



Reverse Logistics Networks with the Gateway Corridor Components: A Case of Waste Electrical and Electronic Equipment

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Background



- Product reuse, remanufacturing, and recycling have been promoted by governments around the world as important practices for achieving sustainability.
- Product reuse, remanufacturing, and recycling have also created new global markets for used/refurbished products and recycled materials.
- Because of the recent environmental protection drive in China, many traditional pulp mills were closed. Now 50% of the industry's fiber comes from recovered paper, and 90% of China's packaging board and newsprint capacity is recovered paper-based (*Journal of Commerce*, 2005).

Ms. Zhang Yin (张茵)



CEO, Nine Dragons Paper (Holdings) Limited
The Richest Woman in China (US\$1.35 billion in 2006)
Fifth Richest Person in China

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- With the arrival of iPhone 4, the markets for used and refurbished iPhones are expected to become booming in some third world countries, including China and India (*United Daily News*, June 2010).

Waste Electrical & Electronic Equipment (WEEE)



- “Waste Electrical and Electronic Equipment” (WEEE) is generally defined as “discarded, surplus, obsolete, or broken electrical or electronic devices.”
- Typical WEEE Designated Products:
 - Desktop computers
 - Portable computers
 - Computer peripherals
 - Monitors
 - Televisions
- Other Possible Designated Products: Copiers, Scanners, Typewriters, Modems, Cellular phones, PDAs, Audio and video players, Cameras, etc.



EU WEEE Directive



- The Waste Electrical and Electronic Equipment (WEEE) Directive has gone into effect in several EU member states since 2006.
- The law requires the “producer-polluter” to take the responsibility to reuse or recycle WEEE. If a producer fails to comply with the directive, it won’t be allowed to sell products into Europe.
- According to Malcolm Wicks, the UK Minister for Energy, WEEE’s cost to UK electrical goods makers could be up to £500 million per year, although that amount would be offset if waste products could be reused or recycled (*Financial Times*, 2006).

*Nothing is truly recyclable if there is no market for the recycle.
Reverse Logistics Networks → New & Emerging Markets*

WEEE Program in Ontario



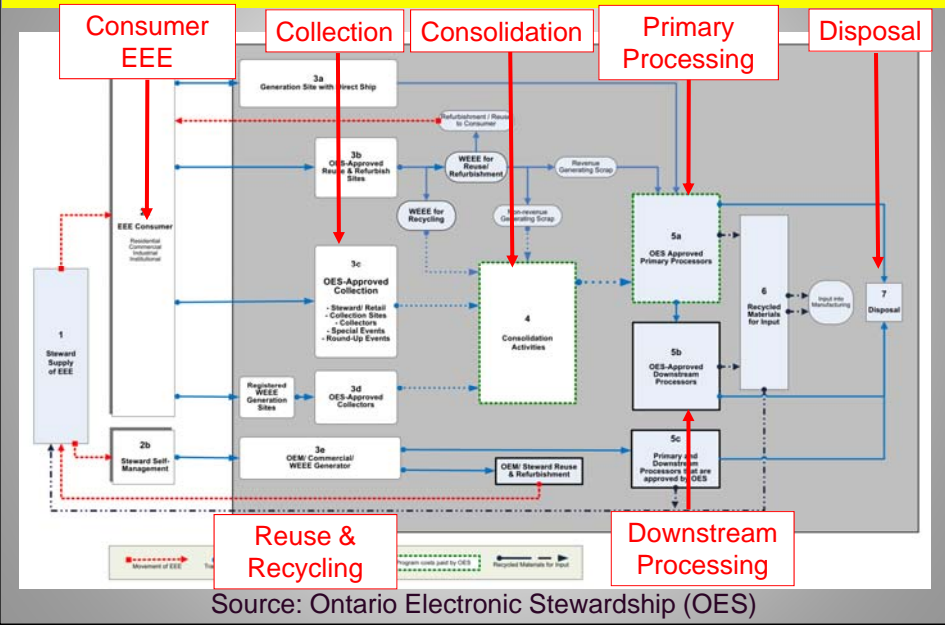
- The WEEE Program Plan (Phase I) was launched in Ontario on April 1, 2009.
- WEEE program is a part of the objectives of Waste Diversion Act (WDA) of Ontario, which requires brand owners, first importers, franchisors, and assemblers of electronic equipment to take necessary actions for collection, transportation, reuse, remanufacture, and recycling of WEEE supplied to Ontario, through establishing a systematic network.
- Ontario Electronic Stewardship (OES) is the Industry Funding Organization (IFO) for implementing the WEEE Program Plan.
- A significant portion of WEEE in Ontario, including reused and refurbished products and recycled materials, is shipped abroad for further processing or resale.

Research Objectives

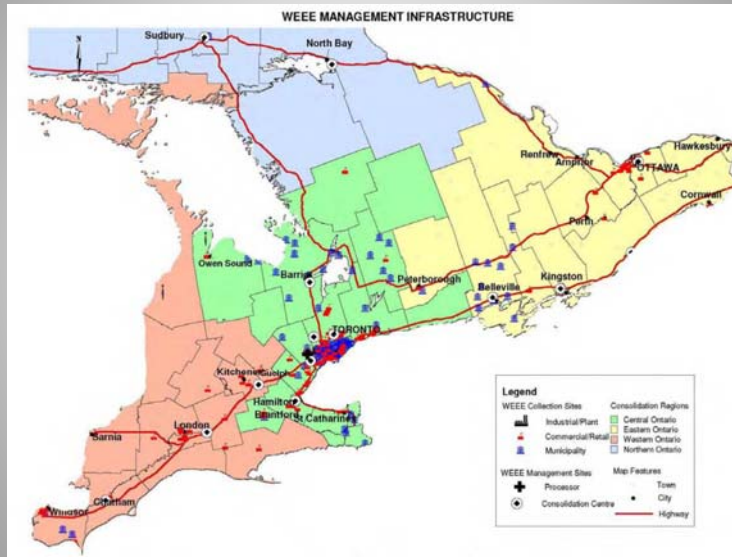


- Develop a simulation model for the WEEE reverse logistics network in Ontario with the gateway-corridor components.
- Analyze important operational and strategic issues for improving the economic and environmental performances of the system.
- Key Factors:
 - Network Structure
 - Location
 - Transport Time & Distance
 - Processing Capacity
 - Delay & Inventory

Ontario WEEE Network

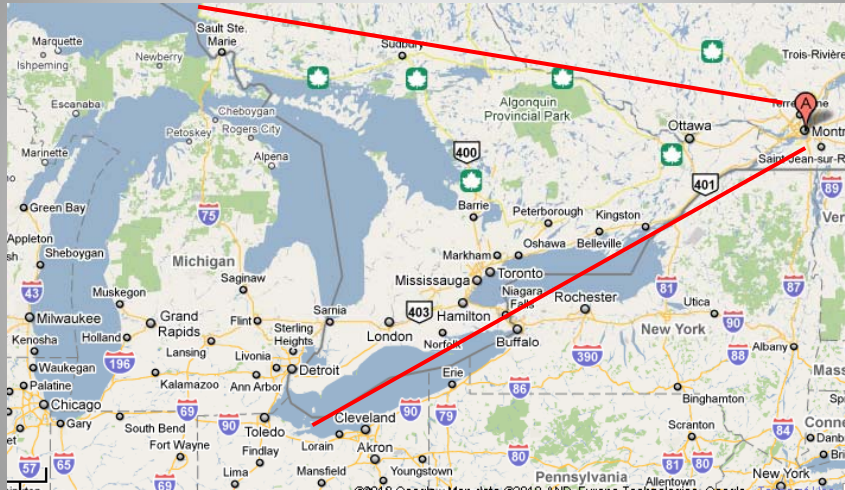


Current WEEE Management Infrastructure



Source: Ontario Electronic Stewardship (OES)

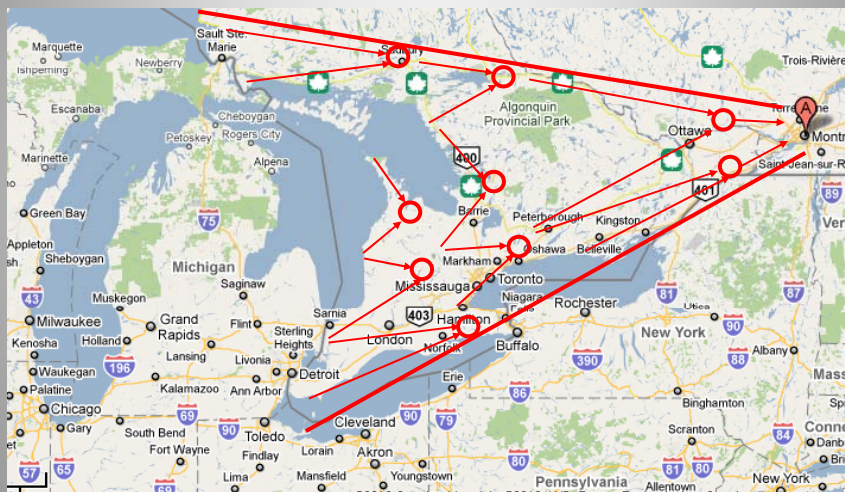
The Ontario-Quebec Corridor



Network with Gateway & Corridor Components



○ Primary Processing Centre



Simulation Approach



- Arena 12.0 is used as the simulation tool for modeling the WEEE reverse logistics network in Ontario with gateway-corridor components.
- The software, which is capable of performing enterprise-wide simulation, is a comprehensive system that addresses all phases of a simulation project from input data analysis to the analysis of simulation output data
- Issues to be studied:
 - Cost-Benefit Analysis
 - Network Structures
 - Strategic Decisions
 - Policy Evaluation
 - Dynamic Behavior

Concluding Remarks



- Through incorporating the gateway-corridor concept, it is possible to design a reverse logistic network for WEEE in Ontario with better economic and environmental performances.
- The simulation model can be used to trace the complex material and financial flows in the reverse logistics network for WEEE in Ontario, and help decisions makers to analyze and evaluate a number of strategic and policy issues.
- Additional data are needed in terms of the amounts of different WEEE streams in Ontario and the processing technologies for remanufacturing and recycling WEEE at different stages and locations of the reverse logistics network.