SUPPLY CHAIN MANAGEMENT OF PERISHABLE ITEMS: CHANNEL DYNAMICS AND INTEGRATED DECISION MAKING

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ABSTRACT

Managing perishable items pose a significant challenge in the supply chain environment. Food stuffs, dairy products, green vegetables, fruits are all items of daily human consumption. These perishable items have a finite usable lifetime, and pass many hands during its movement from source to destination. The study of the supply chain of perishable products is particularly important because they account for more than 50% of supermarket sales, and the potential for extra profit from managing these items has been estimated at 15%. This thesis evaluates the channel dynamics and builds decision making models for supply chain of perishable items. To gain a primary understanding of the perishable item supply chain, the bakery supply chain of The Monginis brand is studied. This is provided in the form of a case, the analysis of which is also provided. A framework for classification of the supply chain management (SCM) problems in literature is established. Theoretically this work can be seen as an amalgamation of two complementary fields, SCM and perishable inventory. On account of high complexity and dynamic environment, chain dynamics are investigated through experiments, macro aspects (long term decisions) are evaluated using system dynamics models and micro structures (short term decisions) are optimized using mathematical models. Coordinated decision making is shown to be cost effective vis--vis individualistic views. The holistic supply chain is modeled using system dynamics formalism, specifying the dominant cycles of spoilage loop that drive the chain dynamics. The information feedback view of the system is used to identify and modify the loops yielding better capacity augmentation decisions in short lifecycle products. This thesis demonstrates the presence of bullwhip effect for perishable item supply chain as well, and shows that it has lesser amplification and stabilizes faster when compared with non-perishable item. ANOVA results show a significant difference in performance metrics under various demand patterns and, to a certain extent, with the item type. An experimental method in the form of Cake Game is used to report the macrodynamics arising from the microstructure in a common managerial context.