related to their potential.
Sexual orientation	<ul style="list-style-type: none"> • Indian family values and religious values challenges acceptance of their identity. • Discrimination and bullying at workplace. • Attracting them would be a challenge.

Source: Kavita Meena, 2015.

Interactional model of the input of diversity on individual career outcomes and organizational effectiveness



Source: Taylor Cox, 1993

CONCLUSION

Review of existing literature has revealed the related advantages and challenges of prevailing diversity in organisations. Diverse workplaces promote enlightenment and open-mindedness. Earlier, the percentage of inclusions was quite less be it in regard to proportion of male and female or entry of bisexuals and transgenders at workplace. Big corporate houses now a days, donot keep reservations in welcoming talent from LGBT categories. The BPO industry has open reservations to include employees from underprivileged background. Differently abled people are also provided platform to participate, feel involved and work with ease in organisations. Diversity has always prevailed in nation in form of heterogenous views and cultures. Strengths in diversity need to be highlighted and

the synergy effect need to be created. Higher participation of women employees, psychological liberty to employees in feeling safe having different religious, cultural and sexual orientations must be focussed. From organisational point of view, it is imperative to devise training programmes on team building, interactive work culture, communication channels and implement diversity policies for wider reach and smooth conduct of operations in firms. Management plays an incremental role in lubricating this practice smoothly. It must recognise unconscious biasness and address the related concerns. It needs to be generous towards people of all race thereby recognising holidays of all cultures. Conflicts will always surround amidst differences, but the same need to be addressed with tact and tolerance.

REFERENCES

- Acquavita, S.P., Pittman, J., Gibbons, M., Castellanos, K., Brown. 2009. Personal and organizational diversity factors' impact on social workers' job satisfaction: results from a national internet-based survey, *Administration in Social Work*. 33(2): 151-166.
- Badal S; Harter K.L. 2014. Gender diversity, business-unit engagement, and performance. *Journal of Leadership & Organizational Studies*, 21(4): 354-365.
- Bersin, J. 2018. Diversity and inclusion is a business strategy, not an HR program, *Business trends/ diversity and inclusion*.
- Gender diversity makes the firm more productive. 2019. Harvard Business Review.
- Imperative of Hope, Wipro Sustainability Report, 2010-2011.
- Jha, A. 2009. Need for Cross- Cultural Management. *HRM Review*, ICFAI University Press.
- Mannix, E., Neale M.A. 2005. What differences make a difference. *Psychological Science for the Public Interest*, 6(2): 31-55.
- Mckinsey. 2018. Delivering through diversity. accessed in www.mckinsey.com
- Meena. Kavita. 2015. Diversity dimensions of India and their organizational challenges: An analysis. *IOSR Journal of Business and Management*, 17(7): 88-98.
- Mohan, R., Chebolu. 2007. Culture Compatibility The Way Forward. *HRM Review*.
- Prasad, A. 2001. Understanding workplace empowerment as inclusion. *Journal of Applied Behavioral Science*, 37(1): 51-69.
- Rijamampianina, R., Carmichael, T. 2005. A pragmatic and holistic approach to managing diversity, *Problems and prospective in Management* 3(1).
- Sabharwal, M. 2014. Is diversity management sufficient? Organizational inclusion to further performance. *Public Personnel Management*, 43(2):197-217.
- Saha, A. 2007. Nurturing Cultural Diversities: A Leadership Challenge. *HRM Review*.
- Saha, S., Mukherjee, D., Patra. 2008. Cross-cultural Issues Intricacies and Ignorance, *HRM Review* ICFAI University Press.
- Saxena, A. 2014. Workforce diversity: a key to improve productivity, *Procedia Economics and Finance*, 11: 76-85.
- Smith, N. Smith V. Verner, W. 2006. Do women in top management affect firm performance? A panel study of 2500 Danish firms. *International Journal of Performance Management*, 55: 569-593.
- Taylor, C. 1993. Cultural diversity in organizations: theory, research and practice. BerrettKoehler. San Francisco.
- Wasserman, I.C., Gallegos, P.V., Fredman, B.M, 2008. Dancing with resistance: Leadership challenges in fostering a culture of inclusion in Diversity resistance in organizations. New York, Taylor & Francis Group:175-200.
- Watson, W.E., Kumar K., Michaelsen, L.K. 1997. Cultural diversity's impact on interaction processes and performance: Comparing homogeneous and diverse task groups. *Academy of Management Journal*, 36: 590-602.
- Wipro Sustainability Report, 2017-2018.
- Workforce diversity management- concept, features and techniques, article accessed in yourarticlelibrary.com
- Websites
- www.allegisgroup.com (last visited on 18.03.2022 at 13:15 hrs)
- www.mckinsey.com (last visited on 27.03.2022 at 23:46 hrs)
- www.wonolo.com (last visited on 30.03.2022 at 00:03 hrs)
- www.yourarticlelibrary.com (last visited on 16.03.2022 at 20:22 hrs)

Role of self help groups in the rural development of Assam A study on Mankhowa Gaon Panchayat, under Kakopather Block, Tinsukia

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ABSTRACT

Self Help Group is a new phenomenon in the context of growing rural economy. It is no doubt true that the Government since independence have undertaken so many economic programs to revitalize the rural economy but failed to yield desired result due to peoples' apathy to participate and co-operate with these ventures. But now there has been a remarkable change once the Self Help Groups have come into being since 1990 as peoples' participation is encouraging. As a result, the rural economic growth is possible now. Self-Help Groups is a voluntary organization formed by some rural people to work for common socio-economic goal and for this purpose they agree to take loan from the Government agency. According to Sagar Mandal and G.L. Roy, "Self Help Group is a unit of two or more people on reciprocal interaction or communication with each other". Such Groups play a vital role in changing the mindset of the rural people to realize the importance of mutual understanding, co-operation, and value of working together and small savings. These Self Help Groups necessarily are likely to go a long way in increasing the family income, helping in self-engagement and empowering women.

Key Words: Self Help Group, Economy, Rural, Empower, People

INTRODUCTION

In India, self employment has been recognized as an essential force of development in rural areas. It has emerged as a strategy designed to improve the socio-economic life and mainly focuses on extending the benefits of development to the poorest in the rural areas improving their standard of living and self-realization. SHGs in India are integrating the low income segments with rest of the rural community by ensuring them a better participation in a more equitable share in the benefit of developments. These Groups are not only speeding up economic growth, but also providing jobs and im-

proving the quality of rural life towards self-reliance. In order to change the face of the socio-economic scenario, Self Help Groups (SHGs) are playing important role in the self-employment by raising the level of income and standard of living rural people (Gupta, 2001). In this framework, one of the most vital aspects of rural self employment is the formation of SHGs which is a valuable investment in human capital through training and capacity building measures. From dairy to mechanized farming, weaving, poultry, food processing units, mushroom cultivation; Rural India has been busy setting up micro-enterprises by forming SHGs (Karmakar, 1999). The group members use collective wisdom and peer pressure to ensure ap-

propriate use of fund and its timely repayment. These are informal groups in nature where members come together towards collective action for common cause. The common need is meeting their emergent economic needs without depending on external help. SHG movement is supposed to build economic self reliance of rural poor, overcome misuse and create confidence predominantly among women who are mostly unseen in the social structure.

The concept of SHGs got a major impetus after New Delhi launched the 'Swarnjayanti Gram Swarozgar Yojana' (SGSY) – a program aimed at bringing families above the poverty line by ensuring a sustainable level of level of income over a period of time (Maitiki, 2008). The main objective of SHG concept is to improve the economic development of women and create facilitating environment for their social transformation in the lift of gender discrimination in work and the household.

Area of Study: This study is conducted on the role of SHG in rural development. The area of study for the proposed research work is confined to the SHGs of Mankhowa Gaon Panchayat under Kakopathar Block of DoomDooma sub-division.

MATERIALS AND METHODS

The study is based on both primary and secondary data. SHGs of Mankhowa Gaon Panchayat under Kakopathar Block have been selected for primary data collection. Direct interaction is held with the members of the SHGs under the area of study. Primary data were collected from the year of February 2009 to February 2011. The secondary data are collected from various reports of the government, DRDA, Assam Gramin Bikash Bank, documents of Self-help groups and other records of the banks and block level institutions. The data included information on fund size, group size, and volume of savings, occupational status and functions of the groups.

The main objectives of the present study are :

1. To examine the role of self help groups (SHG) in rural development under the area of study.
2. To examine the role of SHGs in poverty reduction in rural areas under the area of study.
3. To examine the achievements of SHGs by organizing the poor people of rural areas through the process of mobilization.
4. To examine how far the rural people have been benefitted through the bank credit and government subsidy under the area of study.
5. To examine the shortcomings of the self help groups under the area of study.

RESULTS AND DISCUSSION

When the Central govt. of India adopted the Swarnajayanti Gram Swarozgar Yojana in 01/04/1991 the idea of self-help-group got a major impetus, a program aimed at bringing families above the poverty line by ensuring sustainable level of income over a period of time. It is a popular concept that people of Assam embrace it to prosper with a silent economic revolution sweeping rural Assam. Swarnajayanti Gram Swarozgar Yojana (SGSY) has been launched with the objective of bringing every assisted family above the poverty line within three years, through the provision of micro enterprise. This is a holistic program covering all aspects of self employment such as organization of the poor into self help groups, training, credit, technology, infrastructure and marketing.

The study is conducted in forty seven SHGs of Mankhowa Gaon Panchayat under Kakopathar Block. There are altogether forty seven SHGs in Mankhowa Gaon Panchayat and around 534 women have been engaged with SHGs under the period of study taking five villages as sample villages.

Since the year of 2000, a large number of village people particularly women have been mobilized into Self Help Groups in the areas under Kakopathar Block Assam. This has built the social capital among the poor rural people in the villages

under Mankhowa Gaon Panchayat of DoomDooma Sub-division. This SHG movement in these areas has not only provided economic development to its members but more importantly created viable social capital in the form of an empowered community. Most significant social aspects where in rural women of Mankhowa Gaon Panchayat have been doing tremendous development in the aspects of – increase in overall awareness level about their status and approaches for development, social empowerment in terms of improvement in their confidence, self perception, communication skill and other behavioral changes, mobility of rural women has increased for various socio-economic developmental activities, decision making capacity at household level as well as at community level has increased and become more meaningful. The capacity building covering the following aspects will strengthen both old and new groups.

SHGs and Rural development: The villages under Mankhowa Gaon Panchayat have been facing with various problems related to poverty, illiteracy, lack of skills, and health care, etc. still now like other villages of Assam. Now the SHGs have been playing a vital role to eliminate these problems through the way of group efforts and the way of economic independence.

These problems cannot be tackled individually but can be better solved through group efforts. So Self Help Groups of Mankhowa Gaon Panchayat have become the vehicle of change for the poor and illiterate people. Self-help groups under the area of study are able to organize the poor people and the marginalized to come together to solve their individual problems. The poor people learn the lesson how to collect their savings and save it in banks. In return they receive easy access to loans with a small rate of interest to start their micro unit enterprise when they entangled with the system of SHG (Gadanayak, 2008).

The SHGs provide Self-employment to the rural poor to have sustained incomes and remove the shackles of Poverty. Through the holistic

program Swarnajayanti Gram Swarozgar Yojna provide all aspects of self employment such as organization of the poor in to self help groups, training, credit, technology, infrastructure and marketing. SGSY is funded by centre and the state governments in the ratio of 75:25 (Mandal, 2005). Through this program many poor illiterate women of the area of study have been engaged in self employment taking financial assistance from the govt. and contributed towards development of rural economy.

About 59% of the sample women SGSY beneficiaries are observed to be women, which is considerably higher than the targeted 40%. Over 59% members belong to SC, ST caste groups, about 31% to OBC/MOBC caste group and only about 8% to the forward caste group. The minority community has just registered its presence by about 2% membership. The above distinctions appear to be the product of the SHGs policy of SGSY program. In this case, the SHG members or Swarozgaris must come from the list of below poverty line (BPL) families and the minimum percentage of SC, ST Swarozgaris should be 50%.

A great majority of the members were found to be educated and at least literate in both the groups of SHGs. Over 50% members were capable of reading and writing. Rural people of these areas are engaged in various occupations for earning their livelihood. Information about the occupation of the SHG members under study is collected. So far as the marital status is concerned, the respondents were found to be either unmarried (20%) or married (65%) or widowed (15%).

About 62% members of the SHGs of the area of study are found to be landless who are most likely to conform to the criterion of being below poverty line (BPL). But 25% of the SHG members who are small landholders may or may not conform to this criterion of being below poverty line. Most of the rural women engaged with the SHGs were housewives without any income before joining the SHG. Generally they had been considered as neglected in the house hold affairs by their husbands or head of the families. They

couldn't participate actively in their house hold affairs. They had been dominated by the senior males occasionally. But after joining in to SHG, they learn the lesson of self dependent, self confidence by the way of self earning. They are able to help their families financially at the time of need and they also are able to get prestige in the family as well as in the society.

Achievements: Self employment has been recognized as an essential force of development in rural areas of India. It has emerged as a strategy designed to improve the socio-economic life and mainly focuses on extending the benefits of development to the poorest in the rural areas improving their standard of living and self-realization. SHGs in Assam also have been playing a vital role in integrating the low income segments with the rest of the rural community by ensuring them a better participation in a more equitable share in the benefit of developments. These Self Help Groups are not only speeding up economic growth, but also providing jobs and improving the quality of rural

life towards self-reliance. The SHGs of Mankhowa Gaon Panchayat also have been doing more in achieving the growth of rural economy of that area. Various SHGs have been engaged in various socio-economic developmental activities, like agriculture, dairy, flower nursery, animal husbandry, cloth business, tailoring, etc. Here shows the distribution of occupation before and after the formation of SHGs, so that can be assumed easily the engagement of the rural people.

Table shows that in 53.19% of SHGs, the members of the SHGs were primarily engaged in agricultural activities before formulation. Whereas, the number of SHGs, where their members had no occupation till the SHG formation was about 17.2% respectively. Among the other SHGs, in 19% of SHGs, members were doing activities like business, daily labourer and some other activities. Out of that, in about 8.51% SHGs, members were engaged as a daily labourer and in a few number of SHGs i.e 11% of the total sample SHGs, members took part in multiple occupations like agricul-

Table 1. Distribution of past occupation among the members of sample SHGs before its formation

Occupation	Number of SHGs	Percentage
No occupation	8	17.02
Agriculture	25	53.19
Business	5	10.63
Daily Labourer	4	8.51
Other	2	4.25
Agriculture/Business	0	0
Agriculture/Daily labour	2	4.25
Agriculture/Others	1	2.12
Business/Others	0	0
Total	47	100.00

Source: Field Survey

Table 2. Distribution of present occupation among the members of the sample SHGs after forming SHGs

Occupation	Number of SHGs	Percentage
Agriculture	3	6.38
Dairy	4	8.51
Tailoring	0	0
Flower Nursery	1	2.12
Cloth Business	3	6.38
Animal Husbandry	9	19.14
Others	2	4.25
Agriculture/Dairy	1	2.12
Agriculture/Cloth Business	1	2.12
Agriculture/Animal Husbandry	3	6.38
Dairy/Cloth Business	2	4.25
Dairy/Animal Husbandry	4	8.51
Dairy/Others	1	2.12
Tailoring/Cloth Business	1	2.12
Plantation/Tea nursery	4	8.51
Cloth Business/Others	1	2.12
Animal Husbandry/Others	2	4.25
Agriculture/Dairy/Others	2	4.25
Agriculture/Cloth Business/Animal Husbandry	1	2.12
Dairy/Cloth Business/Animal Husbandry	1	2.12
Tailoring/Cloth Business/Animal Husbandry	0	0
Cloth Business/Animal Husbandry/Others	0	0
Agriculture/Dairy/Cloth Business/Animal Husbandry	1	2.12
Total	47	100.00

Source: Field Survey

It is observed from the table that after joining SHG, the members are motivated to engage with various occupations. It has been observed that the members of the sample SHGs undertake various multiple occupations as their main source of self-employment after the formation of SHG.

Table shows that in 65.83% of the total SHGs, members have engaged in animal husband-

ry. The animal husbandry practices basically include dairy, pig farming, goat, poultry, duck, veterinary, etc. The grade-wise distribution of activities also clearly shows that out of the total 'A' grade SHGs (60), in 70% of SHGs, members take animal husbandry as their primary activity and in 61.66% of total 'B' grade SHGs (60) the members are engaged in animal husbandry and in the rest of the SHGs, it has been observed that members are

Table 3. Distribution of activities among the members of the sample SHGs (in percentage)

Activity	Percentage of SHGs		Total
	A Grade	B Grade	
Agriculture	10	11.66	10.83
Animal Husbandry	70	61.66	65.83
Weaving/Handloom and Textile	13.33	15	14.16
Other Activities	6.66	11.66	9.16
Total	99.99	99.98	99.98

Source: Field Survey

disbursed among the activities like agriculture, weaving and handloom and textile and other activities.

CONCLUSION

The entire observation shows that SHGs are functioning well in organizing the poor women section into a self-serviced economic forum. The formation of SHG can create opportunities for the poor people to participate into the various income earning activities for the women members in the rural areas. SHGs under the area of study provides a motivation for the building up capabilities on the part of their members in the sample area through providing various income earning sources and shifting their occupational structure. Formation of SHGs and enrollment of the members after the formation of SHGs have come out as the significant factor of reducing incidence of poverty in the villages of Mankhowa Gaon Panchayat. In other words, it can be concluded that participation of members in this micro credit program provides a significant contribution towards the development of self-confidence, self-dependent among the members of the SHGs contributing themselves for the rural development in the study region. Further the analysis on adequacy of micro credit facilities from the bank and other financial institutions shows that a significant portion of the SHG members did not have access to better micro credit fa-

cilities in the Mankhowa Gaon Panchayat under Kakopathar Block. This picture clearly reveals that availability of credit to the members in the region still lags far behind than the desired level of the members since the operation under micro finance and micro enterprises enhances the economic status of the poor women in the society which helps eradication of poverty at the root itself.

REFERENCES

- Gupta, K.D. 2001. An Informal Journey through Self-Help Groups, *Indian Journal of Agricultural Economics*, 50(3), July-Sept. pp. 370-86
- Gadanayak, B.B. 2008., Poverty alleviation at the grass root level, Self-help groups as an instrument, Dev4India.org.
- Karmakar, K.G.1999. Rural Credit and Self-Help Group, Micro finance Needs and Concept in India, Sage publication, New Delhi.
- Mandal, A. 2005. Swarnajayanti Gram Swarozgar Yojana and Self-help group: An Assessment, *Kurukshetra, A Journal of Ministry of Rural Development*, January.
- Matiki, R.E. 2008. A New Rural Development Strategy for Rapid and Sustainable development countries, *Journal of Rural Development, A Quarterly of NIRD*, Vol. 27, No.3, July-Sept., pp 449-667

The 'Influence' of Borges in Umberto Eco's *The Name of the Rose*

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ABSTRACT

Ever since its publication, *The Name of the Rose* has received much critical acclaim as a seminal postmodern text. It invariably includes all the typical postmodern traits, including intertextuality and an ironic revisiting of the past. Critics have found a great influence of the Argentine author, Jorge Luis Borges, on Eco's novel. Without denying the 'influence', however, it would be pertinent to point out Eco's own views on this matter. Being a postmodern artist, Eco presents the past with ironic overtures; and Borges being a part of the past, has been looked at with irony. This is what the paper would try to present: how Eco ironically appropriates Borges in his novels as part of a greater cultural inheritance, thus subverting 'influence' with 'appropriation'. These two concepts are the key to understand the manner in which Eco makes use of Borges, thus negating the effect of what Bloom calls the 'anxiety of influence'.

Key words: Influence, Appropriation, Intertextuality, Irony

INTRODUCTION

This paper presents a discussion on how the Italian novelist Umberto Eco uses the postmodern concepts of intertextuality and irony to deal with his appropriation of past writers, especially, Jorge Luis Borges. Ever since its coinage by the French feminist Julia Kristeva in 'Word, Dialogue and the Novel'(1966), the term 'intertextuality' has been much in vogue in postmodern critical studies. Eco presents intertextuality as 'intertextual irony' and distinguishes it from quotations and other forms of allusions (Eco, 'Intertextual Irony and Levels of Reading', 2006). The present paper uses this concept of intertextuality along with the concepts of 'appropriation' and 'influence' to talk about Eco's indebtedness to Borges in writing *The Name of the Rose* (1983).

Influence and Appropriation:

'Influence' and 'Appropriation' are two terms that are recurrently used in contemporary lit-

erary studies. While influence often indicates a conscious or sub-conscious effect of other writers and their works on an author, 'appropriation' has more of a critical stance. What we read often gets reflected in our writing because this is how our mind works. For instance, in 'Borges and My Anxiety of Influence' Umberto Eco states that readers have discovered the influence of a book he had read when he was twelve, on the plot of *The Name of the Rose* (Eco, *On Literature*, p.120). Appropriation occurs when an author deliberately uses another writer's influence, through conscious irony, to either write back to that author, or to critically reconstruct his/her work. This paper will discuss these two concepts by looking at the relation between Jorge Luis Borges and Umberto Eco.

Ever since the appearance of *The Name of the Rose*, critics and scholars have been busy trying to figure out the extent of Borges' influence on the novel. My paper too will make an attempt to analyze the numerous ways in which the Argentine writer Jorge Luis Borges influences Umberto

Eco. Though this influence is perceived in almost all of Eco's novels, my concern here will be to illustrate the same with reference to *The Name of the Rose*. A quick glance at the novel would tell any reader that the presence of Borges in the novel cannot be denied. The old, blind librarian of the monastery is named Jorge; the structure of the library itself echoes Borges's 'The Library of Babel'; and at the centre of the novel surrounded by two chief Borgesian motifs, the mirror and the labyrinthine library, sits the old Jorge guarding, as it were, his world. Apart from these there are more subtle influences of form, of signs and of philosophy that only a deeper study of the novel will reveal. Having said this, we also need to remember that Eco was a postmodern artist who would look at any form of the past with conscious irony, including a past writer. Indeed, he himself has remarked that trying to find precise allusions to this or that in his novels is a waste of time (Eco, 124). Therefore in my attempt to find Borges' influence on Eco, I have not ignored the concepts of intertextuality and parody of history that are an integral part of his work.

My own argument in this paper has been influenced particularly by two articles – Deborah Parker's "Literature of Appropriation: Eco's Use of Borges in *Il Nome Della Rosa*" (1990) and Umberto Eco's "Borges and my Anxiety of Influence" (2006). Both the papers discuss the influence of Borges on Eco, but with a difference. Parker in her essay enumerates the ways in which Eco 'appropriates' Borges in his novel. In the book *Adaptation and Appropriation*, Julie Sanders defines 'appropriation' as a concept that 'introduces ideas of active critical commentary, of creative re-interpretation and of "writing back" to the original', and adds that it is 'often defined in terms of a hostile takeover or possession' (Sanders, 2006). This definition coheres with Parker's view of Umberto Eco's exploitation of Borges. She says that Eco exploits Borges' works as well as his cultural image. While the appropriation of Borges' motifs and plots constitute a positive debt, the appropriation of the political image of Borges is negative. Parker has made quite an elaborate analysis of how Eco has used Borges in his novel and men-

tions in passing that Eco's own attitude towards Borges in the novel is ambiguous. This is where I would choose to differ. In my opinion it is not ambiguous but ironic. We might here take a look at "Borges and My Anxiety of Influence". This essay was originally a talk presented at a conference held at the University of Castilla-La Mancha on the literary relationship between Borges and Eco. The title of Eco's paper alludes to Harold Bloom's 'anxiety of influence' which is quite interesting because the entire paper talks about the influence of books on other books. Without denying his indebtedness to Borges, Eco remarks that he is in that manner indebted to every book of the past and present that he had read or glanced at or even heard about: "...this most important point is that books talk to each other" (Eco, 122). Through this allusion to intertextuality Eco leads us to the important issue of ironically viewing the influence of one author on another. Borges belongs to Eco's past and the past has to be looked upon with conscious irony.

Having said this let us first look at evidence from the novel of Eco's appropriation of Borges. A glaring influence of Borges is seen in the construction of the library. The Aedificium that contains the library is a maze. The library itself is a labyrinth and is a symbol of the universe which is a bigger labyrinth. In 'The Library of Babel' (Borges, Labyrinths, pp.78-86)¹, the narrator tells us:

"The universe (which others call the Library) is composed of an indefinite number of hexagonal galleries, with vast air shafts between...in the hallway there is a mirror which faithfully duplicates all appearances." (Borges, p.78)

In *The Name of the Rose* Adso narrates the following:

"Holding the lamp in front of me I ventured into the next rooms. A giant of threatening dimensions, a swaying and fluttering form came towards me...(William) also saw something, because he brusquely stepped back. Then he leaned forward again and raised the lamp. He burst out laughing. 'Really ingenious. A mirror!' 'A mirror?' 'Yes, my bold warrior...a mirror that reflects your image, enlarged and distorted'".

(Emphasis added)

These two examples from two texts speak a lot. Eco apparently imitates Borges in constructing the library but only to invert it. The mirror which "faithfully duplicates" appearances in Borges presents a "distorted" image in Eco. Speaking about the use of spectacles by William in *The Name of the Rose*, Eco mentions the influence of 'Averroes' Search' (Borges, pp.180-188), a short story by Borges: "This is not a Borgesian technique; mine is an 'anti-Averroes model' but without Borges's model before me I would never have been able to conceive it" (Eco, p.128). The implications of this remark are many. First of all, Eco admits that he has been influenced by Borges. Secondly, he seems to tell us that he is using Borges only as he might use any other material of the past. Moreover, he also mentions that it is inevitable that he be influenced by Borges because both of them draw from what he calls 'the sometimes millennial chain of culture'. Therefore, in Eco's opinion, both of them might have been influenced by common past sources. Eco proves this point by referring back to the presence of the labyrinthine library in *The Name of the Rose*. Though readers often consider it the most conspicuous proof of Borges' influence on Eco, the latter says that it is not so. Theorists of postmodernism regard the labyrinth as a recurrent image in almost all contemporary literature, which implies that Eco might have found his source anywhere. This is how Eco treats every attempt at pointing out Borges' influence on him – with an ironic reversal.

This kind of parody of historical influences abounds in postmodern fiction. As Parker notes, 'Affirmation and applauding of the use of the past is characteristic of present post-modern writers'. They acknowledge the appropriation of other writers...at times even flaunting such incorporation. As a true postmodern artist Eco too is audible about his allusions to Borges but he does not give the latter the credit he deserves. Having said this, let us now move on to the other obvious allusions to Borges. Historicizing of fiction is an interesting parallel that we find in Borges and Eco. In the story, 'Tlon, Uqbar, Orbis Tertius' (Borges, pp.27-43), the narrator leaves no stones unturned

to authenticate the story about a new planet called Tlon. Every reader would of course understand that it is pure fiction and yet the references to all the sources in which a mention of Tlon is made would tell us that it is a scientific and historical fact. In *The Name of the Rose* Eco uses a similar technique when he painstakingly goes through all the processes of finding relevant references to Adso's manuscript. However there is a twist when the narrator of Adso's story remarks: 'In short, I am full of doubts. I really don't know why I have decided to pluck up my courage and present, as if it were authentic, the manuscript of Adso of Melk' (Eco, *The Name of the Rose*, 5). It is this kind of reversal that make Eco's novel a postmodern work that defeats every attempt at finding definite influences of past authors, while all the time reminding us of the influences.

Another such evidence of the use of Borges is the character of Jorge. When asked the reason for creating an evil Jorge, Eco replied that when he gave that name to that particular character, he had not known what the character would later do in the novel. This remark from Eco raises questions pertaining to the extent of Borges's influence on him. Does Borges actually influence Eco as much as it is generally made out? Eco himself admits that he does; at least some of his works did have an enormous influence on Eco, but not in the way most readers perceive. Jorge is a Spanish-speaking blind, erudite librarian. He is the custodian of the labyrinthine library, although he is no longer formally in charge. He believes that it is important to protect knowledge from the masses. He detests laughter and he is responsible for all the murders that take place in the abbey. He is juxtaposed against Roger Bacon whom William admires and Severinus who believes that "it is useful for monks to exchange the accumulated treasures of their learning" (Eco, *The Name of the Rose*, 68). Jorge is presented here as a conservative patriarch who dreads the legitimization of the marginalized voices of society. Parker finds a parallel between the image of Jorge and the cultural image of Borges. Borges, she says is well-known for his detachment from the concerns of the masses. He is less accessible to general readers for his use of

compressed narration and esoteric literary allusions. Eco, on the other hand, tries to reach a mass readership. Here again, we see that Eco uses Borges's image only to differ from him. We only need to draw our attention to the debates between Jorge and William throughout the novel to prove this point. Jorge differs from William in his views about the dissemination of knowledge to the masses, in his view of laughter as an evil, and in his view of Roger Bacon. While Jorge believes that Aristotle's treatise on laughter, if made public, would ruin the world, William believes that it would make the world a better place to live in. William fails to understand why Jorge would damn himself in order to hide the book by Aristotle. If we consider William to be Eco's mouthpiece, then we shall understand why Parker says that Borges's stance is opposite of Eco's. However the fact is that it is difficult to accept everything that Parker says. From Borges's 'Library of Babel' we learn that Borges is equally unhappy with the inaccessibility of certain books, as the narrator says, "The certitude that some shelf in some hexagon held precious books and that these precious books were inaccessible, seemed almost intolerable" (Borges, p.83). In *The Name of the Rose* William believes that keeping the sources of knowledge secret is a great evil.

In such and other things we do find similarities between Borges and Eco. In form and style, at least, Eco was certainly influenced by Borges. *The Name of the Rose* is among other things a detective novel. In writing this novel Eco admits being influenced by Borges's 'Death and the Compass'. In that story, Borges deconstructs the form of the detective story – the detective Lonnot fails to find any design in the series of murders and realizes it was only a ploy to trap him. Similarly, Eco while providing the reader with the thrill of a detective novel, defeats the genre and the detective because there was an absence of design in the murders. As the murderer Jorge is surprised to learn so are we the readers that William the detective found out the murderer only out of chance. As Jorge asks William, "You have shown me that you have arrived here by following a false reasoning. What do you mean to say to

me?" (Eco, *The Name of the Rose*, 471). Just as the murderer in 'Death and the Compass' had been expecting the arrival of the detective from the beginning so Jorge too in Eco's novel had been awaiting expectantly the arrival of William. In fact he had been waiting for William in the library. Later on William tells Adso, "I arrived at Jorge through an apocalyptic pattern that seemed to underlie all the crimes, and yet it was accidental... I arrived at Jorge pursuing the plan of a perverse and rational mind, and there was no plan..." (Eco, *The Name of the Rose*, 472). A detective who is defeated by his obsession with signs and designs when he finally realizes there is no design reminds us of the exhaustion of certain literary forms as suggested by Barth in his 'Literature of Exhaustion'. In this essay, Barth extols Borges for his ability to make the best of 'aesthetic ultimacies' or 'formal dead-ends'. In this context reference is made to the story 'Pierre Menard, Author of the Quixote' (Borges, pp.62-71). Borges's appropriation of the Quixote text shows that he has found a way out of the possible 'exhaustion of literary forms'. Pierre Menard's Quixote is an original text in the sense that the contemporary readers would perceive the story in a different way from the original readers. The same could be said of Eco. It is interesting that Eco actually includes the Pierre Menard story in his list of influences from Borges. As I have mentioned earlier, the narrator is full of doubts about the truth of the Adso manuscript and yet proceeds to present it. Eco makes him do this because he wanted to be the Pierre Menard of this medieval text. He knew that the 'faithful' rewriting of the medieval story would have a different meaning for contemporary readers.

It would not be wrong to say that Eco achieves this through intertextuality and use of history. The detective hero in the novel is William of Baskerville. In the Italian version he is called Guglielmo da Baskerville. He is an ardent admirer of Roger Bacon who wrote a treatise on the use of spectacles in 1262. Now Baskerville would remind the modern reader of Conan Doyle's The Hound of the Baskervilles, and the Detective of Baskerville would certainly speak of Sherlock Holmes, the immortal creation of Doyle. The names Roger

Bacon and Guglielmo would be linked together because Guglielmo is also the first name of Marconi who gave us the Radio. Similarly, the name William suggests an allusion to William of Ockham who was a Franciscan friar and had formulated a law of parsimony now called Occam's razor. This law holds that one should accept as most likely, the simplest explanation that accounts for all facts. William of Baskerville seems to follow this principle when he tries to solve the case of multiple murders in the abbey. So this list of names that Adso so innocently refers to, create a series of interconnected historical and fictional personalities that would lead any modern reader to draw a number of interpretations of the novel. Adso's original manuscript would, of course, fail to do so. The exhausted detective form showcasing the failure of the detective in Adso's manuscript thus gets transformed into what Linda Hutcheon terms 'Historiographic Metafiction'. In this kind of fiction, history and fiction are given parallel status following the postmodern belief that both history and literature are human constructs. In the chapter on 'Intertextuality, Parody and the Discourses of History' in her book *A Poetics of Postmodernism*, Hutcheon remarks that '(these) un-innocent paradoxical historiographic metafiction situate themselves within historical discourse while refusing to surrender their autonomy as fiction' (Hutcheon, 124). For Eco as well as Borges the texts of literature and of history are equal in status. This is why Borges makes use of *Don Quixote*, Encyclopedia Britannica and Hart's *History of World War I* with equal flair. And this is also why Eco uses Jorge Borges in the same way that he would use medieval history, scientific treatises and works written by earlier writers.

Therefore we find Eco using Borges's style of writing a detective story. In this he says he was much influenced by 'Death and the Compass' (Borges, pp.106-117). We also see that like Borges, Eco makes his narrator go through all the labours of placing his story in a historical context, to authenticate it. Like Borges, we find Eco parodying literary genres; in *The Name of the Rose* the detective story is parodied. Like Borges, again, Eco believes that books talk to other books and therefore a library becomes the tower of Babel

where all kinds of books speak all kinds of languages. These seem to the general reader very clear evidences of Borges's influence on Eco. However, while discussing a postmodern writer like Eco, we cannot be misled by apparent clarity. I would like to go back to Eco's essay 'Borges and my Anxiety of Influence'. The first thing that strikes us here is the word 'anxiety'. The manner in which Eco plays on the question of Borges's influence clearly shows he is far from anxious. In fact he is ironically presenting the influence. At the beginning of the essay, he discusses an earlier writer, A's influence on B, a later writer. This can only be a one-way influence – of A on B. However, Eco refers to a third factor X. This X is the chain of previous influences that we call culture. In discussing Borges's influence on his writing Eco says that the 'culture' factor is important because Borges used universal culture as an instrument of play in his works. By bringing in the play of culture, Eco ironically subdues Borges's influence even while admitting it. He says that in fact it was a network of influences and echoes that came into play in his novels and not the influence of a single author. At a particular point in Eco's novel, towards the end, Adso is taken aback by the mutual admiration between Jorge and William. This could well be interpreted as an attraction felt by Eco for Borges. However, Eco says that he was at that time thinking of Proust, of that scene where Charlus tries to seduce Jupien, in *Sodome and Gomorrah*. He also mentions the influence of Thomas Mann's *Doctor Faustus* on the plot of *The Name of the Rose*, which very few readers have been able to trace. This shows how for Eco books by other authors bear a continuous influence on his books. This overturns the importance attached by his scholars on the influence of Borges on his works.

What we can derive from all this is that Eco views Borges as a part of the past, the literary and historical past to which he always turns with conscious irony. Even when he professes to be unconscious of the influence, he is still referring to Borges's works as part of the greater culture. In this therefore, I opt to differ from Deborah Parker who sees more of cultural appropriation of Borges

than literary. I, on the other hand, would say that it is the literary oeuvre of Borges that Eco turns to and appropriates whenever he wants to. He need not feel the anxiety of being influenced by Borges because it is he who actually uses Borges at his own free will. And the irony is that he needs to use Borges or any part of his cultural past in order to situate his novel within the discourse of history itself. As Linda Hutcheon points out in 'Historiographic Metafiction: Parody and the Intertextuality of History', 'a literary work can no longer be considered original; if it were it could have no meaning for its reader. It is only as part of prior discourses that any text derives meaning and significance.' If we now look into the influence of 'Averroes's Search', which I had mentioned only in passing, we shall see that it is pertinent to Hutcheon's discussion of the importance of history to a postmodernist writer like Eco. There could be no simpler and better illustration of its role than what is said by Averroes the character:

Zuhair's verse, when he composed it in Arabia, served to confront two images, the old camel and destiny; when we repeat it now, it serves to evoke the memory of Zuhair and to fuse our misfortune with that dead Arab's. (Borges, p.186).

What Averroes speaks about here is how texts of the past present the present-day readers with layers of interpretation and open up intertextual relationships. This is what Borges believes in as a writer and so does Eco, which brings to light the extent to which Borges is present in Eco's works. It would not be wrong to say perhaps then that the relationship between Eco and Borges can be assessed and understood only in the context of intertextuality and a universal cultural past that all postmodern writers share.

CONCLUSION

In conclusion, the paper attempts to validate the statement that in postmodern writing, the anxiety of influence has been dealt with through irony. Intertextual irony helps the author to relate with the past without facing the accusation of plagiarism. All texts according to the concept of intertextuality

are made up of a network of other texts, and therefore, there is no question of imitating a past author. All authors are a part of, and use, what Eco calls 'universal culture' or 'the universe of intertextuality' (Eco, 'Borges and My Anxiety of Influence', p.119-121). This is why Eco flaunts everything he borrows from Borges, and yet says with a 'wink' that all of it was already written.

Note:

All references of page numbers of Borges's short stories are to the book, *Labyrinths: Selected Stories and Other Writings*.

REFERENCES

- Barth, John. 2002. "'The Literature of Exhaustion' (1967)". *Postmodernism and the Contemporary Novel: A Reader*. Ed. Bran Nicole, Edinburgh UP, 2002, pp. 138-47, JSTOR. Web. 10 Jan 2017.
- Bloom, Harold. *The Anxiety of Influence: A Theory of Poetry*. USA: OUP, 1997.
- Borges, Jorge Luis. *Labyrinths: Selected Stories and Other Writings*. Ed. Donald A. Yates and James E. Irby. London: Penguin, 2000.
- Eco, Umberto. "Borges and my Anxiety of Influence". *On Literature*. Trans. Martin McLaughlin. London: Vintage Books, 2005.
- The Name of the Rose*. Trans. William Weaver. London: Vintage Books, 1998.
- Hutcheon, Linda. 'Intertextuality, Parody, and the Discourses of History'. *A Poetics of Postmodernism: History, Theory, Fiction*. Oxon: Routledge, 1988.
- 'Historiographic Metafiction: Intertextuality and the Parody of History'. TSpace, UToronto (1988). JSTOR. Web. 15 June 2015.
- Parker, Deborah. "Literature of Appropriation: Eco's use of Borges in *Il nome della rosa*". *The Modern Language Review* 85.4 (Oct. 1990): 842-849. JSTOR. Web. 10 Jan 2017.
- Sanders, Julie. *Adaptation and Appropriation*. London: Routledge, 2006.

Role of Assam Startup-The Nest in promoting Entrepreneurship: A case study in Assam

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ABSTRACT

Entrepreneurship is the engine that drives an economy's growth and development by mobilising a nation's resources, and an incubation process aids in the acquisition of those resources by providing the required assistance and guidance. In the study, the function of Assam Startup in encouraging entrepreneurship in Assam was investigated, and it was discovered that the business incubation centre adopts a variety of approaches in boosting entrepreneurship. An attempt has also been made to investigate the differences between the practises used by business incubators and the services provided to incubatee companies. Later, it was discovered that there is a large gap between the practices of the incubation centre and the actual services received by incubatee businesses. Though Assam Startup provide a wide range of facilities and services, but the recipients of the services were not satisfied with regard to its quality and service delivery. Lack of proper funding, technical constraints, institutional support were some of the major problems faced by the incubation centre which has also led to the downfall of start-ups and entrepreneurs across the state.

Keywords used: Incubation, Entrepreneur, Incubatee, Beneficiaries

INTRODUCTION

Entrepreneurship is the practice of starting new organisations or revitalizing mature organisations in response to identified opportunities (Eroglu & Picak, 2011). An entrepreneur is a person who makes value creation through innovations (Bolton & Thompson, 2004; Koster & Rai, 2008) and these innovations increase the GDP per capita of a nation (Doran, McCarthy & O'Connor, 2018). Innovative entrepreneurs tend to be successful (Estrin, Korosteleva & Mickiewicz, 2020) and it acts as a fundamental factor of economic development across the globe (Toma, 2014). But in order to have a positive impact on country's growth and GDP, entrepreneurs must overcome the institu-

tional barriers, which is only possible if the benefits of forming ventures outweigh the costs arising out of those barriers (Cumming, Johan & Zhang, 2014). So, it is important to link entrepreneurship with incubation for firms to enhance its positive impact (Sharma, Shukla & Joshi, 2015) and acquire the resources, capabilities, knowledge and social capital (Eveleens, van Rijnsoever & Niesten, 2017). Business Incubation is an emerging, dynamic and interactive process of developing the entire entrepreneurship ecosystem (Hausberg & Korreck, 2020) through the provision of value-added services (Fernández Fernández, Blanco Jiménez & Cuadrado Roura, 2015). The physical environment of business incubation which is inclusive of a large variety of skills and services,

helps in supporting and developing start-up firms and small and medium enterprises in their business activities (European Union, 2018; *Info Dev Strategic Directions 2009-11 & the FY09 Work Program Donors Meeting*, 2008). Business Incubation stimulates the growth of new and early stage firms through a critical policy (Suk & Mooweon, 2006) and connects individual passion with organisational goals (Eshun, 2009). In order to graduate the incubatees, it is necessary for the business incubation centres to modify their services consistently in support of the beneficiaries (Al-Mubarak & Busler, 2017; Zapata-Guerrero *et al.*, 2020) and have a continuous positive impact on the business firms (Aladejebi & Oladimeji, 2020). Though the incubatees are connected with the incubation process, if the incubation centres do not exhibit continuous performance, the survival chances of the incubatee entities turn out to be bleak (Schwartz, 2013). For effective incubation process, the incubation centres and private firms must receive perpetual assistance from policy makers and regulatory authorities (Hassan, 2020; Voisey *et al.*, 2006). Peña (2004), focused upon the business incubation centres of Basque country which have increased the growth of the ventures by providing them human capital which includes training, assistance and managerial services. And by receiving these services more entrepreneurs are developed across the globe through improved business performance (Ayatse, Kwahar & Iyortsuun, 2017) and it is evident that there exists a strong relationship of incubation with economic development (Kihonge, 2016). But it is also important for entrepreneurial firms to develop its' own assets and resources. According to (Pettersen *et al.*, 2016) though the incubators' resources are highly significant but start-up firm's own network resources proved very crucial in enhancing its performance. The entrepreneurs associated with the start-ups need to clear themselves with the services of incubation which are highly valued and which will give them assured and best results. As mentioned in the study of (Lala & Sinha, 2019) that Seed funding, R&D support and commercializing technologies were

the major factors influencing incubation process. The results of (Thomas & K.I., 2020) also indicated that the operational facilities and services of business incubation centres has led to the growth of new Kerala start-up units. Apart from all these, the incubators also need to timely assess their strength and position which might create hindrance for their beneficiaries. (Ramar *et al.* (2020), highlighted the severe problems faced by incubators which acted as constraints in the entrepreneurship development. The timely identification and resolution of problems will ease the process of incubation and entrepreneurship development across the globe.

The present study focuses on the practices followed by Assam Start-up in increasing the number of entrepreneurs over the years.

The researcher has attempted to examine the role of Assam Start-up in promoting entrepreneurship in Assam and to explore the gap between the practices followed by business incubation centres and the actual services received by the incubatee entities.

Hypothesis :

H₀: There is no significant gap between the practices followed by the incubation centre and the actual services received by Incubatee entities

H₁: There is significant gap between the practices followed by the incubation centre and the actual services received by Incubatee entities

MATERIALS AND METHODS

In the present study, the details of the beneficiaries of Assam Start-up incubation process were collected from the website of Assam Startup-The Nest. Structured questionnaires were mailed to all the incubatee entities but however responses were received from only 50 incubatee entities responded to it. The sample of the incubatee entities are confined to 40 which is fit for the study. Questionnaires were developed after reviewing various studies (Acharya, 2019; Kamdar, 2013; Kant, 2017; Mirza, 2017) and several other existing sur-

vey instruments related to business incubation. The responses were collected on a five-point likert scale from the Incubator head & managers of the incubatee entities and Mann-Whitney U test was conducted to compare their responses.

RESULTS AND DISCUSSION

To check the consistency of the adopted questionnaire, a reliability test was conducted where Cronbach’s alpha coefficient value was calculated.

The obtained value of Cronbach’s alpha (0.843) is greater than the standard value of Cronbach’s (0.70) indicating that the questionnaire is reliable.

Since the significant value of p in both Kolmogorov-Smirnov test and Shapiro-Wilk test is less than the standard p value of 0.05, therefore we reject the null hypothesis at 5 % level of significance and conclude that the data is not normally distributed.

Table 1. Reliability Statistics

Cronbach's Alpha	N of Items	Status
0.843	11	Reliable

Table 2. Tests of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Services of the Incubation program	0.277	41	0.000	0.806	41	0.000

a. Lilliefors Significance Correction

Table 3. Role of Assam Startup-The Nest in promoting Entrepreneurship Compared Means

Category	Business Incubation Centre				Incubatee Entities				Total			
	Mean	N	Std. Deviation	Std. Error of Mean	Mean	N	Std. Deviation	Std. Error of Mean	Mean	N	Std. Deviation	Std. Error of Mean
The Incubation centre shares business ideas with the incubatees entities to develop business plans	5.000	1	0.000	0.000	4.775	40	0.324	0.045	4.905	41	0.275	0.035
The Incubation centre assists the incubatees in conducting feasibility study of the proposed project	5.000	1	0.000	0.000	2.218	40	1.328	0.164	2.743	41	1.672	0.174

The Nest in promoting Entrepreneurship

The Incubation centre facilitates the incubatees with low-cost work space and equipment	4.844	1	0.336	0.056	1.411	40	0.727	0.116	2.270	41	1.757	0.188
The Incubation centre provides access to Know-how/technology resources to incubatee entities	4.611	1	0.532	0.120	3.682	40	1.328	0.177	4.135	41	1.209	0.131
The Incubation centre assists incubatee entities in securing legal approvals and networking opportunities.	4.518	1	0.384	0.913	1.411	40	0.728	0.095	2.243	41	1.612	0.187
The Incubation centre has a laboratory for prototype testing	4.627	1	0.219	0.213	4.318	40	0.416	0.057	4.824	41	0.353	0.045
The Incubation centre provides access to funding	4.479	1	0.363	0.012	1.418	40	0.887	0.392	2.338	41	1.571	0.174
The Incubation centre provides exposure to industry leader and mentorship	4.211	1	0.432	0.118	4.336	40	1.250	0.147	4.126	41	1.139	0.132
The Incubation centre has helped the incubatee entities to start its business with a minimum investment	4.244	1	0.236	0.136	2.134	40	1.343	0.152	2.727	41	1.625	0.167
The Incubation centre has accelerated the growth of incubatee entities	4.311	1	0.522	0.128	2.761	40	0.793	0.136	3.125	41	1.214	0.120
The Incubation centre takes regular feedback from incubatee entities.	4.389	1	0.313	0.046	2.354	40	1.241	0.139	2.243	41	1.627	0.147

Table 3 describes the role of the business incubation centres in promoting entrepreneurship in Assam. The ratings were provided on a 5-point likert scale by the respondents on each of the statement which determine the services rendered by each incubation centre to their respective incubatee entities. In order to promote entrepreneurship in the region, the incubation centres claimed to be rendering all the services with mean scores of above 4. The services include sharing business ideas, as-

sistance in conducting feasibility study, facilitate with low-cost work space and equipment, access to Know-how/technology resources, assistance in securing legal approvals and networking opportunities, laboratory facility, access to funding, exposure to industry leader & mentorship and other support services such as helping the incubatees to start its business with a minimum investment, accelerate the growth of incubatee entities, take regular feedback from incubatee entities.

However varying responses were received from the incubatee entities. From the compared responses, it was found that among the 11 (Eleven) services provided by the incubation centres, only 4 (Four) of them (share business ideas, access to Know-how/technology resources, laboratory facility and exposure to industry leader & mentorship)

services were availed by the incubatee entities with mean scores of above 4.0. And the remaining 7 (Seven) services having means scores in the range of 3 or less, signify that these services are not adequately received by the incubatee entities.

Table 4. Analysis of the gap between the practices followed by Business Incubation Centres and actual services rendered

Services	Mann-Whitney U	Asymp. Sig. (2-tailed)
The Incubation centre shares business ideas with the incubatee entities to develop business plans	432.000	0.107
The Incubation centre assists the incubatees in conducting feasibility study of the proposed project	13.000	0.001
The Incubation centre facilitates the incubatees with low-cost work space and equipment	17.000	0.004
The Incubation centre provides access to Know-how/technology resources to incubatee entities	360.200	0.076
The Incubation centre assists incubatee entities in securing legal approvals and networking opportunities	7.000	0.010
The Incubation centre has a laboratory for prototype testing	416.500	0.073
The Incubation centre provides access to funding	16.000	0.004
The Incubation centre provides exposure to industry leader and mentorship	364.000	0.068
The Incubation centre has helped the incubatee entities to start its business with a minimum investment	86.000	0.002
The Incubation centre has accelerated the growth of incubatee entities	22.000	0.000
The Incubation centre takes regular feedback from incubatee entities	74.000	0.000

To analyse the gap between the practices followed by business incubation centres and actual services received by their incubatees, Mann-Whitney U test was conducted. The test reveals that the Sig. (2-tailed) p values of 4 (four) incubators' services namely sharing business ideas (p value = 0.107), access to Know-how/technology resources (p value = 0.076), laboratory facility (p value = 0.073) and exposure to industry leader and mentorship (p value = 0.068) are greater than the standard p value of 0.05, therefore the null hypothesis couldn't be rejected and it is concluded that there is no significant difference in the four services rendered by the incubation centres and received by the incubates (Table 4). The remaining services of the incubation centres have p values less than the significant value of 0.05, therefore the null hypothesis is rejected at 5 % level of significance and it is concluded that there is a significant difference in those practices of the incubation centres and the actual services received by the incubatee entities.

CONCLUSION

The quality of service provided to beneficiaries determines the success of the incubation process, which is reflected in the establishment of new business units. The successful operation of incubation projects is based on the development of the number of graduate companies, client companies with high survival rates and high added value for innovative products and services, which is also in line with the studies cited above (Al-Mubarak & Busler, 2017; Zapata-Guerrero *et al.*, 2020). From the study it is evident that the business incubation centres are deficient in providing most of the services to the incubatees, that includes - assistance in conducting feasibility study, facilitate with low-cost work space and equipment, assistance in securing legal approvals and networking opportunities, access to funding, and other support services such as helping in starting the business with a minimum investment, accelerate the growth of incubatee entities, taking regular feedback from incu-

batee entities. Out of all the above-mentioned services, high inefficiency was found on the part of the incubation centres in providing assistance to the incubatees in securing legal approvals and networking support. Moreover there is highly significant gap between the practices followed by the incubation centres and the actual services received by the incubatee entities which is similar to the results of (Kamdar, 2013). The incubation centres also provided many other services but that were of less importance to the incubatee entities. There are deviations in the expectations of Incubation centres and Incubatee entities regarding services offered. According to the incubatee entities, the incubator was not consistent enough in its service delivery which led to the closure of many beneficiaries which existed before. Incubation centres must identify their strengths and weaknesses and incorporate the refinements in its process which is similar to the suggestions made by (Gerlach & Brem, 2015). It is recommended that Indian technology business incubation centres should adopt the cost reduction strategies in order to bring efficiency which was also suggested in (Tang *et al.*, 2013). So it is important for incubators to make the best use of its resources to nourish and promote successful entrepreneurs. And it is highly valued that the incubation centres must receive regular financial assistance from government institutions and other prominent organisations to provide the incubatees with much needed help and boost the growth of new start-up units in the region.

REFERENCES

- Acharya, G. V. (2019). *A study of performance-evaluation of business incubation centers* [Savitribai Phule Pune University]. <http://hdl.handle.net/10603/252476>
- Al-Mubarak, H. M., & Busler, M. (2017). Challenges and opportunities of innovation and incubators as a tool for knowledge-based economy. *Journal of Innovation and Entre-*

- preneurship, 6(1), 0–18. <https://doi.org/10.1186/s13731-017-0075-y>
- Aladejebi, D. O., & Oladimeji, D. J. A. (2020). Appraisal of Technology Incubation Centres in South West Nigeria. *Journal of Small Business and Entrepreneurship Development*, 8(1). <https://doi.org/10.15640/jsbed.v8n1a4>
- Ayatse, F. A., Kwahar, N., & Iyortsuun, A. S. (2017). Business incubation process and firm performance: an empirical review. *Journal of Global Entrepreneurship Research*, 7(1). <https://doi.org/10.1186/s40497-016-0059-6>
- Bolton, B., & Thompson, J. (2004). Entrepreneurs: Talent, temperament, technique: Second edition. In *Entrepreneurs: Talent, Temperament, Technique: Second Edition*. <https://doi.org/10.4324/9780080472683>
- Cumming, D., Johan, S., & Zhang, M. (2014). The Economic Impact of Entrepreneurship: Comparing International Datasets. *Corporate Governance: An International Review*, 22(2), 162–178. <https://doi.org/10.1111/corg.12058>
- Doran, J., McCarthy, N., & O'Connor, M. (2018). The role of entrepreneurship in stimulating economic growth in developed and developing countries. *Cogent Economics and Finance*, 6(1). <https://doi.org/10.1080/23322039.2018.1442093>
- Eroglu, O., & Picak, M. (2011). Entrepreneurship, National Culture and Turkey. *International Journal of Business and Social Science*, 2(16), 146–151.
- Eshun, J. P. (2009). Business incubation as strategy. *Business Strategy Series*, 10(3), 156–166. <https://doi.org/10.1108/17515630910956570>
- Estrin, S., Korosteleva, J., & Mickiewicz, T. (2020). *Schumpeterian Entry: Innovation, Exporting, and Growth Aspirations of Entrepreneurs*.
- European Union. (2018). *Critical Success and Failure Factors of Business Incubation in HEI*.
- Eveleens, C. P., van Rijnsoever, F. J., & Niesten, E. M. M. I. (2017). How network-based incubation helps start-up performance: a systematic review against the background of management theories. In *Journal of Technology Transfer* (Vol. 42, Issue 3). Springer US. <https://doi.org/10.1007/s10961-016-9510-7>
- Fernández Fernández, M. T., Blanco Jiménez, F. J., & Cuadrado Roura, J. R. (2015). Business incubation: innovative services in an entrepreneurship ecosystem. *Service Industries Journal*, 35(14), 783–800. <https://doi.org/10.1080/02642069.2015.1080243>
- Gerlach, S., & Brem, A. (2015). What determines a successful business incubator? Introduction to an incubator guide. *International Journal of Entrepreneurial Venturing*, 7(3), 286–307. <https://doi.org/10.1504/IJEV.2015.071486>
- Hassan, N. A. (2020). University business incubators as a tool for accelerating entrepreneurship: theoretical perspective. *Review of Economics and Political Science, ahead-of-p* (ahead-of-print). <https://doi.org/10.1108/rep-10-2019-0142>
- Hausberg, J. P., & Korreck, S. (2020). Business incubators and accelerators: a co-citation analysis-based, systematic literature review. *Journal of Technology Transfer*, 45(1), 151–176. <https://doi.org/10.1007/s10961-018-9651-y> info Dev Strategic Directions 2009-11 & the FY09 Work Program Donors Meeting. (2008).
- Kamdar, M. (2013). *Role of Business Incubation Centres in Promoting Entrepreneurship* [Maharshi Dayanand University]. <http://hdl.handle.net/10603/6527>
- Kant, S. (2017). *Role of entrepreneurship development institutes in promoting entrepreneurial culture in India* [Maharshi Dayanand University]. <http://hdl.handle.net/10603/132534>
- Kihonge, E. (2016). Impact of Business Incubators

- on Economic Growth and Entrepreneurship Development. *International Journal of Science and Research (IJSR)*, 5(5), 231–241. <https://doi.org/10.21275/v5i5.nov163196>
- Koster, S., & Rai, S. K. (2008). Entrepreneurship and Economic Development in a Developing Country. *The Journal of Entrepreneurship*, 17(2), 117–137. <https://doi.org/10.1177/097135570801700202>
- Lala, K., & Sinha, K. (2019). Role of Technology Incubation in India's Innovation System: A Case of the Indian Institute of Technology Kanpur Incubation Centre. *Millennial Asia*, 10(1), 91–110. <https://doi.org/10.1177/0976399619828026>
- Mirza, A. (2017). Role of Incubation Centers in Growth of Small-Scaled Businesses in Afghanistan. *SSRN Electronic Journal*, April. <https://doi.org/10.2139/ssrn.2939565>
- Peña, I. (2004). Business incubation centers and new firm growth in the Basque country. *Small Business Economics*, 22(3–4), 223–236. <https://doi.org/10.1023/b:sbej.0000022221.03667.82>
- Pettersen, I. B., Aarstad, J., Høvig, Ø. S., & Tobiassen, A. E. (2016). Business incubation and the network resources of start-ups. *Journal of Innovation and Entrepreneurship*. <https://doi.org/10.1186/s13731-016-0038-8>
- Ramar, N., Muthukumar, C. K., Manida, M., Nandhini, B., & Parkavi, C. (2020). Role of business incubation centres in promoting entrepreneurship with special reference to Tamilnadu. *International Journal of Scientific and Technology Research*, 9(1), 4344–4346.
- Schwartz, M. (2013). A control group study of incubators' impact to promote firm survival. *Journal of Technology Transfer*, 38(3), 302–331. <https://doi.org/10.1007/s10961-012-9254-y>
- Sharma, A. R., Shukla, B., & Joshi, M. (2015). Can Business Incubators Impact the Start-Up Success? India Perspective! *SSRN Electronic Journal*, November. <https://doi.org/10.2139/ssrn.2511944>
- Suk, J. Y., & Mooweon, R. (2006). *Resource Mobilization and Business Incubation: The Case of Korean Incubators Source: Development and Society*, Vol. 35, No. 1 (June 2006), pp. 29–46. Published by: Institute for Social Development and P. 35(1), 29–46.
- Tang, M., Baskaran, A., Pancholi, J., & Lu, Y. (2013). *Journal of Global Information Technology Business Incubators in China and India: A Comparative Analysis*. October 2014, 37–41. <https://doi.org/10.1080/1097198X.2013.10845635>
- Thomas, J., & K.I., G. (2020). Incubation Centres and Start-ups: A Study on Kerala's Start-up Ecosystem. *SEDME (Small Enterprises Development, Management & Extension Journal)*, 47(1), 43–52. <https://doi.org/10.1177/0970846420930472>
- Toma, S.-G., Grigore, A.-M., & Marinescu, P. (2014). Economic Development and Entrepreneurship. *Procedia Economics and Finance*, 8(14), 436–443. [https://doi.org/10.1016/s2212-5671\(14\)00111-7](https://doi.org/10.1016/s2212-5671(14)00111-7)
- Voisey, P., Gornall, L., Jones, P., & Thomas, B. (2006). The measurement of success in a business incubation project. *Journal of Small Business and Enterprise Development*, 13(3), 454–468. <https://doi.org/10.1108/14626000610680307>
- Zapata-Guerrero, F. T., Ayup, J., Mayer-Granados, E. L., & Charles-Coll, J. (2020). Incubator efficiency vs survival of start-ups. *RAUSP Management Journal*, 55(4), 511–530. <https://doi.org/10.1108/RAUSP-04-2019-0063>

A Study on Women Street Vendors in Sibsagar Town

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ABSTRACT

There are two basic aims of providing micro-finance to the needy persons as well as to the unprivileged class institutions namely for production purpose and consumption purpose. Neither such unorganized and micro class gets financial benefits from big financial institutions nor gets any other support for business development. And at the same time the big financial sectors are not very interested to involve these unprivileged class people or organizations under their ambit of service because of various economic and non economic considerations. In order to indulge this gap of formal financing to various needy, micro-financial institutions have come up with the services with greater extent. The various programmes hosted by micro-financial institutions mainly focused on the most of the unprivileged section like tribal, women, BPL family members etc. Out of the various unprivileged sections, street vendors are not financially self sufficient to manage all their financial needs of business and specially the is very much prominent in case of women street vendors who are integral part of the society. This study is an attempt to examine the sources of finance of women street vendors and its pattern based on primary data. For the purpose, randomly few women vendors were taken as sample for study and with the help of a question schedule the sample respondents were interviewed and inferences were drawn there from. It was seen from the study that most of the women street vendors manage their capital from their own sources. Bankers are not interested to support them financially on the ground that they are unable to give back credit or unable to give security against loans. However, it was seen that the women street vendors were very much interested to save a part of their earnings in various schemes of the banks and other financial institutions. The empowerment of women street vendors can be possible only when the banks and other financial institutions come up with various financial services and schemes.

Keywords: unprivileged section, women, street merchants, savings, micro-finance, formal banks

INTRODUCTION

The poorest has also an integral part in our socio-economic system and for their socio-economic development, they need timely and hassle free financing services. In this regard, the micro-financial institutions have been recognized as one of the best tools for patronizing the financial

needs of the poorest. There are two basic aims of providing micro-finance to the needy persons as well as to the unprivileged class institutions namely for production purpose and consumption purpose. Out of these two, production purpose is more focused because even though they do not have available financial resources, they are likely to be more confident to get them involved in pro-

duction sector (Goswami and Borgohain,2008). However, consumption part cannot be ignored because the improvement of health and safety of the poorest are concerned. Usually it is seen that the formal financial institutions like banks and other FIs have been targeting the rich section of the society on the other hand ignoring the poor people and as a result they become poorest of poor. In order to fulfill this gap, micro-finance institutions have been identified as the best tools for empowering the poor financially. In many developed countries, the governments patronize to establish various micro-financial institutions to help the economically weaker class entrepreneurs as well as the weaker citizens. In the evolution of micro-finance concept, the Grameen Bank of Bangladesh has set example in 1976 when they provided micro credit to the poor women. In India, NABARD has followed that track in 1996 and taken 500 women as sample and provided them micro credit to start up ventures and significantly the idea accelerated with abundant outcomes (Goswami,2012). Self Employed Women Association(SEWA) is an Indian trade union registered in 1972, which took many initiatives to preserve the right of the working women particularly the self employed by providing micro-credit, insurance, social security measures, hygiene and secured workplace through its organization. The various programmes hosted by micro-financial institutions mainly focused on the most of the unprivileged section like tribal, women, BPL family members etc.

Engagement of vast majority of labour in informal as well as unorganized sector is a common phenomenon. Informal sector contributes above 90% of country's workforce and about 50% of country's national product which signifies in the country's economy. Usually a greater proportion of people who are socially and economically of weaker class concentrated in unorganized sector activities. The quinquennial survey of NSSO (2004-05) says, in rural India informal sector workers in each population segment was more than 90% and of which women workers constituted a bigger share than male workers i.e. 94.5% female and 90.34% male.

Street Vending –an unprivileged sector

Street vending is a common street selling trade across the country. It is a very significant and integral part of urban economy also. In India, Mumbai has the highest numbers of street vendors i.e.0.25 million, followed by Kolkata is having 0.2 million street vendors which offer tremendous employment opportunities and livelihoods to the urban weak (Bhatt and Jariwala, 2018). Out of the various unprivileged sections, street vendors are not financially self sufficient to manage all their financial needs of business and specially this is very much prominent in case of women street vendors who are integral part of the society. In India street vending business has become one of the significant parts of informal sector. As per an estimation about 80% of population are engaged in such profession. In many cities of the country women constitute a significant segment of street vending . Along with the opportunities of self employment of urban poor through street vending, it provides “affordable” as well as “convenient” services to the urban population (Jaishankar & Sujatha, 2016). Women can equally contribute to the nation's development like male by way of contribution to education, politics, diplomacy, economic, environment etc. That is why the capabilities of women can never be denied. Thus, ensuring empowerment of women and identifying their capabilities in all respect have been regarded as social obligation of the nation. Micro-financial institutions have been playing significant role in strengthening the poor women traders by way of providing various services which include savings, micro-credit, insurance and training to the women in some thrust areas which again increases the skill and ability to business. Now in our country, there are 94 non banking financial companies as registered by RBI as of May 2021, which are running micro financial institutions covering the schemes like Suchanan Micro loan, Suraksha, Srishti micro loan, Samadhan loan, Su-briddhi micro loan etc. The various FIs like Bandhan Bank, LNT, North East Small Finance Development Corporation,Ujjivan Small Finance Bank, Equitas

Small Finance Bank, Suryoday Small Finance Bank, Annapurna Finance Pvt Ltd, Arohan Finance Pvt Ltd, Sanata Finance Pvt Ltd, Credit Access Grameen Ltd etc are working specially for empowering the poor through its credit schemes (Jaishankar & Sujatha, 2016). As per NSSO data, of the total Country's workforce 82% is being employed in unorganized sector. The 94% of total female workforce of the country is employed in unorganized sector as per the information of National Commission of Women (Keshwari and Arocikam, 2016). Among the unorganized section, women street vendors are the most neglected organ of the urban economy who are usually not financially sound to undertake expansion of their business and who do not have a permanent trading place. Generally, they do their business from the parking places, footpath and other sites which are meant for other use. This study is an attempt to examine the financial inclusion of the poor women and their linkage to various micro-financial institutions and banks and how such linkage gives them a path for financial independency.

The data of Periodic Labour Force Survey, India (2017-2018), says that 54.8% women workers were employed in non-agriculture sector, 72.3% of them working without written job agreement, 50.4% of salaried women did not get paid leave and 51.8% were not being able to avail social security benefits. In a study SEWA figured out in 2019 that approximately 300,000 street vendors were dwelling in Delhi, around 30% of them were women street vendors (Sonawane, S. 2007).

In the capital city Delhi, street vendors constitute approximately 2.5% of the population, and they face lots of challenges to survive (Sonawane, 2007). At the same time government fails to provide them adequate social security measures. In fact the economic, social and legal position of street vendors have been the major challenges for the state for improving their work condition. The introduction of new Street Vendors (Protection of Livelihood and Regulation of Street Vending) Act, 2014 has laid down several provisions which may be considered as landmark initiation and brought ray of hope for development of

the status of street vendors (Kumari, 2015).

The total number of street vendors in India recorded as 10 million as per the data of Ministry of Housing and Urban Poverty Alleviation, and Delhi has alone more than 2,00,000 street vendors which is the second highest number in the country (Goswami, 2012). Most of the street vendors were immigrants from other places who came out in search of job opportunities and had capability of working on an average 10-12 hours a day. They use to work below conditions of economic and social insecurity. It is a fact to be noted that the unorganized or informal sector has been growing in urban areas tremendously because of ample opportunities opened up along with other sector in urban economy. At present among the total workforce in the country unorganized sector accounts for 91.5 per cent (Keshwari & Arocikam, 2016).

Place of Women street vendors

Street vendors are basically migrated from rural places where poverty and less gainful employment condition push them to look for better opportunity in the urban areas. The hawkers and street vendors are constituting substantial proportion of the urban informal sector and it has accounted two third of urban employment. As per the Report of a study titled 'Understanding the Levels of Women's Empowerment' conducted by CII in 2005, in the workplace women represented only 6% of total workforce in corporate houses (Bhatt and Jariwala, 2018). Significantly the rate of women leading in managerial position is expectedly low. Women street vendors normally deal goods at the public places are called street or bus stand or market outside areas. Women vendors are scattered in different category such as in selling different products like broomsticks, cane basket, utensils, petty cosmetics, bangles, vegetables and running road site tea stalls, mess etc. Nearly 40% of total street vendors are women and 30% these women vendors are the one and only earning member of their families. All most all such women vendors started this business because of their primary requirement to earn money and growth of their economic condition. They opted such profession not only to earn but for sheer survival too.

MATERIALS AND METHODS

Objective of the study:

- 1.To examine the pattern of finance used by the women street vendors and the associate difficulties in procuring finance by them.
- 2.To examine the saving habits and pattern of the women vendors.

Area of the study: The study was conducted on 30 numbers of women street vendors doing business in different public spots in Sibsagar town area particularly in the municipality areas. Respondents/samples were collected from the places like Dolmukh Charali, Borpukhuripar, Jenganikotia, Court area, Dikhow bridge, Station Charali etc.

Research design: The research is purely empirical and descriptive type in nature. Data collected from field survey have been analyzed with the help of tabulation and ratio calculation and an attempt was made to draw inferential interpretation of analyzed data.

Sample method: As the populace is vague, the non-probabilistic strategy for testing for example Snowball Sampling Method was utilized to gather information for the review.

Population of the Study: The universe/population is vague or not defined. There was no clear information in the office of municipality about the total number of women street vendors in Sivasagar town. Since the universe is not clear so snowball method was adopted to meet 30 numbers of respondents.

Data collection: Both primary and secondary sources were used for primary data and secondary data/information. The primary data was collected from field survey conducted with the help of interview schedule with the respondents. Secondary data was collected from many other sources like research papers, reports, Websites, Journals and Book. Usually the common time of dwelling on street is morning and evening time. As such the research choose to meet the respondents on those

timings for collecting information.

RESULTS AND DISCUSSION

Status of women street vendors

Status is a huge perspective to get the versatility of the labor forces. Table 1 shows that most of the respondents ladies road sellers for example 20 (Represent 667%) are from neighborhood 10 (Represent 33.3%) are relocated from different states.

Age of Women Street Vendors

Age of the respondents vendors shows the functioning capacity for road exchanging. Road exchanging is a difficult work that requires physical and mental solidarity to deal with the calling. The review uncovered that larger part of test remembered for the age gathering of 31 to 40 is addressing 70% of the example while there are 07 merchants are in the age gathering of 41 to 50 is addressing 23.3% and 20 to 30 which is just 6.7% of the example. The following table shows the age level of respondents.

Conjugal Status of Women Street Vendors

The following table demonstrates that 90% of the sample merchants are hitched and procuring individuals from the family and only 10% are unmarried. The following table uncovers the marital status of respondents.

Education Level of Women Street Vendors

Educational capability is a significant perspective for by and large advancement of individuals. During the study it was observed that greater part of merchants are uneducated for example 24 nos. (Address 80 %) of the respondents have done their education up to class x. This uncovered low degree of schooling among the example ladies merchants. Out of the total respondents 16.7% completed 12th standard of education and only 1 respondents as found graduate. The following table shows the educational level of street women merchants.

Table 1. showing status of women street vendors (place of origin)

Status	No of women street vendors	Percentage(%)
Local	20	66.7%
Migrated	10	33.3 %
Total	30	100 %

Source: Field Survey

Table 2. showing status of women street vendors

Age level	No of women street vendors	Percentage(%)
20-30	02	6.7 %
31-40	21	70 %
41-50	07	23.3 %
Total	30	100 %

Source: Field Survey

Table 3. shows marital status of women respondents

Situation	No of women street vendors	Percentage(%)
Married	27	90 %
Unmarried	03	10 %
Total	30	100 %

Source: Field Survey

Table 4. showing educational level of women street vendors

Education level	No of women street vendors	Percentage(%)
School dropout	10	33.3%
10 th standard	14	46.7%
12 th standard	05	16.7%
Graduate	01	3.3%
Total	30	100

Source: Field Survey

Table 5. showing investment quantum of women street vendors

Quantum (in Rs)	No of women street vendors	Percentage(%)
Up to 2000	04	13.3%
2001-4000	12	40%
4001-6000	08	26.7%
Above 6000	06	20%
Total	30	100

Source: Field Survey

Table 6. showing sales(deals) pattern of women street merchants

Quantum (in Rs)	No of women street vendors	Percentage(%)
Less than 500	02	6.7%
501-1000	10	33.3%
1001-1500	12	40%
Above 1500	06	20%
Total	30	100

Source: Field Survey

Investment of Vendors in Business- Investment is the main input for every business activity. Thus an effort was made to see the investment quantum in business by the women street merchants. Certain amount of fixed cost is required at initially for buying of push truck, pull truck, box for showing of their products. Including these fixed investments, the respondents demonstrate their beginning investment quantum in the manner shown in the following table. The table 5 demonstrates that majority of 40% respondents had their investment in the range of 2001-4000, 26.7% of respondents invested in between 4001-6000, 20% of respondents took investment between above 6000 while 13.3% respondents limited their investments within 2000.

Deals Pattern of Women street vendors- The table 6 uncovers that most of women merchants in the study area deals in between 1001-1500 per day, followed by 33.3% deals between 501-1000, 20% of respondents are capable of doing business

as much above 1500 in a day and only 6.7% is not as much as Rs. 500.

Nature of Financing of women street vendors-

The financial requirement of women street vendors to deal in everyday trading is an important aspect of the study. The table 7 shows that majority of women merchants i.e.43.3% get the initial fund from their own sources like hard earned deposits, other family income etc. It was seen that 20% of respondents took credits from local money lenders at a high rate of interest (10% rate of interest per month), 16.7% respondents have borrowings from family members and few of their friends, 13.3% of women vendors have loans from Bandhan Banks, Arohan Finance and LNT etc and only 6.7% respondents get credit from formal bankers like PNB and Grameen Vikash Bank. Much other formal sources are not opened for the street vendors. The private cash moneylenders charge high pace of revenue while assets from companions and family members are not effectively available like bank fi-

Table 7. showing various sources of fund of women street merchants

Sources	No of women street vendors	Percentage (%)
Own	13	43.3%
Family/friends	05	16.7%
Local money lenders	06	20%
MFIs/NGO	04	13.3%
Banks	02	6.7%
Total	30	100

Source: Field Survey

Table 8. showing savings habits of women street merchants

Situation	No of women street vendors	Percentage(%)
Savings	27	90%
No saving	03	10%
Total	30	100

Source: Field Survey

Table 9. showing monthly saving quantum of women street merchants

Saving (in Rs)	No of women street vendors	Percentage(%)
Up to 500	01	3.3%
501-1000	10	33.3%
1001-1500	15	50%
Above 1500	04	13.3%
Total	30	100

Source: Field Survey

Saving habits of Women street vendors- The women merchants have enthusiasm to save in different plans of banks and other monetary foundations. The table 8 uncovered that 27 nos. (90 %) of respondent women have savings stored in different plans while 3 nos. (10 %) women merchants have no record in banks and other monetary foundations. This uncovered the saving behavior among the ladies road sellers. From this it can be concluded that future savings has been taken as very serious effort by the respondents. They are very much concerned about their children education and family development for which they require plenty of money and as such they anyhow try to keep a part of their earnings aside every day.

Savings quantum of Women street vendors- Since the everyday dealing of respondents is not such big amount, however from that small earnings the women merchants try to maintain savings per month in different plans of banks and other monetary foundations. They generally prefer Grameen Vikash bank and Punjab National Bank for savings purpose. An observation was also made on the saving pattern and quantum of wom-

en street vendors. Most of the respondents deposits in recurring accounts as they get comparatively a high rate of return than other saving account. Some of the respondents keep on buying KVP and NSC every month. Few of them were found having recurring deposits in Post office. The following table shows the saving quantum of respondents in different plans.

The above table uncovers that majority of respondents i.e.50% women merchants are able to save 1001-1500 in a month which is absolutely positive signal for economic empowerment of such small vendors. Similarly 33.3% of respondents have monthly savings between 501-1000, followed by 13.3% respondents have above 1500 in a month.

CONCLUSION

- The banks and other Financial institutions should come forward with extensive benefit schemes for the working women so that they can avail easy financing.
- The municipality board should play active role

in form of incorporating the women street vendors and develop mechanism for the monitoring of their financial and non financial requirements.

- The involvement of NGOs is important for structuring SHGs concepts among the women vendors through which up to certain extent monetary issues can be resolved.
- Recognition is a very important task to be exercised by the government and non government agencies, since women street vendors are significant part of the urban economy and hence they should be given adequate image.
- Concern agencies should initiate for skill training of the vendors on retail trading.
- Official recognition to the women street vendors inform of issuing Identity card, may be initiated by the municipality.
- The municipality administration may provide storage facilities to the street vendors for storing their items after everyday dealing.

REFERENCES

- Bhatt, B. & Jariwala, A. 2018. A study of Street Vending Activities in the Southeast Zone of Surat. *International Journal of Civil Engineering (IJCE)*, Vol. 7(3), p 1-10
- Goswami, K. & Borgohain, K. 2008. A Study of the Street Vendors (Entrepreneurs) with Special Reference to Dibrugarh Town'. In Proceeding of National Seminar on 'Entrepreneurship Development-A Key Issue for Socio-Economic Growth' organised by Guwahati Commerce College on 19th March 2008; Publisher-Guwahati Commerce College, p 123-132.
- Goswami, K. 2012. Empowering Women Street Vendors Through Micro-Financing: A Study in Sivasagar Town of Assam. *Excel International Journal of Multidisciplinary Management Studies*, Vol. 2 (4), p 114-119.
- Jaishankar, V. & Sujatha, L. 2016. A Study on Problems Faced by the Street Vendors in Tiruchirappalli City. *SSRG International Journal of Economics and Management Studies*, Volume-3(9), p 40-43.
- Kumari, P. 2018. Issues and challenges for street vendors in Delhi' January 2015; *SSRN Electronic Journal*. DOI:10.2139/SSRN.2779343
- Keshwari, P. and Arocikam, K. 2016. "The Women Street Vendors' Contribution For The Maintenance of Their Families'. *Indian Journal of Applied Research*, Vol 6(4), p 105-108.
- Sonawane, S. 2007. 'Problems and Solutions of Vendors-A Case Study'. *International Journal of Innovative Research in Science, Engineering and Technology* Vol. 6(1), p 940-943.

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Chung, S-T., Morris, R. L. 1978. Isolation and characterization of plasmid deoxyribonucleic acid from *Streptomyces fradiae*. In: *Abstracts of the 3rd international symposium on the genetics of industrial microorganisms*, University of Wisconsin, Madison, 4-9 June 1978.

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