Lu-McCarthy Report to CPBIS (and Trucking Industry Program (TIP))

Final Report Summary

I. Current Year Results

1. Completed a thorough list of questions prepared for surveying paper industry's trucking-logistics operations.

   Why: This project is important for understanding trucking logistics operations' business models and their performance in the paper industry.

2. Conduct an interview of a senior manager in a paper company about their box-plants' logistics operations. A report of observations and conclusions from this interview in in-progress.

   Why: This is the first step in meeting our project goal of collecting first-hand information from experienced paper company managers about their current practice and future needs in logistics operations. This interview provides us valuable information of the current practice in box-plant logistics operations typical in larger-size paper companies with third-party owned trucking fleets but fully controlled by paper company's schedules. Our next target is to interview managers from medium to small size paper companies, where the logistics operations might rely on private owned trucks.

3. Created a set of performance-evaluation criteria.

   Why: These criteria allow us to compare and benchmark trucking logistics operation performance more quantitatively.

4. Completed one research paper addressing the importance of service quality in supply chain competition/coordination via game theory.

   Why: Service factors such as the quality and speed of trucking logistics operations are important in supply chain contract decision-making processes.

5. A student comprehensive-exam report passed a committee review.

   Why: This student is partially supported by the TIP program in project and thesis research. His report shows that the continuum approximation method has great potential in (trucking-) logistics planning activities, especially in dealing with contingencies such as security threats and opportunities of "tailered sourcing" of materials/products

6. A student-research in-progress paper (close to be completed) in modeling logistics uncertainties and exploring profit-sharing contracts between suppliers and logistics service provider.

   Why: This and other on-going research efforts provide uncertainty-modeling foundation for (trucking-) logistics operations useful in evaluating and optimizing network planning and control strategies.

7. A student is completing a MS thesis that focuses upon transport logistics governance structures for in-bound and out-bound shipments at box-plants.

   Why: The study includes box-plant case studies and a simulation model that identifies the impact of transport costs on mill profitability. This has obvious implications for the mill but is also important to trucking firms in their individual quests for increased market share and to compete more effectively with rail and private carriage.

8. Scheduled a meeting on October 20, 2004 with Professor Liker's research team at the University of Michigan for coordinating their survey research of trucking logistics in the auto-industry.

   Why: This meeting is important to meet the project vision of learning experience from other industry's trucking logistics operations for improving our project-study strategies. Some of the survey-design methodologies could be coordinated for future comparison purposes.

II. Statement of Impact

The intent of this study is to profile best practices for trucking logistics operations followed by integrated and non-integrated box-plants. Within the next six months, detailed case studies and the results of our simulation analysis will enable us to comment on various implications and impacts for the trucking industry.

1. As one CPBIS Industry Advisory Board member stated, "transportation is a growing concern" with potentially significant implications for pulp and paper industry. A growing concern for the paper industry will have "impact" demand implications for its trucking needs.

2. The impact on the trucking industry for box-plant in-bound and out-bound shipments depends on relative modal costs, reliability, and frequency of service. The case studies of box-plant transport logistics operations will impact the trucking industry by identifying those transport factors which are most important to a box-plant's needs.

3. In providing insights on transport factors with the greatest impact on box-plant profitability, the results of the simulation, game-theory based contract decision and continuum approximation models will enable trucking firms to increase their profitability by developing improved carrier strategies for supplying a larger portion of box-plant transport needs.

III. Data

A. Academic

1. **Names of Faculty Members Worked With in this Project:**
    a. **current:** Professors Liker (at U. Michigan), Erera, White, Vande-Vate, Dai, Kvam (at Georgia Tech)
    b. **total:** 6 (from the one-year funding)

2. **Names of Graduate Students Participated in This Project:**
    a. **current:**
        1. **Ph.D. students:** C. Charoensiriwath, S. Dandamudi, H.T. Kim, D. Mangotra, M. Nowak, and N. Wang
        2. **M.S. student:** J. Madariaga, S. Lucy and P. Gupta
    b. **total:** 9.

3. **Names of Ph.D/Master's Students Graduated**
    a. **Ph.D.**
        1. Charoensiriwath, Ph.D., May 2004
        2. H.T Kim, Ph.D., May 2004
        3. S. Dandamudi, Ph.D., December 2004
        4. N. Wang, Ph.D., expected May 2005
    b. **Master's**
        1. S. Lucy, MS, May 2003
        2. P. Gupta, MS, May 2003
        3. J. Madariaga, MS, August 2004
    c. **Total:** 3 Ph.D.s (to date), 3 Master's

4. **Names of other Universities:** University of Michigan.

5. **Titles of meeting presentations:**
    a. Profiling Best Practices: A Cross-center and Cross-Industry Exploratory Analysis of Box-plant Trucking-logistics in the Paper Industry, 2002 INFORMS Conference, San Jose, CA, October, 2002.
    b. Profiling Best Practices: A Cross-center and Cross-Industry Exploratory Analysis of Box-plant Trucking-logistics in the Paper Industry, workshop presentation at TIP's Industry Advisory Board Meeting, Georgia Tech, Atlanta, Fall 2002.
    c. CPBIS Project Presentation, Georgia Tech, Atlanta, Spring 2003.
    d. TIP Project Progress Report, Georgia Tech, Atlanta, July 2003. (presentation prepared; but missed the meeting)

e. Profiling Best Practices: A Cross-Center and Cross-Industry Exploratory Analysis of Box-Plant Trucking-Logistics in the Paper Industry, TAPPI Industry Conference, Atlanta, October 2004.

f. Ni Wang, Jye-Chyi Lu and Paul Kvam, "Multi-scale Spatial Analysis of Logistics System Reliability", 2004 INFORMS Conference, Denver, October 2004.

6. **Numbers of Papers and Books:**

   a. Wang, N., Lu, J. C., and Kvam, P. (2004), "A Multi-level Spatial Model for Logistics Reliability Assessment," paper submitted to *IEEE Trans. on Reliability*.

   b. Kim, Hyoungtae, Lu, J. C., and Kvam, Paul (2004), "Product-order Decisions Considering Uncertainty in Logistics Operations," paper submitted to *Operations Research*.

   c. Charoensiriwath, C., and Lu, J.-C. (2004), "Competition Under Retail Price and Manufacturer Service," paper submitted to *Eurpoean Journal of Operations Research.*

   d. Charoensiriwath, C., and Lu, J.-C. (2004), "Dynamic Learning in Supply Chain with Repeated Transactions and Service Contributions," paper in the final stage of preparation for submitting to *Management Science*.

7. **Awards:** None.

8. **New Courses:**

   a. **Last year:** Data Mining Course using trucking logistics projects as examples.
   b. **Total:** same as above.

B. Industry

1. **Number of Visits to Paper Companies:** Four
2. **Number of Companies Supplying Data:**
   a. JC - None Officially (some data from Home Depot)
   b. McCarthy – Three
3. **Presentation to Paper Industry:** None.
4. **Articles in Industry Trade Journal:** None.

C. Government

1. **Number of presentations to government agencies:** None.
2. **New projects/grants from government:** None (we do have one project from the NSF with some logistics reliability modeling components).
3. **Media Coverage**
4. **Number of Special Articles:** None.
5. **Press:** None.

D. Funding

1. **Received transportation-related funding:**
2. **Industry:** $40,000 from CPBIS and another $40,000 from TIP for the jointly funded 2003 studies.
3. **Government:** $30,000 from the NSF project mentioned in C.2.
4. **Other Sources:** None.
5. **Total Funding from Industry:** This year-one $80,000 project.
6. **Total Funding from Government and Others:** $30,000 from the NSF project addressed in C.2.