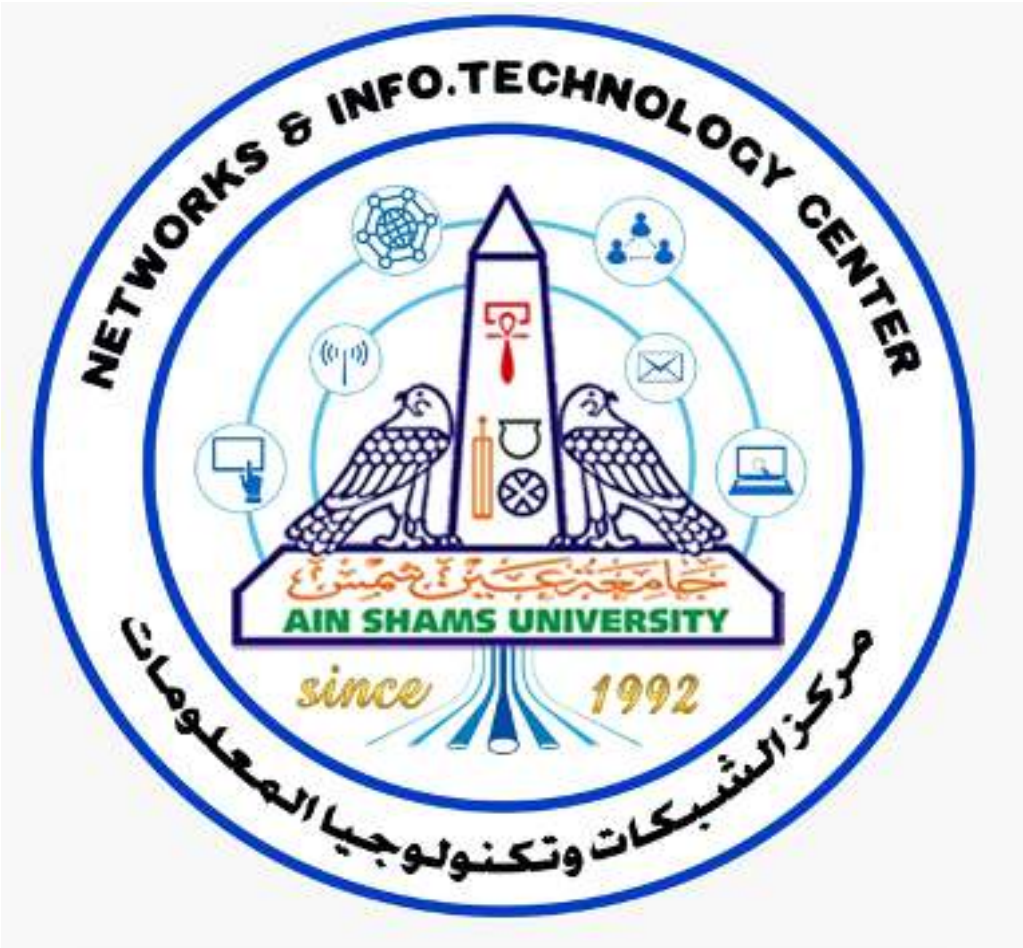
Safaa Mahmoud

بسم اللّه الرحمن الرحيم

مركز الشبكات وتكنولوجيا المعلومات

قسم التوثيق الإلكتروني



Safaa Mahmoud

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم باللّه العظيم أن المادة التي تم توثيقها وتسجيلها

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Ain Shams University

Faculty of Engineering

Mechanical Design and Production Department

Joint Lot-sizing and Scheduling Optimization in Multi-echelon Supply Chains

A Thesis submitted in partial fulfillment of the requirements of the degree of Master of Science in Mechanical Engineering
(Design and Production Engineering)

By

Ahmed Othman Shawky El-Meehy

Bachelor of Science in Mechanical Engineering

(Design and Production Engineering)

Faculty of Engineering, Ain Shams University, 2013

Supervised by

Prof. Amin M. K. El-Kharbotly

Dr. Mohammed M. El-Beheiry

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Ain Shams University-Faculty of Engineering

Mechanical Design and Production Engineering Department

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Ahmed Othman Shawky El-Meehy

B.Sc. in Mechanical Engineering (Design and Production Engineering)

Faculty of Engineering – Ain Shams University

EXAMINERS COMMITTEE

Prof. Mohamed Ibrahim El-Sayed Etman

Faculty of Engineering-Helwan University. .....

Prof. Nahid H. Afia

Design and Production Engineering Dept. .....

Faculty of Engineering, Ain Shams University

Prof. Amin Mohamed Kamel El-Kharbotly

Design and Production Engineering Dept. .....

Faculty of Engineering, Ain Shams University

(Supervisor)

Date: / /2019

Statement

This thesis is submitted as a partial fulfilment of Master of Science in Mechanical Engineering (Design and Production Engineering), Faculty of Engineering, Ain Shams University.

The author carried out the work included in this thesis, and no part of it has been submitted for a degree or a qualification at any other scientific entity.

Student Name

Ahmed Othman Shawky El-Meehy

Signature

.....

Researcher Data

Name	: Ahmed Othman Shawky El-Meehy
Date of birth	: 23/11/1990
Place of birth	: Kingdom of Saudi Arabia
Last academic degree	: B.Sc.
Field of specialization	: Design and Production Engineering
University issued the degree	: Ain Shams University
Date of issued degree	: September 2013
Current job	: Demonstrator at the Faculty of Engineering, Ain Shams University

Abstract

This Thesis addresses the Problem of Joint Lot-Sizing and Scheduling (JLSS) for a multi-echelon SC in which multiple materials are purchased from suppliers to produce multiple products. The SC is composed of two suppliers, single manufacturing facility and a distribution center. The products use the same materials with different ratios. JLSS decision is optimized using mixed integer non-linear programming model such that the demands of different products are satisfied as possible while the SC total profits are maximized. SC total profits are the difference between total SC revenues and total SC costs. SC costs include material purchasing, processing, inventory holding for both items and finished products, changeover and shortage penalty for every undelivered product. The planning horizon is composed of several periods, for each the JLSS decision variables are optimized maximizing SC profits. The effects of inventory holding, shortage penalty and changeover costs are studied for two approaches of the production schedules, namely, unconstrained and constrained levelled production approaches to production schedules. For the unconstrained production schedule, production quantities of products are allowed to differ from period to period, while the constrained production obligates the production schedule to produce equal quantity from each product each period. The effects of production capacity at the manufacturing facility and finished products inventory capacity at the DC on SC performance are also studied. Results show that flexibility in the production schedule (unconstrained levelled production approach) results in higher SC performance especially when the production capacity is limited.

Keywords: Joint Lot-Sizing and Scheduling, Supply Chain optimization, Integrated Supply Chain

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