LEAN AEROSPACE INITIATIVE
Product and Technology Development through Strategic Alliances with Suppliers

October 14, 1998
Presented By:
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Williams College

(N=67: Total number of responding business units with or without CSSAs)
RESPONDING BUSINESS UNITS WITH MOST CRITICAL CUSTOMER-SUPPLIER STRATEGIC ALLIANCE (CSSA) IN SUPPORT OF DEFENSE BUSINESS (1993)

(N=51: Total number of responding business units with CSSAs)
YEAR IN WHICH MOST CRITICAL CUSTOMER-SUPPLIER STRATEGIC ALLIANCE (CSSA) WAS INITIATED

(N=51: Total number of responding business units with CSSAs)

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3/30/97
Survey Reference: H3
Composition of Customer-Supplier Strategic Alliances for Product Development in the US Aircraft Industry By Type of Agreement

- Teaming Agreements (124) 43%
- Memoranda of Agreement (76) 26%
- Legal Partnerships or Joint Ventures (32) 11%
- Other, e.g. Memoranda of Understanding (58) 20%

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Reference: Rob--OldQ#8
BUSINESS UNITS IN THE U.S. AIRCRAFT INDUSTRY ENGAGED WITH CUSTOMER-SUPPLIER STRATEGIC ALLIANCES (CSSAs), BY SECTOR AND FUNCTIONAL TYPE OF ALLIANCE
(JANUARY 1993 - JUNE 1994)

Number of responses by sector given in parentheses
- Technology Development (38,11,16,11)
- Product Development (43,12,20,11)
- Manufacturing (38,9,14,15)
- Customer Support (18,7,5,6)
- Marketing (31,9,14,8)

(N=51: Total number of responding business units CSSAs)

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3/25/97
Survey Reference: H2
MOTIVATING FACTORS FOR BUSINESS UNITS IN THE U.S. AIRCRAFT INDUSTRY FOR ENTERING INTO A CUSTOMER-SUPPLIER STRATEGIC ALLIANCE (CSSAs), 1993
("EXPECTED" AND "REALIZED" BENEFITS ASSOCIATED WITH THE MOST CRITICAL CSSA)

<table>
<thead>
<tr>
<th>Factor</th>
<th>Expected</th>
<th>Realized</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material cost reductions (31,21)</td>
<td>61</td>
<td></td>
</tr>
<tr>
<td>Admin cost reductions (14,11)</td>
<td>41</td>
<td>27</td>
</tr>
<tr>
<td>Mfg cost reduction (26,16)</td>
<td>51</td>
<td>31</td>
</tr>
<tr>
<td>Improved on-time delivery (28,17)</td>
<td>55</td>
<td>33</td>
</tr>
<tr>
<td>Reduced cycle time (22,12)</td>
<td>43</td>
<td>24</td>
</tr>
<tr>
<td>Reduced Risks in PD (30,20)</td>
<td>59</td>
<td>39</td>
</tr>
<tr>
<td>Produce higher quality products (30,19)</td>
<td>59</td>
<td>37</td>
</tr>
<tr>
<td>Access to new technologies (30,19)</td>
<td>59</td>
<td>37</td>
</tr>
<tr>
<td>Market flexibility (23,13)</td>
<td>45</td>
<td>25</td>
</tr>
<tr>
<td>Short-term financial gain (18,13)</td>
<td>35</td>
<td>25</td>
</tr>
</tbody>
</table>

(N=51: Total number of responding business units with CSSAs)

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MOTIVATING STRATEGIC ADVANTAGES FOR BUSINESS UNITS IN THE U.S. AIRCRAFT INDUSTRY FOR ENTERING INTO A CUSTOMER-SUPPLIER STRATEGIC ALLIANCE (CSSAs), 1993

("Expected" and "Realized" Strategic Advantages Associated with the Most Critical CSSA)

(N=51: Total number of responding business units with CSSAs)

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8/24/97
Survey Reference: H5 ALL
MOTIVATING PARTNER CHARACTERISTICS FOR BUSINESS UNITS IN THE U.S. AIRCRAFT INDUSTRY FOR ENTERING INTO A CUSTOMER-SUPPLIER STRATEGIC ALLIANCE (CSSAs), 1993
("Expected" and "Realized" Partner Characteristics Associated with the Most Critical CSSA)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Expected</th>
<th>Realized</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintains financial strength</td>
<td>71</td>
<td>65</td>
</tr>
<tr>
<td>Maintains attractive capabilities</td>
<td>75</td>
<td>63</td>
</tr>
<tr>
<td>High standard of performance</td>
<td>75</td>
<td>47</td>
</tr>
<tr>
<td>Small risk of creating a competitor</td>
<td>27</td>
<td>37</td>
</tr>
</tbody>
</table>

(N=51: Total number of responding business units with CSSAs)
MAIN INHIBITORS TO ESTABLISHING CUSTOMER-SUPPLIER STRATEGIC ALLIANCES (CSSAs) REPORTED BY THE RESPONDING BUSINESS UNITS IN THE U.S. AIRCRAFT INDUSTRY, 1993

<table>
<thead>
<tr>
<th>Inhibitor</th>
<th>Percent of Responding Business Units with CSSAs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer contracts too short</td>
<td>35</td>
</tr>
<tr>
<td>Uncertainty in customer demand</td>
<td>54</td>
</tr>
<tr>
<td>Joint activities are restrictive</td>
<td>15</td>
</tr>
<tr>
<td>Upper mgmt unwilling to change</td>
<td>22</td>
</tr>
<tr>
<td>Other mgrs unwilling to change</td>
<td>17</td>
</tr>
<tr>
<td>Constructing coop agreements</td>
<td>35</td>
</tr>
<tr>
<td>Start-up lengthy/costly</td>
<td>33</td>
</tr>
<tr>
<td>Difficult to org. operations</td>
<td>37</td>
</tr>
<tr>
<td>Alliances do not contribute to bottom line</td>
<td>17</td>
</tr>
<tr>
<td>Alliances not part of corp. culture</td>
<td>17</td>
</tr>
</tbody>
</table>

(N=46: Total number of responding business units with CSSAs)

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3/24/97
Survey Reference: H6 ALL
H5: How Many Respondents Thought Their Strategic Alliance Was Successful?

<table>
<thead>
<tr>
<th></th>
<th>Raw Number</th>
<th>Percentage</th>
<th>Raw Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Successful</td>
<td>Successful</td>
<td>Unsuccessful</td>
<td>Unsuccessful</td>
</tr>
<tr>
<td>Airframe</td>
<td>10</td>
<td>30</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Electronics/Avionics</td>
<td>14</td>
<td>42</td>
<td>4</td>
<td>40</td>
</tr>
<tr>
<td>Engines &amp; Other</td>
<td>9</td>
<td>27</td>
<td>5</td>
<td>50</td>
</tr>
<tr>
<td>Total</td>
<td>33</td>
<td>100</td>
<td>10</td>
<td>100</td>
</tr>
</tbody>
</table>

Successful/Unsuccessful Alliances (by Sector)

Note: Only parts a, b, c, d, and g of the 'Realized' column were considered. If either a 4 or 5 was entered in any of these five categories, the respondent was "successful." If any other response was given, they were "unsuccessful."
Significant Inhibitors to Establishing Customer-Supplier Strategic Alliances (CSSAs)
Reported by "Successful" and "Unsuccessful" Business Units in the U.S. Aircraft Industry, 1993

N=43 (33, 10)

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Survey Reference: Rob, Chart #3–H56
Organizational Position of Company Members Responsible for Approving the Customer-Supplier Strategic Alliance (CSSA)

![Bar chart showing the percent of responding CSSAs by functional department.]

- **Research**: 3% (All), 2% (Only business units with successful CSSA)
- **Development Engineering**: 7% (All), 6% (Only business units with successful CSSA)
- **Purchasing**: 14% (All), 15% (Only business units with successful CSSA)
- **Manufacturing**: 5% (All), 6% (Only business units with successful CSSA)
- **Quality**: 11% (All), 9% (Only business units with successful CSSA)
- **Contracts**: 9% (All), 4% (Only business units with successful CSSA)
- **Legal**: 18% (All), 15% (Only business units with successful CSSA)
- **Marketing**: 9% (All), 8% (Only business units with successful CSSA)
- **Accounting/Finance**: 2% (All), 4% (Only business units with successful CSSA)
- **Teams**: 30% (All), 24% (Only business units with successful CSSA)

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Survey Reference: Rob Q#25ii--H4
Organizational Position of Company Members Responsible for Managing the Customer-Supplier Strategic Alliance (CSSA) on a Day-to-Day Basis

Functional Department

- **Research**: 3 (All), 3 (Only)
- **Development**: 8 (All), 5 (Only)
- **Engineering**: 5 (All), 3 (Only)
- **Purchasing**: 5 (All), 3 (Only)
- **Manufacturing**: 5 (All), 3 (Only)
- **Quality**: 8 (All), 5 (Only)
- **Contracts**: 0 (All), 0 (Only)
- **Legal**: 0 (All), 0 (Only)
- **Marketing**: 3 (All), 3 (Only)
- **Accounting/Finance**: 0 (All), 0 (Only)
- **Teams**: 55 (All), 42 (Only)

Legend:
- ■ All responding business units (n=77)
- ■ Only business units with successful CSSA (n=33)
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Strategic Supplier Alliance Case Study
Profile

- Type of product/technology: electronics
- Type of alliance: bilateral agreement for new product and technology development
- Motivation: create new value; win future business
- Time frame: 1991-1994 (1st wave); on-going alliance
- Background information on customer-supplier relationship
  - Relationship initiated in 1988
  - Supplier share of customer’s purchase of product: 30% of product volume and 50% of dollar value
  - Customer represents 5% of supplier’s total sales of product by value
Strategic Alliance Results

- **Cost**
  - Total cost to customer company reduced by 65%
  - Cost of materials reduction: 21% (1991-94); 30% (1994-96, expected)

- **Cycle time**
  - Design and qualification less than 1 year now, qualification alone took more than 2 years
  - Reduced supplier lead time from 4-6 months to 4-6 weeks

- **Schedule**
  - Increased supplier on-time delivery from 31.5% to 75.9%

- **Quality**
  - Acceptance test yield up from 87% (3rd qtr 1994) to 98% (3rd qtr 1995)
  - Product returns reduced from 5% to under 1%
  - Percent of supplier shipments received w/o prior inspection (through process certification): 0% to 79.2% (1991-94)

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New value created through new product development and leveraging over multiple programs
Strategic Alliance Case Study: Key Practices

- Timely/accurate communications on requirements and changes; electronic linkage between customer and supplier sites
- Synergizing mutual core competencies (supplier's technical expertise and customer's systems applications know-how)
- Early supplier involvement; sharing of technology roadmap
- Joint dedicated cross-functional project team
- Product design standardization and use of standardized products
- Trust-based relationship
- Supplier training in SPC, 6-sigma, etc.
- Long-term options pricing agreement flowed down to subtier suppliers

Compliance with government's competition in contracting requirements through "total cost of ownership" approach