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Appendix

Appendix 1: Comparison of effect of third party involvement in logistics segment for both cases

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Appendix 2: Use of cold chain-specific technologies in different sub-groups

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### Appendix 3: Use of cold chain-specific managerial practices in different sub-groups

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Appendix 5: Discriminant validity of the reflective measurement models in the best case scenario

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<th>Freq</th>
<th>Det</th>
<th>LQ</th>
<th>Prec</th>
<th>PQ</th>
<th>RoA</th>
<th>Rig</th>
<th>Invar</th>
<th>Un</th>
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<td>0.063</td>
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<td>0.005</td>
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<td>0.001</td>
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<td>0.001</td>
<td>0.230</td>
<td>0.074</td>
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<td>0.002</td>
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<td>0.007</td>
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Appendix 6: Correlations between first order constructs in the best case scenario

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<th>Correlations</th>
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<th>Preciseness</th>
<th>Range of Addressees</th>
<th>Rigidity</th>
<th>Invariability</th>
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<td>0.293*</td>
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<td>-0.074</td>
<td>0.391**</td>
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<td>0.490**</td>
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<td>0.264*</td>
<td>0.490**</td>
<td>1</td>
<td>-0.020</td>
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<td>0.293*</td>
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<td>-0.020</td>
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<td>0.379**</td>
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*α = 0.05; **α = 0.01;

Appendix 7: Quality evaluation of the second order model applied to the best case scenario

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<th>Construct</th>
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*α = 0.05; **α = 0.01

Appendix 8: Correlations between second order constructs in the best case scenario

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<th>Formalization</th>
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*α = 0.05; **α = 0.01
### Appendix 9: Results on causal relations for the first order model in the best case scenario

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<th>Coefficients</th>
<th>Standard Deviation</th>
<th>Standard Error</th>
<th>T Statistics</th>
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<tbody>
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<td>-0.2586*</td>
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<td>0.1178</td>
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<td>0.1416</td>
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<td>0.1128</td>
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*α = 0.05; ***α = 0.01;
Appendix 10: Results on causal relations for the second order model in the best case scenario

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<th>Path Coefficients</th>
<th>Standard Deviation</th>
<th>Standard Error</th>
<th>T Statistics</th>
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<tbody>
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<td>Asset Specificity -&gt; Degree</td>
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<td>Degree -&gt; Product Quality</td>
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N= 60; *α = 0.05; **α = 0.01;

Appendix 11: Total effects of the first order model in the worst case scenario

<table>
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<th>Path Coefficients</th>
<th>Direct Effects</th>
<th>Total Effects</th>
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<td>0.2894</td>
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</tr>
<tr>
<td>Asset Specificity -&gt; Product Quality</td>
<td>-0.0605</td>
<td>0.4288</td>
</tr>
<tr>
<td>Frequency -&gt; Logistics Quality</td>
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<td>2.4986</td>
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<tr>
<td>Frequency -&gt; Product Quality</td>
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<td>2.618</td>
</tr>
<tr>
<td>Volume Uncertainty -&gt; Logistics Quality</td>
<td>0.0029</td>
<td>0.0239</td>
</tr>
<tr>
<td>Volume Uncertainty -&gt; Product Quality</td>
<td>0.0289</td>
<td>0.2717</td>
</tr>
</tbody>
</table>

Appendix 12: Total effects of the first order model in the best case scenario

<table>
<thead>
<tr>
<th>Path Coefficients</th>
<th>Direct Effects</th>
<th>Total Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asset Specificity -&gt; Logistics Quality</td>
<td>0.1374</td>
<td>1.0569</td>
</tr>
<tr>
<td>Asset Specificity -&gt; Product Quality</td>
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<td>0.5754</td>
</tr>
<tr>
<td>Frequency -&gt; Logistics Quality</td>
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<tr>
<td>Frequency -&gt; Product Quality</td>
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<td>0.5746</td>
</tr>
<tr>
<td>Volume Uncertainty -&gt; Logistics Quality</td>
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</tr>
<tr>
<td>Volume Uncertainty -&gt; Product Quality</td>
<td>-0.1344</td>
<td>1.1746</td>
</tr>
</tbody>
</table>
Appendix

Appendix 13: Total effects of the second order model in the worst case scenario

<table>
<thead>
<tr>
<th>Path Coefficients</th>
<th>Direct Effects</th>
<th>Total Effects</th>
</tr>
</thead>
<tbody>
<tr>
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<td>1.3131</td>
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<tr>
<td>Asset Specificity -&gt; Product Quality</td>
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</tr>
<tr>
<td>Frequency -&gt; Logistics Quality</td>
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<td>1.5295</td>
</tr>
<tr>
<td>Frequency -&gt; Product Quality</td>
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<td>0.5047</td>
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<tr>
<td>Volume Uncertainty -&gt; Logistics Quality</td>
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</tr>
<tr>
<td>Volume Uncertainty -&gt; Product Quality</td>
<td>-0.2129</td>
<td>1.8418</td>
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</table>

Appendix 14: Total effects of the second order model in the best case scenario

<table>
<thead>
<tr>
<th>Path Coefficients</th>
<th>Direct Effects</th>
<th>Total Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asset Specificity -&gt; Logistics Quality</td>
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<td>0.8319</td>
</tr>
<tr>
<td>Asset Specificity -&gt; Product Quality</td>
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<tr>
<td>Frequency -&gt; Logistics Quality</td>
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<td>2.3523</td>
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<tr>
<td>Frequency -&gt; Product Quality</td>
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<td>0.3647</td>
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<tr>
<td>Volume Uncertainty -&gt; Logistics Quality</td>
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<tr>
<td>Volume Uncertainty -&gt; Product Quality</td>
<td>-0.1037</td>
<td>1.0784</td>
</tr>
</tbody>
</table>

Appendix 15: Comments by respondents

<table>
<thead>
<tr>
<th>Ifdn</th>
<th>Clear and transparent communications of requirements for transportation (Time, Temperature, Routing, Volumes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>43</td>
<td>I will strongly recommend that procedures and standards must be in place for each process. Flexibility can be exercised but continuous deviations must have some penalties or disadvantage. One is tempted to have different processes for different partners under the guise of tailor-made, but in reality it is designed to suit once dependence on that partner. The more dependent we are on the partner the less we apply strict processes.</td>
</tr>
<tr>
<td>44</td>
<td>Yes, we are in the supply chain service industry for the export of perishables - mainly fruit. This involves many parties from the farm to the fork starting with the grower, packhouse, cold store, packaging supplier, transporter, shipping line, forwarding agent etc. In South Africa once deregulation occurred it became very important for various fruit industry bodies to be formed in order to manage the best interests of these industries based mainly on the differing fruit types i.e. stone fruit, grapes, citrus, pomes, subtropicals. Also because of the wide range of products we require many different variances within the same basic temperature controlled chain for optimum shipment of goods from A to B. We also have a unique governing body called the PPECB (Perishable Products Export Control Board) who gives guidance, sets rules, polices that these are adhered to &amp; has the status to accept or reject all fruit for export. The rules both within South Africa (as harbours/systems/protocols are updated) &amp; in receiving countries (Europe, Far East, Middle East - HACCP, Fair Trade etc. or various product sterilization or pest inspection or chemical spraying restrictions) are fast changing &amp; therefore impacting more &amp; more on a fairly stable/standard operating environment that is now having to adapt - both in terms of procedures &amp; information flow/deadlines. So what I am saying is that given your questions it is very difficult to explain the above except to say that most of the time we manage the supply chain in South Africa in a very controlled environment but times are changing - can the drive to lower costs create problems in trying to manage an ever increasing sophisticated safety first global food market?</td>
</tr>
<tr>
<td>45</td>
<td></td>
</tr>
</tbody>
</table>
Keep it simple and be practical. Do not implement procedures that cannot be followed in practice. Follow up your employees with education and relevant information. Take them seriously and listen to good advices. Follow up irregularity reports. Keep your suppliers updated at all times.

Open line communication with a goal to achieving improvement and not penalties.

to rely on third parties when providing logistics services for temp. sensitive goods is not a good idea. Toleration to mistakes varies from companies to companies, unfortunately when handling perishables goods there is not room for mistakes. Normally the mistakes are fatal and Customers don't tolerate then.

We mainly cooperate with specialized transport companies on existing supply chains based on long term relations on both suppliers as clients. In Fresh Fruit and Veg all transport is refrigerated and main damage exists when cooling is interrupted. In our trade business is mainly done by gentlemen's agreement, using many certificates as HACCP, ISO, BRC, IFS, etc.

Every supply chain has companies linking in with each other, both on an operational- and a communication level. The key in the supply chain for temperature sensitive products is to identify the weak spots, normally the escalation points, where the products are handed over from one to the other party. This process should be harmonized, as currently this is still not done. The fear factor of taking ownership of any liability in this process and the fact that transparency is still a curse in our industry, we as an industry fail to improve the complete supply chain. Exchanging best practice cases, sharing own experiences on how to overcome issues on a global level, would help our industry tremendously. At this moment in time the supply chain in our industry is being dominated by local heroes, not the big multinationals of this world.

Clear contractual agreements defining roles and responsibilities including communication.

visibility through integrated IT systems

1. the end goal of the whole process plan must be defined clearly  2. the process must be flexible enough to endure uncertainties in other parts of the chain  3. the process must frequently undergo a live audit and improved and updated accordingly

Universal process / procedure and documents. Clear definition of terminology and required information.

(1) Everyone must follow the agreed procedures, and (2) financial penalties enforce compliance to the procedures.

Collaboration, alignment, knowhow

As so much activity in transportation is managed by third parties (forwarder / airline / trucking company / customs broker - plus shipper / consignee), communication is critical. All processes, whether operational or EDI should be documented.

most important: - seamless transition of data from one IT system to another - try to reduce manual input of data

ROI the first part answers could be duplicated for the second part

Establishing the complete process, ensuring all involved are in agreement and trained, monitoring adherence, evaluating deviations and putting CAPAs in place.

Standard Operating Procedures covering physical handling and information exchange for all parties involved in the supply/cool chain

Awareness and Training and dedicated teams from A to Z. Too many changes on the suppliers lead to mistakes. SOPS, Procedures etc. will not help if people don't know how to handle...
The first step is to sign a good Quality Assurance Agreement. The QAA must describe the technical processes and also the organizational framework including the information pathways between both companies. The QAA should be extensive and accurate, providing no room for misunderstanding. It must include procedures for handling deviations and change control. However, the best QAA doesn't help, if it is not implemented: A system must be established to assure regular re-qualification and/or Audit of the Partner. It is also important to hold regular Meetings or Telephone conferences with the Partner.

| 112 | Most important is the accuracy of received data. Pre-notification is also a part of success in this process. |
| 114 | Very clear procedures are extremely important. These procedures have to be implemented in the whole supply chain. Also pre and post shipment. The ideal model goes from tree to shelf in the supermarket at destination - all controlled by an independent and transparent supply chain service provider who needs to monitor the whole process. |
| 115 | Clear expectations and an efficient Claims and CAPA system are key to a successful relationship. Depending on the industry, the toll for not being effective might have a considerable financial and/or P.R. impact. |
| 116 | Setting up quality systems and aligning the procedures with all different partners is a challenge even though the relationships have been formalized in Contracts and SLA's and/or QA's. |
| 117 | Complete transparency on the requirements and expectations from the customer to the supplier. |
| 118 | Important: using agreed, industry-wide standards; immediately iron out appearing issues |
| 119 | Clearly defined procedures and expectations |
| 120 | Very important for achieving seamless processes at interfaces between companies are exactly defined requirements on processes, interfaces, IT, dealing with deviations. Solutions based on the defined requirements. Defined temperature monitoring online data availability of all temperature devices |
| 121 | The requirements, stakeholders involved, facilities, equipment, packaging material etc. change quite often. This provides new opportunities as well as challenges. Market knowledge and drive for continuous improvement are important to achieve the best result and avoid surprises. Furthermore accurate training of staff and complaint management combined with CAPA analyses are important to maintain and improve existing procedures. For future research the weakest link in the airfreight could be interesting. What are the airport facility and service expectations with regards to conditioned storage and handling and would it be possible to define standards? |
| 122 | The capabilities of the partners especially regarding the adherence of temperature (cold chain) |
| 123 | Involvement of all parties in the supply chain, Shipper, Forwarding Agent, Handling Agent, Airline, CNEE, should all agree on defined processes before they go live |
| 124 | Communication lines must be defined and frequent meetings are required to keep on track |
| 125 | It is very hard to work with truck drivers. Most of the time we discuss with them regarding the rules. |
| 126 | Standard IDOCS and processes |