A Structural Equation Modelling Approach to Analyse Factors Affecting on-line Shopping Experience.

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Introduction

e-Commerce in India is on a rapid ascend. Contributing factors include increase in internet penetration, rising disposable incomes, especially among the middle class, increasing consumer base in urban areas, credit availability, growing number of nuclear families, working women, easy accessibility & convenience and a potentially strong rural consumer market. India led Asia Pacific nation in internet user growth at 28.9 percent. As of December 31, 2013 the county’s internet subscriber base stood at 238.71 million.

This growth opportunity fuelled by the demographic dividend of India is being leveraged by many home-grown and foreign players in the online-shopping portal category. Flipkart, Amazon.in, eBay.in, Jabong, Myntra, SnapDeal, etc. are investing heavily, so as to increase and retain the customer base, while the industry is still in its nascent stage.

Following the e-Commerce bandwagon in India a larger number of players are entering the online-shopping industry. Most of the players offer same products at same price which are heavily discounted which leads to diminishing switching cost for an online shopper and a low customer’s lifetime value. This calls for a study to identify factors which greatly affect the satisfaction from an online shopping experience. The online-shopping players can then develop strategies, to increase a loyal customer base by focusing on the identified factors.

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1 http://articles.economictimes.indiatimes.com/2008-01-08/news/27719779_1_middle-class-spending-marketers
Objective
The objective to the research was to identify critical factors which affect online shopping experience the most.

Literature review
To explain customer satisfaction in the context of online-shopping experience, we take the help of customer concept of service quality which focuses specifically on dimensions of service and is a component of customer satisfaction.²

The service quality dimensions with respect to e-commerce are discussed in “E-service quality: a model of virtual service quality dimensions”. E-Commerce is an e-service. E-service is a web-based service delivered through internet (Reynolds, 2000; Sara, 2000). An e-service differs from traditional service in a way that unlike a traditional service, customer is restricted to two senses (sight and sound) while using an e-service. Another difference is the servicescape, which is a web-page in case of an e-service as compared to a physical location in a traditional service. Product display plays an important role as it aids a customer to make a purchase decision. Also the interaction of an online customer is with that of the user-interface whose quality is directly determined by the user-experience, this in contrast to the traditional service where customers interact with employees of an organisation.

² Services Marketing: Integrating Customer Focus Across the Firm (Valarie A Zeithalm, Mary Jo Bitner, Dwayne D. Gremler and Ajay Pandit)
E-service quality can be defined as overall customer evaluations and judgments regarding the excellence and quality of e-service delivery in the virtual marketplace Lee, G-G. & Lin, H-F. (2005) ⁵.

E-service quality dimensions as identified in different studies are listed in the table below. These dimensions can be utilized in identifying factors which might affect an online shopping experience.

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**E-service quality dimensions**

<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Usability</td>
<td>Ease of use</td>
<td>Fulfillment/reliability</td>
<td>Ease of use</td>
<td>Website design</td>
<td>Web site's entire customer base:</td>
<td>Ease of use</td>
<td>Website usability</td>
</tr>
<tr>
<td>Design</td>
<td>Appearance</td>
<td>Website design</td>
<td>E-scape (i.e. web site design)</td>
<td>Reliability</td>
<td>Efficiency</td>
<td>Appearance</td>
<td>Information quality</td>
</tr>
<tr>
<td>Information</td>
<td>Linkage</td>
<td>Customer service</td>
<td>Customer service</td>
<td>Responsibility</td>
<td>Fulfillment</td>
<td>Reliability</td>
<td>Reliability</td>
</tr>
<tr>
<td>Trust</td>
<td>Content</td>
<td>Security</td>
<td>Security</td>
<td>Trust</td>
<td>System availability</td>
<td>Customization</td>
<td>Customization</td>
</tr>
<tr>
<td>Empathy</td>
<td>Efficiency</td>
<td>Incentive</td>
<td>Privacy</td>
<td>Personaliization</td>
<td>Privacy</td>
<td>Communication</td>
<td>Communication</td>
</tr>
</tbody>
</table>

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⁶ E-Service Quality: A Conceptual Model, Jukka Ojasalo (http://www.academia.edu/1003804/E-Service_Quality_A_Conceptual_Model)
Further an online shopping portal can be compared to that of an organised retail-store. And some of the factors which determine satisfaction with respect to an organised retail-store, as mentioned in the next table, can also be deemed relevant for satisfaction related to the experience of a customer while using an online shopping portal.

<table>
<thead>
<tr>
<th>Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality of service</td>
</tr>
<tr>
<td>Self Service</td>
</tr>
<tr>
<td>Product price range</td>
</tr>
<tr>
<td>Visual merchandising</td>
</tr>
<tr>
<td>Time saving</td>
</tr>
<tr>
<td>Fast Checkout</td>
</tr>
<tr>
<td>Easy accessible layout</td>
</tr>
<tr>
<td>Parking facilities</td>
</tr>
<tr>
<td>Trolley facilities</td>
</tr>
<tr>
<td>Home Delivery facilities</td>
</tr>
<tr>
<td>Store Entrance &amp; walkways</td>
</tr>
<tr>
<td>Variety of Mode of Payment</td>
</tr>
</tbody>
</table>

Of the above factors self serving, product price range, visual merchandising, fast checkout and variety of mode of payment can be considered to contribute to the user experience of an online customer visiting and online shopping portal.

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Research question:

To determine the critical factors which lead to overall satisfaction in on-line shopping experience an empirical research was undertaken with a survey questionnaire as the research instrument.

Conceptual model

Figure 2: Conceptual Model

The conceptual model portrays the following hypotheses which would need to be validated using structural equation modelling.

Hypothesis-1: Ease of using an online shopping portal is positively related to the overall satisfaction experienced by a customer while shopping online

Hypothesis-2: Quality of product display is positively related to the overall satisfaction experienced by a customer while shopping online

Hypothesis-3: Price of products sold via online shop is positively related to the overall satisfaction experienced by a customer while shopping online

Hypothesis-4: Quality of delivery of product and after sales service are positively related to the overall satisfaction experienced by a customer while shopping online
The structural equation modelling would need the following latent constructs and the associated manifest/indicator variables as given below.

Latent constructs in the model and the associated manifest/indicator variables

- **Ease of use** is explained by
  a. **Ease of navigation**: Ease with which a customer is able to find/browse a desired product using the online shopping portal
  b. **Page load time**: Time taken to display the website by the browser
  c. **Payment options**: Cash on delivery, Net banking, Credit card, etc.
  d. **Check-out-process**: Ease with which a customer is able to place an order once he/she has selected the product

- **Quality of product display** is explained by
  a. **Product description**: Text description giving details of the product
  b. **Product review**: Reviews about the product by existing customers
  c. **Product images**: Quality of image of the products
  d. **Range of products**: Number of products offered by the online shopping portal

- **Price** is explained by
  a. **Price of product**: Online price of a product
  b. **Shipping cost**: Cost of delivering the product to designated place, which is charged to the customer
  c. **Coupons and discounts**: Regular or seasonal discounts and coupons which can be utilised for shopping

- **Quality of delivery and after sales** is explained by
  a. **Customer service**: Experience of talking with a customer service executive while resolving a query
  b. **Exchange/return policy**: Ease with which a customer can return a product if the delivered product is faulty
  c. **On-time delivery**: Punctuality of delivering a product

- **Overall satisfaction** is explained by
  a. Recommendation
  b. Repurchase
  c. Satisfaction

The manifest/indicator variables were measured from the survey responses to the questionnaire, as given in the Appendix.
Methodology

Structural Equation Modelling (SEM) is used to confirm the stated hypothesis of the conceptual model. The final sample size was obtained as 98, margin of error of 10%.

Data analysis

Structural Equation Modelling

To run a structural model as presented by the conceptual model, an online survey was designed to capture the responses of online shoppers. A database of 98 responses was prepared based on the data collected using survey.

Cronbach’s Alpha reliability test was performed to check whether the stated indicator variables are able to measure the same construct.

| Constructs |
|------------------|------------------|------------------|------------------|------------------|
| Ease of navigation | Product Display | Price | Delivery & After sales | Overall Satisfaction |
| Ease of navigation | Product Description | Shipping cost | Customer service | Recommend |
| Page load time | Product Reviews | Coupons and discounts | Exchange/Return policy | Repurchase |
| Payment options | Product Images | Price of product | On-time delivery | Satisfaction |
| Check-out process | Range of Products | |

| Reliability Analysis |
|----------------------|------------------|
| Construct Name | Cronbach’s Alpha |
| Ease of use | 0.803 |
| Product Display | 0.804 |
| Price | 0.622 |
| Delivery & After sales | 0.807 |
| Satisfaction | 0.939 |

After reliability test it was found that ‘price’ was not being measured reliably by its indicator variables (price of product, shipment cost and coupons&discounts) as its Cronbach’s alpha value is less than 0.7. Thus the latent construct ‘price’ was not included in SEM.
Modified model

Figure 3: Revised Conceptual Model based on Cronbach’s Alpha values.

**IBM SPSS AMOS (version 21) was used to test the conceptual model**

**Results from structural equation modelling.**

**Results from running SEM (using AMOS v21)**

Indicators of model fit:

- Chi square/degrees of freedom = 1.122
- Overall model p-value = 0.236
- GFI = 0.914
- AGFI = 0.857
- CFI = 0.991
- NFI = 0.99
### Model Fit Summary

#### CMIN

<table>
<thead>
<tr>
<th>Model</th>
<th>NPAR</th>
<th>CMIN</th>
<th>DF</th>
<th>P</th>
<th>CMIN/DF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default model</td>
<td>42</td>
<td>70.694</td>
<td>63</td>
<td>.236</td>
<td>1.122</td>
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<tr>
<td>Saturated model</td>
<td>105</td>
<td>.000</td>
<td>0</td>
<td></td>
<td></td>
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<tr>
<td>Independence model</td>
<td>14</td>
<td>921.640</td>
<td>91</td>
<td>.000</td>
<td>10.128</td>
</tr>
</tbody>
</table>

#### RMR, GFI

<table>
<thead>
<tr>
<th>Model</th>
<th>RMR</th>
<th>GFI</th>
<th>AGFI</th>
<th>PGFI</th>
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<tr>
<td>Default model</td>
<td>.129</td>
<td>.914</td>
<td>.857</td>
<td>.549</td>
</tr>
<tr>
<td>Saturated model</td>
<td>.000</td>
<td>1.000</td>
<td></td>
<td></td>
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<tr>
<td>Independence model</td>
<td>.489</td>
<td>.282</td>
<td>.172</td>
<td>.245</td>
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</table>

#### Baseline Comparisons

<table>
<thead>
<tr>
<th>Model</th>
<th>NFI Delta1</th>
<th>RFI rho1</th>
<th>IFI Delta2</th>
<th>TLI rho2</th>
<th>CFI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default model</td>
<td>.923</td>
<td>.889</td>
<td>.991</td>
<td>.987</td>
<td>.991</td>
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<tr>
<td>Saturated model</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
<td></td>
<td></td>
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<tr>
<td>Independence model</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td></td>
</tr>
</tbody>
</table>

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### SEM

<table>
<thead>
<tr>
<th>LatentConstructsInModel</th>
<th>CMIN/DF</th>
<th>P value</th>
<th>CFI</th>
<th>GFI</th>
<th>AGFI</th>
<th>NFI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good Fit</td>
<td>0 &lt;= 2</td>
<td>.05 &lt;= 1</td>
<td>.97 &lt;= 1</td>
<td>.95 &lt;= 1</td>
<td>.9 &lt;= 1</td>
<td>.95 &lt;= 1</td>
</tr>
<tr>
<td>Acceptable Fit</td>
<td>2 &lt;= 3</td>
<td>.01 &lt;= .05</td>
<td>.95 &lt;= .97</td>
<td>.9 &lt;= .95</td>
<td>.85 &lt;= .9</td>
<td>.9 &lt;= .95</td>
</tr>
<tr>
<td>EaseOfUse</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Product Display</td>
<td>1.122</td>
<td>.236</td>
<td>.991</td>
<td>0.914</td>
<td>0.857</td>
<td>0.923</td>
</tr>
<tr>
<td>Delivery &amp; After sales</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Satisfaction</td>
<td>GoodFit</td>
<td>GoodFit</td>
<td>GoodFit</td>
<td>NotGoodFit</td>
<td>NotGoodFit</td>
<td>AcceptableFit</td>
</tr>
</tbody>
</table>

The model fit was good considering the values of CMIN/DF, p-value, CFI and NFI, we can now proceed to have a look at the estimates weights and their levels of significance.
Conclusion

Looking at the above estimates we can conclude that:

1. Quality of timely delivery and after sales significantly affect the overall satisfaction experienced by a customer while shopping online (Critical Ratio = 6.171 > 1.96, individual p-value is *** indicating highly significant).

2. Ease of using an online shopping portal is positively related to the overall satisfaction experienced by a customer while shopping online. We can conclude this hypothesis but with caution (Critical Ratio = 1.909 < 1.96, individual p-value is .056 indicating somewhat significant relationship).

3. Quality of product display is not positively related to the overall satisfaction experienced by a customer while shopping online (Critical Ratio = -.369 < 1.96, individual p-value is .712 indicating not significant relationship).

The above observations are incorporated in the final model where solid lines show significant relationship dotted line indicates a relationship which is not significant.

<table>
<thead>
<tr>
<th>OverallSatisfaction</th>
<th>EaseOfUseVar</th>
<th>ProductDisplayVar</th>
<th>DeliveryAndAfrSlsVar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimate</td>
<td>.483</td>
<td>-.148</td>
<td>.731</td>
</tr>
<tr>
<td>S.E.</td>
<td>.253</td>
<td>.400</td>
<td>.118</td>
</tr>
<tr>
<td>C.R.</td>
<td>1.909</td>
<td>-.369</td>
<td>6.171</td>
</tr>
<tr>
<td>P</td>
<td>.056</td>
<td>.712</td>
<td>***</td>
</tr>
</tbody>
</table>

Figure4: Final structural model showing significant relationship by solid lines and non-significant relationship by dotted line
Thus from SEM analysis it was found that the below two hypothesis are correct.

H-1: Ease of using an online shopping portal is positively related to the overall satisfaction experienced by a customer while shopping online

H-4: Quality of delivery of product and after sales service are positively related to the overall satisfaction experienced by a customer while shopping online

Figure 5 : Final Model as seen in the AMOS output.
References

4. Services Marketing: Integrating Customer Focus Across the Firm (Valarie A Zeithalm, Mary Jo Bitner, Dwayne D. Gremler and Ajay Pandit)
   a. Valarie A Zeithalm
   b. Mary Jo Bitner
   c. Dwayne D. Gremler
   d. Ajay Pandit
5. http://www.academia.edu/1003804/E-Service_Quality_A_Conceptual_Model
   a. Jukka Ojasalo, Laurea University of Applied Sciences, Finland
   a. U. Dineshkumar, P.Vikkraman

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- P.Vikkraman (dr.p.vikkraman@gmail.com)
Appendix:

Empirical Survey

Q1. Please select your age:
   1. Less than 20
   2. 20 – 24
   3. 25 – 29
   4. 30 – 34
   5. 34 – 38
   6. More than 38

Q2. Please select your gender:
   1. Male
   2. Female

Q3. Please select your education level:
   1. High School
   2. Graduate
   3. Post Graduate

Q4. Please select your occupation:
   1. Student
   2. Employed
   3. Other

Q5. Which type of products do you mostly buy using online-shopping portal? (you can select multiple items)
   1. Books
   2. Apparels
   3. Electronic Items
   4. Other Items (Please specify)

Q6. What is the importance of the below features in an online-shopping portal, for you, using below scale?

Scale: Not important, Low importance, Neutral, Important, Very important
   1. EaseOfNavigation
   2. PageLoad
   3. PaymentOption
Q7. Which online shopping portal have you recently used?

1. Flipkart
2. Amazon
3. eBay
4. Myntra
5. Jabong
6. Others (Please specify)

Q8. Please rate the shopping portal, chosen by you in the previous question, based on the following attributes?

Scale: Very Dissatisfied, Dissatisfied, Neutral, Satisfied, Very Satisfied

1. EaseOfNavigation
2. PageLoad
3. PaymentOption
4. CheckOut
5. PdtDescrption
6. PdtReviews
7. PdtImages
8. PdtRange
9. PdtPrice
10. ShippingCost
11. Discount
12. DeliveryTime
13. ExcPolcy
14. CustCare

Q9. How likely are you to repurchase from the, online shopping portal chosen by you in question 7?
1. Very Unlikely
2. Unlikely
3. Undecided
4. Likely
5. Very Likely

Q10. How likely are you to recommend, online shopping portal chosen by you in question 7, to your friends/family?

1. Very Unlikely
2. Unlikely
3. Undecided
4. Likely
5. Very Likely

Q11. How satisfied are you with the online-experience provided by, online shopping portal chosen by you in question 7?

1. Very Dissatisfied
2. Dissatisfied
3. Neutral
4. Satisfied