CHAPTER 7

HYPOTHESIS TESTING AND MODEL DEVELOPMENT
CHAPTER 7

HYPOTHESIS TESTING AND MODEL DEVELOPMENT

7.1 Introduction

Literature highlights need for research of WoM on Social Media and an opportunity for organisations and researchers to record and leverage WoM activity (Trusov et al., 2009).

From the current body of work a number of drivers of Word of Mouth emerge but there is no evidence of a comparison of these drivers of WoM. Therefore, in most of the literature, usually a single driver/ influencer of WoM are measured against a single effect of WoM. For Example:

1. Greater consumer involvement within a product category, resulting in more information-seeking (Giese, 1996).

2. Valence effects purchase intention (Christodoulides et al, 2012)

3. Behavioural consequences related to WoM communication on Social Media (Zhang et al, 2009).

These drivers need to be analysed further to understand and compare the relative impact of each one of them on WoM effectiveness.

Moreover, not all of these drivers of WoM are tested on the online Social Media. Jillian Sweeny, 2010, urges researchers to study WoM communication in an online context.

A multi item seven-point scale has been developed in the previous chapter for measuring Word of Mouth Effectiveness. This will form part of the final model used for fulfilling the proposed objective of establishing a relationship between the drivers of Word of Mouth and effectiveness of Word of Mouth. The 7 components of this multi-tem scale provide us with a comprehensive measure to test the causal relationship between an individual’s receiving a Word of Mouth message and his response, if any.
The research question to be explored as outlined in Chapter 3 is as follows-

*What is the relative impact of key drivers of WoM on effectiveness of WoM on Social Media for Youth.*

The current chapter describes the hypotheses developed in Chapter 3, developing and testing of the proposed model using Structural Equation Modelling.

### 7.2 Research Gaps

The Research gaps are discussed in two broad categories of Drivers of Word of Mouth and Outcomes of Word of Mouth or Measures of Effectiveness of Word of Mouth.

As highlighted in Chapters two, three and four, the following drivers of WoM have been identified based on literature review and exploratory research

1. **Perceived Source Credibility and Strength of ties with source** (Carl, 2008; Brown, 2007; Ennew, 2000)

2. **Previous experience of receiver** (Samson 2010; Wee et.al, 1995; Jones, 2009; Teng, 2007; Ng, 2011; Bolfing, 1989; Swanson and Kelly, 2001; Söderlund, 1998).


5. **Message Content and Message Delivery; Message Valence** (Lin et.al, 2012; Huang, et.al, 2011; Delgadillo et.al, 2004)
Sweeney, 2010, urges researchers to consider not just WoM valence and volume, as has been typical in previous WOM research, but to also examine specific message details, including cognitive content, richness of the content and strength of delivery.

The 7 components of the multi item scale developed (chapter 5) to measure the outcomes of Word of Mouth are as follows-

**Factor 1: Awareness and Interest**

**Factor 2: Information Search Online**

**Factor 3: Online Buzz**

**Factor 4: Offline Buzz**

**Factor 5: Lead Generation**

**Factor 6: Liking and Trial**

**Factor 7: Purchase Intention**

No single study has done a comprehensive analysis measuring the causal relationship between all Word of Mouth Drivers and all Word of Mouth Effects. In other words, existing literature does not offer a comprehensive end to end (causes to outcome) study for Word of Mouth on Social Media using most of the established variables.

There is, however, one paper that attempt to establish a causal relationship. But these papers, as discussed below, use few measures of Word of Mouth Drivers and only single items for Word of Mouth Effectiveness.

Hennig-Thurau and Walsh, 2003, one of the few researchers that provide an end to end research, i.e. an empirical study showing relationship between causes and effects of WoM, examine why customers retrieve other customers' on-line articulations on social media or other web based platforms. They demonstrate that individuals retrieve on line articulations primarily to ‘save decision making time and make better buying decisions’. Again, the research uses few parameters like Social orientation, Community Membership, Remuneration, etc. as causes for reading an online message, and link it to two outcome constructs, namely, change in buying behaviour and change in communication behaviour. It
may be noted here that the two output constructs are similar to the constructs postulated by Walter J Carl. The results of this paper show that customer’s motives for retrieving on-line articulations strongly influence their behaviour.

The authors, Hennig-Thurau and Walsh, 2003, postulate that the reading motivation can be a necessary, but not sufficient, condition for a change in buying behaviour, and advise researchers to consider further traits to provide a complete picture of online Word of Mouth articulations.

7.3 Hypotheses to be Tested

The drivers of Word of Mouth are tested through two sets of variables, given in chapter 4. These sets are Message Receptiveness and Receiver’s Attitude.

Quality of message received (message content, message valence and strength of delivery of the message); the receiver’s perception of the source (strength of ties with the source and perceived source credibility) and previous experience of the receiver, are all input factors that determine the MESSAGE RECEPTIVENESS. The following hypothesis was thus proposed

H1: Message content, Message valence, Message delivery, Strength of Ties of the Receiver with the Source, Perceived source credibility, Previous experience of the receiver have a significant impact on MESSAGE RECEPTIVENESS, for WoM messages on Social Media on the youth segment.

The second significant group of input variables, that determine the process variables, is the attitude of each individual receiver. A receiver’s characteristic affects how the external inputs from input stage influence the customer’s recognition of a need, pre-purchase search for information, evaluation of alternatives (Schiffman and Kanuk, 2010). Social Orientation, Community Membership and Level of Product Category Involvement of the receiver are hypnotised to influence the RECEIVER’S ATTITUDE.
H2: Product category involvement, Social orientation, Community membership have a significant impact on Receiver’s Attitude to WoM messages on Social Media on the youth segment.

This ‘process’ stage of the decision-making model focuses on how consumer makes decisions. It has been suggested that the receiver’s RECEPTIVENESS OF THE MESSAGE and the RECEIVER’S ATTITUDE, as part of the process stage of a consumer’s decision making process play an important role in determining the output of Word of Mouth.

H3: Message Receptiveness has a significant impact on WoM Output on Social Media on the youth segment.

H4: Receiver’s Attitude has a significant impact on WoM Output on Social Media on the youth segment.

The output variable includes the awareness creation, interest generation, and a desire to try out the product or purchase it, repeat purchase as determined by the scale of Word of Mouth Effectiveness developed in the previous chapter.

Testing the above hypotheses through mapping the different drivers of WoM to onto specific output variables can be done through the following proposed model (Figure 8)
7.4 Methodology Followed

Structural Equation Modelling was used for testing the objective of relative impact of key drivers of WoM, on WoM effectiveness on Social Media for Youth.

Structural equation Modelling is a multivariate technique widely used for testing and establishing a causal model. It examines the structure of interrelationship expressed in a series of equations and tests factor analysis and multiple regression analysis together, Hair et al, 2006.
The causal hypothesis, that is relationship between causes and effects of Word of Mouth are represented in a model. The model is then tested against the obtained measurement data to determine how well the model fits the data.

The advantage of using Structural Equation Modelling and not mere regression is that SEM can simultaneously test measurements and structural relationships amongst a set of variables. In other words, it can test multiple interrelated dependence relationships simultaneously.

Moreover, SEM also has the ability to represent unobserved concepts in these relationships. These unobserved concepts are called constructs. Thirdly SEM provides for both measurement and prediction error in the estimation process.

The sample size for SEM is 600 out of which the valid responses are 581. When the number of factors is larger than six, sample size requirements should exceed 500, (Hair et al, 2006.) As a thumb rule sample size should be 20 X the number of factors. Our factors are 16 in number, 7 observed dependent and 9 observed independent. The sample size should therefore exceed 320 respondents, (Hair et al, 2006).

The following steps have been followed for the Structural Equation Modelling, (Hair et al, 2006; Schumacker and Lomax, 2010).

1. Model Specification
2. Model Identification
3. Assessing the Structural Model’s Fit
4. Model Modification and Re-specification

The software used for analysis was **LISREL 9.2. Robust Maximum Likelihood** was used for model estimation and model testing, as this is the recommended method for data with normality issues (Joreskog et al, 2004.)

### 7.5 Specifying the Overall Measurement Model

The first step towards Structural Equation Modelling is model specification. We need a model that delineates the relationship among variables. The model must be based on theory
or past studies, (Bollen and Long, 1993). The scales selected from literature and scales developed have been used to develop the model proposed for study.

This stage involves defining constructs, selecting scales already published and if required developing new scales that do not have sufficient literature.

Existing scales, such as Richness of Message, Product Category Involvement, Community Membership of receiver, were selected to form the **Ksi Variables** or measured independent variables. These variables defined two latent independent constructs, namely **Message Receptiveness and Receiver’s Attitude**. These have been discussed in the previous section.

A scale was developed to measure the Word of Mouth Effectiveness scale, also called the Word of Mouth Output scale, discussed in the previous chapter. The measures of this scale, for example, generating online buzz, liking and trial, etc. defined the construct **Word of Mouth Output**.

**Independent Variables: Ksi Variables**

- Strength of Ties with Source
- Message Valence
- Perceived Source Credibility
- Previous experience of users
- Message Content
- Message Delivery
- Product Category Involvement
- Social Orientation
- Community Membership

**Independent Variables, Scale Development: Eta Variables**

- Online Buzz
- Liking and Trial
- Online Buzz
- Liking and Trial
- Information Search Online
- Offline Buzz
- Awareness and Interest
- Purchase Intention
- Lead Generation

**The latent variables defined the model are as follows**

- Word of mouth Receptiveness
- Receivers’ Characteristics
- Word of Mouth Output (Effectiveness Measures)

### 7.6 Assessing the Measurement Model Validity

Confirmatory Factor Analysis was carried out for to test the measurement model made by the endogenous variables (dependent variables) in the previous chapter.

The latent constructs made by the exogenous variables (independent variables) were also tested by factor analysis. It was found that the variable previous experience of consumers did not load onto any construct. As single item constructs are not advisable in a Structural Equation Model, (Hair et al, 2006), this variable was dropped.

Structural Equation Modelling has the advantage of simultaneously estimating Measurement Model and the Structural Model, (Hair et al, 2006), the detailed validation of the dependent part of the Measurement Model was done simultaneously, along with testing the Structural Model.

### 7.7 Model Specification

Each Observed variable has a factor loading and a unique measurement error that forms the following equation to compute the latent variable score.

1. **Strength of Ties** = Factor Loading * Message Receptiveness + Measurement Error

2. **Message Valence** = Factor Loading * Message Receptiveness + Measurement Error
3. Perceived Source Credibility = Factor Loading * Message Receptiveness + Measurement Error

4. Message Content = Factor Loading * Message Receptiveness + Measurement Error

5. Strength of Message Delivery = Factor Loading * Message Receptiveness + Measurement Error

6. Previous Experience of Users = Factor Loading * Message Receptiveness + Measurement Error

7. Product Category Involvement = Factor Loading * Receiver Characteristics + Measurement Error

8. Social Orientation = Factor Loading * Receiver Characteristics + Measurement Error

9. Community Membership = Factor Loading * Receiver Characteristics + Measurement Error

10. Online Buzz = Factor Loading * Word of Mouth Message Output + Measurement Error

11. Liking/Trial = Factor Loading * Word of Mouth Message Output + Measurement Error

12. Online Information = Factor Loading * Word Of Mouth Message Output + Measurement Error

Offline Buzz = Factor Loading * Word of Mouth Message Output + Measurement Error

10. Awareness/Interest = Factor Loading * Word of Mouth Message Output + Measurement Error

11. Purchase Intention = Factor Loading * Word of Mouth Message Output + Measurement Error

12. Lead generation = Factor Loading * Word of Mouth Message Output + Measurement Error
The equation of the structural model is as follows

Word of Mouth Output = structure coefficient * Message Receptiveness + structure coefficient * Receivers Characteristic + prediction Error

The Model to be tested, thus specified, is as follows (Figure 9)

Figure 9: SEM Model Specification
7.8 Model Identification

A model has to be just identified or over identified for model testing. Schumacher, et.al, 2010. To estimate the model identification, to determine if there are there a unique set of parameters estimates the order condition assessed. The number of free parameters must be less than or equal to the number of distinct values in the sample covariance matrix.

The number of free parameters is a sum of the following:

16 factor loadings,

16 measurement error variances,

0 measurement error covariance terms

2 latent independent variable variances,

1 latent independent variable covariance,

2 structural coefficients,

1 equation prediction error covariance,

This gives us a total of 38

The number of distinct values in the sample covariance matrix can be calculated as follows:

\[ p(p+1)/2 \]

where \( p \) is the number of observed variables. Thus, the value of distinct variables is \( 16(16+1)/2 = 136 \), which is greater than the number of free parameters or 38.

Our model is thus over identified because there are more values in the sample covariance matrix than the number of parameters to be estimated.

7.9 Model Estimation and Assessing the Model’s Fit

Having specified the Measurement Model correctly, the Structural Model is then tested to provide an empirical measure of the relationships among variables and constructs represented
by the Measurement Model, Hair et al, 2006. The path analysis establishes the validity of the proposed theory against the sample data.

The first round of SEM provided the following result (Figure 10)

As is evident from the figure, Receivers’ Characteristics did not impact the Word of Mouth Output. However, the Message’s Receptiveness did have a significant impact on the Word of Mouth Effectiveness or Output.

Other permutations were tried, but the model in figure 10 provided the best fitted model and hence it was decided to modify this model.
7.10 Model Modification

Adding Modification Indices: Modification indices were added to improve the model fit. Latent independent construct “Receiver Attitude” which did not load onto latent independent construct “Word of Mouth Output”, with factor loading of 0.04 was removed. Similarly, measured independent variables “Strength of Ties” and “Previous Experience of Receiver” did not fit the measurement model, with low factor loadings, and were thus removed.

Other recommended modifications on the side of dependent variables was also incorporated (Figure 11)

Figure 11: Model Modification
7.11 Model Re-Specification

Independent variable Strength of ties with Receiver does not influence the construct Message Receptiveness, and hence it was removed from the model. As Receiver Attitude does not have a significant impact on Word of Mouth Output, it was dropped from the model (Figure 12)

Figure 10: Model Re-Specification
7.12 Model Fit Assessment

Goodness of Fit Indices for the model were found to be acceptable (Table 14) - Root Mean Square Root Error of Approximation (RMSEA) was less than 0.7; Goodness of Fit (GFI) was above 0.90 and Comparative Fit Index (CFI) and Normed Fit Index (NFI) were also above 0.90, indicating good fit (Hair et al, 2006).

A relative Chi square (CMIN ratio) of 0.83 also indicated adequate fit (Wheaton et al, 1977, Byrne, 1989, Marsh et al, 1985, Carmines et al, 1981)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi square</td>
<td>25.13</td>
</tr>
<tr>
<td>Degrees of freedom</td>
<td>30</td>
</tr>
<tr>
<td>CMIN</td>
<td>0.83</td>
</tr>
<tr>
<td>p value</td>
<td>0.71886</td>
</tr>
<tr>
<td>GFI</td>
<td>0.974</td>
</tr>
<tr>
<td>CFI</td>
<td>0.979</td>
</tr>
<tr>
<td>NFI</td>
<td>0.967</td>
</tr>
<tr>
<td>RMSEA</td>
<td>0.05</td>
</tr>
</tbody>
</table>

Table 14: Fit Indices

The next step was assessing Construct Validity or the extent to which the measured items represent the latent constructs, Hair et.al. 2006. Construct Validity was assessed via Convergent Validity.
Convergent Validity (Table 15) was demonstrated as firstly, Factor Loadings or Standardized Lambdas were more than 0.5. As a thumb rule loading should be at least above 0.50, Hair, et al, 2006. Secondly, Average Variance Extracted (AVE) or the average squared factor loadings, was more than 0.5. Thirdly, the Construct Reliability (CR), which is the ratio of squared sum of factor loadings for each construct and the sum squared sum of factor loadings for each construct and the error variance term for each construct, was greater than 0.6 for all seven latent variables. Construct Reliability (CR) between 0.60 and 0.70 is acceptable, Hair et al, 2006

Table 15: Convergent Validity

<table>
<thead>
<tr>
<th>Latent Variable</th>
<th>Measured variable</th>
<th>Standardised Lambda</th>
<th>Error</th>
<th>CR</th>
<th>AVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message</td>
<td>1</td>
<td>0.65</td>
<td>0.57</td>
<td>0.75</td>
<td>0.67</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0.76</td>
<td>0.43</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>0.91</td>
<td>0.17</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>0.71</td>
<td>0.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output</td>
<td>1</td>
<td>0.66</td>
<td>0.57</td>
<td>0.60</td>
<td>0.91</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0.79</td>
<td>0.37</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>0.60</td>
<td>0.64</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>0.65</td>
<td>0.58</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>0.75</td>
<td>0.44</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>0.58</td>
<td>0.66</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
7.13 Hypothesis Testing and Analysis and Results

H1: Strength of ties of the receiver with the source, Message valence, Perceived source credibility, Message content, Message delivery, Previous experience have a significant impact on Message Receptiveness, for WoM messages on Social Media on the youth segment.

The Hypothesis is partially accepted


Of these Message Content has the greatest impact and Perceived Source Credibility has the least.

- **Perceived Source Credibility** (Carl, 2008), is measured by a three-item scale which measures trustworthiness, goodwill and competence of the source as perceived by the receiver. This measured variable has the least factor loading, thereby concluding that how a WoM Receiver’s Receptibility of Message is least affected by his judgement of the source.

- **Message Valance** (Godes and Mayzlin, 2003), is defined as the receivers’ perception on the positivity or the negativity of the received message and is measured on a seven-point scale. It has a significant loading and brings out the fact that a positive message has a greater chance of Receptibility of Message by the receiver.

- **Message Content or Richness of Content** (Sweeney, 2010), is an 11 item, seven-point scale which measures the message as informative, reliable, clear, specific, elaborate, explicit, intense, reinforcing, interesting, entertaining and somewhat new. Message Content, a summation of all these items, has the highest factor loading thereby indicating that the Receiver's Receptibility of the message is maximum when he/she rates the message content as rich.
• *Message Delivery or Strength of Delivery* (Sweeney, 2010), asks 4 questions: was the message delivered powerfully, in a strong manner, in an important manner or using strong words.

This is a judgement of the receiver’s perception on the force with which a message was delivered, and the greater the strength of delivery of message the higher the message’s receptibility.

H2: Product category involvement, Social orientation, Community membership have a significant impact on Receiver’s Attitude to WoM messages on Social Media on the youth segment.

The hypothesis is partially accepted

Out of the 3 measured variables, only the social orientation has a significant impact on receiver’s attitude.

H3: Message Receptiveness has a significant impact on WoM Output on Social Media on the youth segment.

Message Receptiveness has a significant impact on effectiveness of Word of Mouth, therefore H3 is supported.

H4: Receiver’s Attitude has a significant impact on WoM Output on Social Media on the youth segment.

Receiver Characteristics does not have a significant impact, therefore H4 is rejected.
7.14 Conclusion

The outcomes defined in this study cover the relationship between the drivers and outcomes of WoM. It shows that receivers attitude does not have a significant impact on how he reacts to a WoM episode, rather the message - its content, its valence, its style/strength of delivery and source credibility of the source have a significant impact.

An additional benefit of this study is that it can be that the causal relationship between drivers and outcomes can be easily mapped onto the response hierarchy models of communication, thus providing for easier linkage between marketing communication objectives and outcomes.