Optimal Strategies for RFID Implementation in Multi-Echelon Supply Chain

Pritee Ray^a, Sonu Kumar^b, Mamata Jenamani^c, Arun kumar Biswal^d ^a Department of Operations Management, IIM Ranchi, Jharkhand-834008, India pritee.r@iimranchi.ac.in

^{b, c, d} Department of Industrial and Systems Engineering, IIT Kharagpur, West Bengal-721302, India kumar.sonoo@gmail.com, mj@iem.iitkgp.ac.in, chatwitharun1@gmail.com

This paper studies investment strategies in implementing Radio Frequency Identification (RFID) in a multi-echelon supply chain. We develop two models based on renewal reward theory to estimate average inventory at warehouse level. While the first model estimate savings out of RFID implementation and without implementation, the second model is devised to identify the existence of reverse logistics model, which can further cut the cost of RFID-enabled supply chain. A reverse logistics can enable a RFID integrated supply chain to work efficiently without skewed investment in tags. This paper models reverse logistics in a multi-echelon environment to find out the extent of viability of making collection centers for tags. We perform sensitivity analysis on the price of an individual item, in-house or in transit theft and improvement factors. The result shows that more the pilferages in the system, more savings could be extracted using RFID.

References

- [1] Angeles, R.: RFID technologies: supply-chain applications and implementation issues, Information systems management, v. 22, pp.51-65. 2005.
- [2] A.G. de Kok, K.H. Van Donselaar, T. van Woensel.: A break-even analysis of RFID technology for inventory sensitive to shrinkage, International Journal of Production Economics, v.112, pp. 521-531, 2008.
- [3] McFarlane, D., Sheffi, Y.: The impact of automatic identification on supply chain operations, The international journal of logistics management, 14, pp.1-17, 2003.
- [4] Sounderpandian J., Boppana RV., Chalasani S., Madni AM.: Models for costbenefit analysis of RFID implementations in retail stores, IEEE Systems Journal. v.1, pp.105-114, 2007.
- [5] Zhou, W.: RFID and item-level information visibility, European Journal of Operational Research, v.198, pp.252-258, 2009.