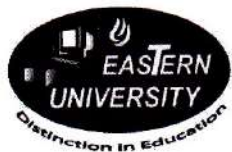


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Book reviews are also considered for publication and they should be within 1500 words (Excluding Reference).

All articles submitted for publication in the journal should be printed, double-spaced on one side of A4 papers with ample margin (an inch and a half on the left-hand side and one inch on the top, bottom and right sides). Their hard copies should be sent in duplicate together with a soft copy in MS word. The author(s) will be informed of the status of the article at the end of the peer review process, which may take a while. The author of an accepted article may be asked to make revisions if required. Manuscripts not accepted for publication are not returned. The authors will receive two copies of the journal that carries the article. Book reviewers will receive one copy of the journal. References must follow the author-date system both for in-text references and end references as noted below:

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SMIB Power System Simulink Model with SMES Unit for Transient Stability Studies

M.G. Rabbani¹

Abstract

This paper presents the development of Single Machine Infinite Bus System (SMIB) model for transient stability studies with a detailed synchronous machine model and a Superconducting Magnetic Energy Storage Unit (SMES) in MATLAB/SIMULINK environment. The proposed SIMULINK model is very simple to understand and also computationally efficient in order to connect with external networks and for extending to a multi-machine power system. Two-axis model of synchronous machine, along with turbine- governor system and excitation system are included to evaluate the transient stability of the system, when three-phase fault on the transmission line occurs with different clearing times at different locations of the line. The simulation results show an accurate performance of the model developed for stability studies.

Keywords: Simulink model, SMES, Power system, transient analysis, stability study

1. Introduction:

With the growth of interconnected power systems and particularly the deregulation of the industry, difficulties related to low-frequency oscillation have been widely reported. The problem becomes more complicated when the system encounters large disturbances such as three-phase faults, loss of a line, etc. Before the disturbance, the system might have run at different operating conditions and the damping of the system might be enough so that the synchronous generator must return to a steady-state after the disturbance (Anderson and Fuad, 1977). Different countermeasures are proposed in the literature, which include power system stabilizer (PSS), static var compensator (SVC) and thyristor controlled series capacitor (TCSC) (Hingorani and Gyugyi, 2000; Magid and Abido, 2003; Panda, Padhy and Patel, 2007; Panda and Padhy, 2007) captive power plant in islanding condition (Goswami, Sadhu and Chakraborty, 2016) unified power flow controller (UPFC) (Shingare, 2015) firefly algorithm for SMIB (Namdev, Khurpiya and Raj, 2017) etc. As the SMES

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unit is considered a fast-acting energy storage device and already has proved its effectiveness in different areas of power system (Bey and Moudjahed, 2016; Srinivas and Devi, 2016; Rabbani, Devotta and Elangovam, 1999; Wui and Lee,1991) a novel SMIB Simulink modelwith SMES unit is developedto enhance the damping of the synchronous generator.

2. Description of the system model

Fig. 1 shows the schematic diagram of SMIB with SMES unit which is placed at the generator side of the transmission line to get the maximum use of its P-Q modulation under different conditions of operations. The synchronous machine is modeled using the two-axis theory (Anderson and Fuad, 1977). The generator is equipped with a static excitation system and the governor and reheat type turbine on the mechanical side (Rabbani, Devotta and Elangovam, 1999; Wui and Lee,1991) one important modeling equations(Anderson and Fuad, 1977; Rabbani, Devotta and Elangovam, 1999; Wui and Lee,1991) shown below.

$$T'_{d0} \frac{dE'_q}{dt} = [E_{FD} - (X_d - X'_d)I_d] \quad (1)$$

$$T'_{q0} \frac{dE'_d}{dt} = [-E'_q - (X_q - X'_d)I_q] \quad (2)$$

$$M_g \frac{d\omega}{dt} = [P_m - D_G\omega - P_e - P_{sm}] \quad (3)$$

$$\frac{d\delta}{dt} = \omega_0(\omega - 1) \quad (4)$$

$$P_e = E'_d I_d + E'_q I_q \quad (5)$$

where

E_{FD} is the field excitation voltage

T'_{d0} is the d-axis open circuit transient time constant

T'_{q0} is the q-axis open circuit transient time constants

P_m is the output power of reheat type turbine

D_G is the damping coefficient

M_g is the moment constant

P_e is the electrical power output in the air gap (Anderson and Fuad, 1977; Rabbani, Devotta and Elangovam, 1999; Wui and Lee,1991),

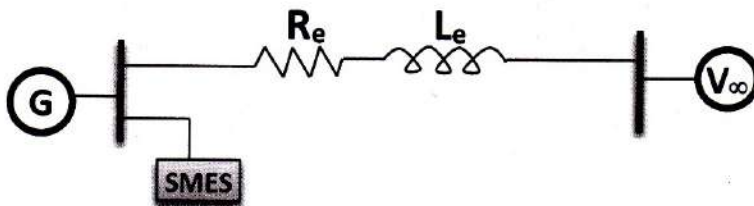


Fig.1 Single machine connected to infinite bus power system with SMES unit

Solving the equations of terminal voltage in d-q frame (Anderson and Fuad, 1977) which describe the relation between the generator and transmission line, the direct and quadrature axis currents, I_d and I_q can be obtained as

$$I_d = \frac{(R_e + R_a)(E'_d + V_\infty \sin\delta) - (X_e + X'_d)(E'_q - V_\infty \cos\delta)}{(R_e + R_a)^2 + (X_e + X'_d)^2} \quad (6)$$

$$I_q = \frac{(R_e + R_a)(E'_q - V_\infty \cos\delta) + (X_e + X'_d)(E'_d + V_\infty \sin\delta)}{(R_e + R_a)^2 + (X_e + X'_d)^2} \quad (7)$$

where

R_a is the stator winding resistance

X'_d is d-axis transient reactance

X'_q is q-axis transient reactance

E'_d is d-axis transient voltage

E'_q is q-axis transient voltage

A 12-pulse converter under an unequal mode of control is used to convert ac to dc or dc to ac. During the rectifier mode, the output dc voltage V_{sm} is positive and energy is stored in the superconducting coil. In the inverter mode, the converter output voltage should be negative and energy is fed back to the AC system. During load fluctuation or fault conditions, both the angular speed ω and the voltage V_t fluctuate. The SMES controller calculates the desired values of P_{sm} and Q_{sm} based on the deviations $\Delta\omega$ and ΔV_t . The major equations that govern the SMES unit are given below:

$$V_{sm} = V_{sm0}(\cos\alpha_1 + \cos\alpha_2) \quad (8)$$

$$I_{sm} = \frac{1}{L_{sm}} \int_{t_0}^t V_{sm} dt + I_{sm0} \quad (9)$$

$$P_{sm} = V_{sm} I_{sm} = V_{sm0} I_{sm} (\cos\alpha_1 + \cos\alpha_2) \quad (10)$$

$$Q_{sm} = V_{sm0} I_{sm} (\sin\alpha_1 + \sin\alpha_2) \quad (11)$$

Where P_{sm} and Q_{sm} are active and reactive power modulation of the SMES unit.

3. SIMULINK Model for SMIB system with SMES

A complete Simulink model with a proper control strategy under unequal α -mode of control is implemented. The Simulink model with all necessary subsystems is shown in Fig. 2 through Fig. 5. All initial values of V_t, E_{fd}, P_m and ω are given in the model. A 4-cycle 3-phase fault at the generator bus is considered to analyze the performance of the model. The desired values of P_{sm} and Q_{sm} are calculated as

$$P_{sm} = \frac{K_{psm}}{1 + sT_{dc}} \Delta\omega \quad (12)$$

$$Q_{sm} = \frac{K_{vsm}}{1 + sT_{dc}} \Delta V_t \quad (13)$$

Where K_{psm} and K_{Vsm} are gains of active and reactive power modulation of SMES unit. T_{dc} is the delay time of the converter. Knowing the desired values of P_{sm} and Q_{sm} , the converter output voltage is determined. As the initial inductor current I_{sm0} is 4kA, an initial offset of I_{sm} is taken into account which ensures the inductor current starts from its initial value. All outputs are available in the scopes and shown in Fig.6 through Fig. 11.

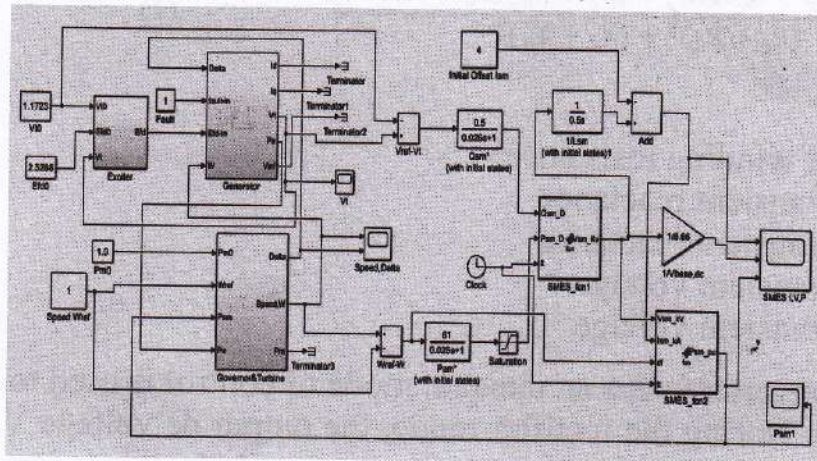


Fig.2 Main Simulink model of SMIB with SMES and control circuit $P_0=1.0pu$

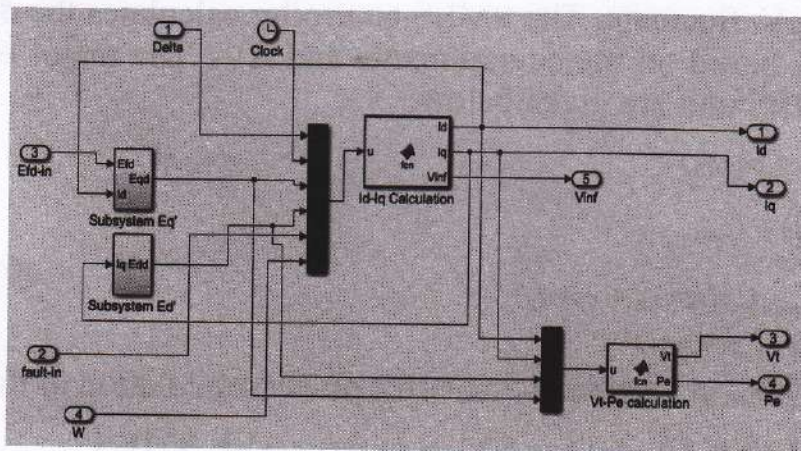


Fig. 3 Subsystem: generator

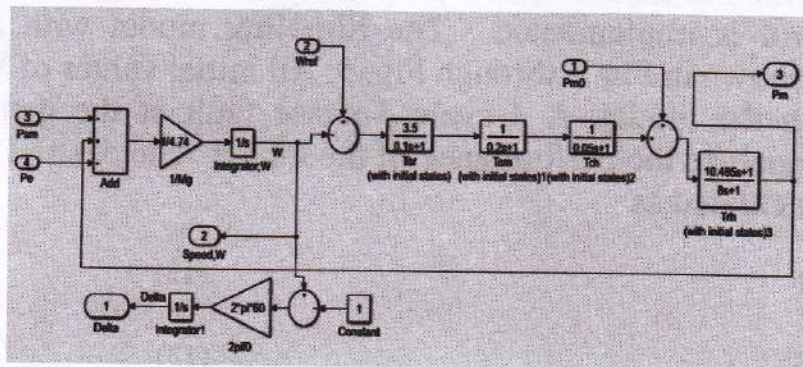


Fig. 4 Subsystem: turbine and governor system

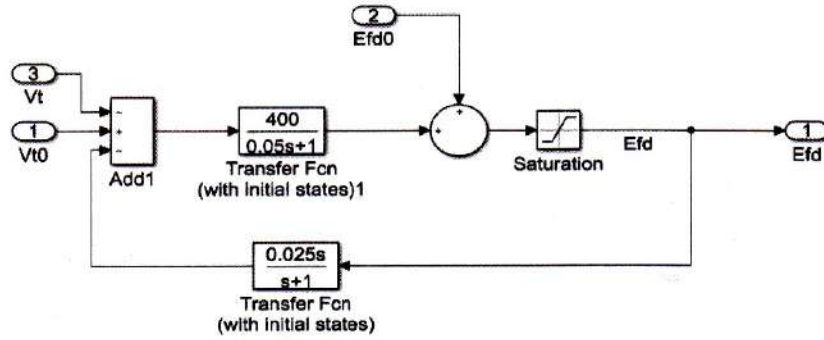


Fig. 5 Subsystem: Excitation System

4. Control Strategy of SMES Unit

4.1 Calculation of Firing Angles of Converters

As we know, under an unequal- α mode of control, the maximum utilization of P-Q modulation of the SMES unit can be ensured. The following steps are to be followed to generate an appropriate firing angle signal from the control circuitry. Because of the constraint of hardware implementation, the voltage V_{sm} has its upper and lower limits. For the SMES modeled here, these limits are:

$$-0.2532 \text{ pu} \leq V_{sm} \leq 0.2532 \text{ pu.}$$

Accordingly, the desired active power P_{sm} has the following limit:

$$-0.2532 I_{sm} \text{ pu} \leq P_{sm} \leq 0.2532 I_{sm} \text{ pu.}$$

These limits are implemented by using a saturation block as shown in the model. In actual practice, the inductor current cannot go beyond certain limits for practical reasons.

In the present SMES system, the lower value of $I_{sm,\min}$ is limited to $0.3 I_{sm0}$ and upper-value $I_{sm,\max}$ is $1.38 I_{sm0}$. This ensures the effective use of the SMES unit in both charging and discharging modes.

Once P_{sm} is finalized, the available Q_{sm} is calculated from the rating of the SMES unit. If the required value of Q_{sm} is more than the available Q_{sm} , it will be restricted to that particular value. This is implemented in the MATAB function named SMES_fcn1 shown in Fig. 2. Function SMES_fcn2 is used to calculate P_{sm} in per unit and acts as an input to the governor and turbine subsystem shown in Fig. 5. Once P_{sm} and Q_{sm} are finalized, the corresponding firing angle α_1 and α_2 under an unequal- α mode of control can be calculated as

$$\alpha_1 = \cos^{-1} \left(\frac{P_{sm}}{P_{sm}^2 + Q_{sm}^2} \right) + \cos^{-1} \left(\frac{P_{sm}^2 + Q_{sm}^2}{2V_{sm0}I_{sm}} \right)$$

$$\alpha_2 = \cos^{-1} \left(\frac{P_{sm}}{P_{sm}^2 + Q_{sm}^2} \right) - \cos^{-1} \left(\frac{P_{sm}^2 + Q_{sm}^2}{2V_{sm0}I_{sm}} \right)$$

4.2 Determination of Amplifier Gains K_{psm} and K_{vsm}

The disturbance in the system is made significantly large so that the system is on the verge of instability. Thus the maximum deviation of terminal voltage ΔV_t and the maximum deviation of angular speed with SMES unit are determined. These values are stored in the memory during post fault conditions to calculate amplifiers gains as follows:

$$K_{psm} = \frac{V_{sm,max} I_{sm,max}}{\Delta \omega_{max}}$$

$$K_{vsm} = \frac{V_{sm,max} I_{sm,max}}{\Delta V_{t,max}}$$

The value of K_{psm} and K_{vsm} are varied on the power system and the rating of the SMES unit. In the system modeled here, K_{psm} and K_{vsm} are found as 65 and 0.5 respectively as shown in Fig 2.

5. Simulation Result and Discussion

To show the damping effect of the proposed system, computer simulations under various operating conditions are examined. A three-phase 4-cycle fault is considered at the generator bus of the power system. All nonlinearities such as exciter ceiling voltage, SMES voltage, and current limits are incorporated in the system. The system parameters are the same as (Anderson and Fuad, 1977; Rabbani, Devotta and Elangovam, 1999; Wui and Lee, 1991). Fig. 6 shows the system performances without SMES under a standard condition of loading where the airgap power $P_e = 1.0$ pu.

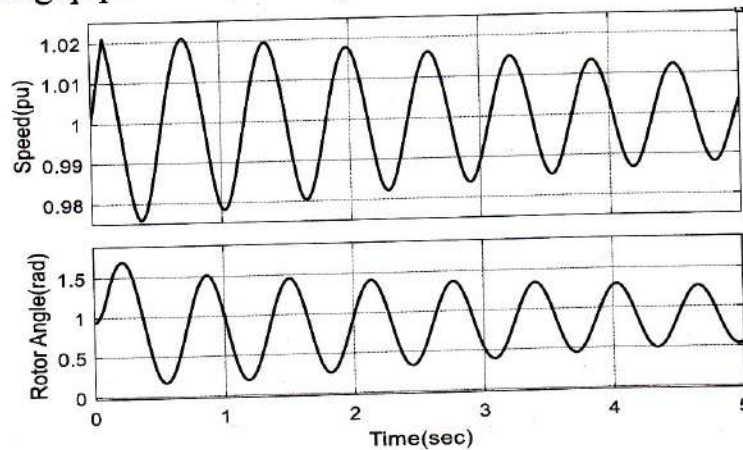


Fig.6 System performance without SMES unit ($P_0 = 1.0$ pu)

It is seen that both angular speed and rotor angles are oscillatory in nature. This ensures the presence of some eigenvalues which are in electromechanical modes as verified by other researchers (Wui and Lee, 1991) However, the performance improved substantially with the presence of SMES unit as shown

Fig. 7. Both angular speed and rotor angles are settled down within 1 sec. The corresponding SMES voltage current and power are shown in Fig. 8.

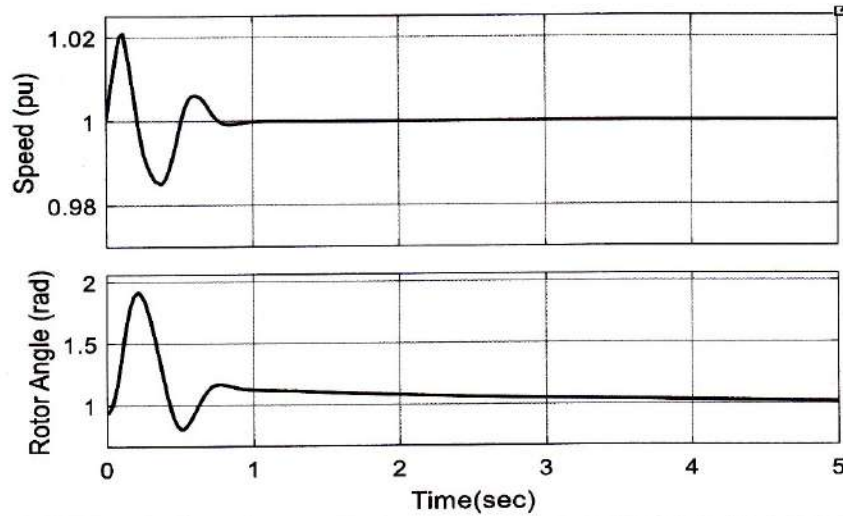


Fig.7 System Performance with SMES unit ($P_0 = 1.0$ pu)

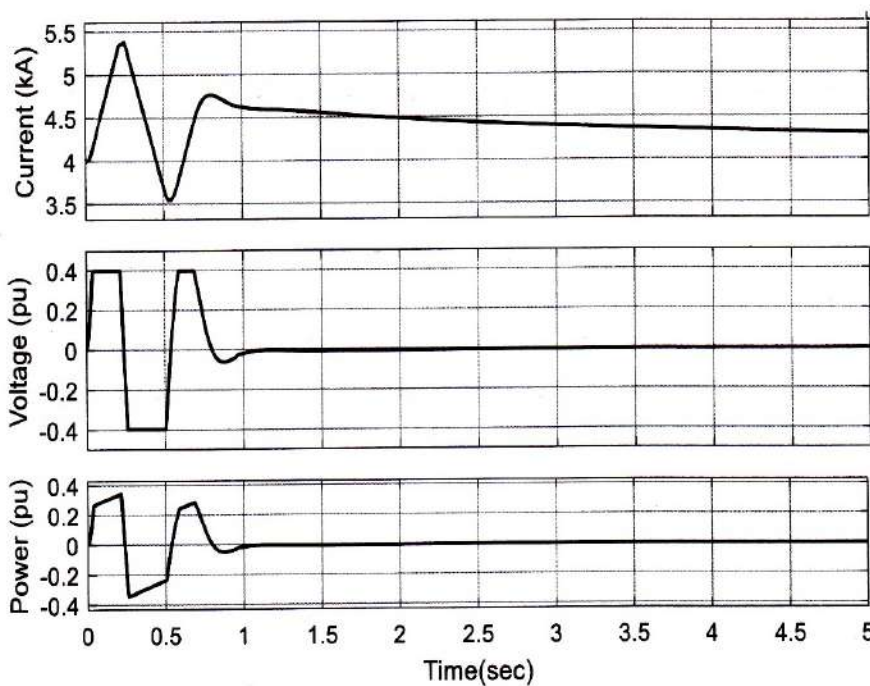


Fig. 8 SMES current, voltage and power under Large Disturbance ($P_0 = 1.0$ pu)

It is seen that SMES current, voltage, and power are within limits. This ensures the effective use of SMES unit following a large disturbance in the power system. To justify the effectiveness of the present state of control, the performance of the system is also analyzed with higher air gap power of $P_e = 1.1$ pu. It is visualized that both angular speed and rotor angles are unstable just after occurring of the fault when SMES unit is not added to the system. The

results are shown in Fig. 9. However, the condition is much improved with SMES unit.

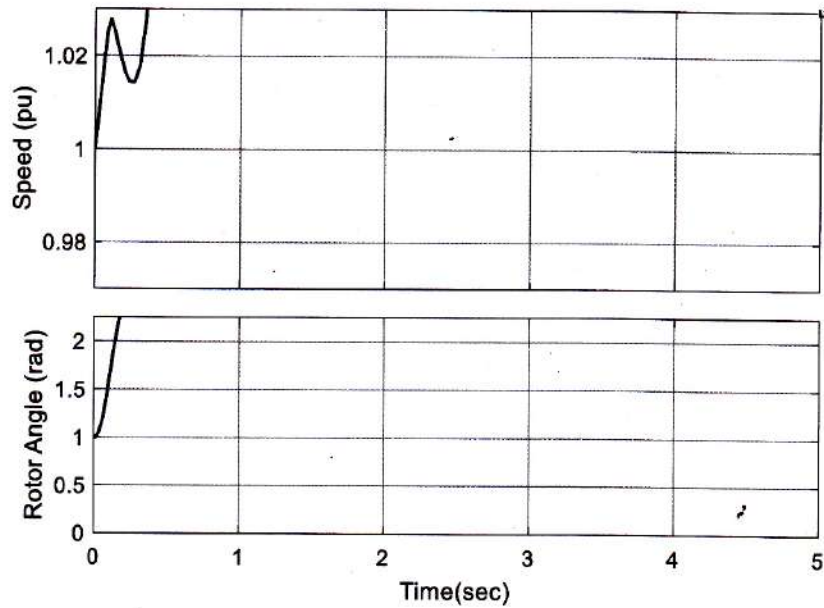


Fig. 9 System performance for large disturbance with SMES unit $P_0 = 1.1$ pu

It is evident from Fig. 10 that the SMES unit helps to bring the system back to stable condition by consuming appropriate active and reactive powers. Thus the stability margin of the power system is increased with the addition of SMES unit. It is seen that the system is settled down within 1 sec, which ensures the effectiveness of the proposed mode of control. The corresponding SMES voltage and currents are shown in Fig. 11.

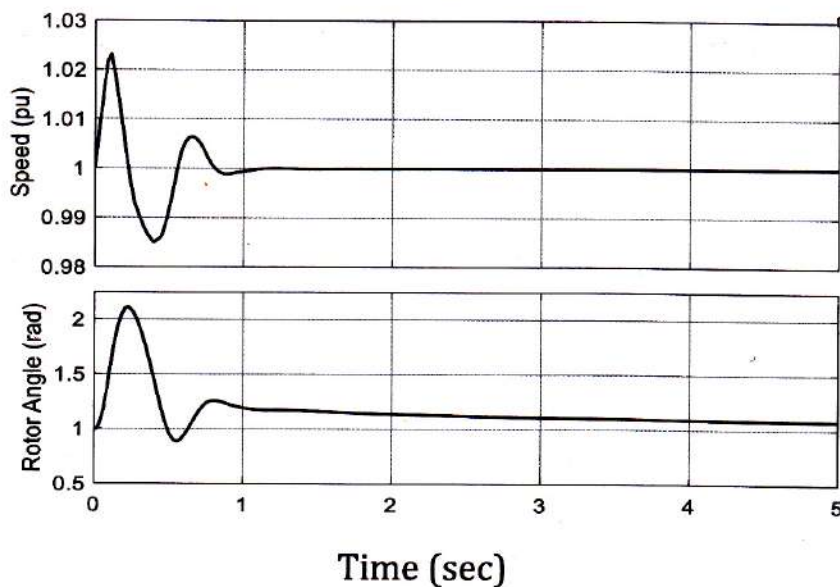


Fig. 10 System performance for large disturbance with SMES unit $P_0 = 1.1$ pu

It is observed in Fig. 8 and Fig.11 that the use of the unequal- α mode of control confirms the SMES P-Q consumption to zero when the system approaches stable conditions. That means the SMES unit is ready to be used for the incoming faults or load changes.

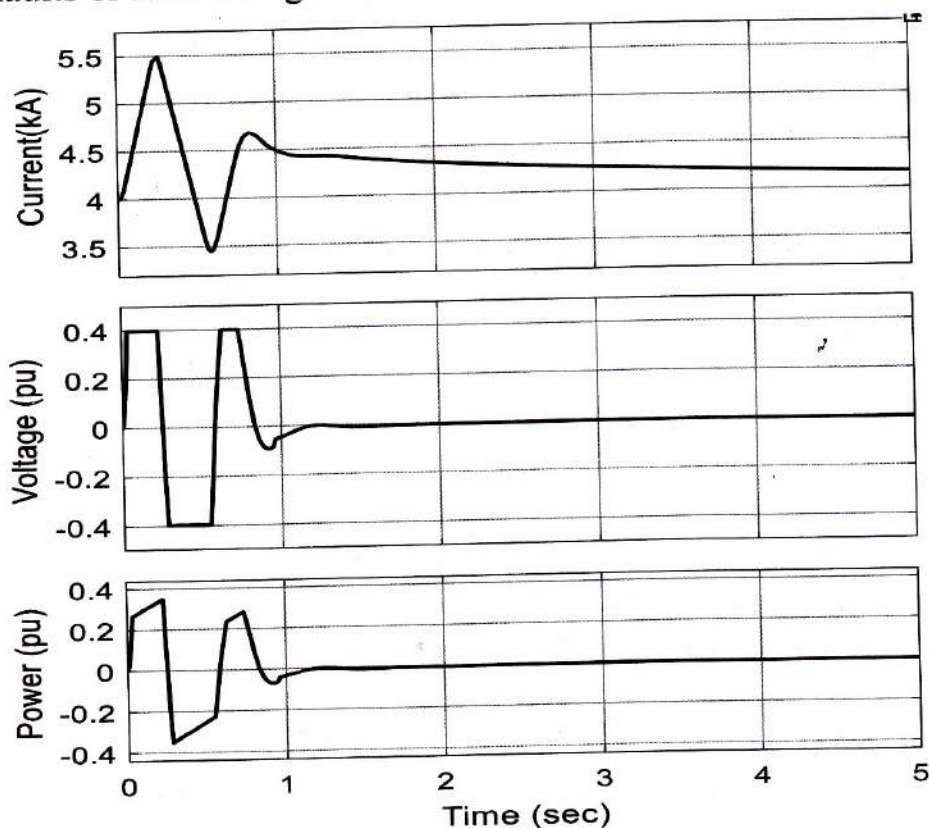


Fig. 11 SMES current, voltage and power under large disturbance

6. Conclusion

A complete Simulink model of a single machine infinite bus system is presented to examine the transient analysis under various operating conditions. The performance analysis made it clear that the model is robust in nature with SMES unit. The control circuit for SMES unit is very simple. The unequal α -mode of control made it possible to provide active and reactive power generation to zero value, which means the unit is ready to act on subsequent faults. The special feature of the control is the priority of the active power compensation by SMES unit. The reactive power compensation is determined from the remaining power and the technique is found very useful as shown in the results. It can be concluded that the proposed model is suitable for carrying out power system stability studies in cases where the dynamic interactions of a synchronous generator and a SMES are the main concern.

References:

- Anderson, P.M., and Fouad, A.A. (1977), *Power system control and stability*, IOWA state University press, Ames, IOWA.
- Bey, M. and Moudjahed, M. (2016), Transient stability enhancement using phasor model of Superconducting Magnetic Energy Storage unit, *Bulletin of Electrical Engineering and Informatics*, 5(1), 8-16.
- Goswami,U., Sadhu,P. K., and Chakraborty, S. (2016), Enhance of controllability to improve the transient performance of captive power plant in islanding condition: A case study, *Electrical Power and Energy Systems*, 83, 188-202.
- Hingorani, N.G.,and Gyugyi, L. (2000),*Understanding FACTS: Concepts and Technology of Flexible AC Transmission System*, IEEE press.
- Magid,Y.L.A. and Abido, M.A.(2003), Coordinated design of PSS and SVC based controller to enhance power system stability, *Electrical Power and Energy Systems*, 25, 695-704.
- Namdev,S., Khurpiya,N. and Raj,D. D. K, (2017), Power system stability analysis of single machine infinite bus system using firefly algorithm, *International Journal of Digital application and Contemporary Research*, 5(9), 446-455,
- Panda, S., Padhy, N.P. and Patel, R.N. (2007), Modeling, simulation and optimal tuning of TCSC controller, *International Journal of Simulation Modeling*, 6(1), 37-48.
- Panda,S. and Padhy, N.P. (2007), MATLAB/SIMULINK base model of single machine infinite bus with TCSC for stability studies and tuning employing GA, *International Journal of Electrical, Computer, Energetic, Electronic and Communication Engineering*, 1(3), 506-515.
- Rabbani, M. G., Devotta,J. B. X., and Elangovam, S. (1999), Application of simultaneous active and reactive power modulation of SMES unit under unequal α -mode for power system stabilization, *IEEE Transactions on Power Systems*, 14(2), 547-551.
- Shingare, S. S. (2015), Modelling and analysis of single machine infinite bus system with and without UPFC for different location of unsymmetrical faults, *International Journal of Engineering Research and Generall Science*, 3(1), 418-426.
- Srinivas, S. T., Devi, D. A. R. (2016), Application of Superconducting Magnetic Energy Storage(SMES) system an Automatic Generation Control, *International research Journal of Engineering and Technology*, 3(10), 839-845.
- Wui, C.J., Lee, Y.S. (1991), Application of superconducting magnetic energy system to improve the damping of synchronous generator", *IEEE Transactions on Energy Conversions*, 6(4), 573-578.

A Study of Teacher Attitudes to Classroom Interaction

Iffat Ara Nasrin Majid¹
Nafisa Kamal²

Abstract

This article studies the attitudes that the teachers have toward interaction in the language classroom. The study reveals that teachers have mixed attitudes towards interaction in the classroom. These attitudes are related to their past educational experience of classroom teaching. The study reveals that teachers need training in the role of and nature of interaction that is conducive to language teaching.

Keywords: Classroom Interaction, Teacher Attitude, Communicative Language Teaching and Open-ended Question

1. Introduction

When teachers and learners come to a class, they come with expectations of behaviors regarding how the class is to be conducted, what is to be taught and how it is to be taught. With a shift of the focus in teaching methods from grammar-translation to the communicative one in language teaching, there is a heightened demand to make the classes interactive. In fact, learners come to language classes hoping that they would master the target language as fast as possible, whereas teachers come to teach with the hope that they can get positive learning outcomes from all the learners present. Although both groups know what they want, the question of how much learning will be achieved and at what rate depends on the nature of the interaction that takes place in that class. It is therefore worthwhile to understand what interaction is and how the attitudes of the teachers can impact the nature of learning that eventually takes place.

According to the dictionary, interaction is 'the mutual or reciprocal action or influence' between entities. When we talk about a classroom, the entities would be the teacher and the students. In his Lancaster working paper, Dick Allwright (2000) looks at the role of interaction and negotiation in learner development in detail and how the behavior of the teacher impacts the learning process. He identifies the following basic stages in classroom learning:

- An overt stage where learners are introduced to new learning. This stage would also involve students questioning for clarification of concepts and ideas.

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- The covert stage where a learner covertly (privately within himself) tries to understand what the teacher is presenting and interprets it in his own way, which is a purely *learner-based* inward (covert) stage;
- The next stage is again an open (overt) stage when the learner engages in whatever classroom activities the teacher involves them in, to promote the practice of whatever has been presented.
- The next stage is again a private, personal (covert) one where the learner tries to use whatever has been presented. This can be with or without much comprehension;
- The final stage of learning that again works at the personal hidden (covert) level relating to the “central mental processing”, which enables storage in the permanent memory, the portion that the learner has actually understood or comprehended.

However, this would happen differently in the case of different learners. Allwright (2000) considers the first two stages of utmost importance as these are the stages when the learners are asking questions, making mistakes, etc. He finds classroom interaction as playing a crucial role in learner development. The type of interaction that Allwright talks about is very important for a teacher to understand as it allows him/her the opportunity to understand how the comprehension stage is processed in the learner. Time needs to be given to the learners to internalize the learning and get ready to reproduce what they have learnt.

Harmer (2006) also considers interaction an important element in classroom learning, by helping sustain student motivation. According to him, when we engage students in activities, we hand over some of the responsibility of learning to them that is expected “responsibility for self”. Only when a student feels involved enough, s/he will develop greater motivation for learning. This involvement will come if they enjoy the class and at the same time understand the goal of the activities that they are being given. A teacher therefore needs to have a positive attitude towards classroom interaction and promote interaction efficiently.

Attitude has been defined by the British psychologist, Michael Hogg, as a ‘negative or positive evaluation of an object which influences human behavior towards that object’ (<https://www.studyandexam.com/attitude-meaning.html>). According to the model given by psychologists like Rosenberg, attitude comprises of (1) cognitive (2) affective as well as (3) behavioral components (<https://www.simplypsychology.org/attitudes.html>). Studies have found a significant relationship between teachers’ attitudes and teaching (Nadeem et. al 2011). Dokko, Wilk and Rothbart (2009) find that teachers who had prior

experience of their occupation had better knowledge of their profession, but did not have a significant impact on the performance of those teachers who were rigid in their attitude. Latchanna and Dagnev (2009) find that although teachers agreed that active learning methods are good for teaching language, the majority of the students respond that their teachers' teachings failed to motivate them. Studies of the relationship between attitude and performance have therefore produced variable results.

What becomes evident from the literature review is that mere interaction will not be useful unless it is done in a positive way that works towards learner development. It is not an easy task to get an equal amount of participation in the class from the learners. Zhu (2006) identifies anxiety as a major reason that causes many students to remain silent during interactive sessions. To mitigate such negative anxiety, he suggests creating a low anxiety climate in the class through (a) better understanding between teachers and students (b) ensuring participation by both dominating and docile students (c) developing positive beliefs among students regarding the usefulness of interaction. These suggestions of Zhu, though of vital importance, can also be difficult to implement by the less experienced teachers as in their attempt to maintain discipline they might be unable to keep up a friendly environment at the same time.

Moreover, merely having a friendly relation is not enough unless teachers know how to ask effective questions. For example, a teacher's questioning may sound like verbal testing with closed (requiring only fixed answers) rather than open questions without making it provocative enough to make a learner think. Again, if teachers lack the conceptual basis, they may also affect effectiveness of questioning. Harrowitz, Darling-Hammond, Bransford, (2005) comment that a solid grounding in development is essential for good teaching as it not only informs a teacher about how to create a developmentally conducive class environment but is also necessary "for helping a teacher select and construct tasks that take into account a student's attention span and developmental readiness and to individualize instruction when necessary."

Kraal (1994) reports on the results of observation done by a group of experienced teachers on an experienced non-native teacher's class where it is found that

- the teacher asked more individual-directed questions than there were answers.
- only a few students sitting in the first rows answered most of the questions.
- the teacher was asking too many questions rather than focusing on teaching.

As evident from these discussions, it becomes clear that the teacher has a vital role to play in making interactive classes effective. However, the way the

concept of interaction is interpreted by a teacher would decide to what extent the teaching is interactive.

A study was therefore conducted to investigate what teachers in Bangladesh understand by “interaction” and their attitudes towards it through a questionnaire survey. The details of this study will be discussed below.

2. Methodology in Brief

Through random sampling, 18 teachers teaching at primary, secondary and higher secondary levels were selected for the study. These teachers were studying for an MA in English Language Teaching in a private university and had come from diverse backgrounds with varied teaching experiences. Questionnaires were given out to them with both closed and open-ended questions. Open-ended questions were asked regarding (a) what they understood by ‘interaction’ and how they viewed promoting it in the classroom, (b) their own learning backgrounds in order to ascertain the relationship of their current attitudes to their personal experience of it as students.

3. Findings and Discussion

In order to understand what each teacher thinks about classroom interaction, they have been asked to describe it in the open-ended part of their questionnaire. Their responses in this regard are presented in the following table. For ethical consideration, the identity of each teacher will henceforth be referred to by the number assigned to them in this table.

Table 1: Teacher descriptions of classroom interaction as written by the teachers

Teacher number	Length of teaching experience	Each teachers’ written comments regarding their understanding of interaction
T-1	6 months O’ level	“Classroom interaction means the communication between not only teachers and students but also it can be among the students”
T-2.	1 year Level not mentioned	“I have understood about my classroom that there are a lot of students in the class. We cannot control them sometimes. Most of the guardians are not conscious so the students don’t make out English”.
T-3.	5 years at intermediate and degree level	“Three types of interaction are seen in a classroom, teacher to students, students to teacher, and students to students”.
T-4.	3 years	“teacher should interact with students by asking questions to clarify their confusion. On the other hand, students also

		need to respond to the teacher, let the teacher know where they are facing problems”
T-5	2 years at SSC/HSC level	“Classroom interaction is the process of communicating. It may develop the ability of the students”.
T-6.	11 years up to class 8 in English medium schools	“It means active participation of all students including teacher where each of them will show their curiosity to know will express their view, will argue ask or debate to be clear of the topic”.
T-7	4 years classes 5-8	“Classroom interaction means teacher will talk to the students as students will talk to the teachers, ask questions etc.”
T-8	Experience and class level not mentioned	“Classroom interaction is very effective for making the classroom more enjoyable. Classroom interaction helps to transfer language properly. Participation of the students ensures learning”.
T-9.	Experience and class level not mentioned	“I mean classroom interaction is to make a class live and interactive so that the students can participate spontaneously on the subject matter/s taught in the class”.
T-10.	Experience not mentioned 11- 12 to tertiary	“Follow the lecture of a teacher and pay full attention to what a teacher says. Make out the class, if not, then try to communicate with teacher. Do the assignment assigned by the teacher. If asked by the teacher, then present the lecture the way a teacher does”.
T-11.	One year at O level	“Classroom interaction means proper communication between students and teachers inside the classroom. Teacher interacts by asking questions, giving clues or possible answers to the students. Students also answer and interact if they feel free and relaxed”.
T-12.	6 years, 2years in an English-medium school, 4years in a college	“Discuss with the students on a certain topic. Asking questions and answers –related to the lesson. Need to encourage the students to speak up in the class”.
T-13.	1 year, classes 11- 12	“The teacher interacts with the students in the class. He speaks with the students. He uses body language in the class”.
T-14	1 year 5 months, classes 11-12	“Classroom interaction means an effective teaching-learning system. Both the students and teacher get the chance to clarify themselves by revealing their opinion and discussion”.
T-15	2 yrs in English medium Junior section	“Classroom interaction makes classes interesting and informative”.

T-16	1 and a half month Level not mentioned	"It is the communication between the student and the teacher. Throughout this communication/interaction basically, a teacher as well as the topic can be understood by the learner and a teacher can easily find out the level of understanding of the student. Actually, this type of interaction is the sharing of knowledge between the learner and the trainer. It makes the process progressive and effective".
T-17.	6 months at English medium school	"Classroom interaction always requires a two-way communication where the communication/discussion takes place between the students and the teacher. This interaction could be in various forms e.g. formal discussion as well as some informal communication to build a friendly teaching atmosphere".
T-18	6 months, classes 5-10	"Classroom interaction means not only the teacher will talk in the classroom but the students also get the chance to say about their opinion. Interaction makes a bridge between the teacher and the student".

As seen in table 1, these descriptions reveal that the majority of the teachers see interaction as a two-way process $T \leftrightarrow S$ where the learners participate by speaking up in the class. Only 2 teachers (# 1 & 3) mention interaction as not only an exchange between teachers and learner but also between $S \leftrightarrow S$ as well.

This table shows that 11 teachers focus on the process of interaction whereas only 5 teachers talk about the effect as well, and 5 teachers talk about the reasons for which interaction should be practiced in the class. What is interesting is that T-10 who teaches students of higher secondary and tertiary level students does not seem to have much idea of what interaction is about and talks about doing class assignment in front of the teacher as part of interaction. The responses of the teachers to the next question on the advantages and disadvantages of classroom interaction provide further insight into their attitudes towards it as revealed in table 2.

Table 2 : Teacher attitude regarding positive and negative aspects of interaction in relation to their years of experience

Teacher #	Length of Experience	Comments written by the teachers regarding advantages of classroom interaction	Comments written by the teachers regarding disadvantages of classroom interaction
1.	6 months O' level	- It is effective to some extent - increase the fluency -students will be more benefited	- sometime it may be disturbing

		<ul style="list-style-type: none"> -it will be helpful for others to some extent -it will also help others to know about the relevant topic 	<ul style="list-style-type: none"> - no need to much talking about the relevant topic - it will hamper the classroom environment - sometimes teachers may feel bored.
2.	1 year Level not mentioned	-I think it is most important for the students because if the students can speak they can write well. This is a great advantage for the students.	- there are some disadvantages for the students to understand the meaning of the sentences
3	5 years at intermediate and degree level	<ul style="list-style-type: none"> -confidence level will increase -will feel free to ask questions -the teacher will easily find out the problem 	<ul style="list-style-type: none"> -If all speak together chaos will be created - If every time he finds himself wrong, he will lose confidence
4.	3 years	<ul style="list-style-type: none"> -it will give them a chance to practice speaking in the class -develop their pronunciation 	-There can be noise which creates if the students start speaking at a time
5.	2 years at SSC/HSC level	<ul style="list-style-type: none"> - it removes anxiety - it helps to share any idea it gives inspiration -it is an opportunity to communicate 	<ul style="list-style-type: none"> - it may create a noisy situation - it may destroy creative thought -it may disturb the attention
6.	11 years up to class 8 in English medium schools	<ul style="list-style-type: none"> - their speaking power will increase their reasoning questioning and answering power will increase - their interest the class will grow -students of college university level get the maximum benefit of the system 	<ul style="list-style-type: none"> - it is a problem for a limited time duration of a period like 30-40 minutes. - students unknowingly go out of the topic which is difficult for a teacher to get them back on the topic -students at the school level will get less benefits because they like to speak up together without thinking of their needs to learning
7.	4 years t classes 5-8	<ul style="list-style-type: none"> -concept will be clear -can speak fluently -can gather more ideas 	<ul style="list-style-type: none"> -one will speak the others are kept silent -sometimes disagree with others
8.	Experience and class level not mentioned	<ul style="list-style-type: none"> -the students feel confident -the students get the opportunity to practice 	<ul style="list-style-type: none"> -they make the class noisy -the students always try to speak up in the class and

		-they get the real environment to speak.	make the environment difficult for teaching
9	Experience and class level not mentioned	-the students will be fluent -will be able to pronounce more correctly -will be ready to communicate promptly -confusions will be eliminated while speaking -will be able to speak good English -will have a good chance to practice and experience the language	- I don't find any disadvantages
10.	Experience not mentioned 11- 12 to tertiary	-presentation skill may improve -confusion may not arise -to master the subject students need to be master -to teach others it may help very well	-time-consuming -students manner may convert other students -teachers whether encouraged or not
11.	One year at O level	-teacher can understand the condition of the students like if there is any problem in pronunciation or not. Also it develops communication skills.	-others can learn from the students e.g if any student makes any mistake other students can also use those things.
12.	6 years, 2years in an English-medium school, 4years in a college	-to clarify confusion in class-it is necessary to know all the information clearly-students can ask several types of questions	-nil
13.	1 year, classes 11- 12	- students can learn to speak English -anxiety is removed	-if teachers give extra pressure to speak in English, learning may be blocked.
14.	1 year 5 months, classes 11-12	-students will get the chance to speak in English -it will increase their thinking ability -they will be more active and enthusiastic in the lesson -effective classroom learning -it can remove their fear and barrier to the lesson	-sometimes chaos can happened, if everybody speaks together. -it will take a long time to finish the specific lesson.
15	2 years	-speaking skills can be developed -students feel confident	- some of the students talk much others remain silent

	in English medium Junior Section	-students can practice more	-makes the classroom noisy
16	One and a half month. Level not mentioned	- it increases the braveness and makes bold in speaking - it makes clear about the understanding of the topic - it also helps other students to understand those topics that they have missed -even this type of speaking helps them about the understanding level /gaps	-if anybody is rebuked or insulted for their less understanding then it is really harmful - sometimes this type of teaching makes someone very much depressed when they are not successfully spoken in front of others - so it should be encouraged within their capability
17.	6 months at English medium school	- include the student in the conversation/discussion - motivate the student after speaking on a particular topic - first, try to say the positive things about the student -ask the student about the topic that has been discussed	- will remain shy -lack of confidence -difficulty in understanding the lesson
18.	6 months, classes 5-10	-it will increase their speaking skill they can share their own opinion	- when all students speak together sometimes it makes noise

If we analyze these responses in table 2, we find that 10 teachers (55%) consider interaction as an activity that will increase the learners' fluency in speaking by giving them more opportunities to practice the skill in English, while 4 (22%) see it not only as a fluency practice activity but also as an opportunity to communicate with the teacher. 5 (27%) teachers consider it as a tool for clarifying the learners' concepts. However, only 2 (11%) teachers consider it an opportunity for the teacher to find out the learners' problems. This perspective is important as it shows a deeper understanding of the role of interaction by allowing the teacher to ask questions that enable them to enquire into the level of understanding of the learner. Interestingly, the same teacher T-10 questions in case of disadvantages as "teacher whether encouraged or not" which clearly indicates that this person does not feel much interested to encourage interaction in the class. Thus, details about teacher attitudes can be found in their answers to what they consider advantageous and disadvantageous.

The features mentioned by the teachers regarding the positive aspects of classroom interaction can be broadly grouped as follows:

- Learners can do more practice speaking and thereby improve their fluency
- The interaction improves pronunciation and communication skills
- It increases learner confidence, and removes anxiety and fear
- It helps increase learner class participation and thereby eliminates confusion about lessons
- It helps the teacher know about the learners and motivate them.

The disadvantages-column of table 2 shows that eight teachers find it a noisy activity. Especially T-6, T-10 & T-14 find doing interactive activities time-consuming and problematic as they hamper completion of the syllabus. Clearly, these teachers will be less inclined towards doing learner-centered interactive teaching despite being aware of its positive attributes. What is all the more interesting is the existence of T-6 in the group as he had the longest amount of teaching experience (11 years) among the respondents but is still not so positive about classroom interaction.

The main concerns expressed by the teachers regarding classroom interaction can be grouped as follows:

- allowing interaction in the class makes it noisy, chaotic and difficult to teach
- it causes loss of valuable teaching time
- it can have negative S ↔ S learning
- undue pressurizing students to respond can cause psychological blocks or negative emotions towards active participation and cause them to lose self-confidence when they are unable to respond properly.

The responses of T-9 & T-12 are worth noting here as they find nothing negative in following an interactive teaching method. Experience does not seem to be a factor in how the teachers feel about interaction as evident by the case of T-6.

T-16 shows a marked concern about learners' negative emotional reactions when they fail to perform in the class and are "rebuked or insulted for their less understanding." This teacher has had only one-and-a-half-month teaching experience and has obviously no training in how to give effective feedback. In fact, her inexperience seems already to have negatively affected her learners. T-1 and T-10 feel that the teacher will not be encouraged while T-5 and T-7 feel that it is negative for creative thinking. T-6 with the highest duration of

experience seems to be the most negative towards interaction unlike T-10 who does not find any disadvantage at all with an almost equal number of years of experience. The number of years of experience is therefore not related to their attitude. This finding supports the findings of the study by Dokko, Wilt and Rothbart (2009) who find that teachers who are rigid in their attitude do not change with experience although their knowledge of the subject increases. It, therefore, becomes obvious that training in handling effective feedback could go a long way towards developing a positive emotional environment in the class, which in turn is directly related to learner motivation and effective learning as revealed in a detailed study on what the learners consider as positive and negative characteristics of teachers (Majid 2011).

When interaction is mentioned as occurring between/among the students, it basically indicates their doing pair work or group work. It becomes obvious here that these teachers are not used to giving students these learner-centered activities.

Table 3: Frequency of teacher exposure to interactive activities in their student days

Frequency of exposure	Pair work		Group work		T→S Related to the lesson		S→T to clarify topic		Teacher seeking student opinion	
	HSC	Ter.	HSC	Ter.	HSC	Ter.	HSC	Ter.	HSC	Ter.
Never	4 (22%)	1 (.5%)	6 (33%)	2 (11%)	2 (11%)	0 (0%)	1 (5.5%)	0 (0%)	7 (38%)	2 (11%)
Sometimes	7 (38%)	5 (27%)	10 (55%)	6 (33%)	5 (27%)	6 (33%)	7 (38%)	8 (44%)	6 (33%)	7 (38%)
Usually	2 (11%)	5 (27%)	2 (11%)	2 (11%)	7 (38%)	4 (22%)	4 (22%)	5 (27%)	3 (16%)	5 (27%)
Always	5 (27%)	6 (33%)	0 (0%)	7 (38%)	3 (16%)	7 (38%)	4 (22%)	4 (22%)	1 (11%)	3 (16%)

Table 3 shows the frequency of exposure to interactive activities that the teachers themselves had experienced in their academic backgrounds. As evident from this table, only 7 (38%) teachers have had a high frequency of exposure to pair work at the HSC level, whereas 4 (22%) never had such exposure and 7 (38%) had some exposure. At the tertiary level, the figure increases to 11 (5+6) i.e. 61% of teachers who had a high frequency of exposure to pair work. In the case of group work, only 2 teachers had a high frequency of exposure at the HSC level while 6 teachers had absolutely no exposure at all while 10 teachers had been infrequently exposed to it. In the case of teachers asking questions to the students regarding the lessons being taught the frequency rises to 11 (7+4), i.e. 61%. This category is different from questions for clarity by the fact that they may contain answers regarding inviting questions from the students to clarify their understanding of the topic. This figure stands at 7 (2+5) i.e. 38% of teachers at the HSC level and only 33% at the tertiary level. This reveals that teachers are not much into the practice of checking on student learning through discussion in the class and students have not been encouraged much to ask questions either. This might explain negative teacher opinions towards interaction as they have not had the experience of learner-centered activities but mostly have been teacher-centered during their own learning. When it comes to the teacher seeking student opinion on a particular topic for discussion, the percentage goes further down to only 4 (3+1), i.e. 22% of teachers at the HSC level and 8 (5+3) i.e. 44% at the tertiary level.

This table shows that most teachers themselves have had very little exposure to interactive activities at both the Higher Secondary as well as the tertiary levels. Experiences during student years go a long way in formulating attitudes towards teaching activities. Teachers who might have enjoyed interactive activities in their student years would probably try to emulate similar teaching practices with their students as well.

4. Conclusion

The findings of this study indicate that although teachers, in principle, agree that interactive teaching is beneficial for the learners, many of them are less inclined to practice it on a regular basis. Their own academic background with insufficient exposure to such teaching might be a contributing factor towards such negative attitudes. Responses of the learners related to such teaching shed light on the nature of inefficiency on the part of the teachers that might make such teaching demotivating and ineffective. However, the fact that both the groups (teachers and learners) have shown awareness about the beneficial effects of such teaching implies that if conducted efficiently such teaching has

great prospects of increasing in frequency and consequently more effective and motivating class. Latchanna and Dagnev (2009) observe that they find many teachers who believe in the beneficial effects of interactive teaching failing to practice it with their students due to many external reasons such as lack of time, cooperation of administration etc. Because of the advent of communicative language teaching, English language teachers are expected to be more aware of interactive teaching techniques, and cooperation of the institutional administration in arranging training in effective training methods can go a long way towards the development of positive attitudes among the teachers. However, interactive classes are conducive not only for language teaching but for other disciplines. Research on the attitudes of teachers of other subjects regarding interactive teaching could be quite useful.

References:

- Allwright, D (2000) 'Interaction and negotiation in the language classroom; their role in learner development' in *Centre for Research in Language Education (CRLE) Working Paper 50* at <http://www.ling.lancs.ac.uk/goups/crile/docs/criles50allright.pdf>
- Dokko, G., Wilk, S.L., & Rothbart, N.P (2009) Unpacking Prior experience : How career history affects job performance, in *Organization Science*, 20, 51-68.
- Hall, J.K.(2009) 'Interaction as method and result of language learning' in *Language Teaching* vol.3 issue 2, 2010. Cambridge University Press, 2009.
- Harmer, J (2006) 'Engaging students as learner's in English Teaching Professional, issue 42, Jan 2006.
- Harrowitz, D.F., Darling-Hammond, L., Bransford, J. (2005) 'Educating Teachers for Developmentally Appropriate Practice' in Darling-Hammond, L., & Bransford, J., Eds., *Preparing Teachers For a Changing World*, Jossey-Bass 2005.
- Kraal, T. (1994), *Teacher Development: Making the Right Moves*. Washington D.C: English Language Programs Division, United States Information Agency.
- Latchanna, G., Dagnev, A. (2009) 'Attitude of teachers towards the use of active learning methods available' at <https://www.researchgate.net/publication/237759651>
- Majid I.A.N.M. (2011) Learner Perspectives of Negative and Positive Teacher Characteristics: A study in *The Eastern University Journal*, Vol. 3., Issue 2, July 201.

Meyer, D.K. and Turners, J.C. (2002) "Discovering Emotion in Classroom Motivation Research" in *Educational Psychologist*, 37 (2), 107-114, 2002.

Nadeem, M., Shaheen, M., Lone, A., Maqbool, S., Khan, A, Naz, K., & Ali, A. (2011), 'Teacher's competencies and Factors affecting the performance of female teachers in Bahawalpur (Southern Punjab) Pakistan', *International Journal of Business and Social Science*, 2 (19).

Puchta, H (2006), "Multiple Intelligence in action" in *English Teaching Professional*, Vol.42, Jan 2006.

Zhu (2006) 'Teaching quieter students' in *English Teaching Professional*, issue 42, Jan 2006.

Preparation and Characterization of Mn-rich Cathode Material $\text{Li}[\text{Li}_{0.50}\text{Ni}_{0.25}\text{Co}_{0.10}\text{Mn}_{0.65}]\text{O}_2/0.5\text{Li}_2\text{MnO}_3-0.5\text{LiNi}_{0.50}\text{Co}_{0.20}\text{Mn}_{0.30}\text{O}_2$ for Rechargeable Li-ion Battery

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Abstract

Li[Li_{0.50}Ni_{0.25}Co_{0.10}Mn_{0.65}]O₂ / 0.5Li₂MnO₃-0.5LiNi_{0.50}Co_{0.20}Mn_{0.30}O₂ as composite cathode material for rechargeable Li-ion battery has been successfully synthesized by improved carbonate co-precipitation process. The synthesized material was characterized through X-ray diffraction, environmental scanning electron microscope, inductively coupled plasma, and electrochemical measurements. The X-ray diffraction result shows a phase-pure well-ordered hexagonal super lattice layered-layered structure. The scanning electron microscope shows spherical-shaped particles with an average size of 13-15 μm. The material's initial discharge capacity was 197 mAh/g and 94% of the initial discharge capacity was retained after 50 charge-discharge cyclings. The excellent electrochemical performance of the proposed composition could be a promising candidate for cathode materials for future study.

Keywords: Rechargeable Li-ion Battery, Composite Cathode Material, Improved Carbonate Co-Precipitation, Layered Structure, X-Ray Diffraction.

1. Introduction

The global lithium-ion battery market size was reported at approximately 32.9 billion USD in 2019 and is expected to grow at a compound annual growth rate (CAGR) of 13.0% from 2020 to 2027 (<https://www.researchandmarkets.com/reports/4396452>). At the end of 2027, the Asian-Pacific Lithium-ion batteries

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market is expected to grow at a CAGR of approximately 16% (Mohamed and Allam, 2020). Since its first commercial utilization in 1991, the demand for lithium-ion batteries (LIBs) is increasing, mainly attributed to smartphones, laptops, digital cameras, and the recent implementation of electric vehicles (Mohamed and Allam, 2020; Li et al., 2011; Jaio et al., 2007). Its high energy and power density, long cycle life, relatively high safety, and continuously decreasing cost make LIBs the number one choice (Armand et al., 2020; Chu et al., 2012). But it is believed that after decades of investigation and technological improvement, the current LIBs will not meet the future energy-density demands. Therefore, a high energy density next-generation LIBs should be developed as social and economic demand continuously increases. The up-to-date version of LIBs is not dependent on a specific battery component; instead, it depends on all the parts such as improvement of anode (negative electrode) materials, cathode (positive electrode) materials, current collector, binder, separator, or the conductive additives (Armand et al., 2020). It is reported that to give a substantial breakthrough, advanced level cathode and anode materials along with other cell components should be developed. Among all the cell components, cathode materials play a significant role in determining the performance of LIBs (Daniel et al, 2014) and for decade's researchers search for better-quality cathode materials (Manthiram, 2020). Keep this in mind, here a secondary cathode material $\text{Li}[\text{Li}_{0.50}\text{Ni}_{0.25}\text{Co}_{0.10}\text{Mn}_{0.65}]\text{O}_2/0.5\text{Li}_2\text{MnO}_3-0.5\text{LiNi}_{0.50}\text{Co}_{0.20}\text{Mn}_{0.30}\text{O}_2$ was synthesized and characterized. At present, commonly used cathode materials are Lithium Iron Phosphate (LFP), Lithium Cobalt Oxide (LCO), Lithium Nickel Manganese Cobalt (NMC), Lithium Manganese Oxide (LMO), Li-rich Mn-based layered oxide cathodes (LLOs) etc. Though these materials are successfully implemented in the market, some areas can be improved, such as structural stability, diffusion kinetics, initial Coulombic efficiency, fast capacity/voltage, etc. that can meet future demands (Manthiram, 2020). Tremendous research and development have been made to construct cathode materials that can improve the electrochemical performance to a desirable level (Armand et al., 2020; Manthiram, 2020; Bensalah and Dawoud, 2016). For improving battery performance, researchers discovered new cathode materials, introduced different synthesis methods, changed transition metal relative ratios, adopted doping and tuned pH, etc. (Armand et al, 2020; Manthiram, 2020; Bensalah and Dawoud, 2016). Some researchers introduced Mn-rich layered composite cathode material with the generic formula of $x\text{Li}_2\text{MnO}_3-(1-x)\text{LiNi}_p\text{Co}_q\text{Mn}_r\text{O}_2$ to replace costly, low rate capable, and hazardous LiCoO_2 (Manthiram, 2020; Johnson et al, 2008; Lee and Zhang, 2020; Guo et al., 2008). These non-toxic cathode materials have the advantage of having stability under a wide operating voltage from 2.5-5.0 V and high

capacity [Johnson et al., 2008;]. A high percentage of manganese also reduces the overall material cost which will be commercially favorable for hybrid electric vehicles (HEVs) (Guo et al., 2008). Nevertheless, this material's long-term cycling performance is still not very satisfactory due to the formation of the Li_2MnO_4 spinal compound. However, higher lithium content can stop the formation of spinal phases (Guo et al., 2008; Julien, 2014). Additionally, it is reported that a well-ordered hexagonal superlattice layered structure and semi-micro-sized spherical particles are desirable for getting better electrochemical properties (Julien, 2014; Zhang et al., 2010; Liu et al., 2019).

Inspired by the above literature, a Li and Mn-rich composite cathode material was synthesized, investigated and discussed in the present study. It is reported that the Li- and Mn-rich layered oxides have drawn much attention for application as cathode materials for lithium-ion batteries due to their high-energy density of over 1000 W h kg^{-1} (Pan et al., 2018). However, the practical applications of the Li- and Mn-rich layered oxides cathode materials still face some challenges: firstly, the reported electrochemical performance at present is obtained under laboratory conditions; secondly, some technical issues should be considered, such as the tap density of the electrode materials and the thickness of the electrode. Zheng *et al.* and Pan *et al.* discussed several issues and challenges that need to be overcome before realizing the commercialization of Li- and Mn-rich layered oxides in their review papers (Zheng *et al.*, 2017; Pan et al., 2018). West *et al.* reported a process to prepare layered-layered compositions of $\text{Li}_{1.2}\text{Mn}_{0.54}\text{Ni}_{0.13}\text{Co}_{0.13}\text{O}_2$ by ball milling and annealing mixtures of the parent compounds (West et al., 2012). Their approach represented a novel alternative to conventional synthetic approaches. They reported the same crystallographic and electrochemical features as those prepared by conventional sol-gel or co-precipitation methods, with a specific discharge capacity of about 250 mAh g^{-1} between 4.7 and 2 V (West et al., 2012). Therefore, selecting an appropriate synthesis process is critical to obtaining the reported criteria. The solid-state reaction is widely used due to its simplicity. Nonetheless, it has led to impure phases, which reduce cell performance (Park et al., 2005). A hydroxide and carbonate co-precipitation method is recently suggested for a superior cationic distribution (Vu and Lee, 2016; Zheng et al., 2011). Earlier, it is reported that in the hydroxide co-precipitation method, the segregation and oxidation of $\text{Mn}(\text{OH})_2$ and MnOOH create an unstable mixed transition metal oxide precursor. On the other hand, the carbonate method provides a homogenous precursor (Xiang et al., 2014). Therefore, in the present work, an improved carbonate method and solid-state method were employed to synthesize well-ordered layered and spherical $\text{Li}[\text{Li}_{0.5}\text{Ni}_{0.25}\text{Co}_{0.10}\text{Mn}_{0.65}]\text{O}_2/0.5\text{Li}_2\text{MnO}_3-0.5\text{Ni}_{0.5}\text{Co}_{0.20}\text{Mn}_{0.30}\text{O}_2$ cathode

material. The mixed transition metal carbonate $\text{Ni}_{0.25}\text{Co}_{0.10}\text{Mn}_{0.65}\text{CO}_3$ precursor was prepared using NH_4OH as a chelating agent and Na_2CO_3 under an N_2 atmosphere. Finally, the electrochemical performance was measured in terms of structural, morphologies, and compositional modification.

2. Experimental

2.1 Synthesis of $\text{Li}[\text{Li}_{0.50}\text{Ni}_{0.25}\text{Co}_{0.10}\text{Mn}_{0.65}]\text{O}_2/0.5\text{Li}_2\text{MnO}_3-0.5\text{Ni}_{0.5}\text{Co}_{0.20}\text{Mn}_{0.30}\text{O}_2$

An aqueous solution of $\text{NiSO}_4 \cdot 6\text{H}_2\text{O}$, $\text{CoSO}_4 \cdot 7\text{H}_2\text{O}$, and $\text{MnSO}_4 \cdot \text{H}_2\text{O}$ (cationic ratio of Ni: Co: Mn = 0.25:0.10:0.65) with a concentration of 1M (solution 1) was pumped into a continuously stirred tank reactor (CSTR) under N_2 atmosphere to prepare $\text{Ni}_{0.25}\text{Co}_{0.10}\text{Mn}_{0.65}\text{CO}_3$ precursor. Simultaneously, 1M Na_2CO_3 and 0.36M NH_4OH solution (solution 2) were separately fed into the reactor. The addition of both solutions 1 and 2 was carefully controlled to keep the pH in a reactor at 7.5 ± 0.1 . The CSTR was maintained at a constant temperature of 50°C with a 500 rpm stirring speed. The precipitated powders were filtered, washed, and dried in a vacuum oven at 80°C for 24 hours. The obtained carbonate precursor was pressed into pellets. The obtained powders were thoroughly mixed with Li_2CO_3 . Finally, pellets were remade and then calcined at high temperatures (950°C) for 24 hours in the air.

2.2 Measurements

The crystalline phase of the prepared powders was characterized by X-ray diffraction (XRD, Siemens D-5000) with $\text{Cu-K}\alpha$ radiations after calcination. The powders' surface morphologies were observed with an environmental scanning electron microscope (ESEM, FEI QUANTA-400). The chemical composition was determined by using inductively coupled plasma (ICP, OPTIMA 200DV).

The CR2032 coin-type half-cell was made to find out the charge-discharge capacity of the prepared material. Cells were consisting of a cathode and a lithium metal anode separated by a porous polypropylene film. The composite cathode was prepared by thoroughly mixing the active material (80%) with super carbon P (10%) and Polyvinylidene fluoride (10%) in N-methylpyrrolidinone. The slurry was then passed on aluminum foil and dried at 130°C for 10 h in a vacuum. Disks were then punched out of the foil. The electrolyte solution was 1M LiPF_6 in a mixture of ethylene carbonate (EC) and dimethyl carbonate (DMC) in a 1:1 volume ratio. The coin cell was assembled in an argon-filled glove box. The cell was cycled between 2 and 4.6V with a Won a

Tech testing system.

3. Results and Discussion

3.1 Structural, morphological, and compositional information of precursor $\text{Ni}_{0.25}\text{Co}_{0.10}\text{Mn}_{0.65}\text{CO}_3$

Fig.1 shows the XRD pattern of $[\text{Ni}_{0.25}\text{Co}_{0.10}\text{Mn}_{0.65}]\text{CO}_3$ precursor synthesized by the improved carbonate co-precipitation method. The concentration of chelating agent (NH_4OH), Na_2CO_3 , stirring speed of the mixture, temperature and pH were maintained strictly to prepare $\text{Ni}_{0.25}\text{Co}_{0.10}\text{Mn}_{0.65}\text{CO}_3$ precursor. The observed XRD patterns (Fig.1) of $[\text{Ni}_{0.25}\text{Co}_{0.10}\text{Mn}_{0.65}]\text{CO}_3$ precursor can be indexed on the basis of the hexagonal $R3c$ space group, which is usually used to index other transition metal carbonate [Thackeray et al., 2007].

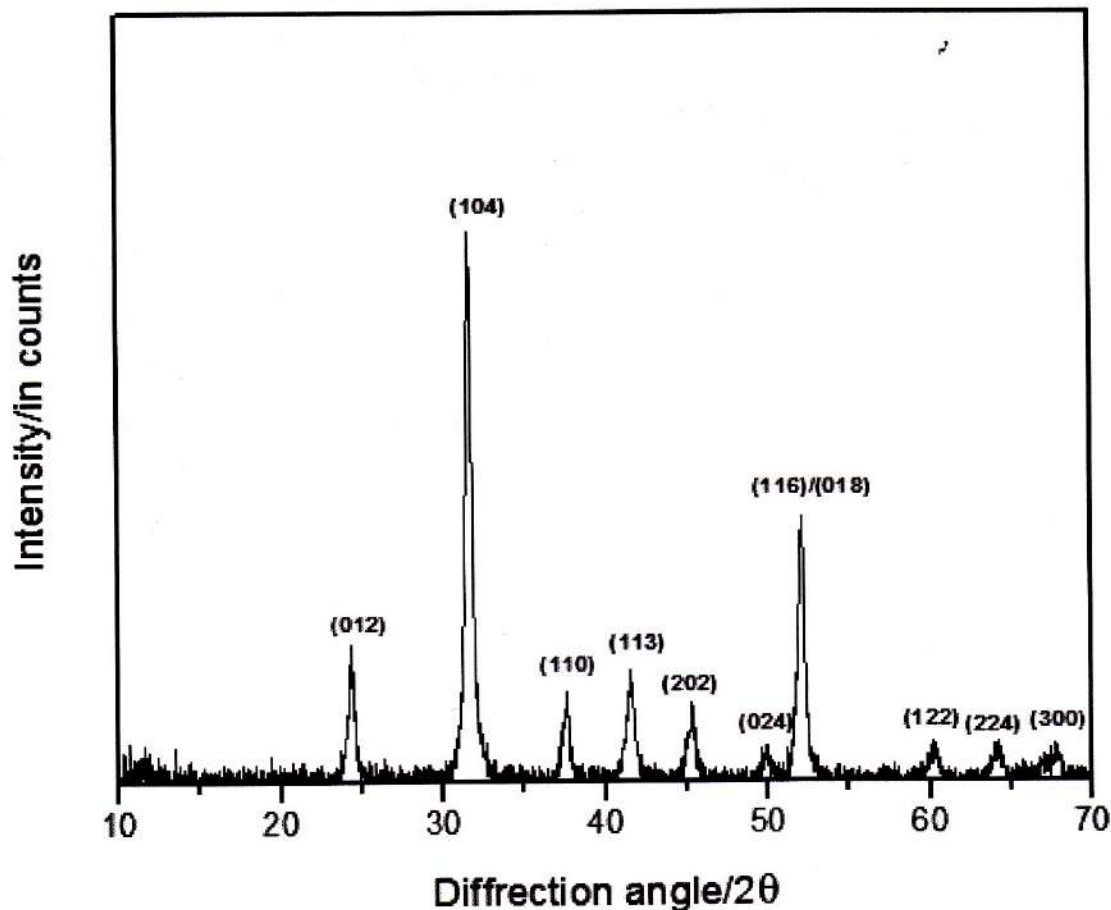


Fig. 1: XRD pattern of the precursor $\text{Mn}_{0.65}\text{Co}_{0.10}\text{Ni}_{0.25}\text{CO}_3$

The chemical composition of the prepared materials is determined using ICP and data is tabulated in Table 1. The ICP analysis identified that the element ratio of Ni:Co:Mn is 0.241:0.102:0.657, which is almost the same as the expected result.

Table-1: Chemical compositions of the experimental and the obtained powders by ICP analysis.

Chemical compositions of the experimental powder	Chemical compositions of the prepared powders as determined by ICP analysis
$\text{Ni}_{0.25}\text{Co}_{0.10}\text{Mn}_{0.65}\text{CO}_3$	$\text{Ni}_{0.241}\text{Co}_{0.102}\text{Mn}_{0.657}\text{CO}_3$
$\text{Li}_{1.50}\text{Ni}_{0.25}\text{Co}_{0.10}\text{Mn}_{0.65}\text{O}_2$	$\text{Li}_{1.50}\text{Ni}_{0.238}\text{Co}_{0.101}\text{Mn}_{0.661}\text{O}_2$

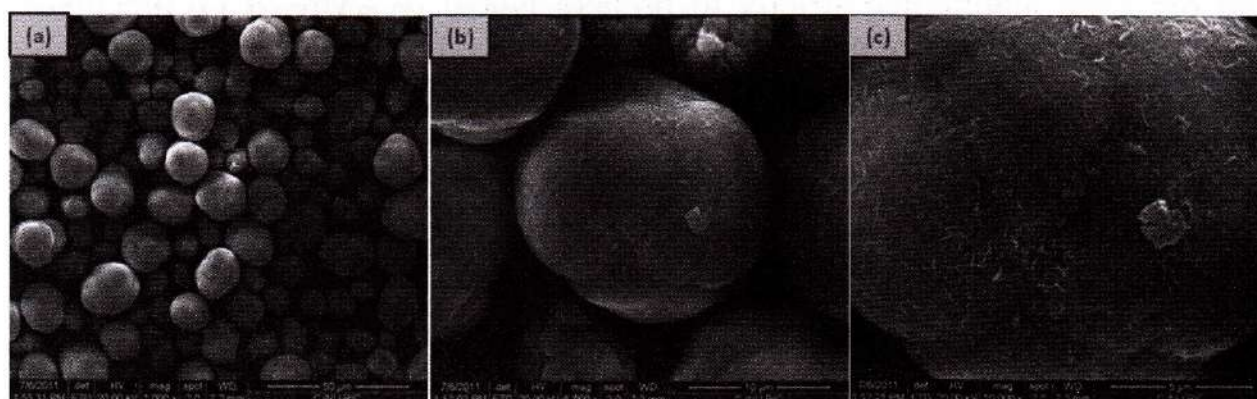
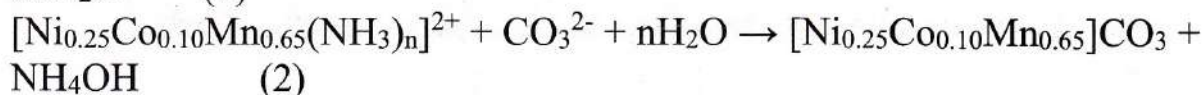
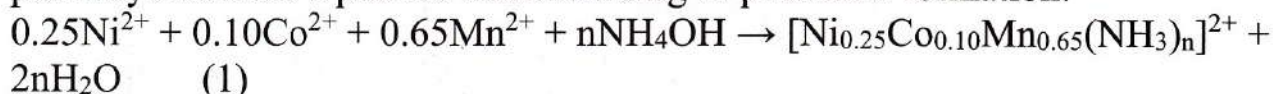
**Fig. 2:** Scanning electron micrographs of $(\text{Mn}_{0.65}\text{Co}_{0.10}\text{Ni}_{0.25})\text{CO}_3$ precursor at different magnifications. (a) 1000X, (b) 5000X and (c) 10000x

Fig. 2 shows the ESEM image of the $\text{Ni}_{0.25}\text{Co}_{0.10}\text{Mn}_{0.65}\text{CO}_3$ precursor. ESEM image indicates uniform, dense, and spherical-shaped particles with an average size of $12.5 \mu\text{m}$. The chelating agent (NH_4OH) might be responsible for thick spherical carbonate powder (Lee et al., 2004). In the improved co-precipitation method, NH_4OH and Na_2CO_3 play an essential role in optimizing this type of cathode material (Lee et al., 2004). The following reaction mechanism pathways indicate a precise understanding of precursor formation.



The reaction mechanism comprises two critical steps. In the first step, an ammoniacal mixed transition metal complex was formed [see Eq. 1]. This complex becomes unstable in the presence of an increasing concentration of carbonate. In the final step, the mixed transition metal carbonate precursor is formed [see Eq. 2]. XRD, ESEM, and ICP analysis clearly indicate the formation of expected metal carbonate precursor $\text{Ni}_{0.25}\text{Co}_{0.10}\text{Mn}_{0.65}\text{CO}_3$.

3.2 Structural, morphological and compositional analysis of $\text{Li}[\text{Li}_{0.50}\text{Ni}_{0.25}\text{Co}_{0.10}\text{Mn}_{0.65}]\text{O}_2 / 0.5\text{Li}_2\text{MnO}_3\text{-}0.5\text{LiNi}_{0.5}\text{Co}_{0.20}\text{Mn}_{0.30}\text{O}_2$

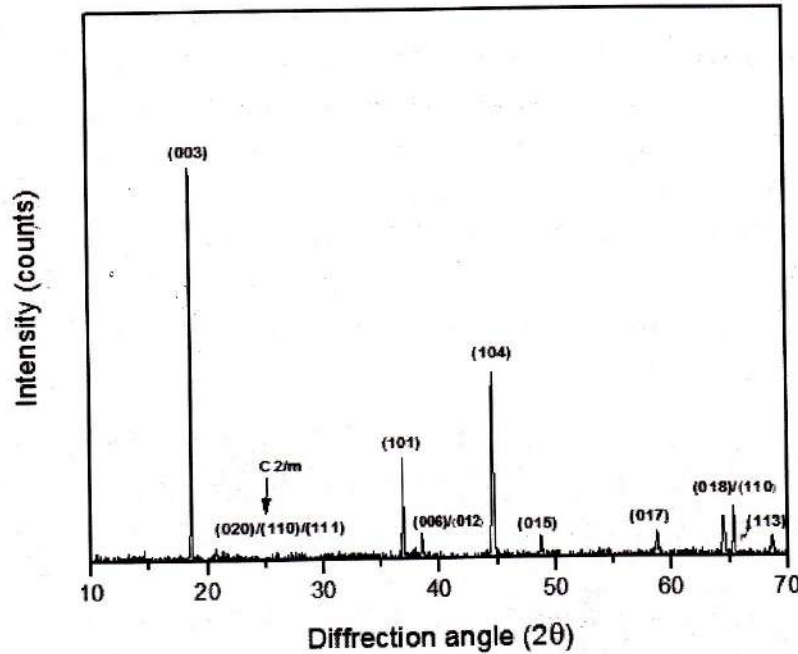


Fig. 3: XRD pattern of the synthesized $0.5\text{Li}_2\text{MnO}_3\text{-}0.5\text{LiCo}_{0.20}\text{Ni}_{0.50}\text{Mn}_{0.30}\text{O}_2$.

The prepared secondary cathode materials were characterized by XRD, ESEM and ICP. Fig. 3 shows the XRD pattern of $0.5\text{Li}_2\text{MnO}_3\text{-}0.5\text{LiNi}_{0.5}\text{Co}_{0.20}\text{Mn}_{0.30}\text{O}_2$ prepared by mixing pre-synthesized precursor $\text{Ni}_{0.25}\text{Co}_{0.10}\text{Mn}_{0.65}\text{CO}_3$ with 6% excess Li_2CO_3 followed by heat treatment. The XRD pattern of the sample could be indexed based on the $\alpha\text{-NaFeO}_2$ structure (space group: $166:\text{R}3\text{m}$) expecting the superlattice peaks between 20° and 25° . The splitting of (006)/(012) and (018)/(110) doublets indicates the formation of a well-ordered layered structure. In addition, the peaks between 20° and 25° are known to originate from the monoclinic Li_2MnO_3 -like unit cell $\text{C}2/\text{m}$, which correspond to the ordering of the Li^+ , Mn^{4+} , Ni^{2+} ions in the transition metal layer [Kim et al., 2010]. The hexagonal lattice parameters are summarized in Table 2.

Table-2: Lattice parameters of the synthesized $0.5\text{Li}_2\text{MnO}_3\text{-}0.5\text{LiCo}_{0.20}\text{Ni}_{0.50}\text{Mn}_{0.30}\text{O}_2$.

$a/\text{\AA}$	$c/\text{\AA}$	c/a	$V/\text{\AA}^3$	I_{003}/I_{104}
2.8491	14.2394	4.9978	100.1205	2.18

The integrated intensity ratio of I_{003}/I_{104} is sensitive to cation mixing (Zhang et al., 2010; Teichert et al., 2020). Generally, a lower intensity

ratio of I_{003}/I_{104} is an indication of undesirable cation mixing (Jeon et al., 2013). In this study a value of $I_{003}/I_{104} = 2.18$ was found, which is a sign of well-ordered crystallization. The lattice parameter, a , is related to average metal-metal intra-slab distance; c is related to the average metal-metal inter-slab length and c/a related to the hexagonal structural disorder. The higher value of c/a is desirable for a better hexagonal structure. In the present study, a high c/a ratio of 4.997 indicates the formation of the layered structure. All the above results confirmed that the prepared $\text{Li}[\text{Li}_{0.50}\text{Ni}_{0.25}\text{Co}_{0.10}\text{Mn}_{0.65}]\text{O}_2/0.5\text{Li}_2\text{MnO}_3-0.5\text{LiNi}_{0.5}\text{Co}_{0.20}\text{Mn}_{0.30}\text{O}_2$ powder had well defined layered hexagonal superlattice structure.

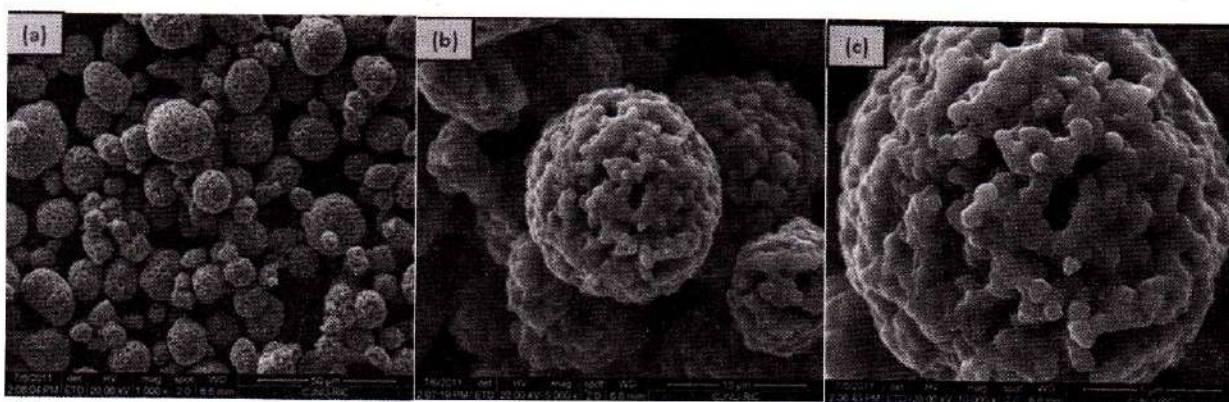


Fig. 4: Scanning electron micrographs of the synthesized $0.5\text{Li}_2\text{MnO}_3-0.5\text{LiCo}_{0.20}\text{Ni}_{0.50}\text{Mn}_{0.30}\text{O}_2$ at different magnifications. (a) 1000X, (b) 5000X and (c) 10000X

ESEM images of the prepared $\text{Li}[\text{Li}_{0.50}\text{Ni}_{0.25}\text{Co}_{0.10}\text{Mn}_{0.65}]\text{O}_2/0.5\text{Li}_2\text{MnO}_3-0.5\text{LiNi}_{0.5}\text{Co}_{0.20}\text{Mn}_{0.30}\text{O}_2$ at different magnification are illustrated in Fig. 4(a-c). The average particle size in the range of 13-15 μm is very close to that of the precursor $\text{Ni}_{0.25}\text{Co}_{0.10}\text{Mn}_{0.65}\text{CO}_3$. The ESEM images confirmed the formation of spherical-shaped particles as well. To obtain the expected lithium and transition metal ratio ($\text{Li}/\text{Ni}+\text{Co}+\text{Mn} = 1.5/1$), an excess Li_2CO_3 (6%) was used because a small amount of lithium evaporates at a high calcination temperature (950°C). The chemical composition of the prepared cathode material $\text{Li}[\text{Li}_{0.50}\text{Ni}_{0.25}\text{Co}_{0.10}\text{Mn}_{0.65}]\text{O}_2/0.5\text{Li}_2\text{MnO}_3-0.5\text{LiNi}_{0.5}\text{Co}_{0.20}\text{Mn}_{0.30}\text{O}_2$ is also determined using ICP and data is tabulated in Table-1. The ICP analysis identified almost the same element ratio $\text{Li}/\text{Ni}+\text{Co}+\text{Mn}=1.5/1$ as the expected value. Therefore, XRD, ESEM, and ICP analysis clearly defined the $\text{Li}[\text{Li}_{0.5}\text{Ni}_{0.25}\text{Co}_{0.10}\text{Mn}_{0.65}]\text{O}_2/0.5\text{Li}_2\text{MnO}_3-0.5\text{LiNi}_{0.50}\text{Co}_{0.20}\text{Mn}_{0.30}\text{O}_2$ formation, which could be considered as promising positive electrode for LIBs.

3.3 Electrochemical properties of

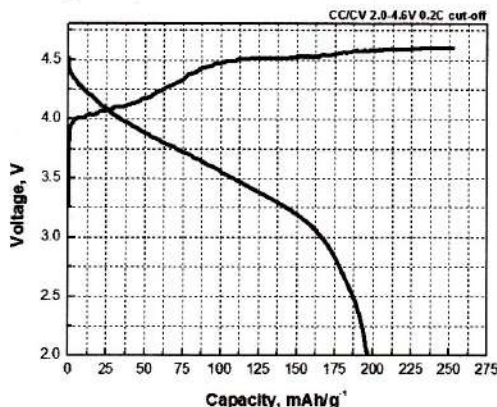


Fig. 5: First charge and discharge curve of $0.5\text{Li}_2\text{MnO}_3-0.5\text{LiCo}_{0.20}\text{Ni}_{0.50}\text{Mn}_{0.30}\text{O}_2$ cathode material for rechargeable lithium-ion battery.

Fig. 5 shows the initial charge and discharge curves of $\text{Li}[\text{Li}_{0.5}\text{Ni}_{0.25}\text{Co}_{0.10}\text{Mn}_{0.65}]\text{O}_2/0.5\text{Li}_2\text{MnO}_3-0.5\text{LiNi}_{0.50}\text{Co}_{0.20}\text{Mn}_{0.30}\text{O}_2$ cathode materials between 2 V and 4.6 V vs. Li at room temperature. The first charge and discharge capacity of 254 mAh/g and 197 mAh/g at 0.2C was observed. It can be seen that the irreversible capacity loss in the first cycle is 57 mAh/g and the columbic efficiency is 77.6%. The cycling performance of $\text{Li}[\text{Li}_{0.5}\text{Ni}_{0.25}\text{Co}_{0.10}\text{Mn}_{0.65}]\text{O}_2/0.5\text{Li}_2\text{MnO}_3-0.5\text{LiNi}_{0.50}\text{Co}_{0.20}\text{Mn}_{0.30}\text{O}_2$ cathode is displayed in Fig. 6. As can be seen in Fig. 6, 94% of the initial discharge capacity is retained after 50 charge-discharge cycling. The high discharge capacity and stable cycling performance of the prepared $0.5\text{Li}_2\text{MnO}_3-0.5\text{LiNi}_{0.50}\text{Co}_{0.20}\text{Mn}_{0.30}\text{O}_2$ can be attributed to its well-defined structure.

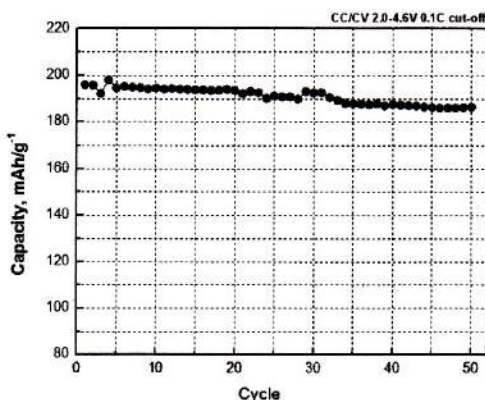


Fig. 6: Cycling performance of the prepared $0.5\text{Li}_2\text{MnO}_3-0.5\text{LiCo}_{0.20}\text{Ni}_{0.50}\text{Mn}_{0.30}\text{O}_2$ cathode material for rechargeable lithium-ion battery.

4. Conclusion

A layered composite cathode material $\text{Li}[\text{Li}_{0.5}\text{Ni}_{0.25}\text{Co}_{0.10}\text{Mn}_{0.65}]\text{O}_2/0.5\text{Li}_2\text{MnO}_3-0.5\text{LiNi}_{0.50}\text{Co}_{0.20}\text{Mn}_{0.30}\text{O}_2$ for LIBs was synthesized by the co-precipitation method. A well-defined superlattice hexagonal structure and spherical particles with an average size of 13-15 μm are obtained. The prepared material showed a high initial discharge capacity at 197 mAh/g (0.2C), low irreversible capacity (57 mAh/g) and stable cycling performances (94%, after 50 cycles). The good electrochemical performance of $\text{Li}[\text{Li}_{0.5}\text{Ni}_{0.25}\text{Co}_{0.10}\text{Mn}_{0.65}]\text{O}_2/0.5\text{Li}_2\text{MnO}_3-0.5\text{LiNi}_{0.50}\text{Co}_{0.20}\text{Mn}_{0.30}\text{O}_2$ can be attributed to its structural integrity. As a result, the synthesized $\text{Li}[\text{Li}_{0.5}\text{Ni}_{0.25}\text{Co}_{0.10}\text{Mn}_{0.65}]\text{O}_2/0.5\text{Li}_2\text{MnO}_3-\text{LiNi}_{0.50}\text{Co}_{0.20}\text{Mn}_{0.30}\text{O}_2$ could be a promising candidate for cathode materials in practical LIBs.

References

- Armand, M., Axmann, P., Bresser, D., Copley, M., Edström, K., Ekberg, C., Guyomard, D., Lestriez, B., Novák, P., Petranikova, M., Porcher, W., Trabesinger, S., Wohlfahrt-Mehrens, M., and Zhang, H. (2020), "Lithium-ion batteries – Current state of the art and anticipated developments", *Journal Power Sources*, Vol. 479, 2020, pp. 228708.
- Bensalah, N., and Dawoud, H. (2016), "Review on Synthesis, Characterizations, and Electrochemical Properties of Cathode Materials for Lithium-Ion Batteries", *J. Mater. Sci. & Engr.*, Vol. 5, No. 4, 2016, pp. 258.
- Chu, S., and Majumdar, A. (2012), "Opportunities and challenges for a sustainable energy future", *Nature*, Vol. 488, 2012, pp. 294-303.
- Daniel, C., Mohanty, D., Li, J., and Wood, D. L. (2014), "Cathode materials review", *AIP Conference Proceedings*, Vol. 26, 2014, pp. 1597.
- Guo, X., Li, Y., Zheng, M., Zheng, J., Li, J., Gong, Z., and Yang, Y. (2008), "Structural and electrochemical characterization of $x\text{Li}[\text{Li}_{1/3}\text{Mn}_{2/3}]\text{O}_2 \cdot (1-x)\text{Li}[\text{Ni}_{1/3}\text{Mn}_{1/3}\text{Co}_{1/3}]\text{O}_2$ ($0 \leq x \leq 0.9$) as cathode materials for lithium ion batteries", *J. Power Sources*, Vol. 184, No. 2, 2008, pp. 414-419.
- Jaio, L. F., Zhang, M., Yuan, H. T., Zhao, M., Guo, J., Wang, W., Zhou, X. D., and Wang, Y. M. (2007), "Effect of Cr doping on the structural, electrochemical properties of $\text{Li}[\text{Li}_{0.2}\text{Ni}_{0.2-x/2}\text{Mn}_{0.6-x/2}\text{Cr}_x]\text{O}_2$ ($x = 0, 0.02, 0.04, 0.06, 0.08$) as cathode materials for lithium secondary batteries", *J. Power Sources*, Vol. 167, 2007, pp. 178-184.
- Jeon, H. J., Monim, S. A., Kang, C. S., and Son, J. T. (2013), "Synthesis of $\text{Li}_x[\text{Ni}_{0.225}\text{Co}_{0.125}\text{Mn}_{0.65}]\text{O}_2$ as a positive electrode for lithium-ion batteries by optimizing its synthesis conditions via a hydroxide co-precipitation method", *J.*

Physics and Chemistry of Solids, Vol. 7, No. 4, 2013, pp. 1185-1195.

- Johnson, C. S., Li, N., Lefief, C., Vaughey, J. T., and Thackeray, M. M. (2008) "Synthesis, Characterization and Electrochemistry of Lithium Battery Electrodes: $x\text{Li}_2\text{MnO}_3(1-x)\text{LiMn}_{0.333}\text{Ni}_{0.333}\text{Co}_{0.333}\text{O}_2$ ($0 \leq x \leq 0.7$)", *Chem. Mater.*, Vol. 20, 2008, pp. 6095-6106.
- Julien, C. M., Mauger, A., Zaghbi, K., and Groul, H. (2014), "Comparative Issues of Cathode Materials for Li-Ion Batteries", *Inorganics*, Vol. 2, 2014, pp. 132-154.
- Kim, D. H., Gim, J., Lim, J., Park, S., and Kim, J. (2010), "Synthesis of $x\text{Li}_2\text{MnO}_3(1-x)\text{LiMO}_2$ (M=Cr, Mn, Co, Ni) nanocomposites and their electrochemical properties", *Materials Research Bulletin*, Vol. 45, No. 3, 2010, pp. 252-255.
- Lee, J., and Zhang, Q., (2020) "Controlled Atomic Solubility in Mn-Rich Composite Material to Achieve Superior Electrochemical Performance for Li-Ion Batteries", *Adv. Energy Mater.*, Vol. 10, No. 5, 2020, pp. 1902231.
- Lee, M. H., Kang, Y. J., Myung, S. T., Sun, Y. K. (2004), "Synthetic optimization of $\text{Li}[\text{Ni}_{1/3}\text{Co}_{1/3}\text{Mn}_{1/3}]\text{O}_2$ via co-precipitation", *Electrochim. Acta*, Vol. 50, No. 4, 2004, pp. 939-948.
- Li, J., Klöpsch, R., Stan, M. C., Nowak, S., Kunze, M., and Passerini, M. (2011), "Synthesis and electrochemical performance of the high voltage cathode material $\text{Li}[\text{Li}_{0.2}\text{Mn}_{0.56}\text{Ni}_{0.16}\text{Co}_{0.08}]\text{O}_2$ with improved rate capability", *J. Power Sources*, Vol. 196, No. 10, 2011, pp. 4821-4825.
- Liu, Y., Liu, H., and Zhao, X. (2019), "Effect of Spherical Particle Size on the Electrochemical Properties of Lithium Iron Phosphate", *J. Wuhan Univ. Technol.-Mat. Sci. Edit.*, Vol. 34, 2019, pp. 549-557.
- Manthiram, (2020), "A reflection on lithium-ion battery cathode chemistry", *Nature Communications*, Vol. 11, 2020, pp. 1550.
- Mohamed, N., and Allam, N. K. (2020), "Recent advances in the design of cathode materials for Li-ion batteries", *RSC Adv.*, Vol. 10, 2020, pp. 21662-21685.
- Pan, H., Zhang, S., Chen, J., Gao, M., Liu, Y., Zhu, T., and Jiang, Y. (2018), "Li- and Mn-rich layered oxide cathode materials for lithium-ion batteries: a review from fundamentals to research progress and applications", *Mol. Syst. Des. Eng.*, Vol. 3, 2018, pp. 748.
- Park, S.-H., Shin, H.-S., Myung, S.-T., Yoon, C. S., Amine, K., and Sun, Y. K. (2005), "Synthesis of Nanostructured $\text{Li}[\text{Ni}_{1/3}\text{Co}_{1/3}\text{Mn}_{1/3}]\text{O}_2$ via a Modified Carbonate Process", *Chem. Mater.*, Vol. 17, No. 6, 2005, pp. 6-8.
- Teichert, P., Eshetu, G. G. Jahnke, H., and Figgemeier, E. (2020), "Degradation and Aging Routes of Ni-Rich Cathode Based Li-Ion Batteries", *Batteries*, Vol. 6, No. 1, 2020, pp. 8.

- Thackeray, M. M., Kang, S., Johnson, C. S., and Vaughey, J. T. (2007), "Li₂MnO₃-stabilized LiMO₂ (M = Mn, Ni, Co) electrodes for lithium ion batteries", *J. Mater. Chem.*, Vol. 17, No. 30, 2007, pp. 3112-3125.
- Vu, D. L., and Lee, J. W. (2016), "Properties of LiNi_{0.8}Co_{0.1}Mn_{0.1}O₂ as a high energy cathode material for lithium-ion batteries", *Korean J. Chem. Engr.*, Vol. 33, No. 2, 2016, pp. 514-526.
- West, W. C., Soler, J., and Ratnakumar, B.V. (2012), "Preparation of high quality layered-layered composite Li₂MnO₃-LiMO₂ (M = Ni, Mn, Co) Li-ion cathodes by a ball milling-annealing process", *J. Power Sources*, Vol. 204, 2012, pp. 200.
- Xiang, Y., Yin, Z., and Li, X. (2014), "Synthesis and characterization of manganese-, nickel-, and cobalt-containing carbonate precursors for high capacity Li-ion battery cathodes", *J. Solid State Electrochemistry*, Vol. 18, 2014, pp. 2123-2129.
- Zhang, S., Deng, C., Fu, B.L., Yang, S. Y., and Ma, L. (2010) "Synthetic optimization of spherical Li[Ni_{1/3}Mn_{1/3}Co_{1/3}]O₂ prepared by a carbonate co-precipitation method", *Powder Technology*, Vol. 198, No. 3, 2010, pp. 373-380.
- Zhang, X., Jiang, W. J., Mauger, A., Qilu, and Gendron, F. (2010), Minimization of the cation mixing in Li_{1+x}(NMC)_{1-x}O₂ as cathode material, *J. Power Sources*, Vol. 195, No. 5, 2010, pp. 1292-1301
- Zheng, J., Myeong, S., Cho, W., Yan, P., Xiao, J., Wang, C., Cho, J., and Zhang, J. G. (2017), "Mn-rich cathode materials: Challenges to commercialization", *Adv. Energy Mater.*, 2017, pp. 1601284.
- Zheng, J. M., Wu, X. B., and Yang, Y., (2011), "A comparison of preparation method on the electrochemical performance of cathode material Li[Li_{0.2}Mn_{0.54}Ni_{0.13}Co_{0.13}]O₂ for lithium ion battery", *Electrochim. Acta*, Vol. 56, No. 8, 2011, pp. 3071-3078.

Website URLs

<https://www.researchandmarkets.com/reports/4396452/lithium-ion-battery-market-size-share-and-trends> on April, 2022.

Introduction to Public Interest Litigation (PIL) with Special Reference to its Relevance to Human Rights Protection in the Modern World

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Abstract:

Public Interest Litigation (PIL) has become a widely accepted concept in the legal world. The commitment of judges to PIL denotes their conviction that the courts are bound to make a relevant and meaningful contribution to the alleviation of tensions and to the preservation of the social fabric. The phenomenon of PIL is one, which seeks to reach out to the segments of a community bereft of influence, privilege or even of basic opportunity, and to assure them, at least in a fundamental sense, of the benefits of the legal order, which could hardly be achieved through conventional litigations. PIL brings justice within the reach of the poor masses. It has the objective of promoting and vindicating public interest which ensures that violation of constitutional or legal or human rights of large numbers of people especially of those who are poor, ignorant or in a socially or economically disadvantageous position, must not go unnoticed and unaddressed. The objective of the study is to depict the development of the concept in different countries and its relation to human rights. One of the findings of the research is that nowadays the judiciaries across the world are welcoming this notion. However, the author suggests that this discretionary power should not be used with arbitrariness and unreasonableness. The author further holds that this weapon should not be used for publicity interest litigation.

Keywords: Public Interest Litigation (PIL), Publicity Interest Litigation, Poor and Disadvantaged People, Environmental Law, Constitutional and Legal Rights.

1. Introduction

One of the functions of law is to secure the rights of the citizens providing different types of safeguards. In countries, especially in the developing countries, most of the citizens are unaware of their rights provided by law and hence the people who are aware should, as the human conscience requires, come forward and endeavor to protect the rights of those ignorant people (Wade

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and Forsyth, 1994, p. 69-75). The Constitution of the People's Republic of Bangladesh, 1972 provides the fundamental aim of the state as establishing an exploitation free society in which the rule of law, fundamental human rights and freedom and political, economic and social equality and justice will be secured for all citizens (Preamble, The Constitution of the People's Republic of Bangladesh). But due to financial and resource constraints and other socio-economic factors such a society cannot be established overnight by a developing state like Bangladesh (Preamble, The Constitution of the People's Republic of Bangladesh). The threat of injustice is a constant one and the holders of state power may actually violate or be tempted to violate the law and human rights at any time (Hoque, 2011, p. 252). Therefore, the requirement of judicial vigilantism against injustice is a permanent phenomenon, although the degree of activism may vary depending on time and place (Hoque, 2011, p. 252). Hence, there lies the requirement of the combination of the social responsibility of people and judicial activism in all states to protect the public interests, rights and thereby the social public cohesion. It is a matter of hope that our judiciary has recognized and accepted this relatively new phenomenon in our legal system (Rahman, 1997, pp. 79-86). The concept denotes cases where conscious citizens or organizations approach the court in the public interest and for the general welfare of the public. Therefore, Public Interest Litigation (PIL) acts as a catalyst to help produce systemic policy change in society on behalf of individuals who are members of groups that are underrepresented or disadvantaged (Hershkoff and McCutcheon, 2000, pp. 283-284). This article aims at construing the nature and feature of PIL in different countries and describes how it contributes to secure human rights and establish the rule of law from comparative aspects. In addition, an attempt has been made to explore how violations of basic human rights are becoming grounds for the initiation of PIL in different jurisdictions.

2. Public Interest Litigation (PIL) as a concept in brief

As it appears, the term 'Public Interest Litigation' is composed of three words, namely "public", "interest" and "litigation". "Public" means which is not private or the number of which cannot be ascertained with exact precision whereas "interest" denotes some benefit, profit, gain or advantage and "litigation" refers to a process of obtaining or challenging a disputed right through court, tribunal or any other adjudicatory body (Goldston, 2006, pp. 492-527). Therefore, PIL refers to the process of obtaining a right belonging to the public at large (Goldston, 2006, pp. 492-527). In general, public interest litigation means a litigation where the interest is presumed to be shared by a class of people without any adverse distinction whatsoever on the basis of age, sex, race, religion or any

other similar criterion (Weisbrod, 1978, pp. 4-29). PIL is the 'litigation for the interest of the public' and is essentially a co-operative effort on the part of the petitioner, the state or public authority and the court to secure legal rights, benefits and privileges conferred upon the vulnerable section of the community and to reach social justice to them (*People's Union of Democratic Rights v. Union of India*, 1982). PIL is an instrument for the administration of justice to be used properly in proper cases but does not mean settling disputes between individual parties (*Ramsaran v. Union of India*, 1989). PIL is not that type of litigation that is meant to satisfy the curiosity of the people, but it is a litigation which is instituted with a desire that the court would be able to give effective relief to the whole or a section of the society (*People's Union of Democratic Rights v. Union of India*, 1982). Lexically, the expression PIL means a legal action initiated in a court of law for the enforcement of public interest or general interest in which the public or a class of the community has pecuniary interest or some interest by which their legal rights or liabilities are affected (*Janata Dal v. H. S. Chaudhary*, 1992). PIL is a cooperative or collaborative effort by the petitioner, the State organs and the judiciary to secure observance of constitutional or basic human rights, benefits and privileges of the poor, downtrodden and vulnerable sections of the society (*People's Union for Democratic Rights & Others v. Union of India & Others*, 1982).

There are certain features of PIL that are helpful in understanding the exact nature of PIL and in distinguishing it from an ordinary lawsuit. Some of them are stated below:-

First, PIL is for a public cause and for the benefit of the people as a whole or a segment of the society aiming at enhancing social and collective justice. A public cause may include several situations as stated below.

First, where the matter in question affects the entire public or the entire community, e.g. illegal appointment of an unfit person as a government servant (Ahmad and Karim, 2006, p. 157);

- a) Where the issue involves a vulnerable segment of the society, e.g. eviction of slum dwellers without any alternative arrangements (Public Law Project, 1996, pp. 77-89);
- b) Where the matter affects one or more individuals but the nature of the act is so gross or serious that it shocks the conscience of the whole community, e.g. rape of a minor girl in police custody (Public Law Project, 1996, pp. 77-89).

Secondly, in the above-mentioned situations, any individual or organization may approach the court. In other words, PIL involves the liberalization of the rules of standing. In cases of PIL, the applicant need not fulfill the strict requirement of *locus standi* unlike the ordinary suits. This includes *suomotu* cases because the judge himself is a concerned citizen in such a case (Downs, 1962, pp. 5-36).

Thirdly, the court adopts a non-adversarial approach in a simple manner as opposed to an adversarial system of litigation. This covers both procedural and substantive reliefs. As a result, the court may treat letters as writ petitions, appoint commissioners, award compensation or supervise and monitor the enforcement of its order (Cooper, 1991, pp. 37-46).

Fourthly, in the ordinary suit, the parties are those who are really aggrieved. In other words, ordinary suits are initiated in the name of the aggrieved person or persons but PILs are not filed in the name of the persons who are really aggrieved, rather in the name of some other persons who act for the benefit of the aggrieved persons (Bhagwati, 1985, pp. 561-577).

Fifthly, unlike ordinary suits, often the PIL involves the question of violation of some fundamental rights guaranteed by the national constitution (Baxi, 1985, pp. 289-315).

At this point, it may be pertinent to ask if PIL is available against a private party. The answer is that a PIL can be filed only against the State, in some cases against municipal authorities, but not against any private party. However, a 'private party' can be included in a PIL as a 'respondent' only after making the state authority or authorities concerned a party or parties (Khan, 1992, pp. 84-95). For example, a tannery factory in Hazaribagh of Dhaka is causing pollution, then people living nearby, or any other person can file a PIL against (a) the State, (b) the Ministry of Forest and Environment, and also against (c) that particular factory. Thus, a PIL cannot be filed against an individual alone.

3. Origin and Development of PIL in Different Jurisdictions

Due to the varying social and economic factors in different countries, the concept of PIL was introduced in the legal system of different countries at different points of time (Kamalkar, 1989, pp. 1-3). The following discussion in this section briefly describes the PIL's historical development.

3.1 USA

The term PIL was first coined in the USA and has been used to refer to cases involving “allegations broadly implicating the operations of large public institutions” (Sabel and Simon, 2004, pp. 1015, 1017). There are a number of movements that may be identified as the roots of public interest law and have shaped its parents’ organization, modes of financing and choices and strategies’ (Balancing the Scales of Justice, 1976, pp. 117-129). The first major root of public interest law may be traced back to the legal aid movement that started in 1876 when a program was taken to assist the arrived German immigrants (Gomez, 1993, pp. 89-93). The second major root of public interest law lies in the works of the Progressive Era reformers, which before aimed to check evils of unregulated business in the time of the rapid industrialization at the turn of the 20th century (Gomez, 1993, pp. 89-93).

The US Supreme Court realized the constitutional obligation of reaching all segments of society particularly the black Americans of African origin. In *Oliver Brown v. Board of Education of Topeka*² it was held that all Americans including Americans of African origin can study in all public educational institutions (*Oliver Brown v. Board of Education of Topeka*, 1954). This was the most significant development in the history of American judiciary since the class action case struck out the “separate but equal doctrine”³ envisaged by the US Supreme Court earlier in the case of *Plessy v. Ferguson* (*Plessy v. Ferguson*, 1896) and thereby declared it illegal to continue segregation in public schools. The US Supreme Court later dismissed the traditional rule of standing in *Association of Data Processing Service Organizations v. William B. Camp* and observed that a plaintiff may be granted standing whenever s/he suffers an “injury in fact”— “economic or otherwise” (U. S., 38 U. S. L. W. (1970), pp. 4193, 4194).⁴In *United States v. Students Challenging Regulatory Agency*

² The case was a class action that was filed against the Topeka, Kansas School Board by representative-plaintiff Oliver Brown, the parent of one of the children who was denied access to Topeka’s white schools.

³ According to the doctrine services, facilities and public accommodations were allowed to be separated by race, on the condition that the quality of each group’s public facilities was to remain equal and thereby the doctrine of US constitutional law justified and permitted racial segregation.

⁴ The decision in the case is not limited to competitor suits. The Court held that the non-economic values— aesthetic, conservational, and recreational, are meant to emphasize that standing might stem from them as well as from the economic injury on which the petitioner relied in the case. See also William A. McLain, “Standing to Challenge Federal Administrative

Procedures (SCRAP)(1973) the court allowed a group of students to challenge the action of the railroad which would have led to environmental loss. In the case of *Thomas E. Singleton v. George J. L. Wulff* (428 U. S. 1976, pp. 106), the Court granted standing to two physicians challenging the constitutionality of a state statute limiting abortions. Similarly, in *Caplin v. Drysdale* (1989), the Court granted standing to an attorney to challenge a drug forfeiture law that would deprive his client of the means to retain counsel. Later development includes the granting of organizational standing by the US Supreme Court. In *Robert Warth v. Ira Seldin* (1975), the Court declared that “even in the absence of injury to itself, an association may have standing solely as the representative of its members.” This judgment had far-reaching consequences. In *James B. Hunt v. Washington State Apple Advertising Commission*, the Court elaborated the parameters for organizational standing where an organization or association “has standing to bring suit on behalf of its members when (a) its members would otherwise have standing to sue in their own right; (b) the interests of it seeks to protect are germane to the organization’s purpose; and (c) neither the claim asserted, nor the relief requested, requires the participation of individual members in the lawsuit” (*James B. Hunt v. Washington State Apple Advertising Commission*, 1977).

In such contexts, it can be stated that nowadays, in the USA, violations of human rights like right to environment or right to life are emerging as grounds of PIL and in that regard, the judiciary of the USA is to some extent widening the concept of standing.

3.2 UK

The use of PIL in the United Kingdom has been comparably limited. The limited development of PIL has occurred through broadening the rules of standing. For example, in *Re Reed, Bowen & Co.* (19 QBD 174) to facilitate vindication of public interest, the English judiciary prescribed broad rules of standing. Under the traditional rule of standing, judicial redress was only available to a ‘person aggrieved’. However, the traditional rule no longer governs standing in the English Courts with the advancement of time and judicial evolution. Lord Denning, one of the most distinguished and respected English Judges, reaffirmed the broadening of standing in the English Courts with his suggestion that the words ‘person aggrieved’ are of wide import and should not be subjected to a restrictive interpretation (*Attorney-General of the Gambia v. Pierre*

Actions in the Wake of *Association of Data Processing Service Organizations, Inc. v. Camp*,” *Loyola University Chicago Law Journal* 1, no. 2 (1970): 285-297.

SarrN'Jie, 1961). *The Blackburn Cases* (*Blackburn v. Attorney-General*, 1971; *Ex parte Blackburn*, 1973; 1 W.L.R. 550. 1976) broadened the rule of standing in actions seeking remedy through prerogative writs brought by individuals against public officials for breach of a private right (e.g. writ of mandamus, prohibition, and certiorari). Under the *Blackburn* standard, "any person who was adversely affected" by the action of a government official in making a mistaken policy decision was eligible to be granted standing before the Court for seeking remedy through prerogative writs (*Regina v. Commissioner of Police of the Metropolis, Ex parte Blackburn*, 1968). Finally, an amendment to the Rules of the Supreme Court in 1978 through Order 53 overcame the English judiciary's least hesitation in applying a broadened rule of standing to relator claims (The Rules of the Supreme Court, 1977, p. 5; Supreme Court Act, p. 31; the Rules of the Supreme Court, 1980). Order 53 applied the broadened rule of standing to both actions seeking remedy through prerogative writs and actions seeking remedy through relator claims. Rule 3(5) of Order 53 stipulates that the Court shall not grant leave for judicial review "unless it considers that the applicant has a sufficient interest in the matter to which the applicant relates" (The Rules of the Supreme Court, 1977, p. 5; Supreme Court Act, p. 31; the Rules of the Supreme Court, 1980). In line with the Rule in *Regina v. Secretary of State for the Environment, Ex parte Rose Theatre Trust Co.* (1990), the Court elaborated that "direct financial or legal interest is not required" to find sufficient interest. Thus, under the new rule of standing embodied in Order 53, individuals can challenge the actions of public officials if they are found to have "sufficient interest" which is a flexible standard. This sufficient interest is a weapon in the hands of the judiciary to use its discretion in accordance with the circumstances. Therefore, the author believes that in line with the new rule that in the near future the actions of public officials if violative of human rights along with other grounds, will be challenged and thereby the new gateway will act as a shield in protecting human rights like other countries.

3.3 India

The origin and evolution of PIL in India emanated from the realization of constitutional obligation by the judiciary towards the vast sections of the society - the poor and the marginalized sections of the society (Kishwar, 1994, pp. 11-23). This jurisdiction has been created and carved out by judicial creativity and craftsmanship. In *M. C. Mehta & Another v. Union of India & Others*, the Court observed that Article 32 of the Constitution of India, 1949 does not merely confer power on the Court to issue direction, order or writ for enforcement of the fundamental rights but also lays a constitutional obligation on the Court to protect the fundamental rights of the people (*M. C. Mehta &*

Another v. Union of India & Others, 1987). The court asserted that to that end the Court has all incidental and ancillary powers including the power to forge new remedies and fashion new strategies designed to enforce the fundamental rights (*M. C. Mehta & Another v. Union of India & Others*, 1987).

The Court broadened the notion of standing stating:

Where there is a violation of a fundamental or other legal right of a person or class of persons who by reason of poverty or disability or socially or economically disadvantaged position cannot approach a Court of law for justice, it would be open to any public-spirited individual or social action group to bring an action for vindication of the fundamental or other legal rights of such individual or class of individuals (*M. C. Mehta & Another v. Union of India & Others*, 1987).⁵

Later on, in order to preserve and protect the fundamental rights of the marginalized section of society by judicial innovation, the courts by exercising their discretion started giving necessary directions and passing orders in the public interest (Priya, 1995, pp. 81-94). The development of PIL has been an extremely significant development in the history of the Indian jurisprudence. The decisions of the Supreme Court in the 1990's expanded the strict *locus standi* requirements to permit the filing of petitions on behalf of marginalized and deprived sections of the society by public-spirited individuals, institutions and/or bodies (Rizvi, 1991, pp. 99-107). The higher Courts exercised wide powers given to them under Articles 32 and 226 of the Constitution of India, 1949. The development of PIL in India may be classified into three phases (Deva, 2009, pp. 19-40):

Phase I deals with directions and orders (*The Mumbai Kamgar Sabha, Bombay v. Abdul bhai Faizulla bhai & Others*, 1976, *Sunil Batra v. Delhi Administration & Others*, 1978; *S. P. Gupta v. President of India & Others*, 1982) passed primarily to protect fundamental rights under Article 21 of the marginalized groups and sections of the society who because of extreme poverty, illiteracy and ignorance cannot approach the court (Rizvi, 1991, pp. 99-107).

Phase II is concerned with the cases relating to protection, preservation of ecology, environment, forests, marine life, wildlife, mountains, rivers,

⁵ The Court in that regard relied on *Bandhua Mukti Morcha v. Union of India & Ors.*, [1984] 2 SCR 67; *S.P. Gupta v. Union of India*, [1981] (Suppl) SCC 87 and *Union for Democratic Rights & Ors. v. Union of India*, [1983] 1 SCR 456.

historical monuments etc. (*M. C. Mehta & Another v. Union of India & Others*, 1987; *Rural Litigation and Entitlement Kendra, Dehradun & Others v. State of U. P. & Others*, 1985; *Chhetriya Pardushan Mukti Sangharsh Samiti v. State of U. P. & Others*, 1990; *Subhash Kumar v. State of Bihar & Others*, 1991; *M. C. Mehta v. Kamal Nath & Others*, 2000).

Phase III is concerned with the directions issued by the Courts (*Vineet Narain & Others v. Union of India & Another*, 1998; *Rajiv Ranjan Singh Lalan & Another v. Union of India & Others*, 2006; *M. C. Mehta v. Union of India & Others*, 2007; *Centre for Public Interest Litigation v. Union of India & Another*, 2003) in maintaining the probity, transparency and integrity in governance (Seervai, 1983, pp. 201-223).

The development of PIL in India acknowledges and reiterates that the role of judicial vigilantism is always required to combat injustice and human rights violations and hence the necessity of PIL in India has continued to grow in scale and importance (Cunningham, 2006, pp. 14). The evolution of PIL in India what is stated above manifestly annotates that nowadays violations of several basic human rights are considered to be acceptable grounds of PIL and the author reasonably believes that such domain will be extended in the days to come in light of further violations of other basic human rights.

3.4 Bangladesh

PIL in Bangladesh is a post-1990s phenomenon, and its entrenchment in Bangladesh constitutional jurisprudence in the mid-1990s was significantly influenced by political change (Ahmed, 1999, pp. 58-60). However, in the development and progress of the scope of Bangladesh, the judges have not been optimally instrumental. Rather, they pursued a parsimonious jurisprudential path for quite some time and refused to look beyond their own world, not because they were ignorant of PIL developments elsewhere but various reasons like lack of concerted efforts from civil society, bar, bench and political will mostly, they delayed implanting it until the pressure from established legal quarters became overwhelmingly strong (Hossain, 1999, pp. 19-26).

3.4.1 The *Berubari Case*: Introducing PIL Vista in Bangladesh

In *Kazi Muklesur Rahman v. Bangladesh* (the *Berubari case*) (1974), when the applicant challenged the Delhi Treaty⁶ to be in violation of fundamental rights

⁶ The Treaty concerning the demarcation of land boundary between Bangladesh and India was signed on the 16th May, 1974 by the Prime Ministers of Bangladesh and India. The Treaty

of free movement, franchise and settlement, he actually came to vindicate his own rights. The applicant alleged that his right to move freely, to reside and settle in any place in the territory, and also his right of franchise was threatened. But the judgment clearly re-interpreted a citizen's right *vis-a-vis* the power of the state. The *Berubari* is often regarded as the first PIL case in Bangladesh pioneering such litigation in South Asia as well (Mustafa Kamal, 1994, pp. 16) and was relied upon by the PIL petitioners in almost all subsequent attempts, i.e., Pepsi, Paracetamol, Slum Dwellers and Industrial cases (discussed in detail in the latter part) to attain standing. But from the PIL perspective, the *Berubari* case has its limitations. *First*, the *Berubari* case involves constitutional questions of grave importance only, not constitutional matters. *Second*, it is involved with fundamental rights. *Third*, it does not deal with cases where a public-spirited petitioner, not himself affected, seeks to move the court to protect the fundamental rights of others. *Fourth*, since there cannot be any specific definition of the constitutional question of 'grave importance' – it remains problematic for the petitioners to get relief as long as the court is conservative (Ahmed, 1999, pp. 58-60). Therefore, it cannot be said that the *Berubari* case authoritatively established PIL in the contemporary sense or that the public interest attributes of the judgment could sufficiently enlighten even the greatest minds in the judiciary (Hoque, 2011, p. 140).

3.4.2 Developments from 1987 to 1993: Stepping Step from 1987 to 1993

During the martial law regime from 1975 to 1986 followed by several coups, the constitutional evolution of Bangladesh faced stagnation the constitution being suspended and the judiciary being ineffective with imposed restrictions by the martial law administrators (Bari, 1987, pp. 35-51; Mamun and Uddin, 2009, pp. 1-31; Bari, 1975).⁷ Therefore, the flow of PIL in that period came to a standstill. After the withdrawal of martial law from 11th November 1986, the Supreme Court of Bangladesh started functioning with its original writ jurisdiction. When the eighth amendment of the constitution decentralized the higher judiciary, the decentralization was successfully challenged in the court in *Anwar Hossain Chowdhury v. Bangladesh* (1989) where the amended Article

provided *inter alia* that India would retain the southern half of the South Berubari Union No. 12 and the adjacent enclaves and in exchange Bangladesh would retain the Dahagram and Angarpota enclaves.

⁷ The Apex Court of Bangladesh declared the acts of the regimes of 1975-1986 illegal by the 5th and 7th amendment cases on the ground of martial law. Justice Khairul Haque termed martial law as no law at all and declared it having no place in the constitution of Bangladesh. As such, the regimes of the said time range (i.e., 1975-1986) should be treated as martial law period.

100 of the Constitution providing such decentralization was challenged to be *ultra vires*. Besides, the court in the case not only confirmed its power of judicial review but also it proceeded to discuss various aspects of constitutionalism in Bangladesh and judicial activism and hence the case established itself as a reference for judges for future whenever the authority of the judiciary was to be decided *vis-a-vis* other governmental organs (Ahmed, 1999, pp. 67-76). As such this case is sometimes described as a forerunner of PIL cases (Rahman, 1997, pp. 53-59).

In 1988, the Young Lawyers Forum (Jubo Ainjibi Forum) initiated *KM Zabir v. Amanullah and Others* (Case No. 1097A1/1988) the petitioner sought to bar Pepsi, a beverage company, from lottery techniques in trade alleging that to be violative of law. The case was fought in the name of PIL and the petitioners won. The court even awarded cost to the association since they had fought the case for public interest (*KM Zabir v. Amanullah and Others*, 1988). For the first time during this period, we see a number of lawyers forming into groups and attempting to fight *pro bono publico*⁸ cases.

In 1991, in *Bangladesh Sangbadpatra Parishad v. The Government of Bangladesh* (1991) (the *BSP Case*), the government had constituted a wage board for fixing the wages of newspaper employees. An association of newspaper owners challenged the Constitution of the Wage Board and its authority and pleaded PIL. The *BSP Case* is therefore a perfect example whereby a privileged group to use the techniques of PIL have actually damaged the movement for cases with genuine concern for social justice (Hossain, Malik and Musaeds., 1997, pp. 88-92).

In 1993 an issue concerning the poor was raised in the *Rokyea Khatun v. Sub Divisional Engineer and Others (Slum Dwellers Case)* (*Rokyea Khatun v. Sub Divisional Engineer and Others*, 1993) when some slum dwellers in Mirpur were ordered to vacate government lands within twenty-four hours. Public spirited lawyers helped a destitute old lady to claim that she must not be removed unless the government provides her with an alternative home. The Court's rejection of the plea that she had a right to stay or to be alternatively provisioned was seen by the lawyers as a denial of PIL. However, the court in the PIL maintained the *status quo* for quite a long time, practically giving ample

⁸*Pro Bono Publico* is a Latin term meaning 'for the public good'. It is the principle that encourages public service-related legal work free of charge.

time to slum dwellers to make alternative arrangements to avoid eviction (Ahmed, 1993, pp. 36-45).

In 1994 a pronouncement in favor of PIL dogma came in *Bangladesh Retired Government Employees Welfare Association and others v. Bangladesh* (1994) where an association of retired government employees challenged discrimination on pension matters. The association's *locus standi* as the applicant representing retired government employees was upheld recognizing the matter as one of public interest and the association having represented the common interests of all retired government officers (*Bangladesh Retired Government Employees Welfare Association and others v. Bangladesh*, 1994).

3.5 PIL and BELA

Founded in 1991 by Late Dr. Mohiuddin Farooque Bangladesh Environment Lawyers Association (BELA) has been playing the pioneering role in PIL in Bangladesh and all PIL cases by BELA are fought in genuine public interest (Ahmed, 1999, p. 37). Because of its contribution towards the development of PIL in Bangladesh and for numerous efforts through PIL, BELA's significant efforts deserve to be dealt with in a distinct segment.

In 1994 BELA filed a Writ Petition namely in *Dr. Mohiuddin Farooque v. Bangladesh and Others (Industrial Case)* (Writ Petition No. 891 of 1994) sought relief against indiscriminate pollution of air, water, soil and the environment by 903 industries of 14 sectors identified as polluters by the Ministry of Local Government, Rural Development and Cooperatives (LGRDC) vide Gazette notification dated 7 August 1986. The 14 sectors include tanneries, paper and pulp, sugar mills, distilleries, iron and steel, fertilizer, insecticide and pesticide industries, chemical industries, cement, pharmaceuticals, textile, rubber and plastic, tyre and tube and jute. The Notification of 7 August 1986 directed the Department of Environment (DoE), the Ministry of Environment and Forests (MoEF) and the Ministry of Industries to ensure within three years that appropriate pollution control measures were undertaken by those industries. But unfortunately, even after the lapse of eight years when no measure was taken the aforesaid Petition was filed. After seven years since the date of filing of the petition on the 15 July of 2001, the court had directed the Directed General, DoE to implement the decision taken with regard to mitigation of pollution by 903 industries identified as polluters within the time frame of six months from the date of the judgment.

It may be mentioned that *Dr. Mohiuddin Farooque v. Bangladesh and Others (Radiated Milk Case)* (Writ Petition No. 92 of 1996) was filed by Dr. Farooque

as a potential consumer seeking redress against the failure of the authorities in taking effective and efficacious measures in dealing with the consignment of 125 metric tons of Milk Powder which was imported to Bangladesh and was found by the Atomic Energy Commission to be containing a high concentration of radioactivity. It was argued that the consumers must be protected against all unscrupulous activities aiming to release the said consignment of radiated milk to give meaning to the constitutional right to life (Islam, 1997, pp. 55-78). The judgment addressed some vital issues for the first time. While the authorities were directed to adopt necessary measures to ensure proper testing of milk, the scope of the constitutional right to life was given a broader meaning. Right to environment was expressly recognized as being included in right to life. Apart from aforesaid cases BELA also filed several other petitions in public interest covering a divergent of areas including complaints against vehicular pollution, artisan propaganda by state-owned television, filling up of lake in Uttara and in Gulshan, cutting of hills and for filling up the vacant posts of Judges in both Divisions of the Supreme Court of Bangladesh (Hoque, 2003, pp. 227-232). But the pole star as to PIL in Bangladesh is the case of *Dr. Mohiuddin Farooque v. Bangladesh* (1997) (the *FAP 20 Case*) where the legality of the establishment of an experimental structural project for flood control in the district of Tangail in Bangladesh was challenged by BELA, alleging adverse effects on more than a million people and natural resources including flora and fauna and thereby violations of law and rights of people.

The *FAP 20 Case* not only widened the vista of *locus standi* but also established the norm of accepting environmental issues as grounds of PIL. Though the High Court Division relying on the *BSP case* refused standing to BELA (50 DLR (HCD) (1998) p. 84), the Appellate Division reversed the decision and granted standing to any person with 'sufficient interest' (not a personal interest) and seeking enforcement of public duty and observance of constitutional or legal provision and wishing to uphold people's rights. It was held that other than an officious intervener or a wayfarer without any interest or concern beyond what belongs to general people or a person having oblique motive any person having sufficient interest in the matter in dispute can maintain an action for judicial redress of a public injury or for the violation of constitutional or legal provision (*Dr. Mohiuddin Farooque v. Bangladesh*, 1997). Hence the court held to include within the meaning of 'person aggrieved' not only the person who is personally aggrieved but also one whose heart bleeds for his less fortunate fellow beings for a wrong done by the government or the local authority in not fulfilling its constitutional or statutory obligations (*Dr. Mohiuddin Farooque v. Bangladesh*, 1997; *National Board of Revenue v. Abu Saeed Khan and Others*,

2013). However, the Appellate Division of the Supreme Court of Bangladesh in this case reaffirmed the commitment of Bangladesh in 'the context of engaging concerns for the conservation of environment, irrespective of the locality where it is threatened' (*Dr. Mohiuddin Farooque v. Bangladesh*, 1997). Furthermore, the Court referring right to protection of law and protection of the right to life as enumerated respectively in Articles 31 and 32 of the Constitution of Bangladesh encompassed within the ambit of the right to life the protection and preservation of environment, ecological balance free from air and water pollution, sanitation etc. and hence held any act or omission contrary thereto to be violative of right to life (*Dr. Mohiuddin Farooque v. Bangladesh*, 1997).

4. Scope of PIL

Earlier it was only a person whose interest was directly affected along with others and whereby his fundamental right is affected, used to file such PIL. Now, the trend has changed, and any public-spirited person can file a PIL on behalf of a group of persons whose rights are affected. In so far as it concerns public wrong or public injury or invasion of fundamental rights of an indeterminate number of people, any member of the public, being a citizen, suffering the common injury or common invasion in common with others or any citizen or an indigenous association, espousing that particular cause is a person aggrieved and has the right to standing in a PIL case (*Dr. Mohiuddin Farooque v. Bangladesh*, 1997). Hence, it is not necessary that the person filing a case should have a direct interest in that PIL (Farooque, 1994-1995). For example, a person residing in Dhaka can file a PIL challenging the pollution caused by a factory situated in Rajshahi; or a citizen can file a PIL challenging government's arbitrary decision to impose a heavy tax that is affecting the poor people, though the citizen filing the PIL may not be personally so much affected by that; similarly, a lawyer can file a PIL for release of some under trial in a jail, who has spent more number of years in jail than the period prescribed as punishment for persons the offence they are being tried for (Farooque, 1994-1995). Therefore, it is clear that any person can file a PIL on behalf of a group of affected people. However, whether a PIL should or should not be allowed will depend on the facts of each particular question and on the general domain of PIL (Islam, 2006, p. 22).

Despite the fact that PIL scope has got widened, it has some constraints discussed below. The presence of an issue of public interest does not make itself a good PIL case. Since it is essentially a litigation, PIL must operate within the limits of certain constraints (Ahmed, 1999, pp. 58-60).

First, the court cannot proceed with a PIL case unless certain basic requirements are fulfilled:

- (a) There must be some violation of constitutional or legal rights, entitlements or privileges or non-performance of constitutional or legal duties *Dr. Mohiuddine Farooque v. Bangladesh and Others*, 1997. In one case relating to importation of cars for the Members of Parliament, the court held that a constitutionally permissible act cannot be challenged merely because it is indecent (*Ahmed Hossain v. Bangladesh*, 1998).
- (b) The courts are not interested to do anything that the judicial mechanism is not designated to perform. In the case of *Vincent Parikulangara v. Union of India* (1987) it was held that the highly technical job of compiling a list of drugs that should be banned cannot be done by the courts of law.
- (c) The court will not entertain any PIL petition filed for personal gain or private profit or personal propaganda or political motive or any extraneous consideration or dubious goal for generating publicity or public sensation (*National Board of Revenue v. Abu Saeed Khan and Others*, 2013; *Dr. Mohiuddin Farooque v. Bangladesh*, 1997).
- (d) The court steps in only when it is possible to provide an effective and adequate remedy through judicial process (*People's Union of Democratic Rights v. Ministry of Home Affairs*, 1985).
- (e) The court will not entertain a PIL when there is any efficacious alternative remedy.

Secondly, the court must follow the theory of separation of power and hence the court should not entertain a PIL petition that trespasses into the areas which are reserved to the executive and legislature by constitutional mandate (*National Board of Revenue v. Abu Saeed Khan and Others*, 2013). Due to this self-imposed restraint, the court cannot do a number of things even in PIL matters. These things are as follows (Ahmed, 1999, pp. 164-165):

- (a) The court cannot dictate or force the executive to shape public policy. In the case of *M. Saleem Ullah v. Bangladesh* (47 DLR 218.), the sending of troops to Haiti was challenged but failed.
- (b) The legislature cannot be forced or compelled to initiate legislation (*State of Himachal Pradesh v. A Parent of a Student of Medical College, Simla*, 1985).
- (c) The court cannot command the administration/executives. However, irregularities made by executives are within the purview of the court. Continuous observation or monitoring of public bodies can be made for

- a limited period of time only in extreme and rare cases where no alternative is at all available (*People's Union of Democratic Rights v. Ministry of Home Affairs*, 1985).
- (d) The court will not entertain any PIL petition that challenges *e.g.* policy matter already mentioned above, development works being implemented by the government, imposition of taxes by the competent authority (*National Board of Revenue v. Abu Saeed Khan and Others*, 2013).
- (e) Where the administration is already dealing with a matter, the court cannot order parallel investigation unless it is fully satisfied that the statutory body is not functioning properly (*State of West Bengal v. Sampat Lal*, 1985). But where the courts are satisfied that other branches of the government are not functioning properly, they must act to ensure social justice.

Thirdly, the court must ensure that the petitioner is approaching with *bona fide* intention (*Dr. Mohiuddin Farooque v. Bangladesh*, 1997). The court in considering the question of *bona fide* in a particular case will have to decide as to why the affected party has not come before it and upon finding no such satisfactory reason for non-appearance should reject the petition (*National Board of Revenue v. Abu Saeed Khan and Others*, 2013). Besides, the court should not entertain any PIL petition that is made by a person who on inquiry is found to be an interloper interfering with the action of any person or authority in connection with the affairs of a state or statutory public authority that does not concern him (*National Board of Revenue v. Abu Saeed Khan and Others*, 2013).

The courts must not forget that the jurisdiction extends no further than the legitimate limits of its constitutional powers and avoid trespassing into political territory which under the constitution has been appropriated to the other organs of the state (*Bandhua Mukti Morcha v. Union of India*, 1984). However, whatever may be PIL's limitation as stated, there is no denying of the fact that PIL is emerging as an effective shield for human rights and rule of law. Therefore, it was held by the Appellate Division of the Supreme Court of Bangladesh that a PIL petition on behalf of the underprivileged or poor, who are unable due to illiteracy or monetary helplessness to come to the court to seek legal redress for the violation of their rights, will be welcomed (*Syeda Rizwana Hasan v. Bangladesh and Others*, 2004; *National Board of Revenue v. Abu Saeed Khan and Others*, 2013).

5. Emerging Roles of PIL at Home and Abroad

PIL is highly connected with human rights and the rule of law. To the downtrodden and the deprived, the fundamental rights which are of deep and daily significance are the rights of survival or subsistence. Without these rights, the exercise of basic freedoms becomes theoretical and without any practical importance. PIL is a savior of many human rights, such as civil rights, poverty, women's rights, child exploitation, etc. (Wadehra, 2009, p. 57). The rule of law, on the other hand, is linked to human rights, because the former is based upon the notion that it must create an environment for establishing social, economic and cultural conditions, which enable men to live in dignity and to live with aspirations. It requires an ordered legal framework that permit the full development of the individual by ensuring certain human rights and fundamental freedoms. Again, it is a cardinal principle of the rule of law that human rights must of necessity be safeguarded and respected (*Benazir Bhutto v Federation of Pakistan*, 1988).

PIL is an integral part of the concept of rule of law. This is because rule of law cannot be segregated from the issue of access to law and justice. Without easy access to justice, legal and constitutional rights would be mere parchment promises or teasing illusions. This would further constitute a denial of justice; which judges are pledged to uphold. Hence, PIL works as a nexus between 'underprivileged group' and 'judiciary' and the outcome of which is the upliftment of human rights, civil and political as well as economic, social and cultural rights (Talukder and Alam, 2011, pp. 17-36). It is a fact that most of the people of third world countries live below the subsistence level. Only because of the prohibitive cost of litigation, they cannot even think of going to the court of law for justice. So, unlike traditional litigation, the lawyers, magnanimous individuals and social service organizations are coming forward for the cause of justice to these poor and disadvantaged people through PIL, and thereby the rule of law and human rights are getting secured (Tan, 2015).

Actually, when the court passes any orders in PIL, the court does not do so with a view to mocking at the legislative or executive authority or in a spirit of confrontation but with a view to enforcing the Constitution and the law. Because, it is vital for the maintenance of the rule of law that the obligations which are laid upon the executive by the Constitution and the law should be carried out faithfully and properly within the legal paradigm (Talukder and Alam, 2011, pp. 17-36). PIL has thus, developed a new jurisprudence of accountability of the state for constitutional and legal violations, adversely affecting the interest of the weaker sections in the community. Various PIL

decisions in different jurisdictions demonstrate how courts have given impetus to the promotion and protection of human rights, by expanding the meaning of fundamental right to equality, life and personal liberty. PIL is thus, a part of a process of ensuring access to law and justice as well as a part of the constitutional commitment and its periphery is being extended day by day (Talukder and Alam, 2011, pp. 17-36).

It is pertinent to state that due to new advancement of case laws the extent and areas of PIL have been extended globally. A plain reading of the leading cases of different jurisdictions suggests that the basic thrust of PIL has always been to protect fundamental and basic rights of the backward and less fortunate section of the people. At times even surpassed its narrow frontiers and developed in other dimensions of public causes (*Maulana Syed Rezaul Haque Chadpuri and Others v. Bangladesh Jamaat-e-Islami and Others*, 2009).

In Bangladesh, BELA has instituted a number of cases on environmental issues. The issues involve a wide range of matters such as river pollution, vehicular pollution, labour welfare, compensation for losses inflicted by development projects, encroachment of vital wetland, relocation of industries and so on (Rafiquzzaman, 2002, p. 127). However, it is no longer confined to the aforesaid issues, the scope has been extended by a number of more vital cases, such as problems related to poverty, police atrocities (Bhuiyan, 2006, p. 69). Furthermore, non-payment of minimum wages to workers, refusal to register a criminal case, atrocities on women, harassment or torture or custodial death caused by law enforcing agencies, disturbance of ecological balance, adulteration of foods and drugs, maintenance of heritage and culture, antiques, forest and wildlife etc. are accepted today as grounds of PIL (*National Board of Revenue v. Abu Saeed Khan and Others*, 2013). Besides, the rights of children and women are also grounds of filing PIL (Rahman, 1999, p. 161). Last but not the least, matters related to the minorities are another new area of PIL and other human rights affairs are also getting importance in case of PIL (Karzon and Faruque, 1999, p. 23).

In India, even the areas of filing PIL are becoming wide. Violation of basic human rights of the poor is the established ground of PIL. Nowadays, in India, the contents and conduct of government policy are also being challenged on the ground of PIL.⁹The courts are also compelling municipal authorities to perform

⁹ For example, in 2008 a public interest litigation was filed seeking the Court to direct to enact a Road Safety Act in view of frequent road accidents and inaction by the government thereon; *Common Cause (A Regd. Society) v. Union of India*, AIR 2008 SC 2116. Besides in 2009 in

public duties. Violation of religious rights and other basic fundamental rights are also established grounds of PIL (Deva, 2009), pp. 19-40). There are some other possible grounds where PIL may be filed, *e.g.* where a factory industrial unit is causing air pollution and people nearby are getting affected (Jain, 2003, p. 111). Where there is no street light in a street, which causes inconvenience to commuters, the court may direct an order on the ground of it (Jain, 2003, p. 117). Some other grounds of PIL include the cases where some “Banquet Hall” plays a loud music at night causing noise pollution or where some construction companies are cutting down trees causing environmental pollution or where poor people are affected due to the state government’s arbitrary decision to impose a heavy tax or where rights of working women are affected (Bakshi, 1999, p. 71). There are instances where in PIL the court directs the jail authority to make appropriate decisions with regards to jail reforms, such as serration of convicts or orders to abolish child and bonded labour and the police for keeping a check on corruption and crime involving holders of high political office (Bakshi, 1999, p. 75). Under the domain of PIL, directions by the court were also obtained for maintaining roads, sewers etc. in good condition, for removal of big hoarding and signboard from busy roads to avoid traffic problems and for directing the Delhi Traffic Police to stop the method of sending *chalan* to address by post due to its misuse (Basu, 2008, p. 137).

In the UK it is axiomatic that the present provision relating to sufficient interest is set out in section 31(3) of the Senior Courts Act, 1981. But after the incorporation of the provision of judicial review in Human Rights Act 1998¹⁰, the areas of sufficient interest are extending through case laws. The areas include rule of law, transparency, accountability, participation, democracy, human rights etc. (Raine, 2013, pp. 81-108).

In the USA, apart from consumer issues, health and hygiene issues, environmental issues economic, social and cultural rights-based issues have been addressed through PIL and remedied by the court (Sarat and Scheingold,

Sanganmal Panday v. State of U. P., a unreported public interest litigation, construction activities were challenged alleging to be not environment-friendly and the Lucknow bench of Allahabad Court stayed concerned construction activities.

¹⁰ The Act has rendered the judiciary the authority to review Acts of Parliament and to judge whether they are compatible with the European Convention on Human Rights (ECHR), 1950. Furthermore, in case of any contravention, section 4 of the Act has permitted judges to issue a ‘declaration of incompatibility’, an explicit declaration of a legislation’s inconsistency with the ECHR.

2001, p. 92). Through PIL, the courts of the USA, especially the Supreme Court, have played a pivotal role in some human rights matters like discrimination in educating the poor, medical services for children, care for pregnant women, prohibition of harsh law for employees, etc (Wadehra, 2009, pp. 148-149).

All these emerging issues addressed in PIL are nothing but the significations of the widened vista of PIL that are playing a vital role in upholding human rights and rule of law.

6. Conclusion

A public interest litigation cannot be a weapon in the hands of so-called human rights activists for publicity interest litigation. For sanctity and further development, there must be real and genuine public interest involved in such litigations and not merely an interest to nurture adventure (*National Board of Revenue v. Abu Saeed Khan and Others*, 2013). Once nose into for a probe, it should not also be invoked by a person or body of persons to further his or their personal causes to satisfy his or their personal grudge and enmity (Halpern, 1974, pp. 118-127). Courts of justice should not be allowed to be polluted by unscrupulous litigants by resorting to the extraordinary jurisdiction. A person acting *bonafide* and having sufficient interest (defined previously) in the proceeding of a PIL will alone have a *locus standi* and can approach the court to wipe out violation of fundamental rights and genuine infection of statutory provisions but not for personal gain or private profit or political motive or any oblique consideration (Craig, 1989, p. 514). It is also observed from the cases elaborated above that discretionary power should be exercised with great caution. It is axiomatic from the development of PIL in all jurisdictions, as stated above, evidently denotes the emergence of human rights as grounds of PIL.

Therefore, it is hoped that PIL will not emerge as 'Publicity Interest Litigation' or 'Private Interest Litigation' or 'money earning litigation'. To address the problems and complexities related to PIL, its proper administration is a must (Choudhury, 1996, pp. 1-6). The whole purpose is to make sure that the right people receive the right benefits of PIL because they do not have the means to materialize their rights. To quote P.N. Bhagwati, a former Chief Justice of India:

"The concern shown (by the law) to the poor and the disadvantaged is much greater than that shown to the rich and well-to-do because the latter can, on account of their dominant social and economic position and large material resources, resist aggression on their rights where the poor and the

deprived just do not have the capacity or the will to resist and fight” (Bhagwati, 1986, p. 769).

PIL has now come to occupy an important field in ensuring human rights and the administration of law and justice since there is no denying of the fact that judicial vigilance is always necessary if the rights of the individuals are to be preserved (Davies, 1975, p. 9).

References:

- Ahmad, I. A. and Karim, M. E., (2006) *Principles of Civil Litigation: Bangladesh Perspective*, Dhaka: Law Lyceum, 157.
- Ahmed, N., *Public Interest Litigation: Constitutional Issues and Remedies*, Dhaka: Bangladesh Legal Aid and Services Trust (BLAST), 37.
- Ahmed, S. I., (1993) *An Expanding Frontier of Judicial Review - Public Interest Litigation*, Dhaka Law Reports 45, 36-45.
- Association of Data Processing Service Organizations, (1970), Inc. v. Camp*, Loyola University Chicago Law Journal 1, no. 2, 285-297.
- Bakshi, P.M., (1999) *Public Interest Litigations*, New Delhi: Ashoka Law House, 71.
- Bari, M. E., (1975) *The Imposition of Martial Law in Bangladesh, 1975: A Legal Study*, Dhaka University Studies, Part- F 1, no. 1, 59-73.
- Bari, M. E., (1987), *Martial Law and Judiciary in Bangladesh: 1975-1979*,” Law and International Affairs 10, nos. 1 & 2, 35-51.
- Basu, D. D., (2008) *Durga Das Basu’s Commentary on the Constitution of India, Vol-II*, ndia: Lexis Nexis, 137.
- Baxi, U., (1985), *Taking Suffering Seriously: Social Action Litigation in the Supreme Court of India*,” in *Judges and the Judicial Power: Essays in Honour of Justice V. R. Krishna Iyer*, eds. Rajeev Dhavan, R. Sudarshan and Salman Khurshid, London & Bombay: Sweet & Maxwell and Tripathi, 289-315.
- Bhagwati, P.N. (1985) *Judicial Activism and Public Interest Litigation*, Columbia Journal of Transnational Law 23, 561-577.
- Bhuiyan, J. H. (2006) *Access to Justice to the Impoverished and Downtrodden Segments of the People through Public Interest Litigation: Bangladesh, India and Pakistan Perspective*, Bangladesh Journal of Law 10, no. 1 & 2, 69.

- Choudhury, A. H., (1996), Public interest Litigation and Distributive Justice, A Conference Paper in The Fifth SAARC Law Conference: Development through Law, held in Dhaka on January, 1-6.
- Cooper, J., (1991), Key guide to Information Sources in Public Interest Law, London: Mansell, 37-46.
- Council for Public Interest Law, (1976), Balancing the Scales of Justice: Financing Public Interest Law in America, Washington DC: Council for Public Interest Law, 117-129.
- Craig, P.P. (1989), Administrative Law, London: Sweet and Maxwell, 514.
- Cunningham, C. D., (2006) The World's Most Powerful Court: Finding the Roots of India's Public Interest Litigation Revolution in the Hussainara Khatoon Prisoner Case, in the Conference on the Comparative Constitutional Traditions in South Asia, held at the SOAS, London, 14.
- Davies, L/ E., (1975) Judicial Activism, Current Legal Problems 28, 9.
- Deva, S. (2009), Public Interest Litigation in India: A Critical Review, Civil Justice Quarterly 28, no. 1, 19-40.
- Downs A., (1962), The Public Interest: Its Meaning in Democracy, Social Research 29, 5-36.
- Goldston, J. A., (2006) "Public Interest Litigation in Central and Eastern Europe: Roots, Prospects, and Challenges," Human Rights Quarterly 28, no. 2, 492-527.
- Gomez, M., (1993) In the Public Interest: Essays on Public Interest Litigation and Participatory Justice, Colombo: Legal Aid Centre of the University of Colombo, 89-93.
- Halpern, C. R., (1974) Public Interest Law: Its Past and Future, Judicature 58, no. 3, 118-127.
- Hershkoff H. and McCutcheon, A., (2000) Public Interest Litigation: An International Perspective, in Many Roads to Justice: The Law-Related Work of Ford Foundation Grantees around the World, eds. Mary McClymont and Stephen Golub, USA: The Ford Foundation, 283-284.
- Hoque, K. E., (2003) Administration of Justice in Bangladesh, Dhaka: Asiatic Society of Bangladesh, 227-232.
- Hoque, R. (2011) Judicial Activism in Bangladesh: A Golden Mean Approach, Newcastle upon Tyne: Cambridge Scholars Publishing, 252.
- Hoque, R. (2011) Judicial Activism in Bangladesh: A Golden Mean Approach, Newcastle upon Tyne: Cambridge Scholars Publishing, 140.
- Hossain, S. Hassan, M. and Hayat, S., (1999), Case Table on Public Interest Litigation, Grameen Poverty Research 5, no. 1, 19-26.

- Hossain, S. Hassan, M. and Musaeds, B., (1997), *Public Interest Litigation in South Asia: Rights in Search of Remedies*, Dhaka: University Press Limited, 88-92.
- Islam, M.A., (1997) A Review of Public Interest Litigation Experiences in South Asia, in *Public Interest Litigation in South Asia: Rights in Search of Remedies*, eds. Sara Hossain, Shahdeen Malik and Bushra Musa, Dhaka: University Press Limited, 55-78.
- Islam, M.A., (2006) Person Aggrieved: PIL and Bangladesh on the threshold, in *The National Workshop on Public Interest Litigation: Sharing Experiences and Initiatives*, A workshop organised by Ain O Salish Kendra (ASK), Bangladesh Legal Aid and Services Trust (BLAST) and Madaripur Legal Aid Association, 22.
- Jain, M. P., (2003) *Indian constitutional Law*, Nagpur: Wadha & Co., 111. JUSTICE/Public Law Project, (1996) *A Matter of Public Interest: Reforming the Law and Practice on Intervention in Public Interest Cases*, London: JUSTICE/Public Law Project, 77-89.
- Kamal, M., (1994) *Bangladesh Constitution: Trends and Issues*, Dhaka: University of Dhaka, 16.
- Kamalkar, S., (1989), *Parameters of Public Interest Litigation*, Bombay Law Reports (Journal Section), 1-3.
- Karzon, S. H. R. and Faruque, A. A., (1999) Status of International Law under the Constitution of Bangladesh: An Appraisal, *Bangladesh Journal of Law* 3, no. 1, 23.
- Khan, M. H., (1992) The Concept of Public Interest Litigation and Its Meaning in Pakistan, *Pakistan Legal Decisions*, 84-95.
- Kishwar, M., (1994) *Public Interest Litigation: One Step Forward, Two Steps Backwards*," *Manushi* 81, 11-23.
- Mamun M. A. A. and Uddin, M. M., (2009) Revolution versus Usurpation: The Doctrine of Revolutionary Legality Reexamined, *The Chittagong University Journal of Law* XIV, 1-31.
- Priya, Y. V., (1995), *Public Interest Litigation*, *Indian Socio-legal Journal* XXI, no. 1 and 2, 81-94.
- Rafiquzzaman, M., (2002) *Public Interest Litigation in Bangladesh: A Case Study*, *Bangladesh Journal of Law* 6, no. 1 & 2, 127.
- Rahman A., (1999), *Public Accountability through Public Interest Litigation*, *Bangladesh Journal of Law* 3, no. 2, 161.
- Rahman, M., (1997), Existing Avenues for Public Interest Litigation in Bangladesh," in *Public Interest Litigation in South Asia: Rights in Search of Remedies*, eds. Hossain, S., Malik, S. and Musa, B., Dhaka: University Press Limited, 53-59.
- Raine, T., (2013), *Judicial Review Under the Human Rights Act: A Culture of Justification*, *North East Law Review* 1, 81-108.

- Rizvi, S. I. H., (1991) *Public Interest Litigation, Liberty and Justice for All*, Delhi: Renaissance Publishing House, 99-107.
- Sabel, C.F. and Simon, W. H., (2004), *Destabilization Rights: How Public Law Litigation Succeeds*, *Harvard Law Review* 117, 1015, 1017.
- Sarat, A. and Scheingold, S., (2001), *Cause Lawyering and the State in a Global Era*, New York: Oxford University Press, 92.
- Seervai H.M., (1983) *Constitutional Law of India: A Critical Commentary*, Vol. 1, Bombay: Tripathi, 201-223.
- Supreme Court Act, 1981.
- Supreme Court, Rules of the Supreme Court (Amendment No. 3), STAT. INST., 1977, No. 1955.
- Talukder S. M. H., and Alam, M. J., (2011) *Public Interest Litigation: An Effective Mechanism for Securing Human Rights and Rule of Law*, *Dhaka University Studies*, Part- F 22, no. 2, 17-36.
- Tan, R. (2003), *The Role of Public Interest Litigation in Promoting Good Governance in Malaysia and Singapore*, "The Malaysian Bar."
- The Constitution of the People's Republic of Bangladesh.
- The Rules of the Supreme Court (Amendment No. 4), STAT. INST., 1980, No. 2000, 2-7.
- Wade, W. and Forsyth, C., (1994), *Administrative Law*, London: Oxford Clarendon Press, 69-75.
- Wadehra, D. B. L., (2009) *Public Interest Litigation: A Handbook*, Delhi: Universal Law Publishing Co. Ltd., 57.
- Weisbrod, B. A., (1978), *Conceptual Perspective on the Public Interest: An Economic Analysis*, in *Public Interest Law: An Economic and Institutional Analysis*, eds. Burton A. Weisbrod, Joel Handler and Neil K Komesar, California: University of California Press, 4-29.

Judicial Decisions:

- Ahmed Hossain v. Bangladesh, 18 BLD (AD, 1998)
- Anwar Hossain Chowdhury v. Bangladesh, 2 SCC (SC, 1987).
- Attorney-General of the Gambia v. Pierre SarrN'Jie, (AC, 1961)
- Bandhua Mukti Morcha v. Union of India &Ors., AIR 802 (SCR, 1984).
- Bangladesh Environmental Lawyers Association (BELA) v. Bangladesh and others, Unreported Writ Petition No. 891 of 1994.

Bangladesh Retired Government Employees Welfare Association and others v. Bangladesh, 46 DLR (HCD, 1994)

Bangladesh Sangbadpatra Parishad v. The Government of Bangladesh, 43 DLR (AD, 1991).

BANGLADESH TELECOM (PVT.) LTD. VS. BANGLADESH TELEGRAPH AND TELEPHONE BOARD, 48 DLR(AD, 1996)

Benazir Bhutto v Federation of Pakistan, PLD 416 (SC, 1988)).

Bihar Legal Support Society v. The Chief Justice of India and Another, 4 S.C.C. 767 (SC, 1986).

Blackburn v. Attorney-General, 1 W.L.R. 1037 (1971).

Caplin v. Drysdale, 491 U. S (SC, 1989).

Centre for Public Interest Litigation v. Union of India & Another, AIR 3277 (SC, 2003)

ChhetriyaPardushan Mukti Sangharsh Samiti v. State of U. P. & Others, AIR 2060 (SC, 1990)

Dr. MohiuddineFarooque v. Bangladesh and Others, 49 DLR (AD, 1997).

Exparte Blackburn Q.B. 241, (1973).

James B. Hunt v. Washington State Apple Advertising Commission, 432 U. S. (SC, 1977)

Janata Dal v. H. S. Chaudhary, 4 SCC (SC, 1992).

KaziMuklesur Rahman v. Bangladesh, 26 DLR (SC, 1974).

M. C. Mehta & Another v. Union of India & Others, AIR 1086 (SC, 1987).

M. C. Mehta v. Kamal Nath& Others, 6 SCC (SC, 2000).

M. C. Mehta v. Union of India & Others, 12 SCALE (SC, 2007).

M. Saleem Ullah v. Bangladesh, 47 DLR 218 (HCD, 2004)

Maulana Syed Rezaul Haque Chadpuri and Others v. Bangladesh Jamaat-e-Islami and Others, Writ Petition No. 630 of 2009.

Mustafa Kamal, J. in Dr. Mohiuddin Farooque v. Bangladesh, 49 DLR (AD, 1997).

National Board of Revenue v. Abu Saeed Khan and Others, 18 BLC (AD, 2013).

Oliver Brown v. Board of Education of Topeka, 347 U. S. (SC, 1954).

People's Union for Democratic Rights & Others v. Union of India & Others, 3 SCC (SC, 1982).

People's Union of Democratic Rights v. Ministry of Home Affairs, AIR 268 (SC, 1985).

Plessy v. Ferguson, (1896) 163 U. S. (SC, 1896).

Rajiv Ranjan Singh Lalan & Another v. Union of India & Others, 6 SCC, (SC, 2006).

Ramsaran v. Union of India, AIR 251 (SC, 1989)

Re Reed, Bowen & Co, 19 QBD, (Queen's Bench, 1887).

Regina v. Commissioner of Police of the Metropolis, Ex parte Blackburn, 2 W.L.R. 893 (QBD, 1968)

Regina v. Secretary of State for the Environment, Ex parte Rose Theatre Trust Co., 1 Q. B. (Queen's Bench, 1990).

Rokyea Khatun v. Sub Divisional Engineer and Others, Unreported Writ Petition No. 701 of 1993.

Rural Litigation and Entitlement Kendra, Dehradun & Others v. State of U. P. & Others, AIR 652 (SC, 1985).

S. P. Gupta v. President of India & Others, AIR 889, (SC, 1982).

State of Himachal Pradesh v. A Parent of a Student of Medical College, Simla, AIR 195, (SC, 1985).

State of West Bengal v. Sampat Lal, AIR 195, (SC 1985).

Subhash Kumar v. State of Bihar & Others, AIR 420 (SC, 1991)

Sunil Batra v. Delhi Administration & Others, AIR 1675, (SC, 1978).

Syeda Rizwana Hasan v. Bangladesh and Others, Civil Appeal No. 200 of 2004.

The Mumbai Kamgar Sabha, Bombay v. Abdulbhai Faizulla bhai & Others, AIR 1455 (SC, 1976).

Thomas E. Singleton v. George J. L. Wulff, 428 U. S. (SC, 1976).

Union for Democratic Rights & Ors. v. Union of India, AIR 271, (SC, 1983).

Unreported Chief Metropolitan Magistrate Court, Dhaka Complaint Registered Case No. 1097A1/1988.

Vineet Narain & Others v. Union of India & Another, (1998) AIR SC.

Warth v. Ira Seldin, 422 U. S. (SC, 1975).

Solar Energy Deployment: Present Activities and Future Opportunities in Bangladesh

Md. Maidul Islam¹

Abstract

Bangladesh is in a very suitable position in respect of the utilization of solar energy. Solar Energy is boundless and pollution free. It is now being widely used for electrical power generation. A rigorous study is continuing to search the solution for fruitful utilization of solar energy. Recently, many developed countries are generating power from solar energy sources. In this view, it becomes important to study of present solar energy activities and to search various scopes for utilizing solar energy recourses in Bangladesh. Current paper makes an effort to demonstrate a short review of current solar PV energy activities and future prospects in Bangladesh. Current extent of the area for production of electricity from solar resources and some proposed scope for fruitful utilization of solar energy in respect of Bangladesh has been discussed in this paper.

Keywords: Renewable Energy, Solar PV, Utilization, Electric Vehicles, Deployment

I. Introduction

The greatest amount of solar energy is available between two broad bands encircling the earth between 15° and 35° latitude north and south. Graphically Bangladesh is located in the north-eastern side of South Asia between 20° 34' & 26° 38' north latitude and 88° 01' & 92° 41' east longitude [Statistical pocket book Bangladesh 2016]. So Bangladesh is situated in a very advantageous place in the regarding of fruitful utilization of solar energy. More than 75% of the population lives in the rural areas of Bangladesh [Statistical pocket book Bangladesh 2016]. A huge amount of people of rural people are in electricity crisis along with increasing energy demand in all over the country. As the growth of the grid is inordinately pricy within the rural areas, so far several initiatives are taken to familiarize the utilization of green energy sources. The total power generation capacity in Bangladesh is about 25145 MW (as updated on 18th June 2021) [Power cell 2021]. Renewable energy shares about 2.91%

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of total generation [Sreda 2021]. At present Solar PV contributes 68 % of total renewable energy in Bangladesh [Sreda 2021]. In the future of the year 2030, the total electricity generation capacity will increase to 39000MW. As future plan within the year of 2021, 10% renewable energy will share in the total generation [Sreda 2021]. As Bangladesh is situated in a beneficial place in regarding for deploying of solar energy, Employing this advantages of solar resources can promote to 10% renewable energy share within the year of 2021. A recent scenario of the solar PV energy-related works in Bangladesh is shown in this research paper. Some beneficial area for efficient use of solar PV energy also has been proposed.

II. Review of Existing Solar PV Energy Activities in Bangladesh

The present government is pledged-bound to supply electricity uninterrupted to all citizens within 2021 by way of materializing the Vision-2021. The deployment of solar energy is usually found in rural areas of Bangladesh. There are different types of technologies used in Bangladesh such Solar Mini-Grid, Solar Nano-Grid, Solar Park, Solar Roof-Top (Off- Grid), Solar Roof-Top (On-Grid) Solar powered irrigation system, Solar home system, Solar charging station.

Solar PV-Based Mini-Grid, Micro grid, Nano-grid

Several areas in Bangladesh which are out of consuming electricity from the national grid. They fully depend on microgrid to cover their electricity demand. Microgrid supported by small diesel-based production is being used in Bangladesh. The government has the vision to implement many microgrids based on solar energy shown in figure 1. Primarily, from this vision, thirty suitable rural places have been chosen under this mission where grid expansion has not schemed for the next 15-20 years. In addition, new locations will be explored to implement the solar mini-grid system on the basis of successful execution. Overall solar energy capability in addition from this constituent will be 25 MW. A solar mini-grid can guarantee quality electricity in rural areas and facilitate the villagers to possess an improved financial gain, which is able to mitigate their poorness to some extent [Sreda 2021].

In addition, BPDB and REB have implemented bigger size of solar PV based micro grid in several places in Bangladesh. A 100-kW solar photovoltaic (PV) microgrid (IDCOL) has implemented at Sandwip island in Chittagong by PUROBI Green Energy Limited (PGEL). To reduce the matter of low solar radiation a 40-kW diesel generator has been implemented into the suggested power plant in order to confirm adequate power demand [Sajib *et al* 2016].

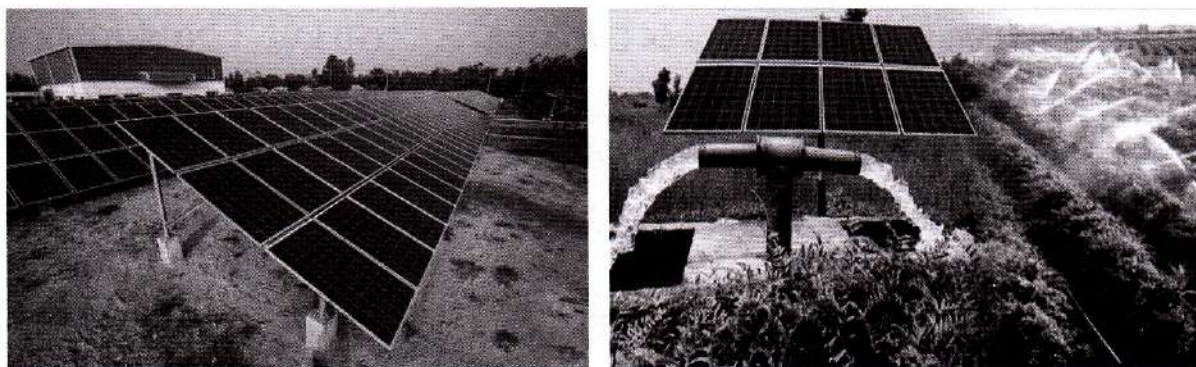


Figure 1. Solar PV-based mini-grid Figure 2. Solar powered irrigation system

Table:01 List of Solar Mini-Grid Project in Bangladesh [Renewable Energy Master Database 2021]

SL.	Project Name	Capacity	Completion Date
1	BREL Solar Mini-Grid Project	170 kW	2020-01-22
2	Impressive Greentech Ltd. Mini-Grid Project	250 kW	2019-12-31
3	Western Renewable Energy Ltd. Minigrid Project-01	218 kW	2019-11-23
4	UDDIPAN -1 Mini-Grid Project 1	220 kW	2019-03-25
5	Connectia Limited Mini-Grid Project	220 kW	2018-12-27
6	GHEL Solar Mini-Grid Project 02(Char Kajal)	100 kW	2018-11-24
7	Western Renewable Energy Ltd. Minigrid Project-01-	280 kW	2018-10-31
8	GHEL Solar Mini-Grid Project 03(Char Biswas)	100 kW	2018-10-26
9	Blue Marine Energy Limited Mini-Grid Project	250 kW	2018-09-30
10	Eastec Ltd. Mini-Grid Project	250 kW	2018-04-20

11	Envis Energy Limited Mini-Grid Project	250 kW	2018-04-13
12	Brit Bangla Trade Initiatives Ltd. Mini-Grid Project	250 kW	2018-03-18
13	UDDIPAN -2 Mini-Grid Project 2	160 kW	2018-03-10
14	Solar Electro Bangladesh Ltd.-Mini-Grid Project 3	250 kW	2018-01-06
15	Vincen G-Tech Ltd. Mini-Grid Project	250 kW	2017-12-30
16	Solar Electro Bangladesh Ltd.-Mini-Grid Project 2	250 kW	2017-12-14
17	Solargao Solar Mini-Grid Project	130 kW	2017-02-28
18	PEL Solar Mini-Grid Project	210 kW	2017-02-15
19	Super Star Solar Mini-Grid Project	228 kW	2017-01-28
20	AVA Solar Mini-Grid Project	150 kW	2016-11-16
21	650 kWp Solar Minigrid Pilot Project at remote haor areas of Sullah, Sunamganj	650 kW	2015-12-31
22	GEAL Solar Mini-Grid Project	160 kW	2015-11-14
23	SEBL Solar Mini-Grid Project	180 kW	2015-10-20
24	HBPL Solar Mini-Grid Project	140 kW	2015-03-09
25	GHEL Solar Mini-Grid Project 01	100 kW	2015-01-15
26	Shouro Bangla Solar Mini-Grid Project	140 kW	2014-12-12
27	PGEL Solar Mini-Grid Project	100 kW	2010-10-01

Total 26 solar mini grid systems are now running with more than 5MW capacity. Maximum projects are supported by IDCOL [Renewable Energy Master Database 2021].

The World Bank, KfW, JICA, GPOBA, USAID, ADB and DFID are allocating financial support in those projects.

In Bangladesh, There is no solar based micro grid yet. Two solar nano grid projects are now running. One is 50 Wp Solar Nanogrid Project in Matlab another 250 Wp Solar Nanogrid Project in Sunamganj with 0.75kW capacity

Solar Park

A solar park is a large-scale photovoltaic power generation system (PV system) designed for the supply of merchant power into the electricity grid. Recently a Sirajganj 7.6 MWp Grid Connected Solar Photovoltaic Power Plant has been deployed by the month of March 2021 in Sirajganj. Small scale capacity solar park in total more than 90MW is completed at the various rural place of Bangladesh up to month of March of the 2021 year. Now 9 solar park with different capacities are implementing at different places in Bangladesh.

Table:02 RE solar park project summery in Bangladesh [Renewable Energy Master Database 2021]

Sl	Project Name	Capacity	Location	Completion Date	Present Status
1	Sirajganj 7.6 MWp Grid Connected Solar Photovoltaic Power Plant	6.13 MW	Sirajganj Sadar Upazila, Sirajgonj	2021-03-30	Completed
2	50 MW (AC) Solar Park by HETAT-DITROLIC-IFDC Solar Consortium	50 MW	Gauripur, Mymensingh	2020-11-04	
3	Kaptai 7.4 MWp Grid-connected Solar PV Power Plant	7.4 MW	Kaptai Upazila, Rangamati	2019-05-28	
4	8 MW Solar Park by Parasol Energy Ltd.	8 MW	Panchagarh Sadar, Panchagarh	2019-05-13	
5	20MW (AC) Solar Park by Joules Power Limited (JPL)	20 MW	Teknaf Upazila, Cox's Bazar	2018-09-15	
6	3 MW Grid-connected PV Power Plant at Sharishabari, Jamalpur	3 MW	Sarishabari Upazila, Jamalpur	2017-07-14	

7	Sonagazi 50 MW Solar Power Plant Construction Project	50 MW	Sonagazi, Feni	2022-12-30	Implementation Ongoing
8	5 MW (AC) Solar Park by PV Power Patgram Ltd.	5 MW	Patgram, Lalmonirhat	2021-12-31	
9	5 MW (AC) Solar Park by Sun Solar Power Plant Ltd.	5 MW	Gowainghat, Sylhet	2021-12-30	
10	200 MW (AC) Solar Park by Beximco Power Co. Ltd.	200 MW	Sundarganj, Gaibandha	2021-10-26	
11	30MW (AC) Solar Park by Intraco CNG Ltd & Juli New Energy Co. Ltd.	30 MW	Gangachara, Rangpur	2021-09-26	
12	35 MW (AC) Solar Park by Consortium of Spectra Engineers Limited & Shunfeng Investment Limited	35 MW	Shibalaya Upazila, Manikganj	2021-03-12	
13	32 MW (AC) Solar Park by Haor Bangla-Korea Green Energy Ltd.	32 MW	Dharampasha, Sunamganj	2021-02-28	
14	Solar Street Lighting Program in 8 City Corporations (SSLPCC)	0 kW	Whole Bangladesh	2019-12-31	

15	200 MW (AC) Solar Park by SunEdison Energy Holding (Singapore) Pvt Ltd	200 MW	Teknaf Upazila, Cox's Bazar	2018-07-09	
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Near about total 1622MW at small scale power plant is under planning to deployment process [Renewable Energy Master Database 2021].

Solar Roof Top

A Commercial rooftop on-grid solar plant capacity is 26MW till 23th February 2021. Total 122 solar roof top including on grid and off grid project under GoB. and private has been initiated in Bangladesh [Renewable Energy Master Database 2021].

Solar Powered Irrigation System

In Bangladesh 1.34 million diesel pumps are used for irrigation. 3.4 million hector lands are used in irrigation. If the implementation of solar irrigation pump is used when the Government of Bangladesh reduces 150 MW energy from this sector so that we can save 95,000 liters of diesel and reduce the amount of CO₂ release per day. Under the vision of RE policy, 500 MW solar energy programmed development strategy is the biggest evergreen energy development mission in the People's Republic of Bangladesh that is picked in 2012. That vision implemented by 2016. The vision aims at direct participation of the private sector for project compilation. Benefit from 500 MW Solar programmed development strategy as applicable as 52 solar power irrigation pumps have been installed remote places to facilitate farmers to get water for farming at low cost [500MW Solar Power Programme, 2012-2016]. Now total installed 6.62MW solar power is used for irrigation system shown as figure 2. [Renewable Energy Master Database 2021]. Up to March 2021, 1,515 solar irrigation pumps are operational with an installed capacity of around 40 MWp. IDCOL has a goal to finance 10,000 solar power irrigation pumps within 2027. The World Bank, KfW, GPOBA, JICA, USAID, ADB, and Bangladesh Climate Change Resilience Fund (BCCRF) are supporting this initiative [IDCOL 2021].

At present, 2129 solar power irrigation system has been deployed all over the Bangladesh and 96 systems is now implementing [Renewable Energy Master Database 2021].

Solar Home System (SHS)

Most of the Village people depend on kerosene lamps for lighting and traditional stoves for cooking. The Government has initiated various programs and has given enormous efforts to introduce flexibility in the rural economy.

Solar energy, especially SHS technology, has been received by village people as a rational way to manage the demand of lighting. In the off-grid remote places of Bangladesh, more than 4.13 million SHSs have been already implemented under the administration of the mission [IDCOL 2021]. An example of SHS shown in figure 3. In addition, more than 18 million rural people are receiving solar power electricity that is almost 12% of the total population of Bangladesh. IDCOL has another aims to give financial assistance to 6 million SHSs within 2021, with an approximated electricity generation capacity of 220 MW [IDCOL 2021].

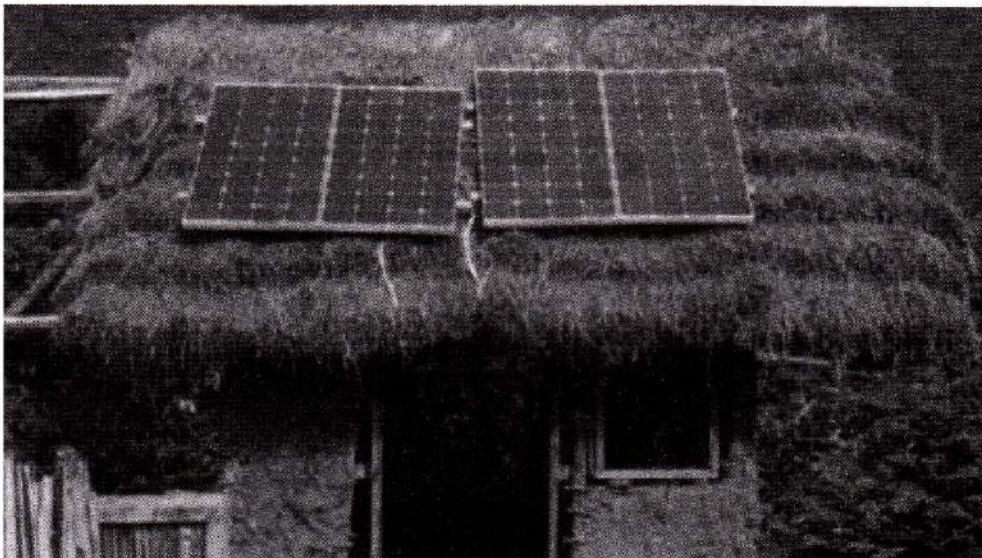


Figure 3. Solar home system

Right now, the SHS program is implementing by 47 Partner Organizations (POs). IDCOL gives grant support, refinancing and at an equivalent time essential technical help to the POs. The POs implement the SHSs, increase credit to the end-users and help with after-sales services. From the World Bank, JICA and other financial supporting organizations IDCOL received grant support and credit [IDCOL 2021].

Under the administration of the program more than 65,000 SHSs are now being installed every month. Right now, year to year installation progress rate of 58%. The program has superseded 1.14 million tons of fuel that have an associate calculable price of USD 411 million each year. In addition, almost 75,000

people are directly or indirectly involved with the mission. The program has been heralded as one of the largest and also the fastest growing off-grid green energy missions in the world [IDCOL 2021].

Solar Power Solutions for Telecom Sector

As the reason for the high price of fuel and regular maintenance forced the telecom operators to the intrigue of a renewable energy source. By which the remote and off-grid BTSs can be easily functioned. For uninterrupted voice and data services, many of them have determined to run off-grid BTSs with solar-diesel hybrid power systems. This technology uses solar PV as the main power supply and as a backup diesel generator. IDCOL has financed more than 138 such solar-diesel hybrid power systems in the telecom sector so far [Rahman *et al.* 2013].

Solar Drinking Water System

Up to till date total of 152 solar power drinking water systems have been installed in coastal areas for pure drinking water for rural people whose total capacity of 1.55MW solar PV power.

Solar Charging Station

In these days, battery or electric vehicle (EV) is one of the immersing technology among them. A vision to use solar energy to charge the battery run three wheelers named as easy-bikes has taken by the government of Bangladesh.



Figure 4. Solar PV charging station

Figure 4 shows the solar PV charging station (SCS). Keraniganj has an SCS, whose capacity is 21 KW and has been running as a main program of the power division. Dhaka Palli Bidyut Samitee-2 (PBS) also implemented the SCS which can now charge a total of 20-25 easy bikes at the same time [Energybangla 2017]. In Bangladesh, Total 14 solar charging station (SCS) has been installed at different places during the last five year (2016 and 2020). Among them, Bangladesh Rural Electrification Board (BREB), BPDB, Dhaka Power Supply Company (DESCO), and WZPDCL has installed 7 SCS, 2 SCS, 1 SCS, 1 SCS respectively. At present, the total installed capacity of the solar charging station is 0.23 MW [Sreda 2021].

II. Review of Emerging Technology to Be Promoted Deploying Solar Energy

In Bangladesh, Solar energy is generated by the various ways and used in a different field. But recent research, some emerging concepts have been come out to be developed utilizing solar energy. A short review of the recent emerging technology is described below:

Solar Vehicles

Petroleum oil widely used in Maximum vehicles in Bangladesh. In addition, we have to import petroleum from the international market. The demand for petroleum oil is all-time higher than the supply and costly. In this situation, we can widely use a solar energy-based electric vehicle such as Rickshaw, Easy Bike. Which are driven by an electric motor that will much more cost-efficient than traditional vehicles. But the fact is, the solar panel failed to supply the total energy that is required to run the motor. So, in the research, it can be used additional batteries which combined power supplies to the motor can be said as the hybrid solar car. To develop the hybrid solar car, first have to find out the external area solar panel can be fixed, designing a new vehicle body, rickshaw, easy bike, working on the battery charger, voltage and motor controller is needed.

Solar Roof Top on Fishing Trawlers

More than 24,140 kilometers of the entire length is surrounded by 700 rivers including tributaries in Bangladesh. There are 1,280,000 fishermen exist within the country. Among them and 510,000 marine fishermen and 770,000 inland whose financial gain fully depends on fisheries. Trawlers (fishing boats) are the only tools which use for fishing purpose in the sea and river by Bangladeshi fisherman. At the night time, those trawler boats require electric power for fishing and lighting. In this day, a trawler is powered by an electric battery

which is charged through a generator synchronous with trawler engine. Recent research exhibits the total solar PV panel production for each year for 2000 trawlers will be utilized to generate 518.86 MW, if the solar polycrystalline technology is used [Sajib *et al.* 2016].

Solar Roof Top on Launch

Considering all the coefficients, the available rooftop area of each two deck launch is 6260 sq.ft. Considering different PV technologies (Mono and polycrystalline) solar potential is calculated individually. Figure 5 illustrated the solar potential of each launch [Hasan *et al.* 2017]

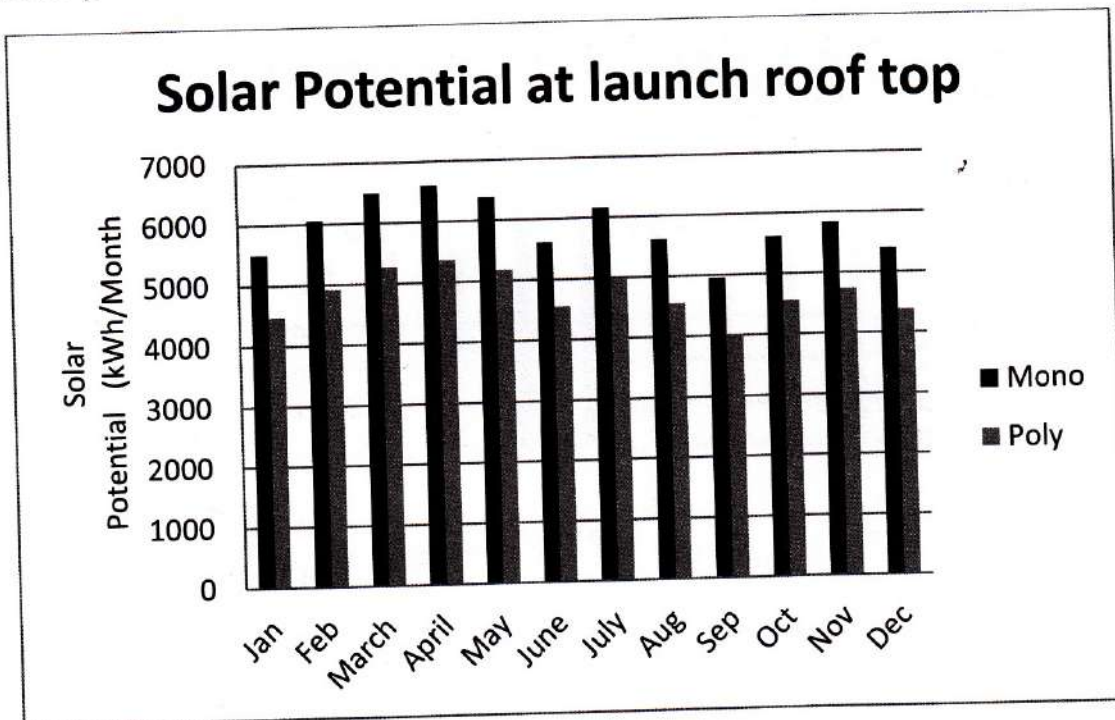


Figure 5. Solar potential for each launch at Dhaka region [16].

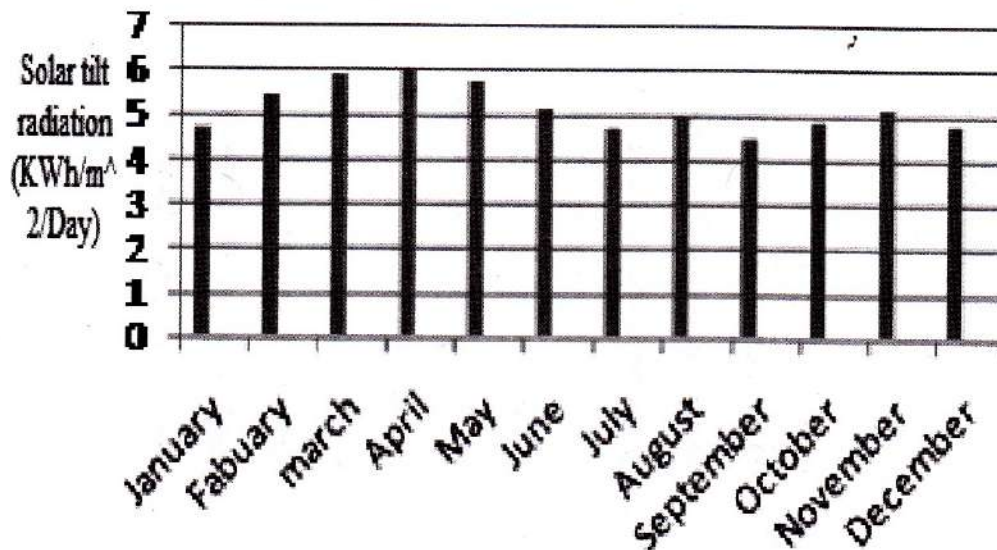
Total solar energy 70.225MWh is generated per year utilizing mono-crystalline solar panel and 56.969MWh for polycrystalline from a single passenger Launch. Total 24kW solar power will be generated from one Launchutilizing mono-crystalline solar cell and 19.5kW fromfor polycrystalline panel. Roughly 646 passenger launches operate in 186 routs in Bangladesh. The total PV panel output for 646 passenger launches will be to 15.5 MW and 9.6 MW if solar polycrystalline and solar thin-film technologies are used, respectively [Hasan *et al.* 2017].

CSP Technology

There is a requirement of abundance DNI for the smooth operation of CSP

plant. The intensity in the radiation that originates directly through the sun prior to scattering is described as Direct Normal Irradiation (DNI). Bangladesh is located which is between 20.30° - 26.38° north latitude and 88.04° - 92.44° east. Sunlight gets almost perpendicularly at the place of near the equatorial plane. Fortunately, Bangladesh is very much close (23.50° North) to the equatorial line. Here from the figure we find that solar radiation varies between 4 to 6.5 KWh/m^2 in all over the country. For CSP technology there is needed annual average Direct Normal Irradiation (DNI) 2000KWh/m^2 . In Bangladesh, there is abundant solar radiation annually which is nearly 1900KWh/m^2 [Nafisa *et al.* 2009]. Average DNI of Bangladesh is shown in Figure 6.

Labour cost is cheaper in Bangladesh than any other developed countries, so 15% cost reduction might be possible. Raw materials of most of CSP power



plants are glass and steel

Figure 6. Solar tilts radiation for different months of a year in Dhaka Region [Average DNI in Bangladesh 2020]

sheet. Bangladesh has become self-sufficient in glass production. Now glasses are being exported in many countries. More than 400 steel re-rolling company is under operation in Bangladesh. This will lessen investment cost and also create more jobs for unemployed people [Market Insight 2016].

IV Conclusion

Bangladesh is in electricity crisis along with increasing energy demand all over the country. Bangladesh meets their energy demand from 68% solar energy of 2.91% renewable energy of a total generation. This study shows that last five years in renewable energy sector especially deployment of solar technology has

increased by GOB and private agency in Bangladesh. This paper studies about on present solar technologies with install capacity to utilize solar resources as well as scopes of future emerging solar technologies. The RE generation capacity is projected to be 10% of the total installed capacity by 2041, it will translate into nearly 6000 MW. Employing beneficial place of solar resources Bangladesh can promote to 10% renewable energy. But to foster of utilization of solar resource need ample amount of land. Bangladesh is a tiny and populated country. This paper has also investigated that the opportunities to generate plenty amount of solar power utilizing emerging technology such as the solar vehicle, solar rooftop on fishing trawlers, solar rooftop on launch which will solve land crisis problem as well as meet the targeted amount of solar energy generation.

References

Hasan R., Jahangir N., and Sani S. " Quantifying Solar Potential on Roof Surface Area of Launch in Dhaka Sadargar Region in Bangladesh," B.S. thesis, Department of electrical and electronics, Eastern Univ., Dhaka, 2017

Islam, M.M., Nipu K.D., Sampad G., and Mrinmoy D. "Design and implementation of cost effective smart solar charge station." In Strategic Technology (IFOST), 2014 9th International Forum on, pp. 339-342. IEEE,2014

Nafisa N., and Muneer S., "Concentrating solar power (CSP) and its prospect in Bangladesh." In Developments in Renewable Energy Technology (ICDRET), 2009 1st International Conference on the, pp. 1- 5. IEEE,2009

Rahman M.S., Saha S.K., Khan M.H, Habiba U. Habiba& Chowdhury S.H Chowdhury, "Present Situation of Renewable Energy in Bangladesh: Renewable En- ergy Resources Existing in Bangladesh", Global Journal of Researches in Engineering Electrical and Electronics Engineering Volume 13 Issue 5 Version 1.0 Year 2013

Sajib C., SafayetUllah SM., and Razzak M. A., "Quantifying solar potential on roof surface area of fishing trawlers in Chittagong Region in Bangladesh." In Innovative Smart Grid Technologies-Asia (ISGT-Asia), 2016 IEEE, pp. 833-837. IEEE,2016

Web source

Statistical pocket book Bangladesh 2016, Bangladesh bureau of statistics, Ministry of planning, Bangladesh, Published date: March2017

<http://www.powercell.gov.bd>

<http://www.sreda.gov.bd> accessed on 18-06-2021

Renewable Energy Master Database, accessed on 19-06-2021

“500MW Solar Power Programme, 2012-2016”, An Initiative to Promote renewable energy programme in Bangladesh, Power Division, Ministry of Power, Energy and Mineral.

<http://www.idcol.org/>, accessed on 19-06-2021

<https://energybangla.com>, published at 19, February, 2017

“Market Insight: Emerging steel in Bangladesh,” [online] Available: <http://www.lightcastlebd.com/blog/2016//02/Market-insight-emerging-steel-industry-in-Bangladesh>

“Average DNI in Bangladesh” , [online] Available: <http://nrel.gov/csp>

<http://www.sreda.gov.bd>, accessed on 20-06-2021

The Politics of the Docile Body: Avarodh, Discipline and the Utopian Dream of Subversion Humaira Shegufta Chowdhury¹

Abstract:

Re-visiting the 19th and early 20th centuries of our sub-continent reveals the fact how women have been subjugated in male-dominated views, especially of purdah. Muslim women of the 19th century of this subcontinent have been made into docile bodies and controlled by the wishes of the patriarchy through the religious view of purdah. The dissemination and practice of the word purdah created a panoptic society where women are kept under constant watch/gaze. In this paper I have tried to reread Rokeya Shakhawat Hossain's two highly acclaimed works—Avarodhbasini and Sultana's Dream, in the light of Michel Foucault's theory of the panoptic society. Rokeya's works concentrate on the Bengali Muslim community of the 19th and early 20th centuries and show how women were secluded from the world and becoming boxed automation docile bodies, without minds of their own. This paper will try to disclose how patriarchy has created a panoptic society with the help of the religious doctrine of purdah, as will be very evident from the analysis of the stories of Avarodhbasini and Rokeya's attempt to subvert the world of seclusion and docility through her fictional Sultana's Dream.

Keywords: Avarodhbasini, Sultana's Dream, Purdah, Patriarchy, and Panoptic Society.

I

Rokeya Shakhawat Hossain is considered one of the pioneers of feminist writing in the Indian sub-continent and one of the founding pillars of Bengali Muslim feminism. She has written about social inequality, injustice and oppression of women in this part of the world. In *Avarodhbasini*, she attempted to show how patriarchy creates a panoptic society to control and make docile bodies in women, making them incapable of independent thought and actions. Rokeya ingeniously reversed this panopticism in *Sultana's Dream* to demonstrate that women are as capable and creative as their male counterparts, and to suggest that if given proper opportunity and space, women

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can contribute fully in creating a strong and competent society. In *Avarodhbasini*, a collection of real-life incidents presented in a short sketched format, Rokeya portrayed the plight and vulnerability of women who are kept in such extreme seclusion that they lose their right to express themselves as living human beings. In *Sultana's Dream* Rokeya subverts this panoptic world where women are segregated and created a utopia for them where men and not women are kept indoors.

For centuries women have been denied the equal opportunities enjoyed by men in the name of biology, social obligations, marital obligations, religious norms and many other patriarchal constitutions. In many parts of the world/ *Purdah* has been used to dominate women, and we can find out from Rokeya's writings, how women were kept under strict *purdah* in the name of religious honor. Because faith is a sensitive issue, not many have the audacity to challenge or question religious practices and methods. From the beginning of time patriarchy has had religion on its side as a weapon to control any suspicion or enquiries about the dominant position men have over women. Whether Judaism, Christianity, Islam or Hinduism, patriarchal views or ideals have had shaped the religious world views and has created a panoptic world for women, making them docile bodies, incapable of independent thought and action for its sustainability.

To understand and disclose more concretely the patriarchal domination of women through cultural and social ideas of a religious worldview, I have chosen to read Rokeya Shakhawat Hossain's highly acclaimed works *Avarodhbasini* and *Sultana's Dream*.

The first work is a collection of forty-seven non-fictitious, real-life incidents portraying the sad effects of seclusion on women. It is written by a Muslim woman who herself was raised in strict *purdah* or veil, so the argument against seclusion it advocates is cogent. The second work is fictional but it upholds the possibilities of women's potentiality, creativity and strength, suggesting that it needs an outlet through education and participation. In the first work, the stories may amuse us with their humorous presentation of the absurdity of some *purdah* practices common in the 19th and early 20th century Bengali Muslim community, but ultimately they delve into the oppressive patriarchal social conduct and expose the misery of women.

In the utopian *Sultana's Dream*, Rokeya created a world where the patriarchal order of oppression is reversed and women hold the power of economy and state, men, on the other hand, are put into *mardana* (a secluded enclosure for men) and are confined to the home. At the surface level Rokeya's story may appear to be only utopian, but when we go deep into the text, we discover the

hidden message in it that she wanted to convey to society, especially to men. She makes us wonder what if the table was turned and men have to face what they are forcing women to endure for so long?

Rokeya's works concentrate on the Bengali Muslim community of the 19th and early 20th centuries. Although both Hindus and Muslims elites of that period practiced *purdah*, for the latter this custom took a turn towards extreme seclusion to such an extent that women were denied education, or participation in any activities outside the home, or any creative work, or even talking to people except those who were in the permitted category even at the point of death.

As the title of my paper suggests women in Rokeya's time were put into extreme seclusion or *avarodh* in the name of religious and social discipline for the interest of patriarchy. To enforce discipline, women were made to perform as docile bodies. I will explore this social practice in the light of Michel Foucault's theory of the panopticon and make use of his explanation of the need for discipline and docile bodies.

Rokeya was never against religion and morality itself, but she was against extreme aspects of patriarchy regarding women's position in society. After all, keeping *purdah* means adopting decent clothing and manners, and not seclusion from the world and becoming boxed automatons, without minds of their own. Through this paper, I will discuss why the Muslim patriarchy of that period kept women in strict *purdah* and how a panoptic world was created through a veil of discipline. I will also endeavor to show through her bold and assertive writings, Rokeya upheld the miserable conditions of the unfortunate women and how Rokeya's dream of subversion of the oppressive patriarchal order found an outlet through her pen.

II

Rokeya Shakhawat Hossain was brought up in the strict traditional Islamic way of life, and had the first-hand experience about the life of women in *zenanas*. Because she was brought up as *purdah-nashin*, (one who stays behind *purdah*) she knew very well how it impacted the perspective and personality of women; as Patricia Jeffery's book *Frogs in a Well: Indian Women in Purdah* depicted how this "frog in the well" world of women kept many women like Rokeya totally isolated from the outside world. She had first-hand experience of "frog's life" - no education, no social activities outside the house or opportunities to develop creatively. The only thing that was permitted to women like her was parroting the Holy Quran. Formal education was strictly prohibited for girls.

This of course does not indicate any lack of parental goodwill or love. It was, on the contrary, a very normal decision made by a representative of the Muslim elite of the time. The code of conduct that was enforced then demanded that women be kept indoors, and made to do household works and child bearing and caring, whereas males were allowed to have decent educations likewise, Rokeya's brothers were sent to study in the elite college in Calcutta but where the education of the daughters was concerned, there was a curious indifference on their father's part. Formal education was simply not an important concern in the upbringing of Muslim girls.

Whereas Muslim men were educated in institutions of higher education and were given the opportunity to venture out into the world of knowledge and power, the women of society remained cooped at home, ignorant of the world around them. Even though, most Muslim men were by and large indifferent to the situation of women, exposure to liberal knowledge and ideas, men like Rokeya's elder brother Abul Asad Ibrahim Saber and her husband Khan Bahadur Syed Shakhawat Hossain encouraged Rokeya to pursue education in English and Bengali. Rokeya was lucky in that she had male members in her family who cared enough to give her education; but most women in the Muslim community of that time were not so lucky. Muslim males were so conscious of their family pride and honor that they would rather sacrifice their womenfolks than compromise family honor. The first code of conduct in safeguarding family honor was to rob women of their voices, and deny them education. Consequently, most women remained ignorant beings with little or no power to separate right from wrong.

Rokeya's life long goal was to educate the poor secluded women of contemporary Muslim society. She understood how seclusion in the name of Islam had created a cage for them denying them some basic human rights. Throughout her life, Rokeya was saddened by the waste of human potential. She was thus determined to oppose the observance of customs she considered absurd. She wrote: As the glow of an electric bulb is dimmed by a thick cover, so the lady described by me could not show her gift due to the covers or *pardah*.(Jahan, 4)

Rokeya saw the evil behind the rigid *pardah* system. She never opposed the custom of *pardah* itself but believed that what took place at that time in the name of Islam was wrong. The type of seclusion that was exercised upon women at that time was very extreme from what Islam commended. Rokeya was against the enforcement of *pardah* in the name of Islam, which denied women's humanity, making them appear dumb, deaf, and paralyzed as if they were a burden of society.

Such an extreme form of domination in the name of Islam hurt Rokeya, because in Islam women had been given the right to education and had other social and economic rights. But women of that time were completely ignorant about these facts and consented to whatever version of life was provided to them by Muslim patriarchal society. The result of such enforced seclusion was that the Muslim community lagged behind in most aspects in comparison with Hindus and Brahmins. Rokeya understood that the lack of education of women was the reason behind the backwardness of Muslim society.

The Bengali renaissance started in the first half of the nineteenth century. Behind this reformation were the Brahmins. The pioneers of the Renaissance were Raja Ram Mohan Roy (1774-1833) and Iswar Chandra Vidyasagar (1820-1890). The need for new thinking resulted from contact with European education and dissatisfaction with the conservative ideology.

The Bengali Hindu and Brahmin community realized that without the participation of women they would never attain a modern and educated society. Prominent scholars and liberal thinkers tried their utmost to involve women in the political and social arena. They also opposed customs and practices that were inhuman and resulted in the loss of women's freedom. They started to learn English and used that language to secure their position in the state. The reformist atmosphere initiated by educated Hindus and Brahmins led to a more politically conscious culture. Nationalistic feelings, which found a concrete foundation among men and women, and the desire for freedom, took a concrete shape, and eventually led to the independence of India and Pakistan.

Sadly, in contrast, the Muslim response to these changes was slow and guarded. The loss of the Mughal Empire to the British Raj was reason enough for them to be reluctant to have anything to do with either the British or Hindus. The formal end of Mughal rule in India by the Royal Edict of 1859 was seen by the Muslim community as the humiliating end of the glorious Muslim rule of India, and from anger and resentment they avoided participating with both the English rulers and the majority Hindus in the overall social and cultural conduct of India.

The English rulers took many administrative steps, adopted educational policies and initiated reforms in economic policies. They also replaced the Muslim legal system with the British penal code, and introduced English as the court language instead of Persian. All these changes made the Muslim community more withdraw even from state affairs as they saw these as going against the laws of Islam. In these circumstances, the Hindus and Brahmins seized the opportunity and many of them rushed to learn English and fill all available political and administrative posts and secure the benefaction of the colonial rulers.

But eventually, some Muslim scholars and philanthropists understood that this withdrawal from state affairs and education could only push the Muslim community into further degradation. Many prominent Muslim leaders like Sir Syed Ahmed and Nawab Abdul Lateef (1828-1893) advocated modern education and participation in state affairs for Muslims. These brought fruitful changes in the Muslim Community. But unfortunately, these changes affected only the men, who somehow failed to bring their womenfolk into the light of education like their counterparts Hindus and Brahmins had done.

But why did Muslim males keep women under such restrictions? Although Muslim men gained education, religious thinkers and leaders were reluctant to change; furthermore, Muslims considered the Holy Quran to be the ultimate source of knowledge and a guide for life. But this Quranic knowledge was only available to men and they held the sole power about the *Tafsir* (exegesis) of the Quran and the use of *Sharia* law.

Women were seen only as the bearer of seeds and so they were considered vulnerable and would have to be protected from the lust of men. Bengali Islamic law has granted women rights in marriage, divorce, inheritance of property and above all education, but the *pardah* was a status symbol for Muslim patriarchy and the more extreme the measures, the more status for the rich and formidable. (Jahan, 12) Thus, the thought of status encouraged rich Muslim families in Rokeya's time to send their sons to progressive schools but stand in the way of their daughter's education.

But how and why did such an extreme form of *pardah* exist in Bengali Muslim society? Was it inevitable and what does Islam actually say about the seclusion of women? Muslim patriarchy had been justifying this cruel custom for centuries in the name of Islam, arguing that God has decreed this practice through the Quran, and in God's own word. But, to understand the truth about *pardah*, we must analyze what the Quran says about the seclusion or *Purdah* of women.

III

Purdah is a Persian word (Arabic *hijab*), literally meaning, "Curtain," and used to describe the traditional seclusion of women in the Middle East and parts of Southeast Asia. It is particularly linked with Muslim and Hindu society, but other religious believers also observe this custom. *Purdah* has been the subject of interest and debate for centuries, with some people supporting the practice, but others rigorously opposing it, arguing that *pardah* was being used as a tool for the suppression of women. As a general rule, *pardah* is a cultural rather than a religious tradition. In other words, although *pardah* is associated specifically with some religions, this association is not really sanctioned by them. While

pardah stems from religious values about modesty and proper behavior, it does not in fact have a grounding in religious teaching.

Another way of putting this is to say *pardah* simply involves the isolation of the sexes. Men and women would be traditionally separated by a screen for prayer, for example, and they would be discouraged from associating in public. At home, women had a private area (e.g., *zenana*), where men were not allowed, and men and women would never be left alone together, unless they were married.

Although the practice was linked with the spread of Islam, historical evidence suggests that the sexes were separated long before the period of Muslim conquest in the region. Elite women in ancient Mesopotamia, Byzantine, Greek and Persian Empires practiced *pardah* or veiling as a sign of respectability and high status. *Pardah* or veiling was meant to differentiate respectable high-ranking women from slaves and commoners. *Pardah* was also to some extent about the manipulation and show of power, as only wealthy people could afford to have separate women's quarters, for example, or to isolate their women so that they did not have to come into contact with society.

In adopting the *pardah* for women Muslim patriarchy claimed to practice the orders of Islam, as explained in the Islamic sacred texts: The Quran, the *Sunnah* or *Hadith* and the *Sharia*. In Islam, the Quran is considered to be the most important source of information on the laws and practices. So we need to find within the Quran the mention of *hijab* to be worn by a Muslim woman. A search for the word *hijab*, veil, cover or *pardah* throughout the Quran uncovers the following passages:

Between them shall be a veil, and on the Heights will be men who would know everyone by his marks: they will call out to the companions of the Garden, "Peace on you." They will not have entered, but they will have an assurance (thereof). (Qur'an, 7:46, Ali, 353).

As related in the Book (The story of) Mary, when she withdrew from her family to a place in the East, she placed a screen (to screen herself) from them. Then We sent to her Our angel, and he appeared before her as a man in all respects. (771) Qur'an, 41:5):

They say: Our hearts are under veils, (concealed) from that to which thou dost invite us, and in our ears is a deafness, and between us and thee Is a screen: so do Thou (what thou wilt); For us we shall do (What we will). (1287) (Qur'an, 42:51):

It is not fitting for a man that God should speak to him except by inspiration, or from behind the veil, or by the sending of a Messenger to reveal with God's permission, What God wills: for He Is Most High, Most Wise. (1321) (Qur'an, 33:53):

Ye who believe! Enter not the Prophet's house, - until leave is given you, - For a meal, (and then) not (so early as) to wait for its preparation: but when ye are invited, enter. And when ye have taken your meal, disperse, without seeking familiar talk....

Nor is it right for you that ye should annoy God's Apostle, or that ye should marry his widows after him at any time. Truly such a thing is in God's sight an enormity. (Qur'an, 11:24)

If we analyze these *above Qur'anic verses*, it is evident that the word *hijab*, *Purdah*, cover or veiling, is not meant for any Islamic dress code for women. The first line from *Surah 7* talks about the partition between the inhabitants of Hell and Heaven whereas the second excerpt from *Surah 19* is about Mary, the mother of Jesus Christ. When she found out she was pregnant, she separated herself from the others. The third excerpt, taken from *Surah 41*, speaks about those nonbelievers who have a cover on their hearts that deprives them of the teaching of Islam. The fourth one from *Surah 42* is about the veil God uses to shield humankind from His divine brilliance. The last excerpt from *Surah 33* uses the word "partition" in the sense that the men should maintain a distance from the wives of the Prophet (PBUH). It also says that they should behave very modestly towards those women.

However, there are three *Ayats* in the Quran, which are used, by all the *Alems* (wise person) and *Ulamas* (theologians) for justifying the strict *purdah* for women.

Surah 24 An-Nūr: Ayats 30-31:

Say to the believing men That they should lower Their gaze and guard Their modesty: that will make For greater purity for them: And God is well acquainted With all that they do....and that they Should not strike their feet. In order to draw attention To their hidden ornaments. And O ye Believers! Turn ye all together Towards God, That ye May attain Bliss.(904- 905)

Surah33 Al-'Aḥzāb: Ayats 32-33

O Consorts of the Prophet! Ye are not like any of the (other) women: If ye do fear (God), be not too complaisant of speech, lest one In whose heart is a disease should be moved with desire: but speak ye a speech (that is) just and stay quietly in your houses, and make not a dazzling display, like that of the former times of ignorance; and establish regular prayer, and give regular charity" and obey God and His Apostle. And God only wishes to remove all abomination from you, ye Members of the Family, and to make you pure and spotless. (1115)

Surah33 Al-'Aḥzāb: Ayat 59

O Prophet! Tell Thy wives and daughters And the believing women, That

should cast Their outer garments over Their persons (when abroad) That is most convenient, That they should be known (As such) and not molested And God is Oft-Forgiving, Most Merciful. (1126)

While these excerpts of the Quran talk about women's clothing and the way women should appear in public is mentioned; in none of these three passages, we find that women have to cover themselves completely from top to bottom. These lines also do not forbid women to talk to other men in public. In fact, nowhere in the Quran is it said that women are supposed to be caged inside a house, devoid of any education or, excluded from outside activities.

Rather, if we closely follow the last three excerpts, we see that here the Quran is talking about common decency for both men and women. As the Quran speaks of decent behavior and codes of conduct, it addresses first the men and then the women. This fact is interesting because it is believed women are the main obstacle to purity for men but *Surah 24* clearly asks men to be decent first and not women. But unfortunately, the focus has always been and continues to be on women only.

Another very important point to be noted is that the supreme leader of the Muslim *Ummah* (brotherhood) and a messenger of God, Prophet Muhammad (PBUH) had to follow specific obligations and strict religious conduct as an example to others but in no way has he ever stated that women should be locked behind doors or never let the sunlight touch their skin. On the contrary, he had set an example of fatherhood to all by raising his three daughters properly. Also one can note the life of his wife, Khadiza (RA), who was a businesswoman in her own right.

The Quran conveys God's command that every human being should gain knowledge. We can find many verses wherein the Quran regarding this structure:

Surah 2 Al-Baqarah: Ayat 151

A similar (favor have ye already received) in that We have sent among you an Apostle of your own, rehearsing to our Signs, and sanctifying you, and instructing you in scripture and wisdom, And in new Knowledge. (61)

Surah Al-Jumu'ah: Ayat 2:

It is He Who has sent amongst the unlettered an apostle from among themselves, to rehearse to them His Signs, To sanctify them and to instruct them in Scripture and wisdom—although they had been before in manifest error (45-46)

Surah Fāṭir: Ayat 28:

And so amongst men and crawling creatures and cattle, are they of various

colors, Those truly fear God, amongst His Servants, who have knowledge; for God is Exalted in Might, Oft-Forgiving. (1161)

Prophet Muhammad (PBUH) said it is the duty of the parents to give all their children proper upbringing to be a wise and honest human being. He also said that seeking knowledge is mandatory for every Muslim.

We can also find in the Quran that God has ordered human kind to respect women:

Surah An-Nisā':Ayat 1:

Mankind! Reverence Your Guardian-Lord Who created you from a single person,created of like nature. ... Reverence God Through Whom Ye demand yourmutual (rights) And (reverence) the wombs (That bore you): for God Ever Watches over you.(178)

Women were also given financial security by Islam 12 centuries before they were granted to European women:

Surah An-Nisā':Ayat 4 (Medina revelation):

And give the women (on marriage) their dower As a free gift; but if they of their own pleasure, remit any part of it to you, Take it and enjoy with good cheer. (179)

Surah 2 Al-Baqarah: Ayat 151 (Medina revelation):

And for divorced women Maintenance (should be provided) on a reasonable (scale)–This is a duty on the righteous. (96)

From these verses of the Quran, we find that Islam has given women the right to education, financial security and respect. There is not a single *Ayat* in the Quran that says we should confine women in a place and rob them of basic human rights. So if anyone advocates about women's seclusion citing Islam, they should think twice before drawing examples from the Quran and the *Sunnah*.

IV

Our discussion of the Quranic verses reveal that the harsh custom of seclusion which was practiced in the name of Islam, cannot be justified in the name of Islam since it advocates the contrary. Then how did this manifestation of domination of women come into existence? For one thing, it was done in such a manipulated and normative way that the whole idea now appears normal to us. Such interpellation reminds one of what Foucault described as "power/knowledge". We can analyze his work to understand how the Quran was used as a system of domination through interpellation.

Michel Foucault said that knowledge is always a form of power and that knowledge can be gained from power and vice versa. From the beginning of human civilization, we note that as men were biologically strong, their physical strength impacted women, and even sexual interaction gave the impression that the male was the giver of the seed and women the passive receiver. Constant childbearing restricted women to venture outside the domestic sphere, whereas men went outside and gained knowledge from the world around them. Their physical vulnerability at the time of pregnancy necessitated a secure shelter, which men provided for women; as they also provided food for them.

This simple procedure of reproduction through time took a more complex form as agricultural society developed. The relationship of men and women became like a social contract: men would provide, while women would receive. In due process, men became the master of the house and also the outside world. It is not surprising that men formulated customs as they ventured outside and tried to understand the nature around them. The practices and ideologies of a particular culture were mixed with their religious beliefs, where beliefs were revealed.

The monolithic religion, as it is believed, was given to men by God to restore discipline and order in society. All the Apostles were men. This creates the idea that men had some supreme quality as God only gives His divine orders to men. With this divine knowledge man created social order. So does this mean God has a special relationship with men? Or do males embody divine attributes and women are by nature weak or sinful as depicted in the Adam and Eve story?

Asma Barles in her book *Believing Women in Islam: Unreading Patriarchal Interpretation of the Quran* describes how the misreading of Islam's attitude towards women came into being. Patriarchy has often manipulated the Quran for its own use. Women's status and roles in Muslim societies as well as patriarchal structures and gender relation are functions of multiple factors, most of which have nothing to do with religion. The interpretation of the Quran may become influenced by the patriarchal cultural norms of the societies at that time. Muslim women had to suffer directly from this resulting misinterpretation of the Quran.

As numerous scholars have pointed out, inequality and discriminations derive not from the teaching of the Quran but from secondary religious texts, the *Tafsir* (Quranic exegesis) and the interpretation of the *Hadith*. These interpretations allegedly make Islam a patriarchal religion by claiming that "God is on their side". Mohammad Arkoun said, "Quran has been ripped from its historical, linguistic, literary and psychological contexts and then been continually recontextualized in various cultures and according to the ideological needs of various actors" (Arkoun, 5). This clutches the point that is

being made here that the Quran is manipulated in interpretation so fit by patriarchy according to its needs. As all theologians and religious leaders were men, they provided women with the *Tafsir* of the Quran from the patriarchal point of view and most women accepted the patriarchal exegesis without questions. Another point relevant here is that, as the Quran is said to have come straight from God, most women never dared question the authenticity of interpretations put forward by the *Ulamas*.

Foucault said, "Knowledge linked to power, not only assumes the authority of 'the truth but has the power to make itself true. All knowledge, once applied in the real world, has effects, and in that sense at least, 'becomes true.' Knowledge, once used to regulate the conduct of others, entails constraint, regulation and the disciplining of practice. Thus, "There is no power relation without the correlative constitution of a field of knowledge, nor any knowledge that does not presuppose and constitute at the same time, power relations." (Foucault, 27)

The knowledge of the powerful becomes the truth for society. And to maintain such power relations, the ruling ideology must create a panoptic society. To sustain its authority over women, Muslim patriarchy has created a panoptic society, by imposing many disciplinary mechanisms on women in the name of Islam. Practices like observing *pardah*, denying any education except recitation of the Quran, prohibiting women to go out of the house, and not letting them speak their opinion about anything, putting restrictions on them by categorizing which women should let their voices be heard legitimizing physical abuse in the name of discipline etc. are the many kinds of mechanism applied to make women docile so that they will remain passive under Patriarchy's rule.

V

Rokeya Shakhawat Hossain's *Avarodhbasini* depicts a true picture of the panoptic society, created by Muslim patriarchy in the 19th and early 20th centuries. The Forty-seven sections of the *Avarodhbasini*, expose the excess of seclusion in the name of *pardah*, a custom which is absurd, shameful, horrendous and at times both comic and pathetic.

From *Avarodhbasini* we can gather the evidence that to maintain their hegemony over women, Muslim patriarchy created a panoptic society and through disciplinary mechanisms made women docile bodies. To substantiate this argument more clearly we must first understand what is panopticon and docile body.

Michel Foucault first used this term in his book *Discipline and Punishment: the Birth of the Prison*. Foucault takes the term "panopticon" from the early

19th century English reformer Jeremy Bentham, who designed a circular prison, the Panopticon, in which each inmate was kept, separated and was always in view of a single guard on a central tower.

Foucault used this idea to explain the mechanism of social control used by the powerful to dominate ordinary people. In his view, through such a disciplinary system the powerful of a society keep constant surveillance on the general people and acquire knowledge about them. This knowledge is used to control and regulate society according to the wishes of the people in power. With the power acquired through knowledge, the powerful can manipulate the observed object and turn it into a docile body, which then works according to the wishes of the observer with full consent.

As Foucault argues, in a panoptic society, docile bodies are created through disciplinary mechanisms. Foucault describes a docile body as, “a body that may be subjected, used, transformed and improved.” (136). He again says, “It is easy enough to find signs of the attention that paid to the body that is manipulated, shaped trained, which obeys, responds, becomes skillful and increase its force.” (136). About disciplinary mechanism, Foucault notes:

These methods, which made possible the meticulous control of the operations of the body, which assured the constant subjection of its forces and imposed upon them a relation of docility-utility, might be called “disciplines” What was then being formed was a policy of coercions that act upon the body, a calculated manipulation of its elements, its gestures, its behavior. A political anatomy “which was also a mechanics of power”, was being born; it defined how one may have hold over other “bodies, not only that they may do what one wishes, but so that they may operate as one wishes with the techniques, the speed and the efficiency that one determines. “Thus discipline produces subjected and practiced bodies, docile bodies.” (136-137).

The idea of docile body, which Foucault describes here, originated from his study of how men at the end of the 19th century were turned into soldiers through the subjugation of their bodies and souls so that the state could use them as it wished. If this idea of docile body and the process of discipline mechanism are applied to 19th and early 20th century Muslim society, we will get the same result. Women's docile bodies were passive and vulnerable, thus ready to be controlled. The *Ulamas* and religious thinkers used their knowledge to create a kind of panoptic society. The head of the family kept this panopticon working by surveillance on the movement of women. They used disciplinary mechanisms to make docile bodies in women.

We can now carry out a parallel analysis of how Foucault described the art of discipline and how Muslim patriarchy disciplined women. Foucault argued that, discipline sometimes requires enclosure or confinement, that is to say, a protected place for disciplinary monotony. A similar kind of enclosure was created for women in Muslim society- the *zenana*, a separate enclosure for women inside the main house. Here the women were secluded from the outside world and kept under the surveillance of the men of the house.

Foucault also points out that in a panoptic society every person is individualized for the sake of better control. Likewise, we see in Muslim society, how through the practice of veiling a woman is separated from others. This allows the Muslim patriarchy the upper hand in dominating women. This separation was done in such an extreme manner that they would be hidden away from other women as well. Rokeya wrote about her own experience:

Let us leave the experiences of other people. Let me share with you some of my own experience of purdah. Ever since I turned five I had to hide myself from women even. I could not understand the rationale behind it. Yet I had to disappear as soon as strangers approached. ...Somebody would make a sign and I had to find the nearest hiding – place – the kitchen; inside the rolled mats of the maids; under the bed even. (Jahan, 54 – 55)

In Foucault's view discipline is the art of rank, hierarchy, pyramidal supervision. His concept can be applied to the family in 19th century Bengali Muslim society. In the family, there is the guardian father figure who takes decisions and keeps an eye on the order. Thus the family is constituted like a pyramid. We find such examples in *Avarodhasini* where we see the head of the family supervising the transport to be used by women folks and deciding how the women folks would travel. Even if a woman was sick the head of the family would not allow the doctor to examine the patient properly. One such incident that she narrates is as follows:

A certain begum was down with pneumonia. I said, “the condition of the lungs would have to be examined I could examine it from the back.” The Nawab (head of the family) ordered, “Ask them aid to put the stethoscope wherever necessary”.... Yet I had to comply with the Nawabs command. (50)

Foucault focuses on the control of activity in a disciplinary system. There the pupils must always hold their body erect, place their elbows on a table etc. In a patriarchal society, similarly, the women's body and gesture are fixed according to the patriarchal disciplinary, by lowering their gaze, speaking in a low and soft tone, always hiding their face under a veil, not speaking to anyone outside the “permitted category” etc. Rokeya wrote about one such incident:

Once, a thief entered the female compartment of a moving train. The women were embarrassed and tried to cover themselves completely. The thief asked for and got all the jewelry without a penny from the helpless, shrinking women. (63–64)

We can see from the story that women were so submissive that they could not raise their voice even when they were in danger.

Women were under the constant observation of the male guardians who were obsessive about keeping their honor secured. If any disorder was found physical abuse was inflicted on women in order to keep them in line. A panoptic society was thus created.

Rokeya's *Avarodhbasini* documents how Muslim women lived in a miserable condition in the 19th century Bengali Muslim society. The panoptic society, formed by Muslim patriarchy, produced docile women bodies thereby creating a "frog in a well" world for women. Her reports give us the picture of a pathetic world where women are not only passive; but also totally under the control of men. They preferred death to being without *purdah*.

These stories are humorous but also heartbreaking. The women she describes are so much interpolated that, they do not realize how utterly useless and feeble their life had become. Muslim patriarchy through religious discourse manipulated these women and convinced them that they were vulnerable and fragile, and so they needed seclusion to protect them. In the process, patriarchy made them completely dependent.

Rokeya was saddened by this utter submission of women. She wrote that seclusion was suffocating women silently like carbon monoxide. She could understand clearly why secluded women were not vocal about their miseries. They were accustomed to subjugation and did not know any other way of life. As she put it: "if anyone asks fisherwoman, does rotten fish smell good or bad to you", how would she answer that? (20).

Rokeya wrote about the miseries of these secluded women skillfully. Some of the stories are very comical and funny like the one about a woman who was so respectful of her husband that she could not pronounce his name and pointed at the sun and her handbag, as her husband's name was Aftab (Persian for sun) Beg. Another one was about the bathing of palanquin, where the woman was such *purdah-nashin* that she sat inside the palanquin, and the bearer dipped the whole palanquin in the water. But some incidents that she narrated were really gruesome and horrible.

The terrible death of Rokeya's aunt-in-law whose maid did not permit anyone to rescue her by pulling her out of the train tracks where she had fallen down

after stumbling against her *burqua* and let her be run over by a train in front of a station full of men, or women who stood in a burning cottage and burned to death and did not rush out to safety as they might be seen by strangers assembled to fight the fire – all testify how women really honored the *purdah* and truly believed in “death before dishonor”. Their modesty was so extreme that thieves took advantage of this seclusion, because they knew that women would give up all their jewelry to them without screaming for help to not let strangers hear their voices.

Her account of women's journeys reveals some of the most extreme practices of *purdah*. The custom of putting women in a covered palanquin with layers of cloth sewed together has been aptly described by Rokeya as packing at in of "Brook Brand" tea. The women of that time, born and bred in *purdah*, were like lifeless inanimate objects, who felt utter helpless and became distraught without any help from their male family members. They in deed became dolls in the hands of others.

Strict *purdah* was maintained from their early childhood, as it was popularly believed that Ayesha (Ra), the bride of Prophet Muhammad (PBUH), had her puberty at 9 years of age. But this tendency to observance was not spontaneous. It was drilled into women from early childhood. Severe punishment was meted out for any violation of *purdah*. So from their very childhood women were turned into docile bodies to be manipulated by patriarchy. We find the following account in *Avarodhbasini*:

It is said that the venerable wife of the Prophet (PBUH), Ayesha (RA), attained puberty when she was 9 years old. In her honor, as soon as a girl of a respectable Muslim family approaches her ninth year, her guardians, male or female, forbid her to laugh aloud, to talk loudly or jump and run around. In short, all her movements become restricted. (72).

The pathetic situations and vulnerability of the *purdah*- observing women may look humorous and amusing but it was in effect humiliating for the women, though they did not understand that. The strict observance of *purdah* not only separated them from men, it also separated them from women, as these ladies were not supposed to come in front of any woman not related to them. But we can see that this observance of *purdah* in the name of religion became a farce in the marriage ceremonies. Their brides were forced to give their consent to their marriages. In one such incident, the mother does not hesitate to hit the reluctant girl; and when she cries out in pain, that is taken to be her consent.

These incidents show how the *purdah* becomes a manipulative tool for patriarchy and how women helped it in the process.

Through her writing in *Avarodhbasini* Rokeya explores the inhuman tradition of seclusion. From childhood, girls were forced into a docile position, and turned into almost inanimate objects.

Rokeya's primary objective was to make everyone realize what the actual state of seclusion was. She believed that poor timid secluded women needed to find voices to let the world know of their miseries. She became their voice and presented the true picture of the condition to the world. Rokeya's *Avarodhbasini* gives us a true and credible picture of a panoptic society and showed how women were manipulated and made docile through the mechanism of seclusion.

VI

Rokeya understood that the patriarchal world was preventing women from realizing their full potentiality and creativity. In the name of religion and honor, women were suppressed, and in due process, all the creative instincts of the women were directed into one purpose - to obey patriarchy's prescription and live accordingly. The hidden talents, which could blossom into full personality if proper guidance and encouragement were given, were wasted from the pressure of religious confinement and social conservatism.

Virginia Woolf in her work *A Room of One's Own*, suggested that women needed a room or space of their own to comprehend their potentials. Rokeya also realized that women needed space, a place of our own, where women could exercise and sharpen their talents and emerge as artists, freed from social burdens and fear of patriarchal surveillance. Such realization compelled her to write *Sultana's Dream*. It is evident from the focus of Rokeya's activities that in *Sultana's Dream*, the driving force behind the success of a utopian feminist country of Ladyland women's education.

Rokeya always insisted that women should be given the right to education. Rokeya was never against the descent and moderate form of *pardah*. She said that *pardah* should not be an obstacle to female education. With separate girls' schools and adequate teachers, women could both maintain the obligatory minimum of *pardah* and still get educated. We find this idea in *Sultana's Dream* too, where there are universities run only for women and by women teachers.

This novella depicts a country, which is governed and ruled by women, where all outside activities and businesses are done by women. All the men in that country are kept in seclusion inside *mardana*, are verse picture of the society that Rokeya lived in. Rokeya writes:

"Where are the men?" I asked her.

In Their Proper Places, where they ought to be." (Hossain,4).

On the surface level, *Sultana's Dream* appears to be a fantasy tale of utopia for women, but Rokeya wanted to convey some messages to both men and women through this story. To women, she delivered the message that education is the primary condition for emancipation, and that women should acquire modern, scientific education to free themselves from the bond of patriarchy. To men, she wanted to show that women were as capable and creative as men, and if they were given proper guidance and opportunity, women could help men in creating modern, liberal society.

Rokeya wanted to deconstruct and destroy the patriarchal idea of female, and the myths created by them to justify their domination over women. In *Sultana's Dream*, Rokeya places particular emphasis on the importance of women familiarizing themselves with the world of science.

She is unequivocal about the violent nature of some males, who try to rely more on brawn than brain. Rokeya in her novella pointed out the futility of secluding women by showing them the stupidity of the basic argument in favor of seclusion. She contends that if women are considered vulnerable and seclusion is the mean of sheltering them from possible male aggression then a more logical and effective way of achieving this end would be to contain their potential aggressors, men, rather than rounding up the potential victims, the women. Rokeya here deconstructs the patriarchal interpretation of the Quran, which emphasized only women's modesty, whereas in our earlier discussion we saw that the holy book men were asked to be modest first.

Another patriarchal myth about women being sexually seductive has also being exposed in this novella. The world of Lady land is free from sin and harm; as Sister Sara Puts it, "virtue herself reigns here". (4) The creation of a sinless, virtuous society was possible because, when men are put into *mardana*, there will be no crime and sin and so there will be no need for any policemen or prison. This is the deconstruction of the panoptic society, where men use constant surveillance through state forces to dominate women.

In *Sultana's Dream*, the whole patriarchal ideology is reversed. We see that in Lady land, violence is forbidden, because women are content with what they have.

Women here look after businesses, offices and carry out other commercial transactions, which reveals the myth men have created about women not being capable of doing such complicated tasks.

Women scientists here have discovered how to use solar power in cooking and other utilities; they have also discovered a way of acquiring water directly from the clouds. The whole kingdom, under the control of a virtuous and able queen, lives happily and peacefully. As sister Sara notes, there is no war or bloodshed, no punishment based on violence and pain in this world, because the religion practiced here is based on Love And Truth. The idyllic society in effect reverses the panoptic society that patriarchy created over time.

Rokeya deconstructed the need for seclusion of women which patriarchy argued was necessary to keep society safe from *fitnas* and *fesaads* (crime and chaos), as from patriarchy's point of view women are most of the time reason behind these problems. By Showing that men are the actual culprits and sinners, she breaks the notion of women being the reason behind all *fitnas* and *fesaads*. She points out that it was really the greed of man that led to much disorder in society.

She also argues against patriarchal myth sab out women not being capable enough to do anything other than house works. But Rokeya knew that it was not incapability but lack of opportunity that kept women from outside work. Women in Lady land quietly and nicely balance office and home activities.

Rokeya deconstructs another patriarchal idea by suggesting that men actually like to spend their time idly. Sister Sara substantiates this argument by saying men waste most of their time smoking and do little work in the office. That is why their work is never done on time.

Again, she takes on the myth that women's brains are smaller than men's, and that is why they are not as smart as men. But Rokeya suggests that women's brains are quicker than those of men and they can and do think more quickly and efficiently. Women are more patient, insightful and caring than men. In *Sultana's Dream*, sister Sara comments on this point thus:

“But we do not trust our *zenana* members with our embroideries!” She said laughing, “as a man has nor patient enough to pass thread through a needle even.” (6).

Rokeya celebrates and admires the feminine qualities, which in men's eyes are nothing but sentimental hysterias.

Rokeya wrote *Sultana's Dream* to make both men and women understand that God has given everyone innate qualities in equal proportion. It is our duty to recognize and nurture those qualities. God has created men and women equal so that everyone can get ample opportunities to fulfill their potentiality. But patriarchy has restricted women's potentiality by suppressing them in the name of religion. And to reinforce their domination they have created myths about

women. In *Sultana's dream*, by destroying and reconstructing those myths, Rokeya advocates women's education and other rights they deserve as human beings. This novella celebrates virtues of purity, sincerity, patience, respect for nature, non-violence and love and advocates women's right to exercise their potentiality and creativity to become proper human beings.

Through her writings, Rokeya Shakhawat Hossain uncovered the plight and misery of Muslim women of her time. Relentlessly, she critiqued the oppression of women in the name of religion. Her work was unique to that era, because, before her, no Muslim women writer dared to approach such sensitive issues in such a bold way. Her dream was to create a world where women would have access to education and would go hand in hand with men in building society. She single-handedly fought for the rights of Muslim women against a society that was pitiless and ignorant about women's thoughts and rights.

This essay will, hopefully, enhance our understanding of such a bold and assertive person, who with her writing and work made a permanent niche in the history of women's struggle for emancipation, especially in the Indian sub-continent. Also, my analysis of the panoptic society of the 19th and early 20th century Muslim community can enhance our understanding of how latently and tactfully patriarchy used its economic and political power domination over women through religious or social practices, which could be applied to every community in society.

Rokeya Shakhawat Hossain always wanted a society where men and women would live equally. She wanted Muslim society as a whole to emerge as a strong and modern society, so that it could develop and compete with Hindus and the English to establish itself on par with them. But religious and social conservatism and backward mentality about women left the whole Muslim community languishing behind those other communities. As an educated person, Rokeya understood that no society could ever prosper without the equal participation of men and women. She not only worked to get women their rightful place, but also wanted the male section of the society to see the effects of such inequality. She knew that the very Islam used by the religious thinkers to dominate women, had actually given equal opportunities to women. She imagined a world where women are not turned into docile bodies, for manipulation in the interest of patriarchy.

Rather, Rokeya Sought An Equal Society, where men and women will work hand in hand for the development of society and will live happily and harmoniously.

References

- Ali, Abdullah Yousuf., trans. *The Glorious Kuran*. Lahore: n.p., 1934. Print. Amer, Saher. *Uncovering the Meaning of the Veil in Islam*. 12 sep 2011. <http://www.unc.edu/depts/europe/conference/veil2000/veil-sa/veil_islam-amer.PDF>. Web.
- Arkoun, Muhammad. *Rethinking Islam: Common Questions, Uncommon Answers*. Trans. Robert D. Lee. Colorado: Westview Press, 1994. Print.
- Ashcroft, Bill. *Post-Colonial Transformation*. New York: Routledge, 2000. Print. Barlas, Asma. *Believing Women in Islam: Unreading Patriarchal Interpretation of the Quran*. Austin: University of Texas Press, 2002. Print.
- Beauvoir, Simone de. *The Second Sex*. Trans. and ed. H. M. Parshley. London: Vintage, 1997. Print.
- Bhuiyan, Anwarullah, ed. *Rokeya Juktibad Nobojagoron O Shikha-Shamaztata*. Dhaka: Rodela Prokashoni, 2008. Print.
- Bhuiyan, Harunar Rashid, ed. *Begum Rokeya Rachana Shamagra*. Dhaka: Hashi Prokashoni, 2004. Print.
- Brooker, Peter. *A Glossary of Cultural Theory*. London: Arnold Publishers, 2003. Print. Connell, R. W. *Gender and Power: Society, the Person and Sexual Politics*. Oxford: Polity Press, 1987. Print.
- Engels, Dagmar. *Beyond Purdah? Women in Bengal: 1890-1930*. Delhi: Oxford University Press, 1999. Print.
- Foucault, Michel. *Discipline and Punishment: the Birth of the Prison*. Trans. Alan Sheridan. New York: Vintage Books, 1979. Print.
- . *The Will to Knowledge: the History of Sexuality Volume 1*. Trans. Robert Hurley. London: Penguin Books, 1979. Print.
- . *The Use of Pleasure: The History of Sexuality Volume 2*. Trans. Robert Hurley. London: Penguin Books, 1979. Print.
- Hossain, Rokeya Shakhawat. *Sultana's Dream: Two Feminist Utopias*. Trans. Barinita Bagchi. New Delhi: Penguin Books, 2005. Print.
- Jahan, Roushan, (ed. and trans) *Inside Seclusion: The Avarodhbasini of Rokeya Shakhawat Hossain*. Dhaka: Women for Women, 1981. Print.
- Jeffery, Patricia. *Frogs in a Well: Indian Women in Purdah*. London: Zed Books Ltd, 1979. Print.
- Macy, David. *The Penguin Dictionary of Critical Theory*. London: Penguin Books, 2000. Print.
- Mason, Moya K. *Foucault and His Panopticon*. n.d. <<http://www.moyak.com/papers/michel-foucault-power.html>>. Web.
- Mernissi, Fatema. *The Veil and the Male Elite*. Trans. Mary Jo Lakeland. New York: Adison-

Wesley Publishing, 1991. Print.

Minsky, Roskind, ed. *Psychoanalysis and Gender: An Introductory Reader*. London: Routledge, 1996. Print.

Rabinow, Paul, ed. *The Foucault Reader: An Introduction to Foucault's Thought*.

London: Penguin Books, 1984. Print.

Sufi, Motahar Hossain. *Begum Rokeya: Jibon O Shahitya*. Dhaka: University Press Limited, 1986. Print.

Woolf, Virginia. *A Room of One's Own*. London: Grafton Books, 1977. Print.

Man, Madness, and Manipulation: Gendering Insanity in Shakespeare's *Hamlet* and *Macbeth*

Shibaji Mridha¹

Abstract

Insanity in William Shakespeare's tragedies has never been a gender-neutral term; any general discussion on insanity can lead to a bias towards a particular gender. Hence, gendering insanity is crucial to better comprehend the nexus between the discourse of madness and the patriarchal status quo. Scholars have investigated the notion of hysteria, melancholia, and madness of both male and female characters of Shakespeare's plays to a great length, occasionally comparing female hysteria with male madness. While critics mostly address the whats and hows of male and female insanity, this paper is particularly interested in why: why Lady Macbeth and Ophelia must die as hysteric women when Macbeth and Hamlet work through and act out different forms of mental disorder. It is more invested in the patriarchal manipulation of the discourse of madness, investigating the power dynamics of "male insanity" and "female insanity." This paper, thus, explores how insanity robs women of whatever little agency they have and, how, on the other hand, it provides men with a certain sense of power and wisdom, resulting in a method of madness. Studying the way in which society silences or discards women who no longer conform to the ideal/conventional version of womanhood, it exposes the patriarchal politics of appropriating the concept of insanity in order to control female sexuality.

Keywords: Gender, Insanity, Normative sexuality, Transgressive sexuality, and Patriarchy.

Undeniably the discussion on insanity has always occupied a crucial place in William Shakespeare's tragedies. Feminist critics have made this discussion more problematic by introducing a gender lens into the discussion, bringing in the notion of gender performance, female sexuality, and representation. Insanity in Shakespeare's tragedies cannot simply be read as a gender-neutral term. Any general discussion on insanity can lead to a prejudice towards a particular gender. Hence, gendering insanity is essential to better comprehend the nexus between the discourse of madness and the patriarchal status quo. Scholars have investigated the notion of hysteria, melancholia, and madness of both male and female characters of Shakespeare's plays to a great length,

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occasionally comparing female madness with that of their male counterparts. However, there is still a scope to further the discussion of insanity in gendered terms, explicitly identifying “male insanity” and “female insanity” in relation to the patriarchal power discourse. Referring to Ophelia and Hamlet from *Hamlet*, and Lady Macbeth and Macbeth from *Macbeth*, this paper investigates how the notion of insanity has been appropriated by the patriarchal ideology in an attempt to control female sexuality, both normative and transgressive. In the process, what can also be examined is the politics of gendered insanity in connection to the agency it bestows on, or strips off, the characters. Drawing references on the scholarship on insanity and gender studies, this paper, thus, explores what tale the portrayal of gendered insanity tells about male anxiety and patriarchal power dynamics.

Critics, while discussing Shakespeare’s portrayal of insanity, use different terms for different reasons to refer to the characters—ranging from mad, insane, hysteric, lunatic, depressive, distracted to melancholic. Carol Thomas Neely in her book *Distracted Subjects: Madness and Gender in Shakespeare and Early Modern Culture* (2004) intends to investigate male melancholia and female trivialized disorders, exploring various representations of distracted subjects, both men and women, and their prospective repercussions. She uses distraction as a common symptom of many cases of mental disorder, stating that Renaissance most often used distraction as a near synonym for extreme madness. She makes a distinction between madness/distraction and melancholia—where the former is mostly associated with women and the latter is with privileged men. She argues: “While ‘madness’ and ‘distraction’ denote excessive and often violent activity and behavior to others, ‘melancholy,’ in contrast, denotes torpor, passivity, and the inner emotions of fear and sorrow” (p. 4). Juliana Schiesari in her discussion of madness shifts between depression and melancholia which she considers male elite illness (p. 7). Duncan Salkeld (1993) makes use of the term madness, irrespective of gender and degree of madness, throughout his book *Madness and Drama in the Age of Shakespeare*, maintaining that in Shakespeare, “the meaning of madness is open and plural” (p. 27). While some critics stick to melancholy, hallucination, and paranoia when it comes to men, others prefer using the concept of hysteria, malady, lunacy, insanity etc. when it comes to women. Thus, a common consensus has not yet been achieved of what sort of mental disorder these characters suffer from, even though the characters surely encounter different forms of insanity, and in different degrees.

One possible reason could be that critics use diverse theoretical lenses to diagnose the behavioral symptoms. Besides, one must not forget the fact that we are dealing with fictional characters, not with real people. Therefore, a pluralist interpretation is possible while dealing with the nature of insanity in Shakespeare’s characters. However, the scope of the paper is neither to analyze

the psycho-social origin of madness nor to dissect and distinguish different forms of it. Throughout the paper, both 'insanity' and 'madness' will be used interchangeably as an umbrella term to denote different forms of mental disorder. Though madness or insanity was not a unified or universally validated term during the Renaissance, it possibly would serve the purpose of the paper since it primarily addresses the repercussion of insanity, be it real or feigned, considering all its forms in gendered terms, rather than diagnosing the origin and nature of insanity in individual subjects.

Insanity and women have been linked together since time immemorial. From mythical Cassandra (*Agamemnon*) to fictional Blanche DuBois (*A Streetcar Named Desire*)—women who display superior knowledge, over-feminized sexuality, or transgressive sexuality are silenced and controlled through the manipulation of the discourse of madness. Finding the nexus between female sexuality, captivity, and madness, Jacqueline O'Connor (1997) rightly asserts: "Ever since the Greeks mistakenly associated hysteria with a disorder of the womb, female sexuality and insanity have been linked by theories of cause and effect" (p. 48). The essence of her argument is that insanity used as a way of denying women's voice as well as dismissing their agency is nothing new in literature. One of the earliest feminist theorists Mary Wollstonecraft in her unfinished novel *Maria; or, The Wrongs of Woman* (1798), thus, tells the tale of a woman who is a victim of the partial laws and customs of the society. Her heroine Maria has been forcefully sent to an asylum by her abusive husband who wanted complete control over her wealth and freedom. Pointing at the bias, Elaine Showalter, in *The Female Malady* (1987), discusses how the traditional history of psychiatry paid little attention to gender questions. She maintains that the standard sources for psychiatric history, such as medical journals, psychiatric textbooks, asylum records, and court cases "leave out, indeed silence, women's voices" (p. 6). She also discusses how female malady has been categorically associated with the sexuality, vulnerability, and essential nature of women. One can certainly claim that the discourse of insanity, thus, has been under the domain of patriarchy since the concept was primarily defined and constructed by a male chauvinist society. Therefore, labeling insanity to women in order to control, subjugate, and deny their agency is a practiced scheme in patriarchy. It is, then, no surprise that the traces of manipulation of the discourse of insanity are pervasive in literature and in society, in general.

Attributing insanity to Ophelia and Lady Macbeth can be perceived as a mechanism to control their female sexuality that triggers a generic male anxiety in both *Hamlet* and *Macbeth* respectively. A woman in the state of madness is positioned outside the boundary of the patriarchal rule of femininity and gender performance since performed madness is generally believed, and excused, as an irrational act of a chaotic mind. The defiance, both conscious and sub-

conscious, against the man-made social decorum by displaying superior knowledge and non-normative sexuality can be dismissed if a woman is named as insane. Therefore, labeling a woman as mad can be a way of containing female dangerous sexuality and agency before they threaten the patriarchal discourse of normative female sexuality. Both Ophelia and Lady Macbeth produce male anxiety for their display of over-feminized and transgressive sexuality respectively. Ophelia and Lady Macbeth are two diametrically opposite characters who exhibit two different forms of gendered performances of women—normative and transgressive. Critics of feminist and gender studies categorically argue how, in a patriarchal society, gender is a social construct, and sexuality is a behavioral performance. Though it is performed by both men and women, it is exclusively defined by men. Jeffrey Weeks, in his book *Sexuality* (2010), discusses how crucial it is to identify sexuality as a historical construction that once did not exist, and at the same time in the future may not exist again. He contends: “Sexuality is not a given, it is a product of negotiation, struggle and human agency” (p. 21). Naming the position as “the male epistemological stance,” the American feminist Catharine MacKinnon (1982) argues that gender divisions and women’s subordination are rooted in heterosexuality. Showcasing the construction of patriarchal power discourse, she comments that: “men create the world from their own point of view, which then becomes the truth to be described... Power to create the world from one’s point of view is power in the male form” (p. 537). In short, women are expected to play their assigned feminine roles set by the patriarchal society.

Since femininity defines a woman, her gender performance is required to be naïve and submissive, which turns out to be an archetype of one kind of gendered behavior, generally identified as normative sexuality. If a woman refuses to play her assigned gender role, her deviant sexuality becomes a matter of constant scrutiny and threat, making her gender performance transgressive. Therefore, women of normative sexuality are those who conform to the patriarchal gendered standard of femininity. On the other hand, women are known to be displaying transgressive sexuality when they consciously or subconsciously subvert or problematize the conventional code of gender performance. Having accepted the intricate grey area between normative and transgressive sexuality, the following discussion will show how, on a general level, the portrayal of Lady Macbeth and Ophelia falls into the above-mentioned category of gendered behavior respectively, and their connection to female insanity.

Generally considered the fourth witch of *Macbeth*, Lady Macbeth starts off as a spur to stir Macbeth’s ambition who stands as an antithesis to what a woman should be according to the Elizabethan standard. Lady Macbeth who first appeared on stage in Act 1, scene V has been given equal status to Macbeth, if not greater, in terms of mental strength and determination. She knows that

Macbeth has ambition, but what he lacks is the wicked courage as he is “too full o’ the milk of human kindness” (1.5.15). She is confident that her intelligence and rhetoric would persuade him to act on his intent to become the king of Scotland by killing Duncan. When Macbeth waivers, like Hamlet, between to do or not to do, complaining he has “no spur/ To prick the sides of my intent, but only/ Vaulting ambition” (1.7.25-27), at this point, Lady Macbeth enters the stage as if a spur to stir his ambition. Her rejection of traditional femininity, espousal of ambition, and display of super confidence make her a threat to the patriarchal power structure. To our utter surprise, Lady Macbeth, the female protagonist of the tragedy, invokes the evil spirit, reminding us of the three witches at the beginning of the play:

LADY MACBETH: Come, you spirits
That tend on mortal thoughts, unsex me here,
And fill me from the crown to the toe top-full
Of direst cruelty. Make thick my blood, (1.5.38-41)

The blatant refusal of playing the orthodox role of a submissive, motherly, and moral woman is evident in the above lines that makes her un-sexed gendered identity equal to Macbeth in terms of the power dynamics. Even, Macbeth could not but utter that she can “Bring forth men-children only,/...Nothing but males” (1.7.73-75). What can be inferred from this is that even if Lady Macbeth’s body can function as a woman biologically, her mind is nothing but a man’s.

However, the power of Lady Macbeth must be checked before it can create a rapture to the dominant masculine ideology. Though they both are portrayed as extremely ambitious, and eventually punished, Macbeth is questioned on his legitimacy and moral right while Lady Macbeth is judged based on her gender. Marilyn French (1992) argues that if Macbeth has violated moral law, Lady Macbeth has violated “natural law” (p. 266). She explicates why she is portrayed as supernaturally evil whose crime is heinous because it violates her social role, failing “to uphold the feminist principle” (p. 266). The male anxiety over her displayed transgressive sexuality can only be pacified by making her silent. However, to subdue such a strong person like her could have seemed impracticable. She also does not deserve a cruel death like Tamora—another sexually transgressive woman portrayed in *Titus Andronicus*—since she did not take part in any crime other than planning of the murder of King Duncan. Therefore, insanity has been made an answer for her transgressive sexuality that can contain her power and erase her previous agency. Jane Ussher (1992) in *Women’s Madness: Misogyny or Mental Illness?* convincingly argues how the concept of madness is used to maintain the dominant order within patriarchal society. She states: “‘Madness’ acts as a signifier which positions women as ill, as outside, as pathological, as somehow second-rate – the second sex” (p. 11). Considering psychology as a singularly male enterprise, she elucidates the politics of patriarchy in regulating an alternative discourse of madness for

women. Thus, gendered insanity can be an exploitative tool in constructing identities and exercising power in an attempt to silence women's voices, and in this regard, Lady Macbeth's insanity can be an excellent example of that custom.

If insanity saves Lady Macbeth from being a witch who can overpower men through her superior knowledge and confidence, it saves Ophelia from being a whore. The play initially presents Ophelia as a loyal devotee to the patriarchal order who is desperately trying to be a good daughter, a good sister, and a good lover. Though she embodies normative femininity through her compliance and repressed desire, her over-feminized sexuality produces another form of fear in male sub-conscious. Her extreme naivety exposes her to be an easy victim of manipulation that is underscored by Polonius and Laertes's constant reference to her vulnerability and virginity. Laertes's cautionary note to keep her "chaste treasure open/ To his unmastered importunity" makes the audience aware of the impending danger of a virgin "chariest maid" (1.3.31-36). Like Laertes, Polonius, teaches her "baby" (1.3.105) a lesson of how to protect sexual purity. Though Ophelia asserts that Hamlet professes love "in honorable fashion" (1.3.111), he reminds her of "implorators of unholy suits, /Breathing like sanctified and pious bawds" (1.3.129-130). Her father's anxiety over her sexually vulnerable "green girl" (1.3.101) is evidently implied in his double-meaning reference to "brokers," "investments," "implorators," "bawds" etc. (1.3.127-130).

However, the fear of Ophelia's over-feminized naivety is manifestly best exemplified in Hamlet's treatment towards her. Hamlet, despite his intense love for Ophelia, cruelly asks her to go to "a nunnery" so that she does not be a "breeder of sinners" (3.1.122). The suggestion to a brothel in his utterance hints at his complete mistrust in naive female sexuality due to her mother's unprotesting sexual union with his uncle Claudius. His anxiety is evident when he constantly asks her to marry a fool as wise men know what "monsters" (3.1.139) women make of them. Thus, all the three important men in Ophelia's life are, somehow, obsessed with her vulnerable sexuality that, they fear, can be easily manipulated and subjugated. This male sub-conscious fear of Ophelia turning into a whore is so overwhelming that she must reject her performative femininity and desired body. Ophelia's madness denotes her refusal of affirmative sexuality that pacifies the male anxiety over her virginal body. Critic Valerie Traub (1995) persuasively demonstrates how masculine anxieties towards female erotic power are manipulated into "a strategy of containment" and "a metaphoric transformation of women" (p. 121). Analyzing the psychosexual and political dynamics within male-female relationships, he explicates how only the silence of death can offer Ophelia desirability and angelic status that saves her being a woman like Gertrude who can make a man a monster or a cuckold. This masculine imposition of silence, and more particularly of inertia, on women is connected with "a fear of chaos associated with the sexual act" (Traub, p. 121). Thus, Ophelia's insanity, resulting in her

death, can be read as channeling male anxiety over female sexuality to a considerable resolution of the conflict within patriarchy.

Patriarchy does not halt exercising its authority by only attributing madness to women. Rather, the manipulation of the discourse of madness intensifies once women are robbed of their limited agency and made as objects of possession by the institutionalized patriarchy. Both *Hamlet* and *Macbeth* follow a parallel structure of men overcoming madness while women are presented as helplessly giving in to it. Men not only triumph over madness but also turn out to be wiser and braver in the process. It is true that Hamlet problematizes the portrayal of madness since his madness is mostly feigned. The play draws a fine line between Hamlet's feigned madness and real disorder. However, what is tempting to see is Hamlet's authority over the discourse of madness that gives him a certain power to exercise his will. Though certainly disturbed by the knowledge of his father's murder and mother's hasty marriage, Hamlet's deliberate attempt to present himself mad does not go unnoticed. Initially, he might not have planned pretending madness; but once he realized he could hide his extreme grief and revenge motive using the mask of madness, he readily exploits it as far as possible with everyone, except his friend Horatio. Hamlet's doublet all unbraced, hatless head, stockings ungartered, and down-gyved to his ankle, pale shirt, and a piteous look gave Ophelia the impression of something terribly wrong with him. When she reports to her father, he readily considers it as "the very ecstasy of love" (2.1.103). He believes that Ophelia's denial of Hamlet makes him mad as "it is common for the younger sort/ To lack discretion" (2.1.117-118). Though both Claudius and Gertrude are suspicious of Hamlet's "transformation" (2.2.5), Polonius somehow manages to convince them that "the very cause of Hamlet's lunacy" is his intense love for Ophelia (2.2.49). The conversation between Hamlet and Polonius in the following scene, Act 2, Scene II, gives Hamlet a clear idea that Polonius considers him as mad, and this information has been already conveyed to the king. This knowledge makes him play along with his words and wits to confuse, and to tease, Polonius. His feigned madness is evident at the end of this scene with Hamlet's plotting against the king in an attempt to verify the version told by the ghost. Even if much distracted by the repulsive act of the "incestuous, that adulterate beast" (1.5.42), he still didn't lose his sanity. He sets the play, justly titled as *The Mousetrap*, and his feigned madness as a trap to "catch the conscience of the king" (2.2.582).

However, in Act 3, Scene IV, finally Hamlet displays his fits of lunacy. The following conversation between Hamlet and Gertrude in her chamber clearly suggests Hamlet's hallucination unlike the first few scenes where Hamlet, his friends, and guards all were able to see the ghost:

QUEEN GERTRUDE. To whom do you speak this?

HAMLET. Do you see nothing there?

QUEEN GERTRUDE. Nothing at all; yet all that is I see.

HAMLET. Nor did you nothing hear?

QUEEN GERTRUDE. No, nothing but ourselves.

At this point, considering Hamlet mad, Gertrude comments that this lunacy is the very coinage of his brain. She is so convinced that while reporting to Claudius, she describes him as “Mad as the sea and wind, when both contend/ Which is the mightier:” (4.1.6-7). It seems that the king also believes at this point that Hamlet “in madness hath Polonius slain,” before he orders Rosencrantz and Guildenstern to aid in the matter (4.1.33). Claudius might not know the true cause of his madness, but he is certainly disturbed by this violent, distracted Hamlet. Though he shows symptoms of a disordered mind, he is able to clearly think and act even after hallucinating his father’s ghost. Before dragging Polonius’s dead body for burial, he says: “I must be cruel, only to be kind./Thus bad begins, and worse remains behind” (3.4.162-163). Though arguably in the famous grave digging scene Hamlet might display certain features of madness, he continues to manage a control over his irrational mind. Polonius rightly says, even if Hamlet is mad, there is a certain “method” in it (2.2.203).

If Hamlet’s is madness with a method, Ophelia’s is “a document in madness, thoughts and remembrance fitted” (4.5.174-176). Ophelia’s real madness is documented through her speech, costume, and response to other characters. Her news of madness is first provided by a gentleman who is reporting to the Queen. He narrates her winks, nods, and gestures might carry thought, but nothing is sure: “That carry but half sense: her speech is nothing” (4.5.6-7). Later, Claudius’s comment evidently tells that Ophelia, unlike Hamlet, has lost her sanity completely:

CLAUDIUS. poor Ophelia

Divided from herself and her fair judgment,

Without the which we are pictures, or mere beasts;(4.5.80-82)

The sharp contrast between the presented insanity in gendered terms is evident when no one questions her insanity as if she was so weak and unguarded, both physically and intellectually, that it was a natural consequence. Elaine Showalter (1992) investigates the history of the representations of Ophelia, exploring cultural links between femininity, female sexuality, insanity, and representation. Referring to many stage representations and critical perspectives from across the centuries, she argues that while Hamlet’s madness is perceived as metaphysical, linked with culture, Ophelia’s is a product of her female body and female nature. She states: “If male melancholia is associated with intellectual and imaginative genius, women’s melancholy is seen as biological, and emotional in origins” (p. 285). Therefore, it is no surprise that Hamlet is in a position to manipulate with the notion of madness while Ophelia is slowly giving in to the power of madness. Gertrude reports that, as one “incapable of her own distress,” she drowns herself in the weeping brook

(4.7.149). On the other hand, Hamlet's madness can never swallow him completely. In Act 5, Scene I, his stormed encounter with Laertes at Ophelia's burial where he pronounces his deep love for her, saying "forty thousand brothers/ Could not, with all their quantity of love,/ Make up my sum," (5.1.254-256) not only exhibits his intense grief over the tragic death of his love but also displays his disturbed mind. Though there can be disagreement over whether Hamlet is behaving truly madly in this scene, in the penultimate scene he certainly uses madness as his armor to convince Laertes that he is not responsible for his past deeds:

HAMLET: Who does it, then? His madness: if't be so,
Hamlet is of the faction that is wrong'd;
His madness is poor Hamlet's enemy. (5.2.174-176)

Hamlet certainly knows by this point that his real enemy is never his madness, rather his introspection and moral dilemma over his father's murder caused by his uncle. Already aware of Claudius's vicious plan during the sword fight, he, for the last time, exploits the discourse of madness in an attempt to act on his intent. Thus, he always manages to negotiate with his irrational mind, and can return to normalcy.

H. Somerville in *Madness in Shakespearian Tragedy* (1969), considering madness as a condition of degree, discusses how Macbeth showcases symptoms of "hallucination" and "paranoia," in which madness is a temporary condition. On the other hand, Lady Macbeth suffers from real madness, in which the collapse is complete, and the damage is done (p. 41-68, p. 143-160). Though his book is not a comparative study of gendered insanity, his study of the madness of the characters resonates the pattern Shakespeare used in *Hamlet*—men overcoming madness and women becoming sheer victims. In *Macbeth*, Macbeth's paranoia presents itself as more severe than Hamlet's hallucination. Somerville (1969) considers Macbeth as a "paranoiac of the worst and most dangerous type, a man suffering from delusions or persecution with homicidal tendencies" (p. 56). Macbeth's hallucination is first evident when he sees the "fatal vision" (2.1.36) of a dagger after the murder of King Duncan. His mental distraction reaches to its extreme when he encounters Banquo's ghost at the feast. Like Hamlet in Gertrude's chamber, no one else except Macbeth can see the ghost. He himself admits that it is a "strange infirmity" (3.4.85) that is bothering him while asked by the other guests at the feast. However, Lady Macbeth, at this stage, still seems to be rational enough to comfort him, both in person and in public. She cautions him with the impending danger: "These deeds must not be thought/ After these ways. So, it will make us mad" (2.2.32-33). Ironically, it is Lady Macbeth who eventually gives in to madness while her male counterpart turns out to be stronger and more determined in the process. Her success in stimulating Macbeth's evil intention by pouring "spirits" in his ear and chastising with the "valour" of her tongue not only

suggests her ambition and her skills in political strategy but also manifests her power over Macbeth (1.5.24-25). The great bond they share is evident at the beginning of the play when Macbeth could not wait to send her a letter stating the details of the prophecy of the witches.

However, this status quo collapses once Macbeth becomes the king, especially after the murder of Banquo. We witness Macbeth claiming superior authority while replying her queries about his next action: "Be innocent of the knowledge, dearest chuck,/ Till thou applaud the deed" (3.2.46-47). In course of time, Lady Macbeth starts losing her mind, especially after Macbeth's soldiers "savagely slaughtered" Lady Macduff and her little son (4.3.206). She laments, showing us the symptoms of phobic disorder: "The thane of Fife had a wife: where is she now?/What, will these hands ne'er be clean?" (4.3.36-37). Later, symptoms of somnambulism are evident when the gentle woman reports Lady Macbeth's sleepwalking in detail to the doctor. Though the doctor is uncertain of the nature of her disease, what he comprehends from her symptoms is crucial to understand gendered insanity:

DOCTOR: Foul whisperings are abroad: unnatural deeds
Do breed unnatural troubles: infected minds
To their deaf pillows will discharge their secrets: (5.1.61-63)

The subtext of the above lines is informed by the idea that men can win over the infected minds—no matter how much unnatural troubles they suffer from—but not women. Compared to Macbeth's foul play, Lady Macbeth's sin is nothing; she even failed to take part in the killing of Duncan as he resembled her father. Macbeth can process all the grief and irrationality that come with all the heinous murders, apart from suffering some temporary hallucination. In this regard, McLuskie's (2001) discussion on the link between misogyny and patriarchy in defining Shakespearean women in tragedies is compelling. Arguing chaos in gendered terms, she discusses how the power of patriarchy eventually restores the order of the society without compromising its chauvinist principles. Therefore, the institution of "male power" in the family and the State is portrayed in many Elizabethan tragedies as "the only form of social organization strong enough to hold chaos at bay" (McLuskie, p. 36). Following the pattern, the weaker Lady Macbeth becomes, the stronger Macbeth becomes in proportion, who is capable of fighting against all odds, including the inner ones. Once strong-willed, composed, and ambitious Lady Macbeth is shown incapable of carrying the burden of unwanted knowledge of human's greed, treachery, futility, and life in general. Eventually, she collapses and commits suicide, being a helpless victim to madness. While her guilt and grief are slowly leading her to death, his guilt and grief, like Hamlet's, make him philosophically utter: "Life's but a walking shadow...full of sound and fury,/ Signifying nothing" (5.5.23-27).

Juliana Schiesari (1992) analyses the elevation of male melancholia and the devaluation of female mourning and loss in Renaissance culture. Considering melancholia as “a privileged form of male expression” (p. 13), she argues how women’s losses are delegitimated or made to seem insignificant compared to men for whom it can be a sign of spiritual greatness. She believes Hamlet’s displayed melancholia encodes a gendered bias when compared to the diatribe and ridicule Gertrude and Ophelia receive at the hands of Hamlet. Considering depression as an elite illness, she states: “Depression for ‘qualified’ men thus became a sign of spiritual greatness that, in turn, empowered such men to capitalize on their difference by making it a difference that counts” (p. 7). Her discussion of the superiority of the homo melancholia that reinforces patriarchal cultural legitimacy explains why Hamlet’s madness, both feigned and real, is dynamic, full of rage, and restless, while Ophelia’s madness is presented as dull, introspective, and melodic. What makes her vulnerable, weak, and dull-witted, makes him wiser, sharper, and stronger. Hamlet’s speech is either as sharp as a dagger or philosophical. In the scene where he ‘hallucinates’ his father’s ghost, his speech is so piercing that Gertrude must beg him to stop: “O, speak to me no more;/These words, like daggers, enter in mine ears;” (3.4.84-85). There are many instances in the play when Hamlet is heard to utter philosophical nuances—be it when Hamlet feigned madness in front of Polonius, famously avowing “What a piece of work is a man!” (2.2.294), or when he transgressed the limit of sanity in the grave digging scene talking to skulls, superbly manifesting the futility of human existence. Feigned or real, his madness makes complete sense adorned with excellent words and wits.

On the contrary, Ophelia’s speech is inconsequential and fragmented, and her songs resonate nursery rhymes:

OPHELIA: You must sing ‘Down, a-down’,
An you call him a-down-a.
O, how the wheel becomes it! (4.5.169-171)

There possibly could be multiple layers in her speech and songs that can be divulged using psychoanalysis and linguistic theory. However, the point of reference here is how insignificant it is to other characters and how little impact it creates on others. In this regard, Schiesari (1992) rightly argues how the portrayal of madness “legitimizes the male in his ‘excessive’ suffering, ..., but leaves women as an oppressed and nameless (or generic) other” (p. 13). The gentleman who reports her madness to Gertrude sums up the general attitude towards her distracted condition: “Her mood will needs be pitied” (4.5.3). Ophelia’s case is a private affair; this “poor wretch” (4.7.153) can create only pity in a small circle. On the other hand, Hamlet’s apparent madness is a source of worry, insecurity, and constant speculation for Claudius. Even in his state of apparent insanity, he is a threat to the power of Claudius which he clearly expresses with Rosencrantz and Guildenstern while plotting against Hamlet:

CLAUDIUS. The terms of our estate may not endure
 Hazard so dangerous as doth hourly grow
 Out of his lunacies. (3.3.5-7)

The whole kingdom seems to have invested in his madness. In Act 5, Scene 1, we come to understand that Hamlet's madness is public knowledge through the conversation between the gravediggers. When Hamlet playfully inquires, hiding his identity, why the prince has been sent to England, the first clown replies: "Why, because a was mad. A shall recover his wits there;" (5.1.140). Hamlet, being a man, can resolve the dilemma of "to be or not to be" while Ophelia is burdened with her loss and grief so much that she must die. Her water-soaked heavy gown that pulls her into the water can be read symbolically as her intense sorrow, loss, and irrationality that she was wearing on her soul. While Ophelia, at best, creates pity, Hamlet is portrayed as producing pathos who dies like a hero—victorious and nobler. The play ends with the elevation of Hamlet as an unyielding fighter:

FORTINBRAS. Let four captains
 Bear Hamlet, like a soldier, to the stage;
 For he was likely, had he been put on. (5.2.339-341)

Unlike Ophelia, Lady Macbeth's death is made more insignificant which is presented as a form of news coming from a woman that follows Macbeth's hasty lamentation. It is understandable that Macbeth is full of grief by the news. He still possibly loves her as he did before, yet he is a changed man now. His initial response to the death of Lady Macbeth was: "She should have died hereafter;/There would have been a time for such a word" (5.5.17-18).

Shakespeare does not even disclose the nature of her death until the end of the play. It is Malcolm who in his final speech briefly mentions that this "fiend-like queen" herself took her life by her "violent hands" (5.11.35-36). Thus, the woman who was shown equally powerful to Macbeth has been reduced to a walking shadow whose gradual demise involves only a few people like a gentlewoman, a doctor, and Macbeth himself. Like Ophelia, her involuntarily submission to insanity makes her a poor victim over whom we can shower only pity. It is the same Lady Macbeth, once advising her husband that only a little water can wash the blood, who now laments that "all the perfumes of Arabia will not sweeten this little hand" (5.1.43). By making her madness an insignificant, private affair to mourn, the play is able to easily discard her from the plot as a disposable mad woman. On the contrary, like Hamlet, Macbeth's tenacity to fight till the end and claiming his heroic identity make him a hero that enables us to feel a sense of catharsis. Like a true warrior, both on the battlefield and in life, Macbeth resolutely pronounces: "Yet I will try the last. Before my body/ I throw my warlike shield" (5.10. 32-33). While we are made to identify with the pathos created by the tragic death of Macbeth, we are only invited to show pity to the tragic death of Lady Macbeth, resulting from her

madness. Thus, the portrayed female insanity equates to passive submission to death resulting in pity in a private sphere. On the other hand, male insanity, first, equates to a triumph over it, and then, a glorifying death springing from other reasons rather than madness, that finally involves a public spectacle.

Gendering insanity in *Hamlet* and *Macbeth* divulges the sub-textual politics of men's manipulation of madness. Only the notion of "male insanity" and "female insanity" can essentially explain why Lady Macbeth and Ophelia must die as hysteric women while Macbeth and Hamlet work through and act out different forms of mental disorder. If Shakespeare's mad heroes display method in madness, his mad women are nothing but sheer madness documented. The manipulation of the discourse of madness reflects the agency of men in subjugating female sexuality if it somehow disrupts the patriarchal status quo. Resultantly, mad women are depicted losing whatever little agency they owned before, thereby making their words and actions, both before and after the madness, inconsequential and irrelevant. In the process of attributing insanity to women, and thus, silencing their voices, patriarchal discourse, sub-consciously, exposes its anxiety over female sexuality. There is no denying that a lot has been said regarding gender and insanity; nevertheless, further investigation in the power dynamics of "male insanity" and "female insanity" in Shakespeare's tragedies can still substantially add to the ongoing complex discussion of naming and shaming women's gender performance and sexuality.

References:

- French, M. (1992). "The Late Tragedies" in J. Drakakis (Ed.), *Shakespearean Tragedy*. New York: Longman, 227-279.
- Mackinnon, C. (1982). "Feminism, Marxism, Method and the State: An Agenda for Theory", *Signs*, 7(2), 515-44.
- McLuskie, K. (2001). The Patriarchal Bard: Feminist Criticism and Shakespeare: King Lear and Measure for Measure' in K. Chedgzoy (Ed.), *Shakespeare, Feminism and Gender*. New York: Palgrave, 24-48.
- Neely, T. C. (2004). *Distracted Subjects: Madness and Gender in Shakespeare and Early Modern Culture*. New York: Cornell University Press.
- O'Connor, J. (1997). *Dramatizing Dementia: Madness in the Plays of Tennessee Williams*. Bowling Green: Bowling Green State University Popular Press.

- Salkeld, D. (1993). *Madness and Drama in the Age of Shakespeare*. New York: Manchester University Press.
- Schiesari, J. (1992). "Introduction" in *The Gendering of Melancholia: Feminism, Psychoanalysis, and the Symbolics of Loss in Renaissance Literature*. New York: Cornell University Press, 1-32.
- Shakespeare, W. (2008). "The Tragedy of Hamlet, Prince of Denmark" in Stephen Greenblatt et al. (Eds.), *The Norton Shakespeare: Based on the Oxford Edition*. New York: W. W. Norton, 1683-1784.
- Shakespeare, W. (2008). "The Tragedy of Macbeth" in Stephen Greenblatt et al. (Eds.), *The Norton Shakespeare: Based on the Oxford Edition*. New York: W. W. Norton, 2569-2632.
- Showalter, E. (1992). "Representing Ophelia: Women, Madness, and the Responsibilities of Feminist Criticism" in J. Drakakis (Ed.), *Shakespearean Tragedy*. New York: Longman, 280-295.
- Showalter, E. (1987). "Introduction: The Female Malady" *The Female Malady: Women, Madness, and English Culture, 1830-1980*. London: Penguin Books, 1-20.
- Somerville, H. (1969). *Madness in Shakespearean Tragedy*. London: The Richard Press Ltd.
- Traub, V. (1995). "Jewels, Statues, and Corpses: Containment of Female Erotic Power in Shakespeare's Plays" in D. Barker and I. Kamps (Eds.), *Shakespeare and Gender: A History*. New York: Verso, 120-141.
- Ussher, J. M. (1992). *Women's Madness: Misogyny or Mental Illness?* Amherst: The University of Massachusetts Press.
- Weeks, J. (2010). *Sexuality*. New York: Routledge.