# Conclusions & Recommendations

University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

*Chapter 6*

# 6. CONCLUSIONS AND RECOMMENDATIONS

Final conclusions derived from the data analysis (Chapter 5) are described in this chapter, with possible practical explanations. Since these results were obtained by analyzing a randomly selected sample, there is a greater ability for generalizing them to similar manufacturing firms in terms of the contextual factors considered. However, the justifications provided for the conclusions might not be valid for any kind of situation and, there may be various other interpretations which were not seen. The recommendations have been provided to be in line with the objectives of the research with several suggestions that are assumed to be realistic.

## 6.1 Conclusions

- The Industry has a significant impact on Information Sharing practice of manufacturers
  - Apparel manufacturers have relatively higher level of Information Sharing practice than printers and food manufacturers. Printers have the lowest level of IS while food industry is in between apparel and food.
  - The level of IS of Apparel manufacturers is higher than the overall average IS while for the other two industries it is lower than the average. In Sri Lanka, apparel manufacturing companies are far ahead than any other type of manufacturers, especially in global business. Since SCM is a gateway to the success in international business and sharing of information with trading partners is vital for good SCM, higher IS might be the dominating factor behind apparel manufacturers' success.
  - When interviewing respondents while collecting data, it was found that printing companies pay the least attention on collaborative business success which could be achieved through SCM practices.

- Size of the manufacturing firm has a significant impact on level of Information Sharing
  - Small scale firms practice lesser IS relative to Large firms. The reason might be the relatively little use of information technology in small scale firms.

University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

- The supply chain structure of manufacturers has an impact on their IS practice.
  - In fact, this effect is the combined effect of upstream and downstream structures of the SC.
  - Organizations who buy their main raw material directly from its manufacturer and sell their main product directly to the end customer have relatively high IS practice. The companies who buy their main raw material from retailers and sell to the end customer have lesser IS practice. According to these results, getting close to the suppliers has affected firms' IS than the closeness to the downstream SC partners. Therefore, it is more important that manufacturing companies try to improve the knowledge on their supplier base, minimize the number of intermediaries in between them and their raw material suppliers.
  - However, since the effect of SC structure is a combined effect of upstream and downstream structures rather than upstream structure only, reducing the number of intermediaries to the end customers is also important.

- The contextual factors considered in the study have no significant impact on SCM practices: Strategic Supplier Partnership, Customer Relationship, Internal Lean Practices and Postponement.

Electronic Theses & Dissertations

  - According to the industry, size of the firm, SC structure, length of the SC and level of uncertainty in the demand, these SCM practices are not changed. This does not imply that all Sri Lankan manufacturers of these three industries are equally good in these practices. It simply means that all types of manufacturers should equally focus on these practices in order to achieve better levels of SCM.

- Industry and the size of the firm has a combined effect on Information Quality.
  - Small scale apparel manufacturers have relatively the highest level of IQ and it is very low in medium scale food manufacturing and small scale printing firms. Mean comparison results of the study implies that medium scale food manufacturers and small scale printers have significantly lower level of IQ compared to, medium scale printers medium/small scale apparel and small scale food manufacturers.

- Downstream supply chain structure has a significant impact on IQ.
  - Manufacturers who sell their main product through distributors/wholesalers and retailers, tend to exchange better quality information with trading partners than who sell products only through retailers. Even though the reason behind this could not be exactly realized, lack of formalization in information flow might be prominently caused. Perhaps manufacturers who sell through retailers might not understand the genuine importance of quality of information exchanged.

## 6.2 Recommendations

- The key area of IS that the manufacturers in food and printing industries should focus on is 'Sharing business unit proprietary information with trading partners'.
  - This does not imply that apparel firms are perfect in this type of information sharing. It simply means that this is the key IS dimension which has caused to keep these two industries behind the apparel industry. As correlation analysis results imply, all three industries should improve this attribute of IS in order to improve their overall IS practice.

University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

- 'Making informed trading partners in advance of changing needs' is the key IS attribute which small scale firms should improve their IS up to the level of large scale firms.
  - Small scale firms might not have much influential power on their trading partners due to smaller level deals with them. But they should change this attitude and try to improve two-way communication emphasizing their importance to the trading partners.
  - As rank correlation analysis of the study imply, this attribute of IS is not good in any scale of manufacturing firms of three industries. Many of large Sri Lankan firms might have their trading partners overseas and might not have larger influential power. Therefore, they also should

improve the means of communicating changes required in advance, and it will improve their sales performance.

- In order to improve IQ, medium scale food and small scale printing firms should focus on 'Timely' and 'Reliable' exchange of information with trading partners.
  - Therefore, manufacturers of these two types should try to develop fast and reliable ways of communication.

- Medium scale food manufacturers should also concentrate on 'Adequacy of information exchanged'.
  - In food industry, it is very important to frequently assess if the information received is adequate because of unpreserved nature of food products. Information from upstream as well as downstream trading partners is equally important for this.

## 6.3 Further Research Directions

The research has focused only three industries and it could be extended to a number of other industries. The results might be different from what has been discovered, if it concentrates on industries which are different in SC characteristics. Since this study only covers SCM practices of manufacturers, it would be interesting if a research covers other positions in the supply chain such as raw material suppliers, distributors or wholesalers and retailers. This type of study will facilitate investigation of similarities and dissimilarities in the SCM practices of different partners in the SC. A comprehensive investigation of underlying causes for having different impacts of the contextual factors could be focused in another study.

University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

This research could not analyze higher order interactions between contextual factors because of having inadequate number of observations for the sub categories. Another research can have the same focus with a large enough sample with adequate data points for each sub category, then it might discover different types of relationships. A new research can focus one or few of these SCM practices in detail for a particular industry where those practice(s) is/are perceived to be largely important.

## REFERENCES


[1] Aziz A., Naser A., and Ahmed S, 2005. Critical issues in packaged food business, *British Food Journal*, 107(10), 760-780

[2] Berman K. and Sami K., 2005. The supplier and customer contribution to manufacturing flexibility: Australian manufacturing industry's perspective, *Journal of Manufacturing Technology Management*, 16(7), 733-752

[3] Charles R., Gowen I.I.I. and Tallon, W.J., 2003. Enhancing supply chain practices through human resource management. *Journal of Management Development,* 22(1), 32-44

[4] Damien P., 2005. Supply chain management integration and implementation: a literature review, *Supply Chain Management: An International Journal*, 10(4), 252-263

[5] Ho D.C.K., Au K.F. and Newton E., 2002. Empirical research on supply chain management: a critical review and recommendations, *International Journal of Production Research*, 40(17), 4415-4430


University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk


[6] Li S., Ragu-Nathan B., Ragu-Nathan T.S. and Rao S.S., 2005. Development and validation of a measurement instrument for studying supply chain management practices. *Journal of Operations Management,* 23(6), 618-641

[7] Li S., Ragu-Nathan B., Ragu-Nathan T.S. and Rao S.S., 2006. The impact of supply chain management practices on competitive advantage and organizational performance. *OMEGA,* 34(2), 107-124.

[8] Lockamy A. and McCormack K., 2004. Linking SCOR planning practices to supply chain performance: An exploratory study, *International Journal of Operations & Production Management*, 24(12), 1192-1218

[9] McCormack K. and Kasper K., 2002. The extended supply chain: A statistical study, *Benchmarking: An International Journal*, 9(2), 133-145

[10] McMullan A., 1996. Supply chain management practices in Asia Pacific today, *International Journal of Physical Distribution & Logistics Management*, 26(10), 79-95

[11] Sahay B.S., Gupta, Jatinder N.D. and Ramneesh M., 2006. Managing supply chains for competitiveness: the Indian scenario, *Supply Chain Management: An International Journal,* 11(1), 15-24

[12] Sahay B.S. and Mohan R., 2003. Supply chain management practices in Indian industry, *International Journal of Physical Distribution & Logistics Management*, 33I(7), 582-606

[13] Sanjay J. and Ravi S., 2006. Some sectoral dissimilarities in the Indian manufacturing industry, *Supply Chain Management: An International Journal*, 11(4), 345-352

[14] Simatupang T.M. and Sridharan R., 2005. The collaboration index: a measure for supply chain collaboration, *International Journal of Physical Distribution & Logistics Management*, 35(1), 44-62

[15] Suhaiza Z. and Premkumar R., 2005. Supply chain integration and performance: US versus East Asian companies, *Supply Chain Management: An International Journal*, 10(5), 379-393

University of Moratuwa, Sri Lanka.
www.lib.mrt.ac.lk

[16] Yew W.C., Stentoft A.J. and John J., 2005. Supply chain management practices in toy supply chains, *Supply Chain Management: An International Journal*, 10(5), 367-378

[17] MIT Center for Transportation and Logistics. *Bottom Line Practices.* Available from: http://ctl.mit.edu, [cited 15 July 2006]

[18] United Nations Environment Programme.2000. *Good Practices – Possible Solutions – Supply Chain Management.* (Updated 10 August 2001) Available from: http://www.agrifood-forum.net [cited 15 July 2006]

[19] WinWriters. *The 2003 WinWriters Salary Survey – Size Matters.* Available from: http://www.winwriters.com, [cited 27 September 2006]

# Questionnaire

University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

*Annexure I*

# Questionnaire

(These data is extremely confidential and used only for research purpose)

**Tick (✓) on appropriate box**

1. Your industry is

| | |
|---|---|
| Apparel | |
| Food processing | |
| Printing | |

2. According to your knowledge your company is a

| | |
|---|---|
| Large company | |
| Medium sized company | |
| Small company | |

3. Number of employees in your firm [ ]

4. Annual turnover of your company (Rough average) [ Rs. ]

**Tick (✓) on appropriate box**

| | Strongly agree | Agree | Neither agree nor disagree | Disagree | Strongly disagree |
|---|---|---|---|---|---|
| We share our business unit Proprietary information with trading partners | | | | | |
| We inform trading partners in advance of changing needs | | | | | |
| Our trading partners share propriety information with us | | | | | |
| Our trading partners keep us fully informed about issues that affect our business | | | | | |
| Our trading partners share business knowledge of core business process with us | | | | | |
| We and our trading partners exchange information that helps establishment of business planning | | | | | |
| We and our trading partners keep each other informed about events or changes that may affect the other partners | | | | | |

University of Moratuwa, Sri Lanka
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

**Supply Data:**

1. The method we obtain material is

| | |
|---|---|
| We produce our materials on our own | |
| We buy materials from others | |

2. If you buy your main raw material from others you buy it,

| | |
|---|---|
| Directly from its manufacturer | |
| From retailers | |
| From its distributor/dealer | |
| From wholesaler | |
| Other (specify)..... | |

3. Number of entities (firms) passed by your basic raw material until come to you

| | |
|---|---|
| Less than 2 | |
| 2 to 5 | |
| More than 5 | |

| | Strongly agree | Agree | Neither agree nor disagree | Disagree | Strongly disagree |
|---|---|---|---|---|---|
| We rely on few dependable suppliers | | | | | |
| We rely on few high quality suppliers | | | | | |
| We consider quality as our number one criterion in selecting suppliers | | | | | |
| We strive to establish long-term relationship with our suppliers | | | | | |
| We regularly solve problems jointly with our suppliers | | | | | |
| We have helped our suppliers to improve their product quality | | | | | |
| We have continuous improvement programs that include our key suppliers | | | | | |
| We include our key suppliers in our planning and goal setting activities | | | | | |
| We actively involve our key suppliers in new product development process | | | | | |
| We certify our suppliers for quality | | | | | |

University of Moratuwa, Sri Lanka
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

**Demand Data:**

1. You sell your main product

| | |
|---|---|
| Directly to the end customer | |
| Through retailers | |
| Through distributors/dealers and retailers | |
| Through wholesalers and retailers | |
| Other (specify)..... | |

2. Number of entities (firms) passed by your product until go to its end consumer

| | |
|---|---|
| Less than 2 | |
| 2 to 5 | |
| More than 5 | |

3. The uncertainty of the demand for our main product is

| | |
|---|---|
| High | |
| Low | |

| | Strongly agree | Agree | Neither agree nor disagree | Disagree | Strongly disagree |
|---|---|---|---|---|---|
| We frequently evaluate the formal and informal complaints of our customers | | | | | |
| We frequently interact with customers to set reliability, responsiveness, and other standards for us | | | | | |
| We have frequent follow-up with for quality/service feedback | | | | | |
| We frequently measure and evaluate customer satisfaction | | | | | |
| We frequently determine future customer expectations | | | | | |
| We facilitate customers ability to seek satisfaction from us | | | | | |
| We share a sense of fair play with our customers | | | | | |
| We periodically evaluate the importance of our relationship with our customers | | | | | |

University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

**Operational Data:**

| | Strongly agree | Agree | Neither agree nor disagree | Disagree | Strongly disagree |
|---|---|---|---|---|---|
| Information exchange between our trading partners and us is timely | | | | | |
| Information exchange between our trading partners and us is accurate | | | | | |
| Information exchange between our trading partners and us is complete | | | | | |
| Information exchange between our trading partners and us is adequate | | | | | |
| Information exchange between our trading partners and us is reliable | | | | | |
| Our firm reduces set-up time | | | | | |
| Our firm has continuous quality improvement program | | | | | |
| Our firm uses a "Pull" production system | | | | | |
| Our firm pushes suppliers for shorter lead-times | | | | | |
| Our firm streamlines ordering, receiving and other paperwork from suppliers | | | | | |
| Our products are designed for modular assembly | | | | | |
| Our production process modules can be re-arranged so that customization can be carried out later at distribution centers | | | | | |
| We delay final product assembly activities until customer orders have actually been received | | | | | |
| We delay final product assembly activities until the last possible position (or nearest to customer) in the supply chain | | | | | |
| Our goods are stored at appropriate distribution points close to the customers in the supply chain | | | | | |

University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

# Residual Analysis

University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

*Annexure II*

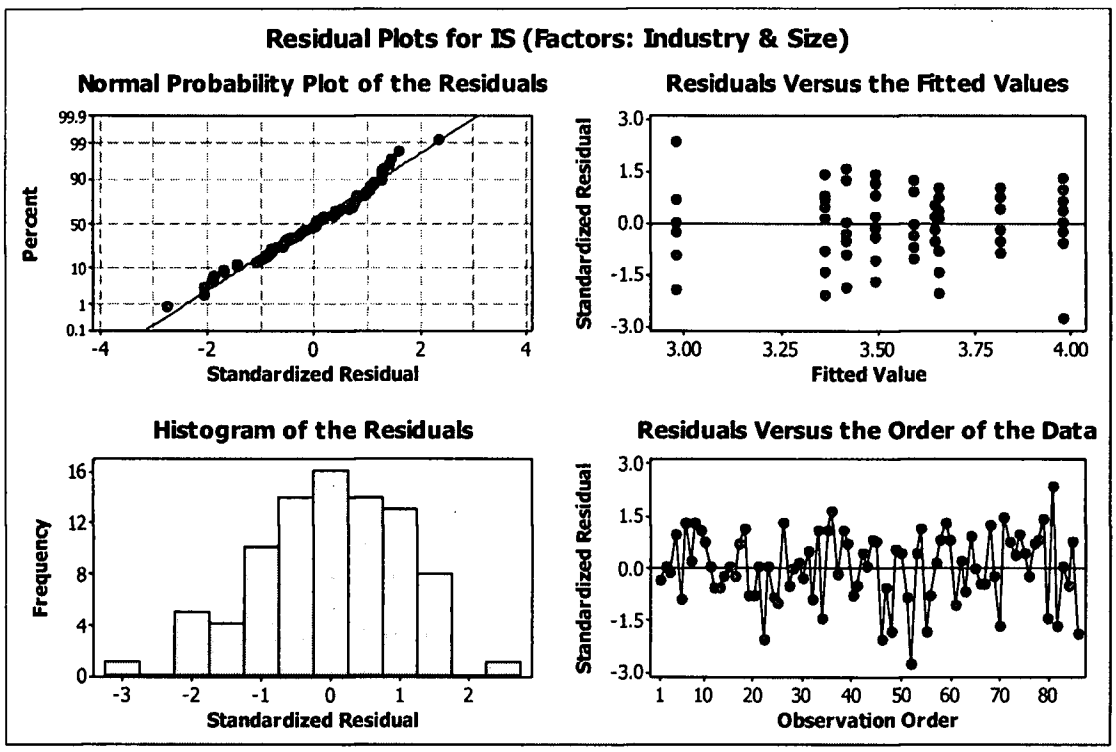
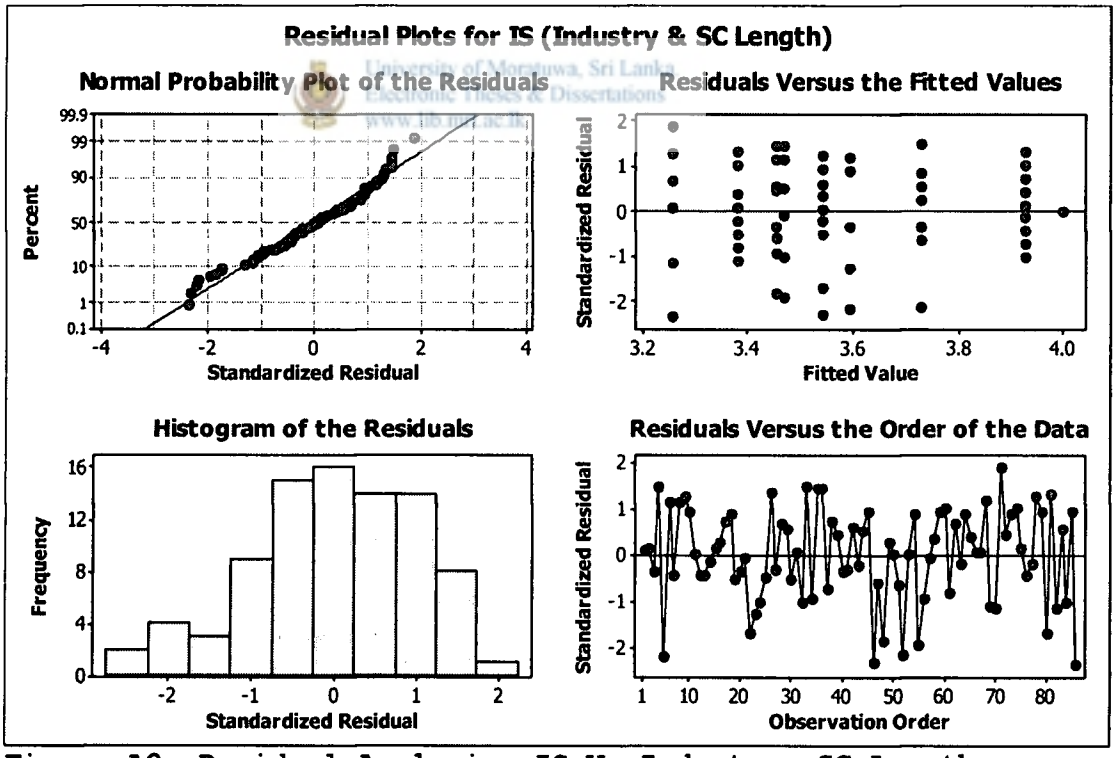



Figure A1: Residual Analysis: IS Vs Industry, Size




University of Moratuwa, Sri Lanka
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

Figure A2: Residual Analysis: IS Vs Industry, SC Length

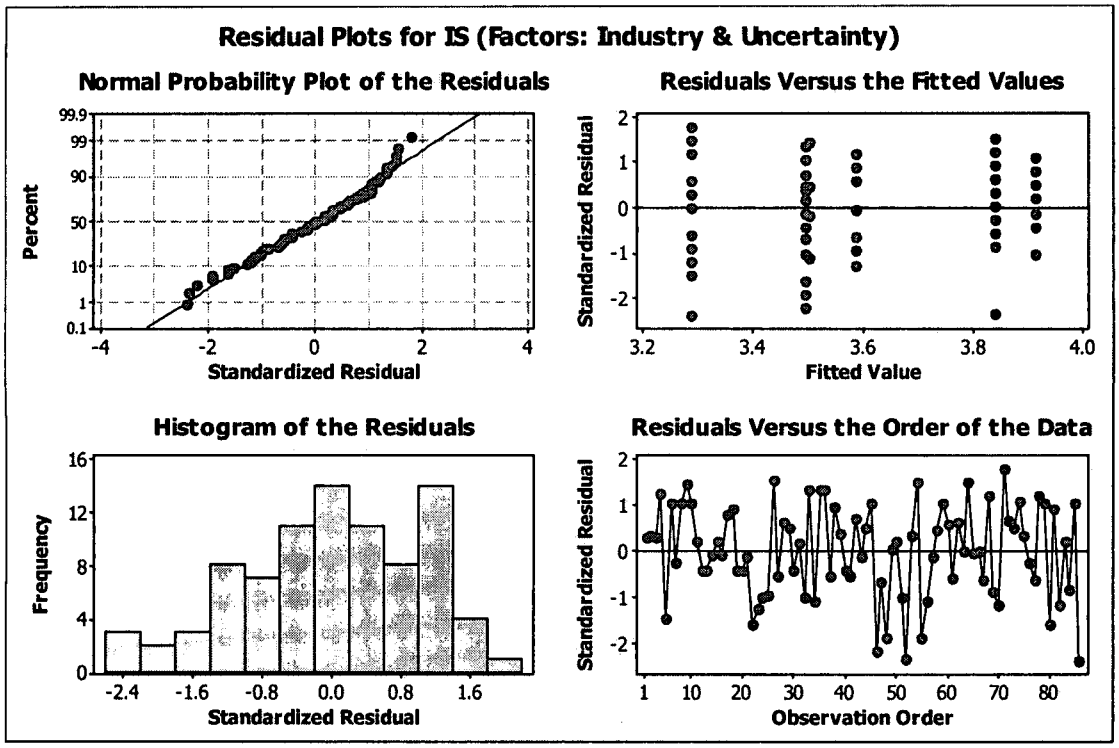



Figure A3: Residual Analysis: IS Vs Industry, Demand Uncertainty

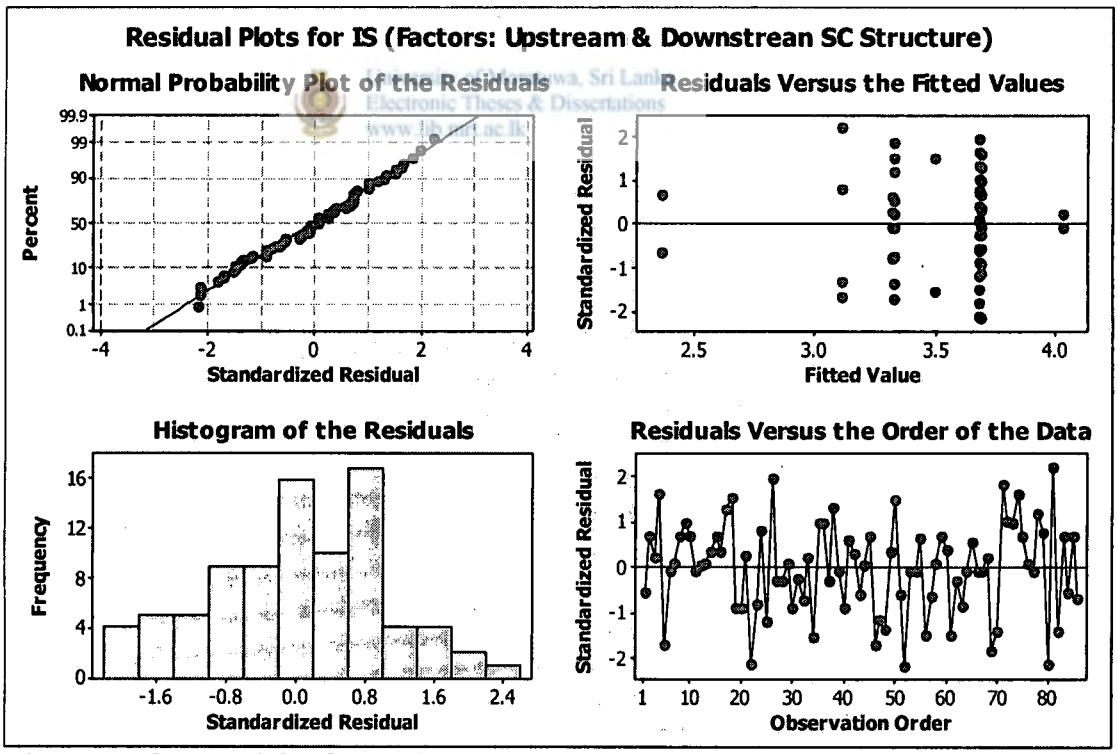



Figure A4: Residual Analysis: IS Vs Upstream, Downstream SC Structure

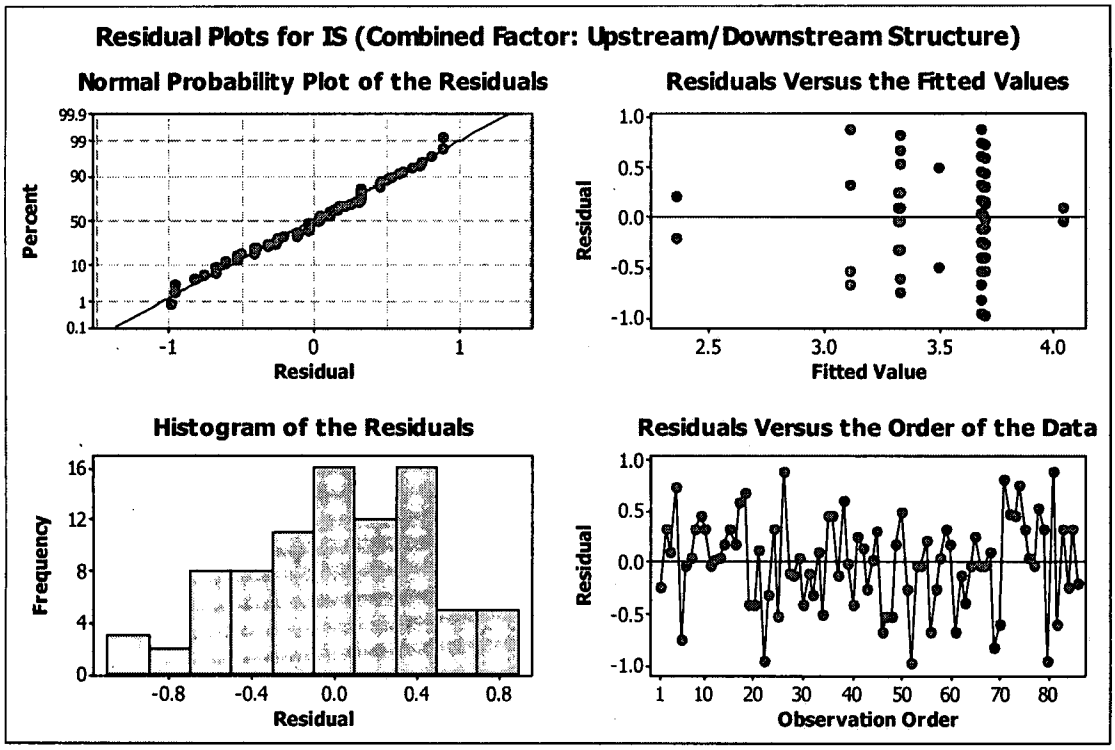
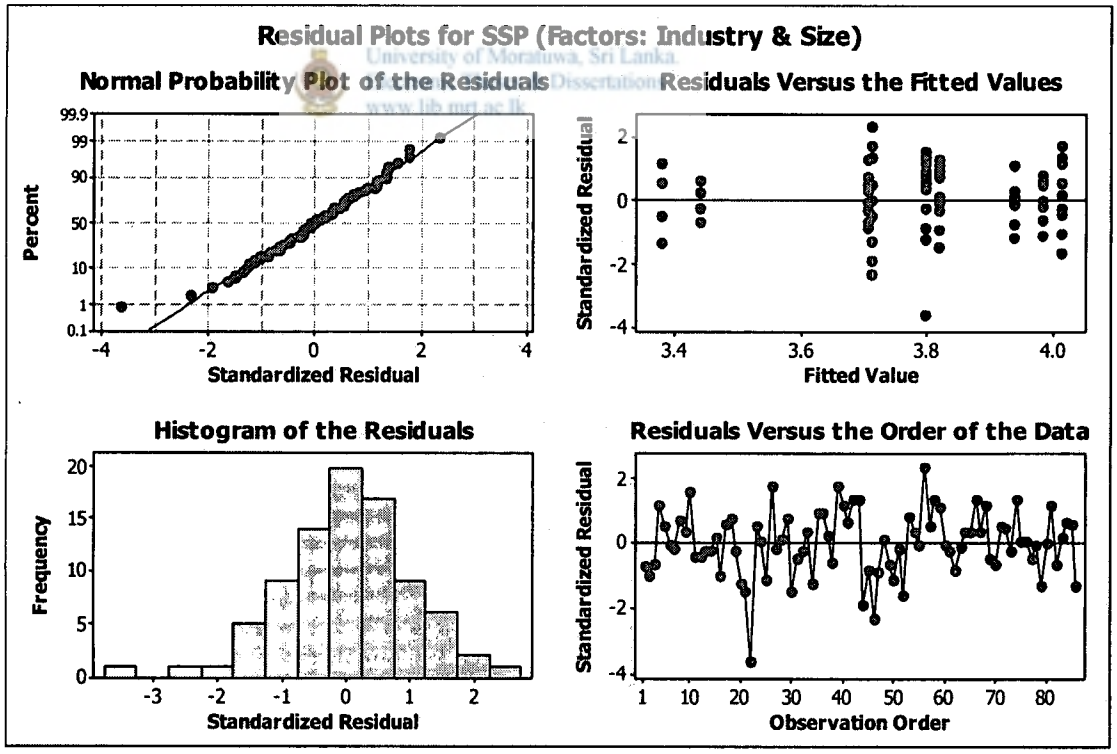



Figure A5: Residual Analysis: IS Vs Upstream, Downstream SC Structure




University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

Figure A6: Residual Analysis: SSP Vs Industry, Size

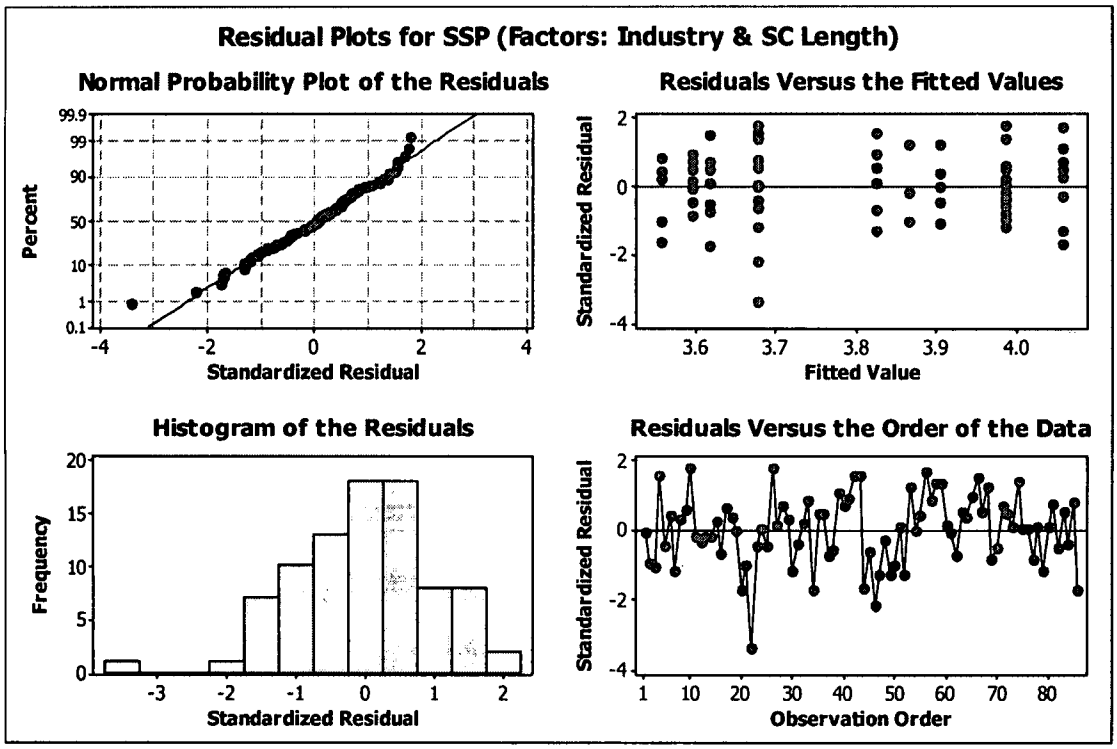



Figure A7: Residual Analysis: SSP Vs Industry, SC Length

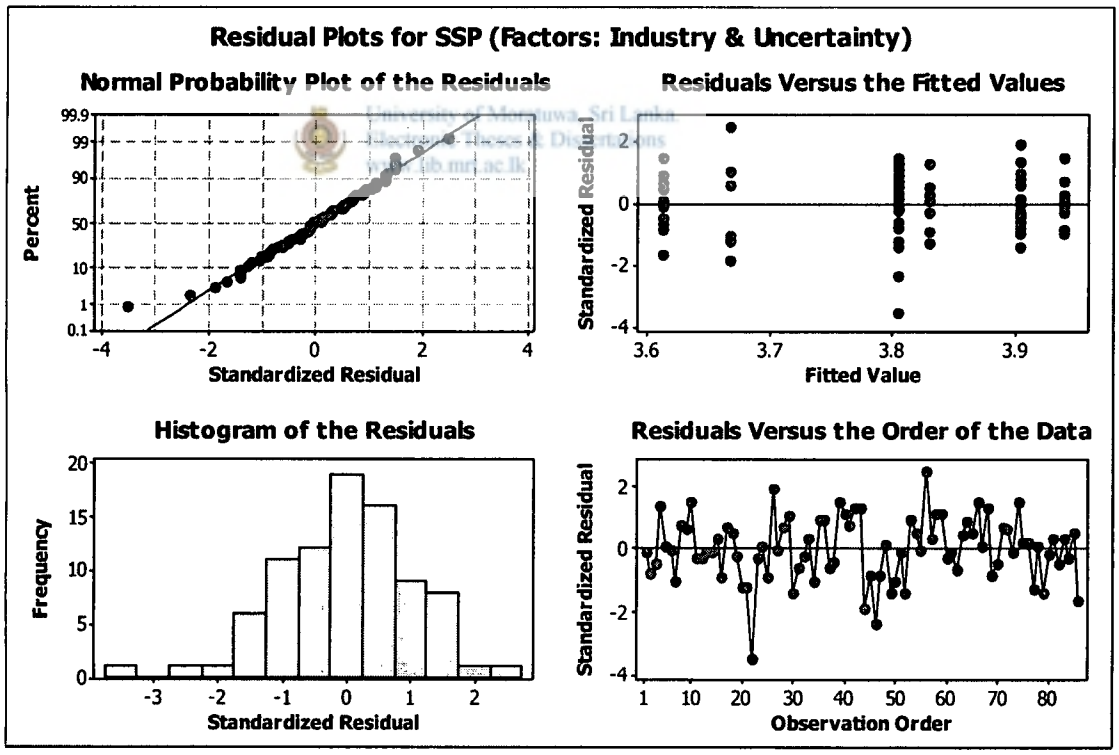



Figure A8: Residual Analysis: SSP Vs Industry, Demand Uncertainty

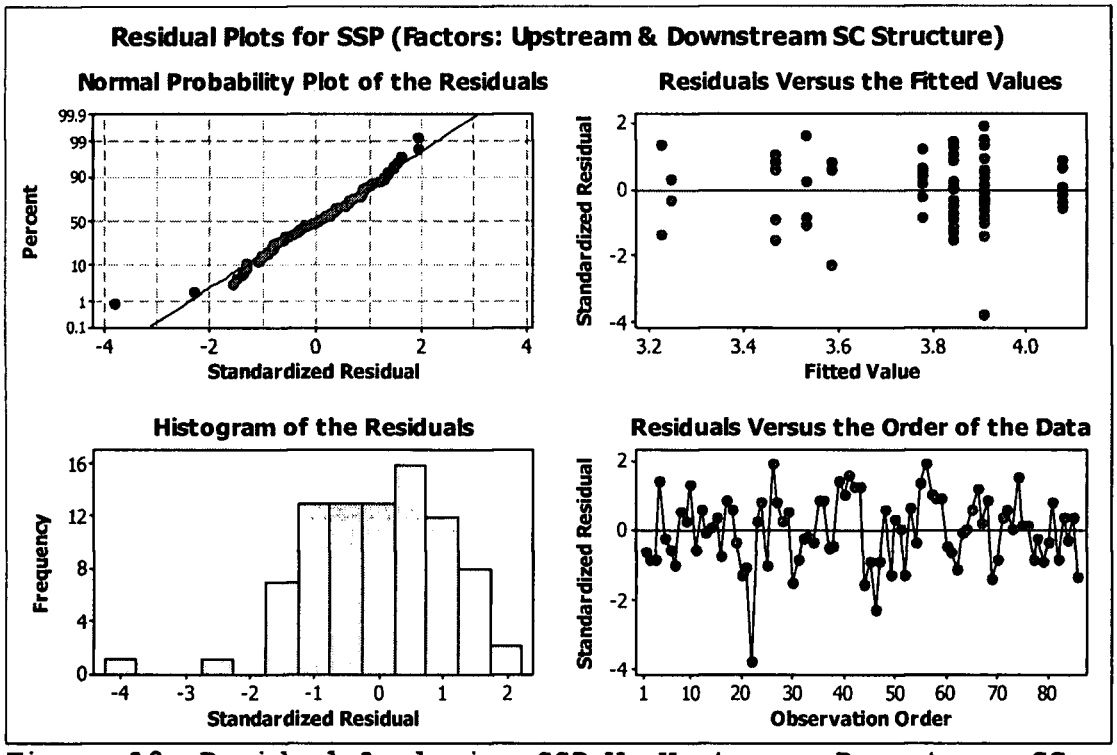



Figure A9: Residual Analysis: SSP Vs Upstream, Downstream SC Structure

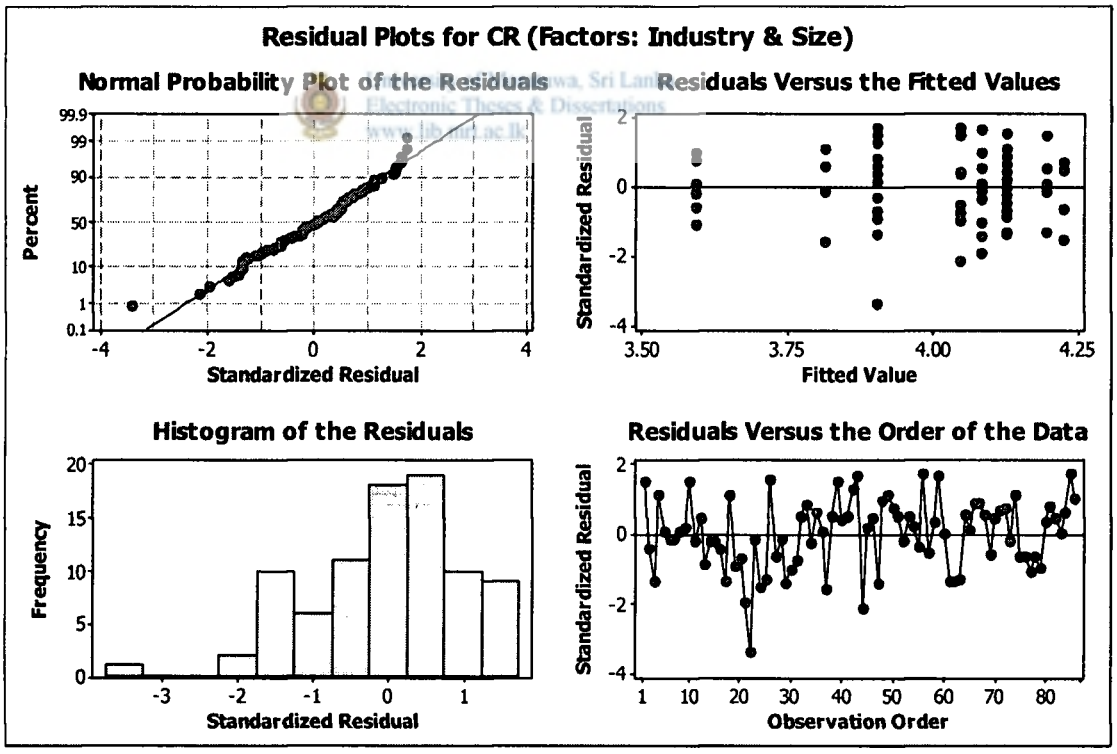



Figure A10: Residual Analysis: CR Vs Industry, Size

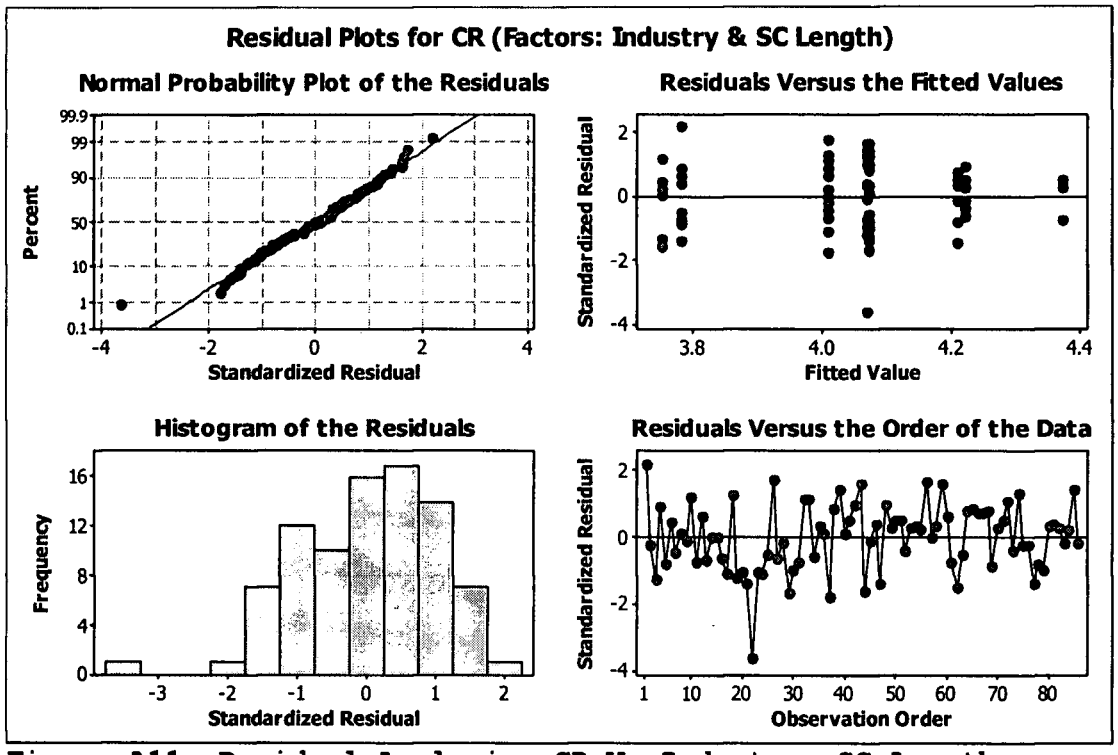



Figure A11: Residual Analysis: CR Vs Industry, SC Length

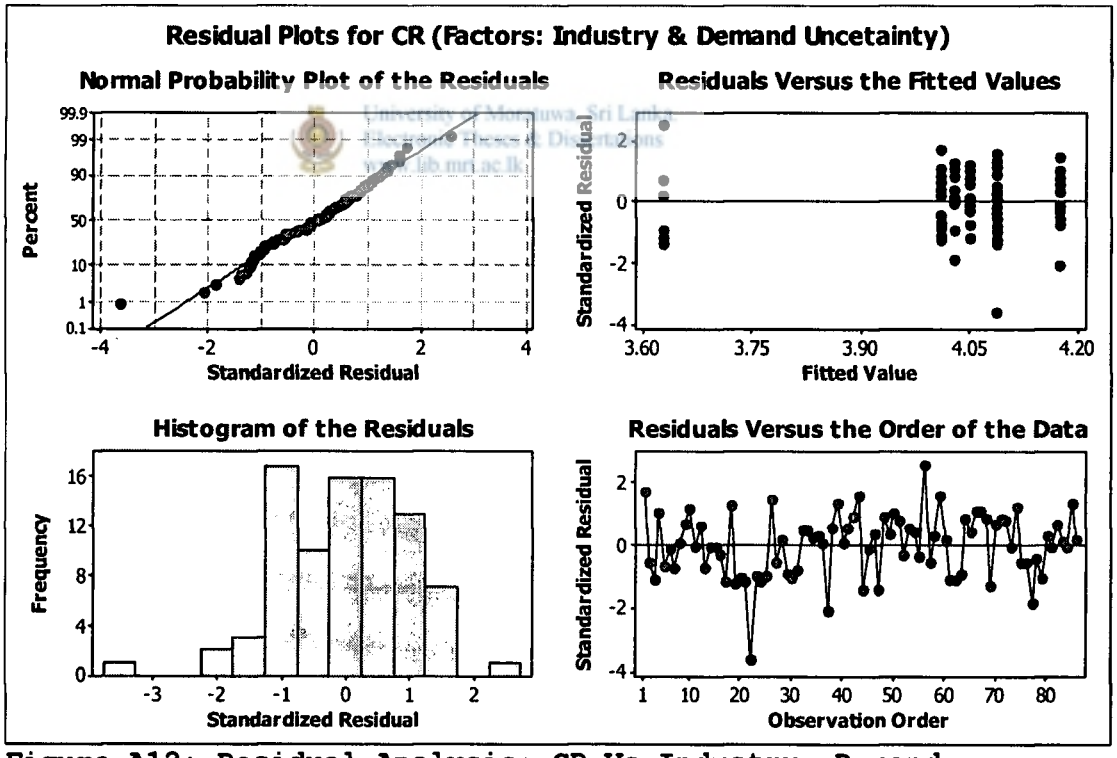



Figure A12: Residual Analysis: CR Vs Industry, Demand Uncertainty

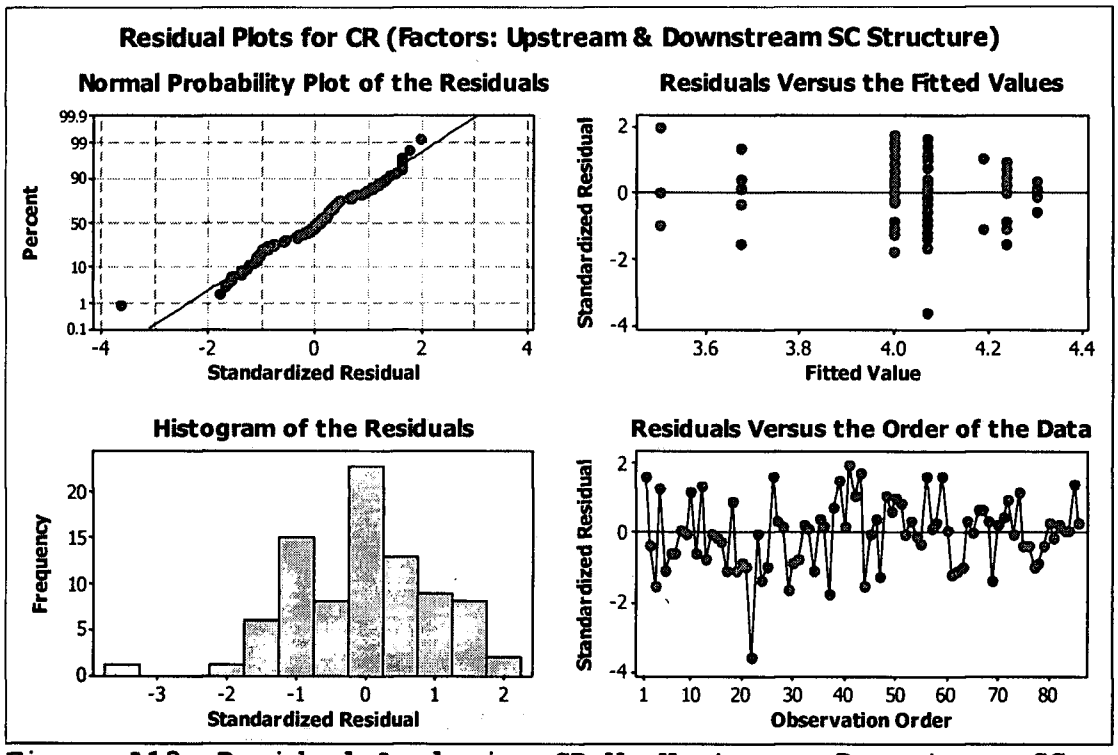



Figure A13: Residual Analysis: CR Vs Upstream, Downstream SC Structure

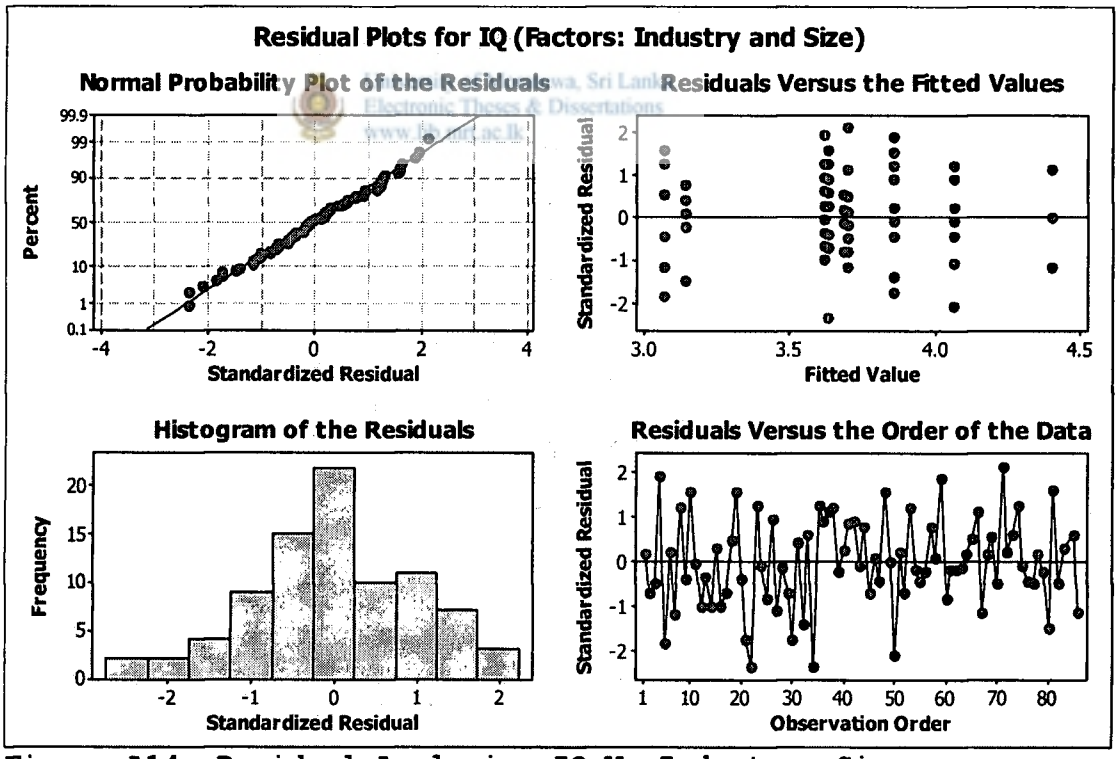



Figure A14: Residual Analysis: IQ Vs Industry, Size

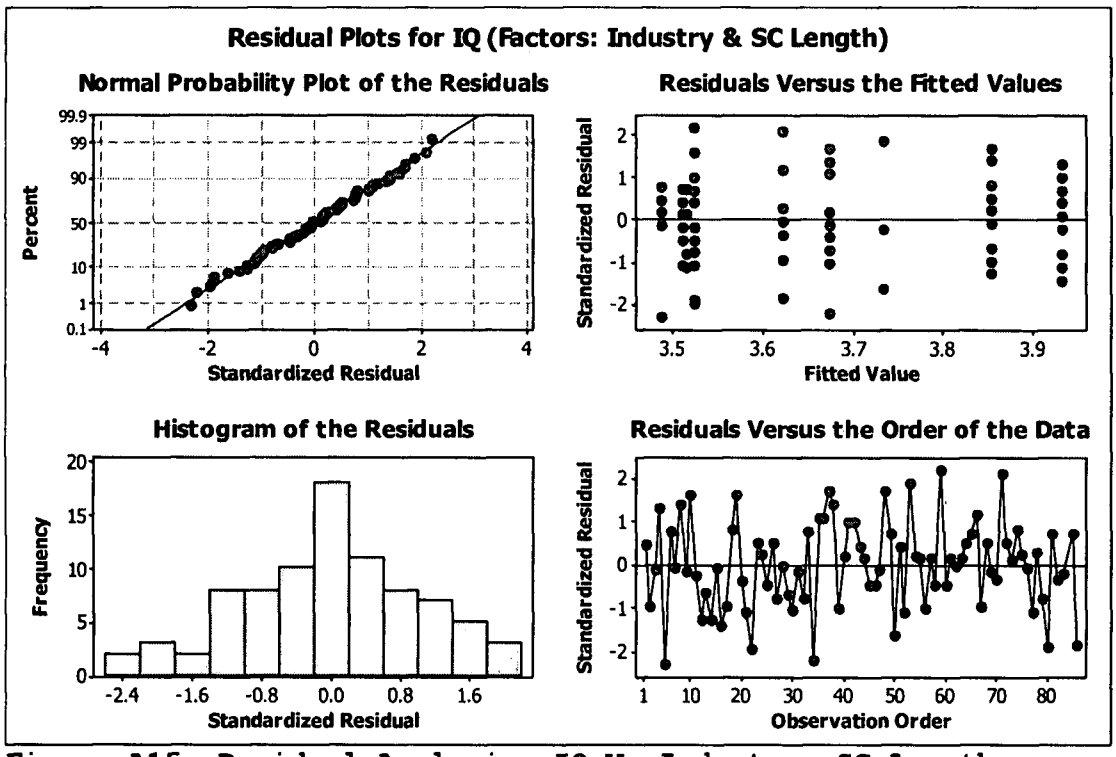



Figure A15: Residual Analysis: IQ Vs Industry, SC Length

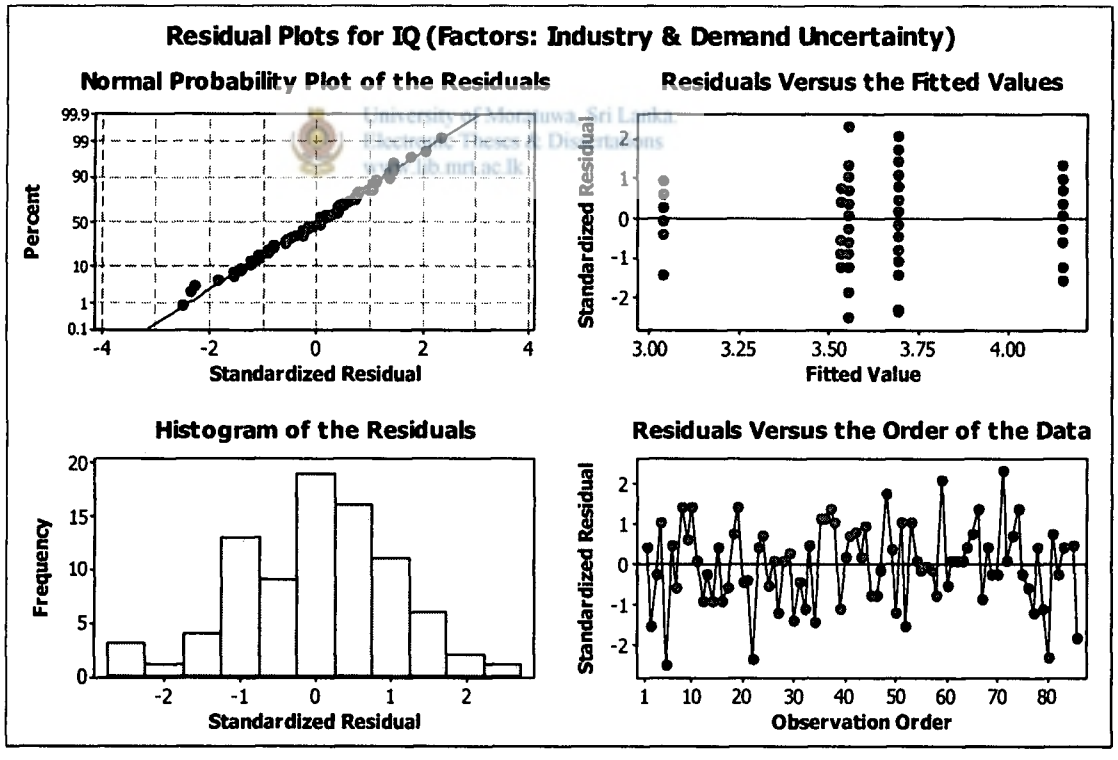



Figure A16: Residual Analysis: IQ Vs Industry, Demand Uncertainty

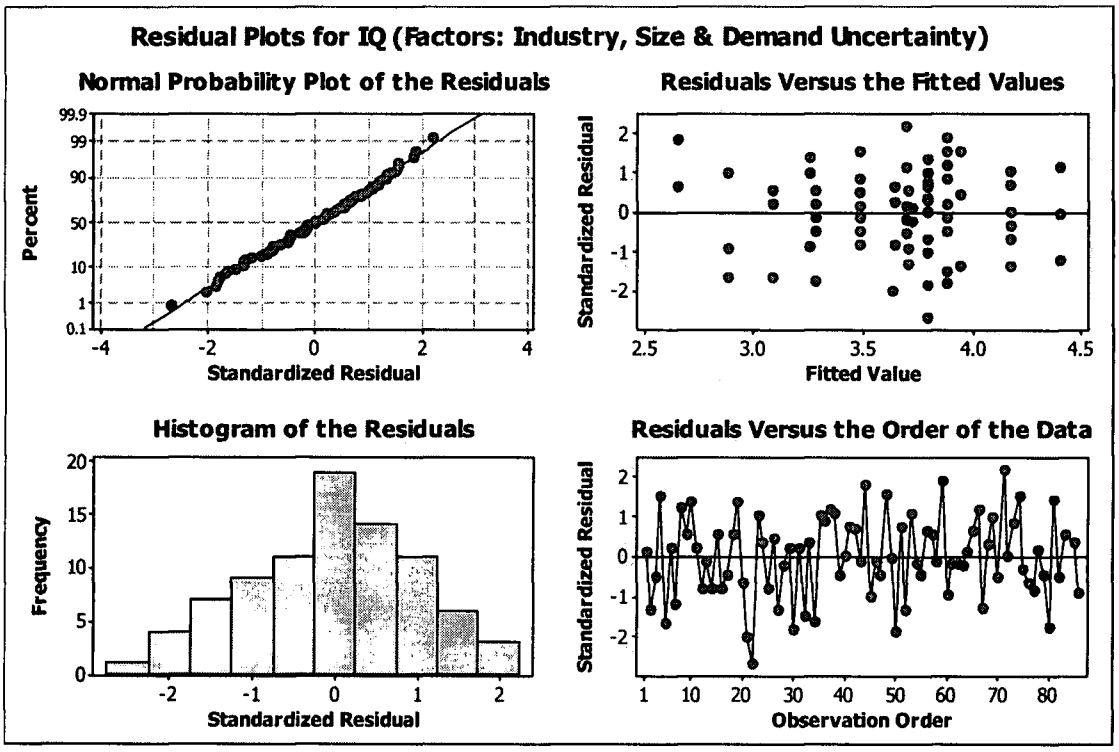
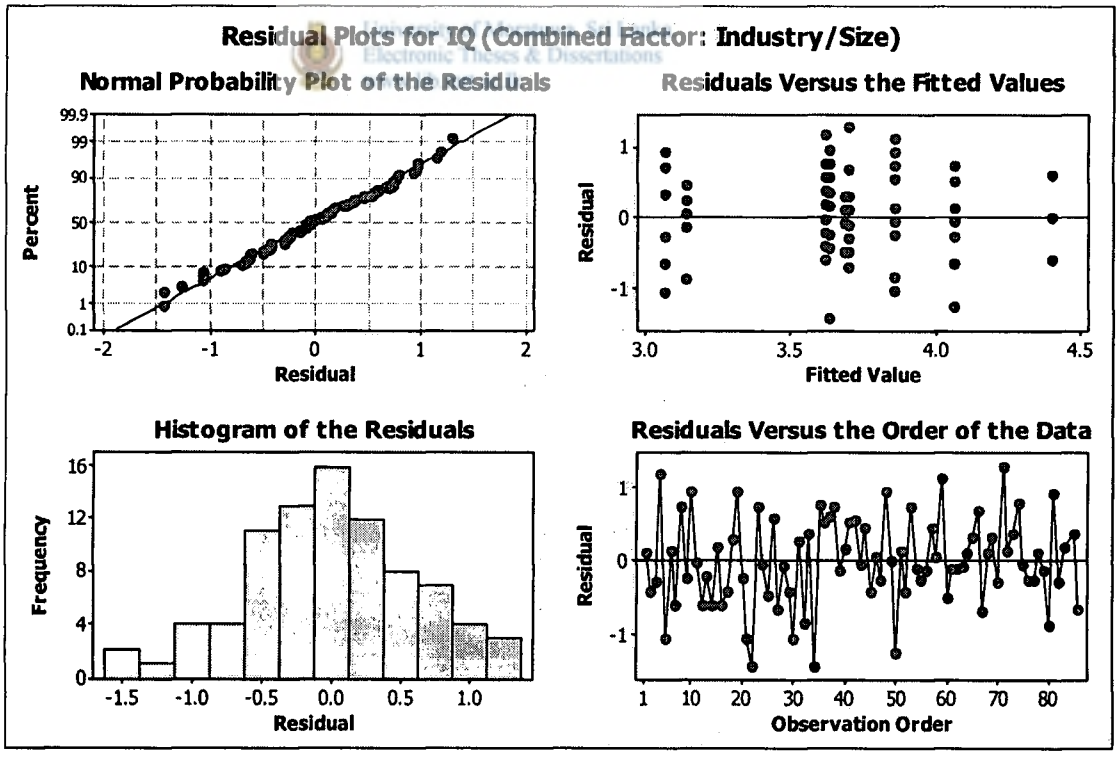



Figure A17: Residual Analysis IQ Vs Industry, Size, Demand Uncertainty




Electronic Theses & Dissertations

Figure A18: Residual Analysis: IQ Vs Combined Factor: Industry/Size

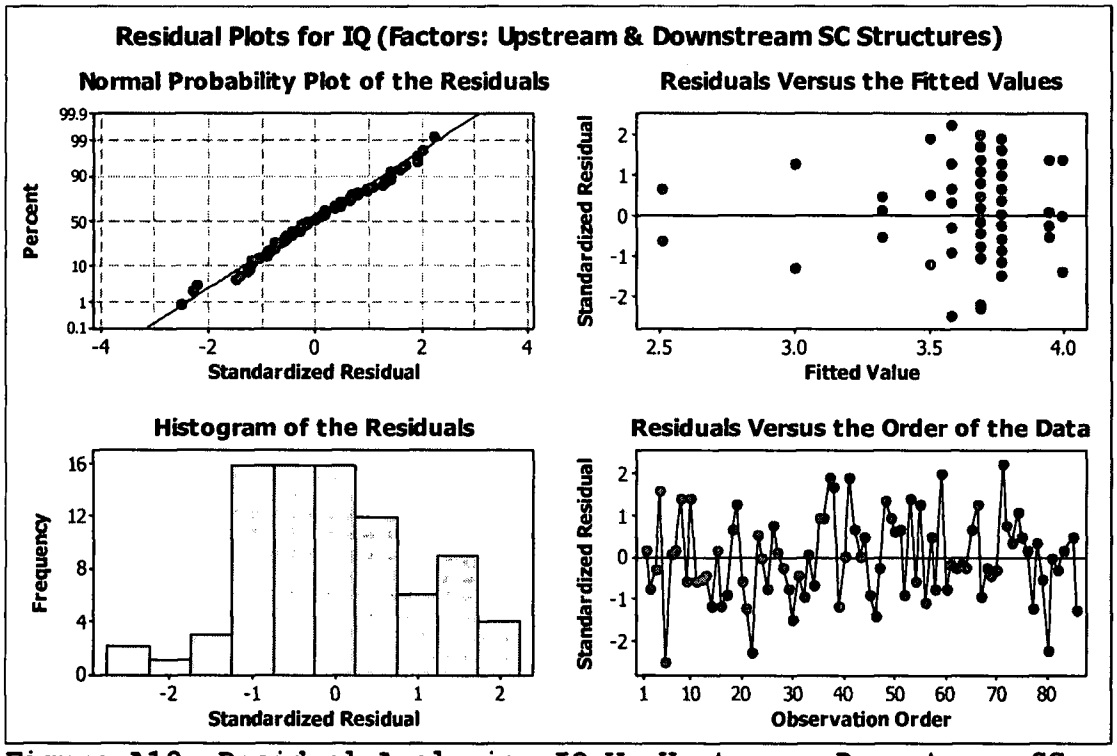
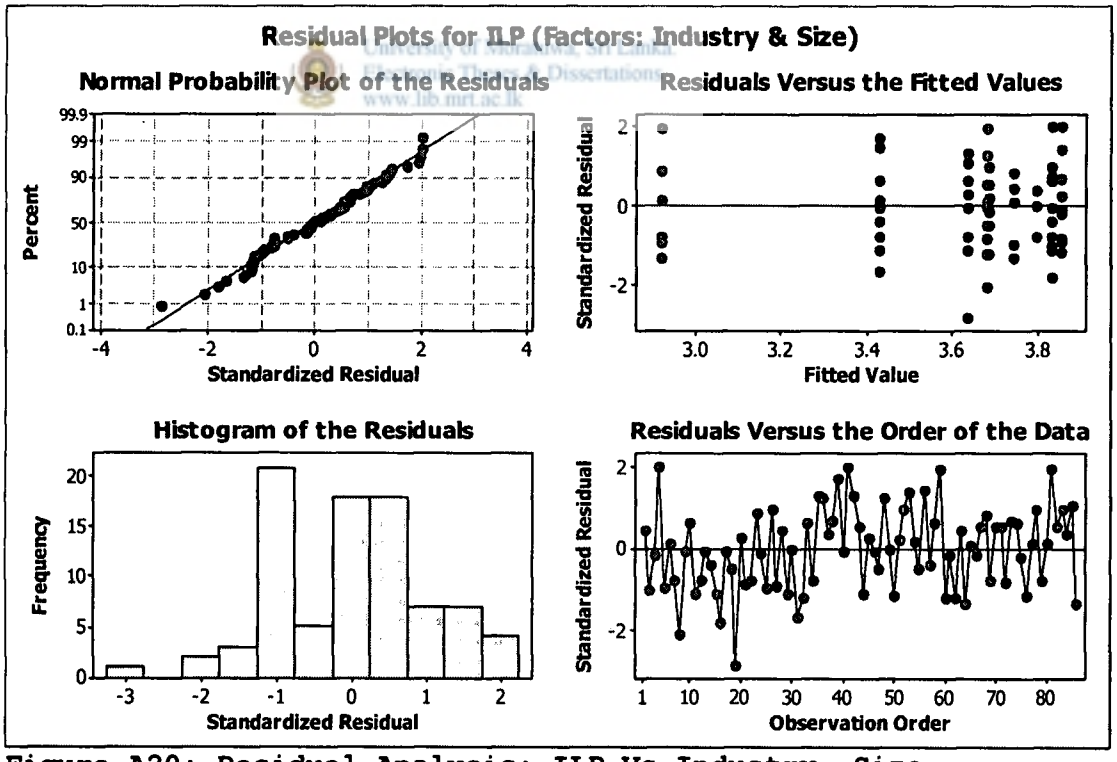



Figure A19: Residual Analysis: IQ Vs Upstream, Downstream SC Structure




University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

Figure A20: Residual Analysis: ILP Vs Industry, Size

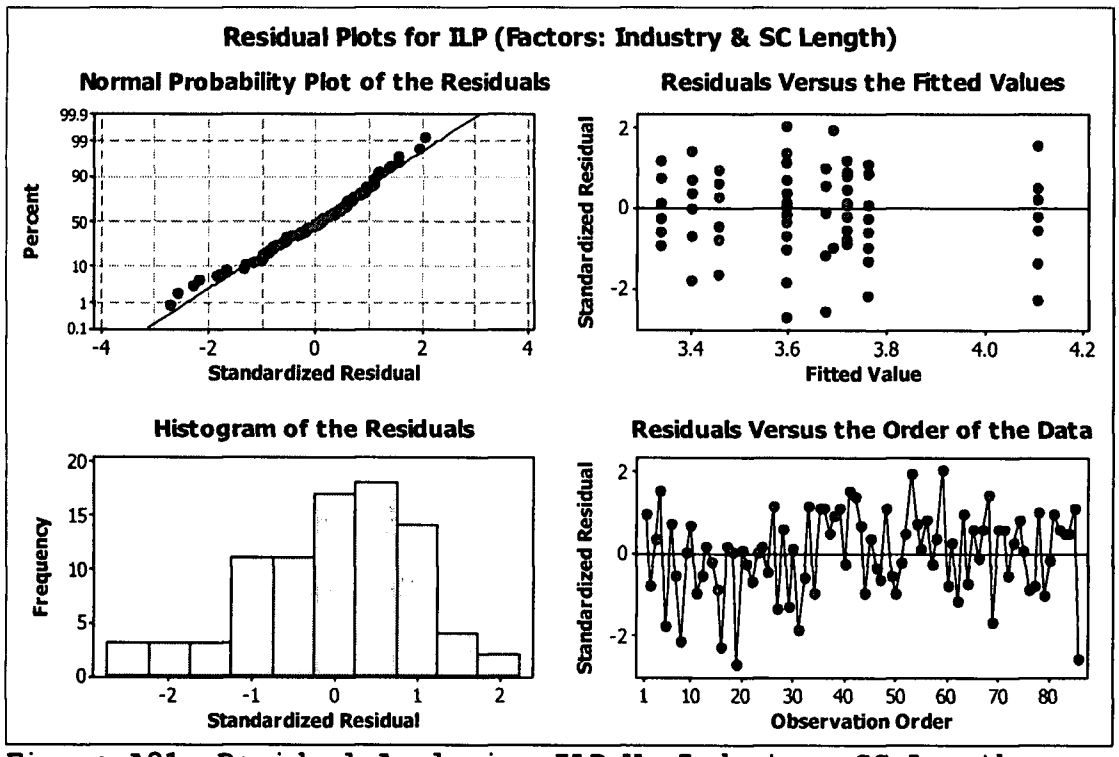



Figure A21: Residual Analysis: ILP Vs Industry, SC Length

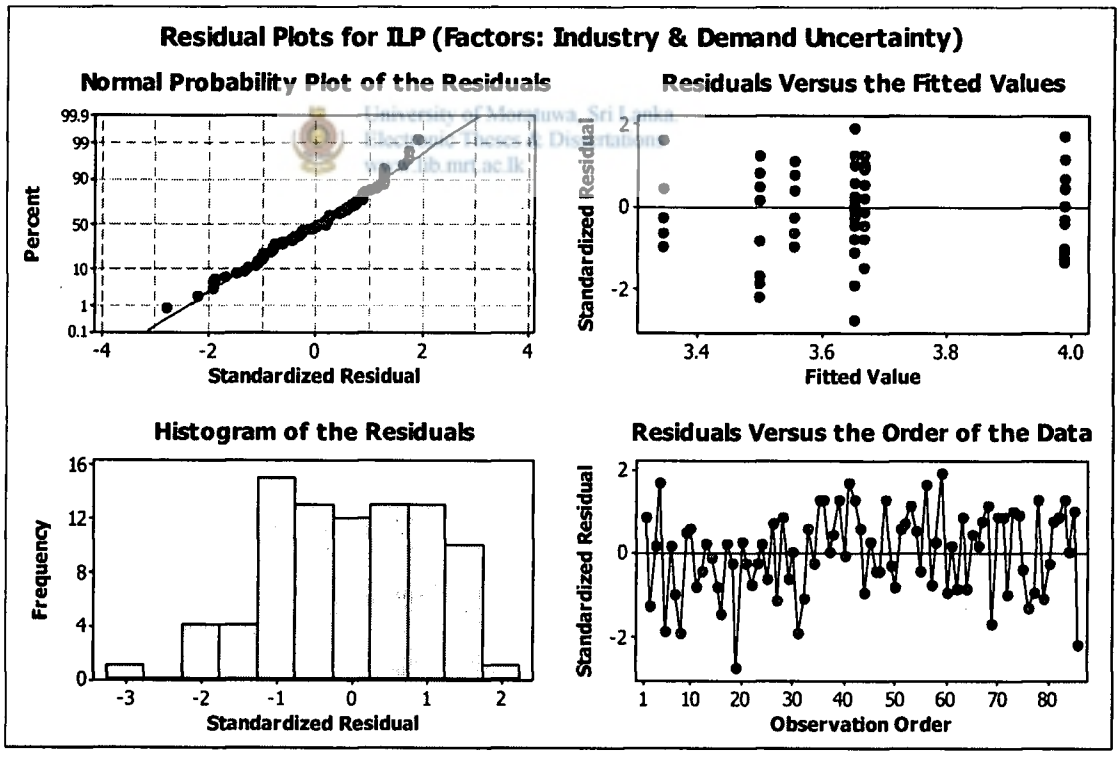



Figure A22: Residual Analysis: ILP Vs Industry, Demand Uncertainty

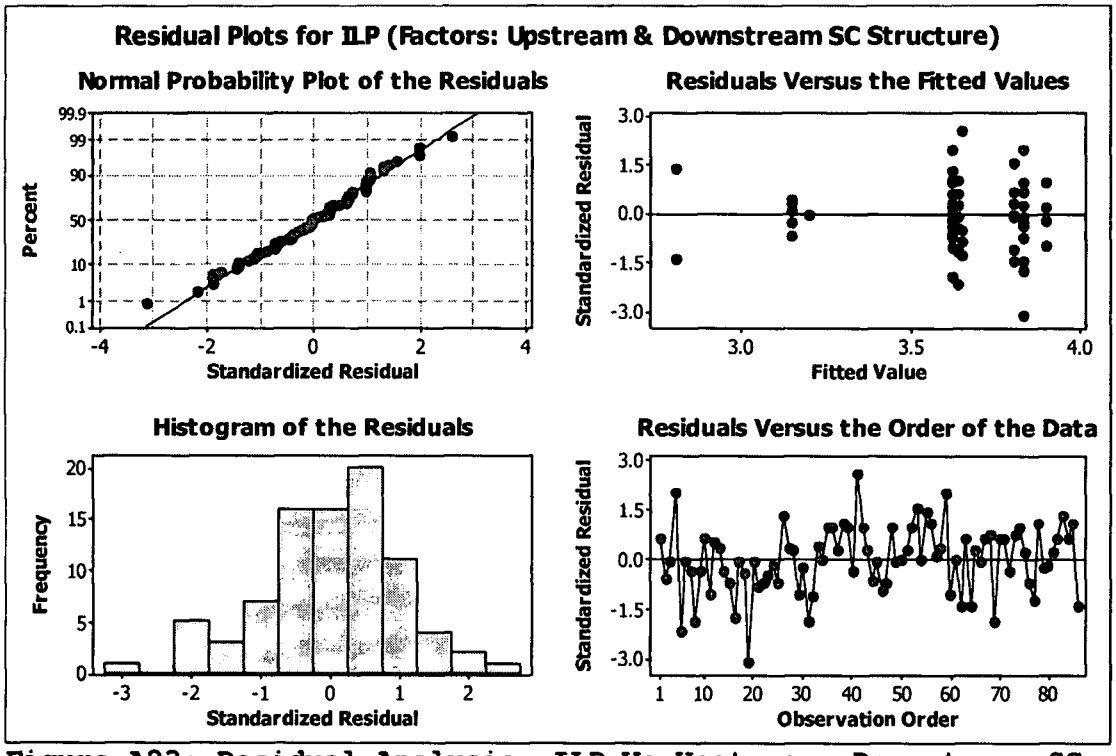
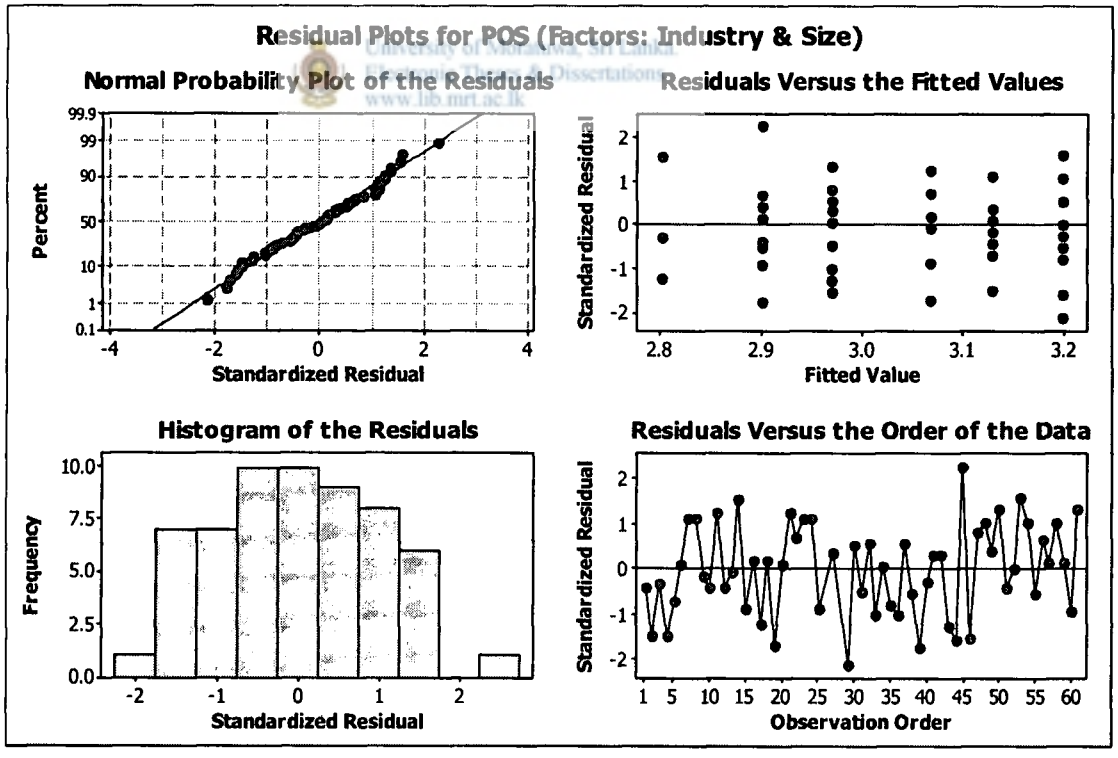



Figure A23: Residual Analysis: ILP Vs Upstream, Downstream SC Structure




University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

Figure A24: Residual Analysis: POS Vs Industry, Size

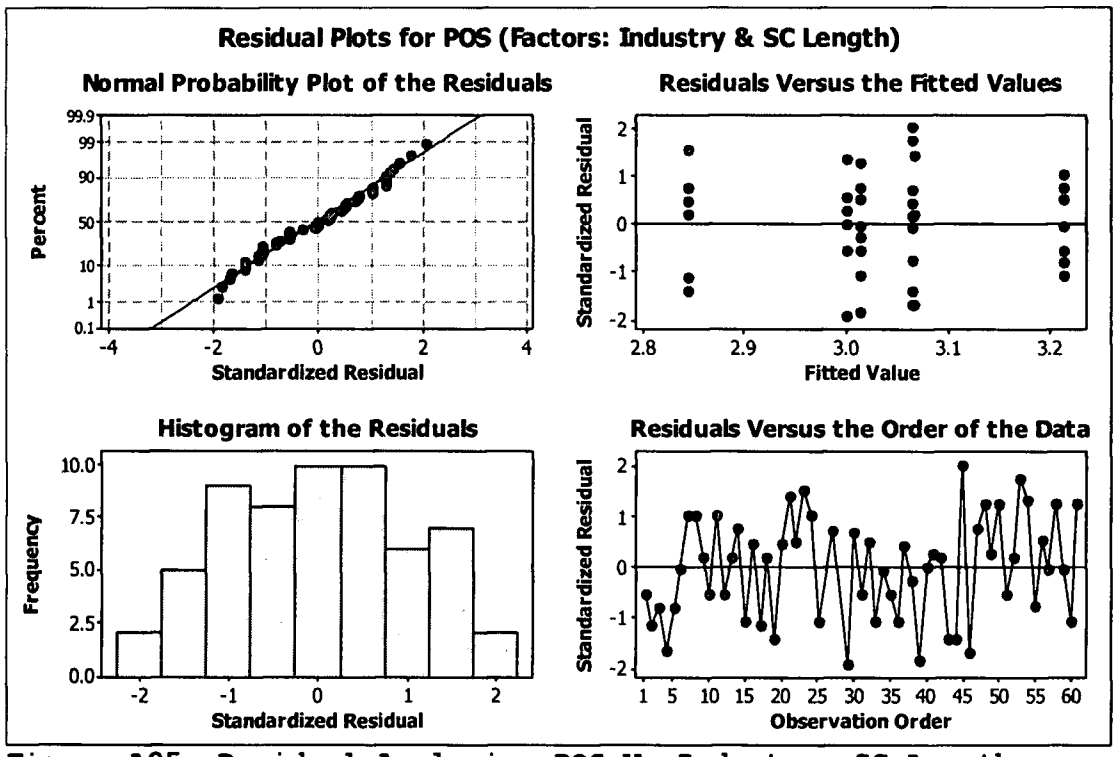



Figure A25: Residual Analysis: POS Vs Industry, SC Length

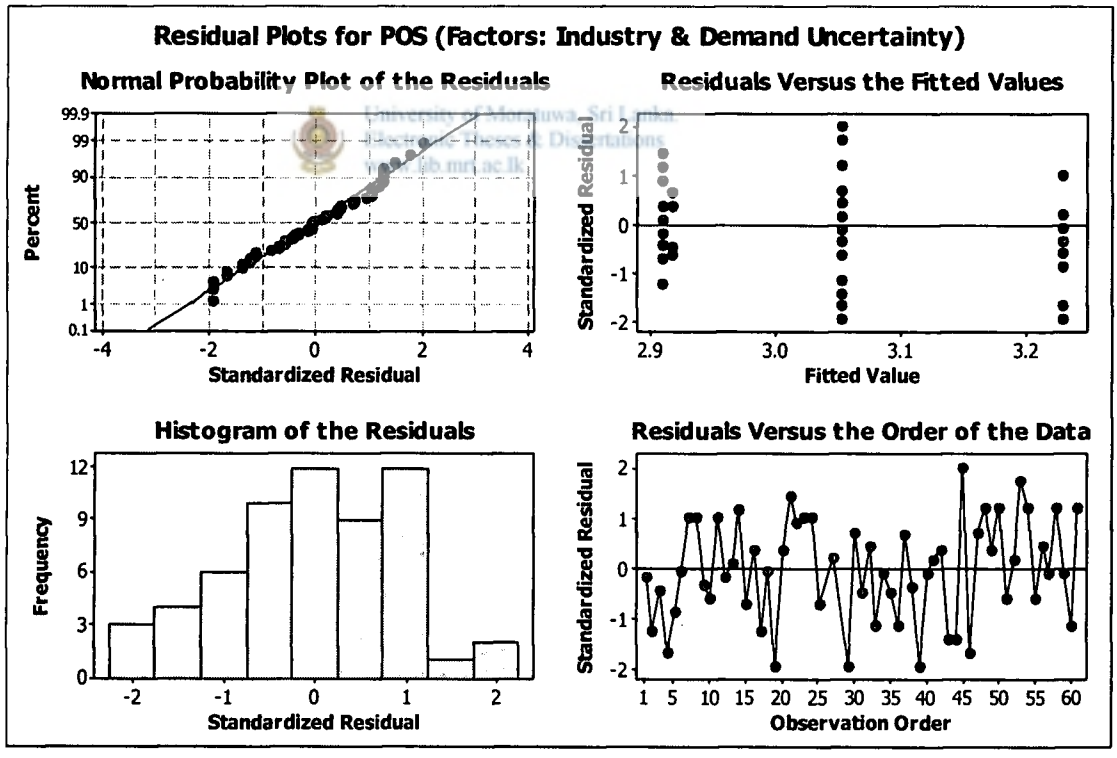



Figure A26: Residual Analysis: POS Vs Industry, Demand Uncertainty

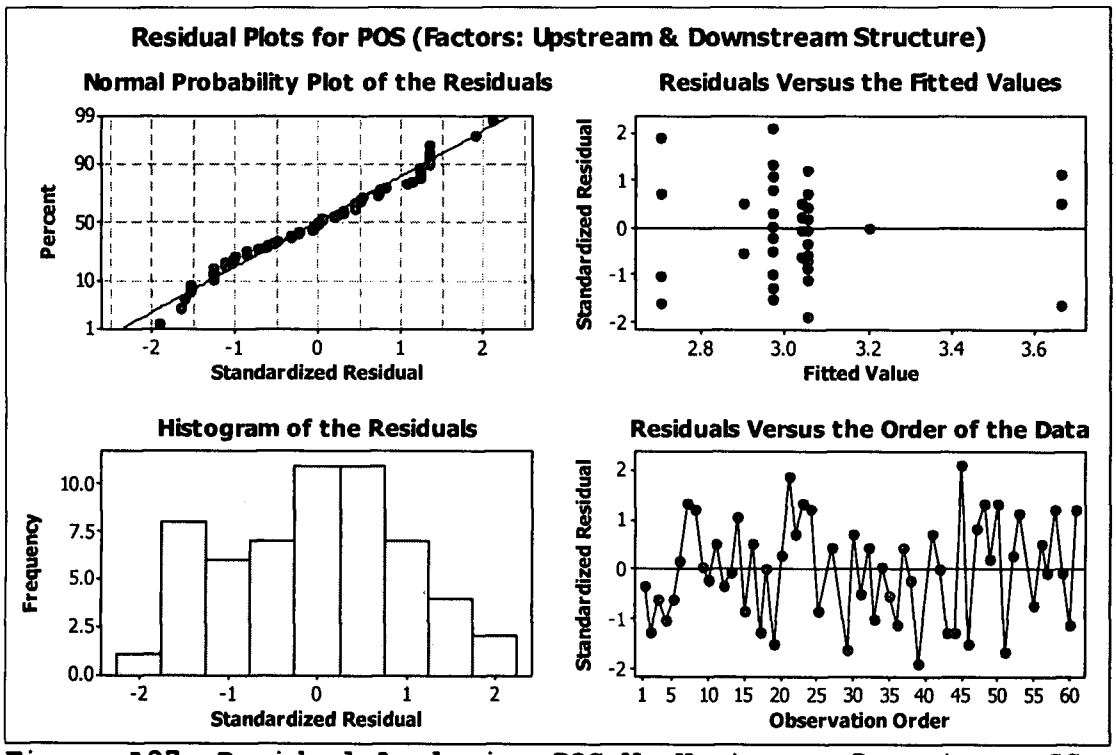



Figure A27: Residual Analysis: POS Vs Upstream, Downstream SC Structure

University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

**Table A1: Normality Test for Residuals**

| Output No. | ANOVA Model | P-Value (Anderson Darling Normality Test) |
|---|---|---|
| 5.1 | GLM (IS Vs Industry, Size) | 0.111 |
| 5.2 | GLM (IS Vs Industry, SC Length) | 0.075 |
| 5.3 | GLM (IS Vs Industry, Uncertainty in the Demand) | 0.139 |
| 5.4 | GLM (IS Vs Upstream & Downstream SC Structure) | 0.368 |
| 5.5 | One-Way ANOVA (All combinations of Upstream & Downstream SC Structures) | 0.368 |
| 5.6 | GLM (SSP Vs Industry, Size) | 0.718 |
| 5.7 | GLM (SSP Vs Industry, SC Length) | 0.631 |
| 5.8 | GLM (SSP Vs Industry, Uncertainty in the Demand) | 0.750 |
| 5.9 | GLM (SSP Vs Upstream & Downstream SC Structure) | 0.507 |
| 5.10 | GLM (CR Vs Industry, Size) | 0.295 |
| 5.11 | GLM (CR Vs Industry, SC Length) | 0.790 |
| 5.12 | GLM (CR Vs Industry, Uncertainty in the Demand) | 0.396 |
| 5.13 | GLM (CR Vs Upstream & Downstream SC Structure) | 0.151 |
| 5.14 | General Linear Model (IQ Vs Industry, Size) | 0.836 |
| 5.15 | GLM (IQ Vs Industry, SC Length) | 0.893 |
| 5.16 | GLM (IQ Vs Industry, Uncertainty in the Demand) | 0.787 |
| 5.17 | GLM (IQ Vs Industry, Size, Uncertainty in the Demand) | 0.934 |
| 5.18 | One-Way ANOVA (All combinations of Industry & Size) | 0.836 |
| 5.19 | GLM (IQ Vs Upstream & Downstream SC Structure) | 0.453 |
| 5.20 | GLM (ILP Vs Industry, Size) | 0.418 |
| 5.21 | GLM (ILP Vs Industry, SC Length) | 0.125 |
| 5.22 | GLM (ILP Vs Industry, Uncertainty in the Demand) | 0.225 |
| 5.23 | GLM (ILP Vs Upstream & Downstream SC Structure) | 0.258 |
| 5.24 | GLM (POS Vs Industry, Size) | 0.385 |
| 5.25 | GLM (POS Vs Industry, SC Length) | 0.138 |
| 5.26 | GLM (POS Vs Industry, Uncertainty in the Demand) | 0.358 |
| 5.27 | GLM (POS Vs Upstream & Downstream SC Structure) | 0.319 |

University of Moratuwa, Sri Lanka.
www.lib.mrt.ac.lk



25 MAY 2007
UNIVERSITY OF MORATUWA