CHAPTER-4

FORMULATION OF THE PROBLEM

4.1 Detection of Manipulators in Stock Market

Manipulators are mostly involved in selling rather than buying. So identification of the seller brokers with abnormal sell quantity is the most vital need for stock fraud detection.

According to Zakia et al. (2006) [140], following observations can determine the detection of Manipulators:-

- Identify seller IDs whose sell quantity rise up suddenly.
- Identify seller IDs whose sell quantity fall suddenly.
- Identify buyer IDs whose buy quantity rise up suddenly.
- Identify seller/buyer IDs who suddenly starts a large volume of trade.
- Identify stock IDs if trade volume or trade quantity increases suspiciously.
- Identify stock IDs with sudden raise or fall in price or having same buyer and seller.

Initially we have started our research work by studying and analyzing historical data of BSE (Bombay Stock Exchange), NSE (National Stock
Exchange) of various companies and investors complains [131] registered with SEBI (Security Board on India) against the Companies, Brokers, Promoters, Institutional/Non-Institutional Investors, individuals etc. from their respective official websites, to study and analyze the various possibilities of frauds in Indian Stock Market.

After studying and analyzing historical data of lot of companies and the fraudulent activities of various kind done by some of the companies, we have focused on studying and analyzing trading patterns of suspicious companies.

4.2 Data Structure

The current study utilizes the historical data of bulk deals and historical data of stock prices available on BSE and NSE websites, www.bseindia.com and www.nseindia.com in CSV (Comma Separated Value) file format for various fields (Attributes) which we have converted into XLS (Excel) File Format. The observations, utilized in the study were collected from the sites in the month of March-2012, July-2012 and December-2012. Among all the attributes available on these sites, the current study utilizes the data with respect to following fields:
From **Historical Data of Bulk Deal** we have taken only following fields (attributes)-

1. Deal Date
2. Trading Entity Name
3. Deal Type (Buy/Sell)
4. Quantity
5. Price

From **Historical Data of Stock Prices** we have taken only following fields (attribute) -

1. Date
2. Open Price
3. High Price
4. Low Price
5. Close Price
4.3 Algorithm I

To Detect Price Manipulation by Trading Entities

Step-1- Begin

Step 2- Read: NBDD

Step 3- Read: BBDD

Step 4- Read: CMP

Step 5- Set MBDD: = NBDD + BBDD

Step 6- Repeat Steps 7 & 8 for TE=1 to MBDD [TE] Not Equal to NULL

Step 7- Set TBQ_{TE}: = Sum of all BQ_{TE}
        Set TSQ_{TE}: = Sum of all SQ_{TE}
        Set WABP_{TE}: = (BQ_1*BP_1+BQ_2*BP_2+……BQ_n)/TBQ_{TE}
        Set WASP_{TE}: = (SQ_1*SP_1+SQ_2*SP_2+……SQ_n)/TSQ_{TE}
        Set SHQ_{TE}: = TBQ-TSQ
        Set WAPSHQ_{TE}: = (TBQ*WABP-TSQ*WASP)/SHQ
        [End of For Loop]

Step 8- If WABP_{TE}>WASP_{TE} or WAPSHQ_{TE}>CMP then:
        Write: “Outlier Trading Entity Name”
        [End of If Structure]

Step 9- End
Table 4.3.1- Abbreviations used in Algorithm-I

<table>
<thead>
<tr>
<th>Labels of Field Name</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSE Bulk Deal Data</td>
<td>NBDD</td>
</tr>
<tr>
<td>BSE Bulk Deal Data</td>
<td>BBDD</td>
</tr>
<tr>
<td>Merged Bulk Deal Data of NSE and BSE</td>
<td>MBDD</td>
</tr>
<tr>
<td>Trading Entity</td>
<td>TE</td>
</tr>
<tr>
<td>Total Buy Qty</td>
<td>TBQ</td>
</tr>
<tr>
<td>Total Sell Qty</td>
<td>TSQ</td>
</tr>
<tr>
<td>Weighted Average Buy Price</td>
<td>WABP</td>
</tr>
<tr>
<td>Weighted Average Sell Price</td>
<td>WASP</td>
</tr>
<tr>
<td>Still Holding Qty</td>
<td>SHQ</td>
</tr>
<tr>
<td>Weighted Average Price of Still Holding Qty</td>
<td>WAPSHQ</td>
</tr>
<tr>
<td>Current Market Price</td>
<td>CMP</td>
</tr>
<tr>
<td>Buy Quantity</td>
<td>BQ</td>
</tr>
<tr>
<td>Sell Quantity</td>
<td>SQ</td>
</tr>
<tr>
<td>Buy Price</td>
<td>BP</td>
</tr>
<tr>
<td>Sell Price</td>
<td>SP</td>
</tr>
</tbody>
</table>
4.4 Algorithm II

For Detection of Outlier Trading Entity

Step 1- Begin

Step 2- Read NBDD

Step 3- Read BBDD

Step 4- Set MBDD: = NBDD + BBDD

Step 5- Repeat Steps 6 & 7 for TE=1 to MBDD [TE] not equal to NULL

Step 6 – Set TBQ_{TE}: = Sum of all BQ_{TE}

Set TSQ_{TE}: = Sum of all SQ_{TE}

Step 7- If [TBQ_{TE} - TSQ_{TE}] =0 or [TBQ_{TE} - TSQ_{TE}] >0 then:

Write: “Normal Trading Entity”

Else

For TD=1 to MBDD [TD] not equal to NULL

Read DB [TD]

Read DS [TD]

If DB [TD] = DS [TD] then:

Write: “Outlier Trading Entity”.

Else

Write: “Normal Trading Entity”

[End of Inner If-Else]

[End of Inner For Loop]

[End of Outer If- Else]

[End of Outer For Loop]

Step 9- End
Table 4.4.1- Abbreviations used in Algorithm-II

<table>
<thead>
<tr>
<th>Label of Field Name</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSE Bulk Deal Data</td>
<td>NBDD</td>
</tr>
<tr>
<td>BSE Bulk Deal Data</td>
<td>BBDD</td>
</tr>
<tr>
<td>Merged Bulk Deal Data of NSE and BSE</td>
<td>MBDD</td>
</tr>
<tr>
<td>Trading Entity</td>
<td>TE</td>
</tr>
<tr>
<td>Total Buy Qty</td>
<td>TBQ</td>
</tr>
<tr>
<td>Total Sell Qty</td>
<td>TSQ</td>
</tr>
<tr>
<td>Trading Day</td>
<td>TD</td>
</tr>
<tr>
<td>Date of Buying</td>
<td>DB</td>
</tr>
<tr>
<td>Date of Selling</td>
<td>DS</td>
</tr>
</tbody>
</table>