1. INTRODUCTION

The intense competition in the semiconductor and electronics industry poses a great challenge for manufacturers to reduce cost. Many manufacturers try to reduce sales’ representatives and adopt the direct shipping, such as dell. For the manufacturers, the customers’ demand is stochastic and price sensitive (e.g., purchasing laptops). So the manufacturers have to control the order quantity and pricing dynamically to get maximum profit and incur minimum cost.

In recent years, the uncertainty of supply chain increased significantly due to influence of natural disasters, strikes, terrorist attacks and political instability and other factors. Supply chain risk management has attracted interest from both researchers and practitioners in operations management. Chopra and Sodhi (2004) provided...
a diverse set of supply disruption examples. Various operational tools that deal with supply disruptions have been studied: multisourcing (e.g., Anupindi & Akella, 1993; Wang et al., 2011; Babich et al., 2007), alternative supply sources and backup production options (e.g., Serel et al., 2001; Kouvelis & Milner, 2002; Babich, 2006), flexibility (e.g., Van Mieghem, 2003; Tomlin & Wang, 2005), and supplier selection (e.g., Deng & Elmaghra, 2005). For a recent review of supply-risk literature, see Tang (2006). Generally, after investigation of 800 companies’ disruption cases, Hendricks and Singhal (2003, 2005a, 2005b) find that firms that experienced supply glitches suffer from declining operational performance and eroding shareholder value (e.g., the abnormal return on stock of such firms is negative 40% over three years).

The issue of linking risk assessment with risk mitigation for low-probability high-consequence events such as disruptions of supplies is discussed by Kleindorfer and Saad (2005), where a set of 10 principles is formulated for specifying sources of risk, assessment and mitigation of risk.

In addition to high-impact, low-likelihood disruption risks, supply chains are also vulnerable to high-likelihood, low-impact Operational risks (e.g., Oke & Gopalakrishnan, 2010) that may arise from problems in supply and production process. Though the production is strictly controlled, yield of the components can be uncertain due to the characteristics of process engineering or uncontrolled operations (Maddah et al., 2009; Gurnani, 2005). For example, in the LCD manufacturing industry, it is quite common to get production yield of less than 50%. So in these industries, the manufacturers have to face the random yields besides random demand.

Yano and Lee (1995) give through review about single item single stage, multi item multi stage in the assembly system with lot sizing. Gurnani, Akella, and Lehoczky (2000) study a centralized assembly system facing random demand and random yield due to production yield losses. They formulate the exact cost functions with target level of finished products to assemble and the order quantity of the components from the suppliers as the decision variables. Gerchak and Wang (2004) studied coordination in decentralized assembly systems having random demand. But they do not consider dynamic pricing and random yield. Gurnani and Gerchak (2007) study coordination in decentralized assembly systems with two suppliers and one manufacturer under uncertain component yield and determined demand. They considered that the component suppliers and manufacturer choose their production quantities and order quantities separately based solely on their own profit structure. Güler and Bilgic (2009) considered a decentralized assembly system with multi suppliers and one manufacturer under uncertain yield and demand. They proposed two combined contract to coordinate the assembly system. As to dynamic pricing under random yield, Li (2006) studied the joint inventory replenishment and pricing problem for production systems with random demand and yield. Ismail and Elif(2006) considered the effects of recovery yield rate on pricing decisions in reverse supply chains and determined the optimal acquisition price for the end-of-life products. Tomlin and Wang (2008) studied the production, pricing, down conversion and allocation decisions in a two-class, stochastic-yield co production system. They established that down conversion will not occur if prices are set optimally.

To the best of our knowledge, most literature under random component yield has focused on coordination of supply chain at determined price (Singh et al., 1990; Gerchak et al., 1994; Gurnani, 1996; Maddah et al., 2008). Some have studied establishing properties of the profit function of the chain and finding the optimal order quantity (Gurnani et al., 2000; Guler & Bilgic, 2008). Few have concentrated on dynamic pricing under random yield (Li, 2006; Ismail & Elif, 2006; Tomlin & Wang, 2008), but they studied different aspects from ours. Since lot sizing with uncertain yields is an important area of production/manufacturing systems (Yano & Lee, 1995), we will consider...