

# Business and Supply Chain M&S Applied Research Area

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# The Business and Supply Chain Applied Research Area - Overview

It seeks to identify and pursue fundamental research that:

- Bridges the gap between theory and practice.
- Uses M&S to develop innovative approaches in:
  - Supply chain, economics, operations research, and operations management.

# Research Areas

## 1. Applications:

- M&S in Manufacturing,
- M&S in Service, and
- M&S in Institutional Enterprises

## 2. Theoretical:

- Optimization and Simulation-based Optimization
- System Dynamics
- DES

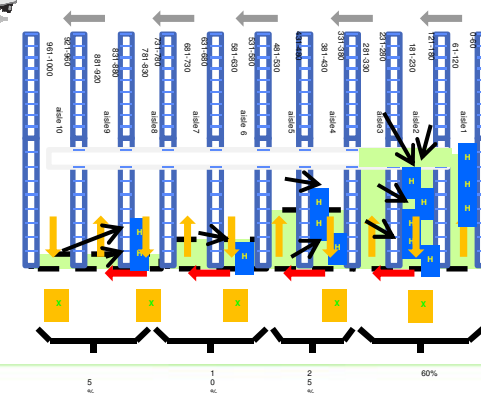
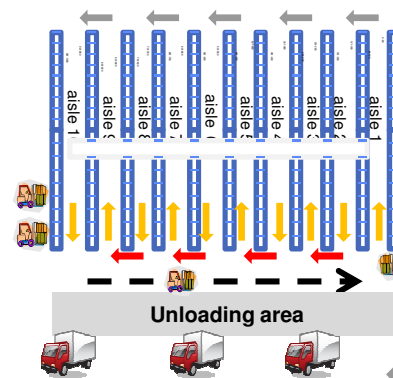


# 1. WH study: Optimizing SKUs slot assignments



# Considering the dynamics of the demand

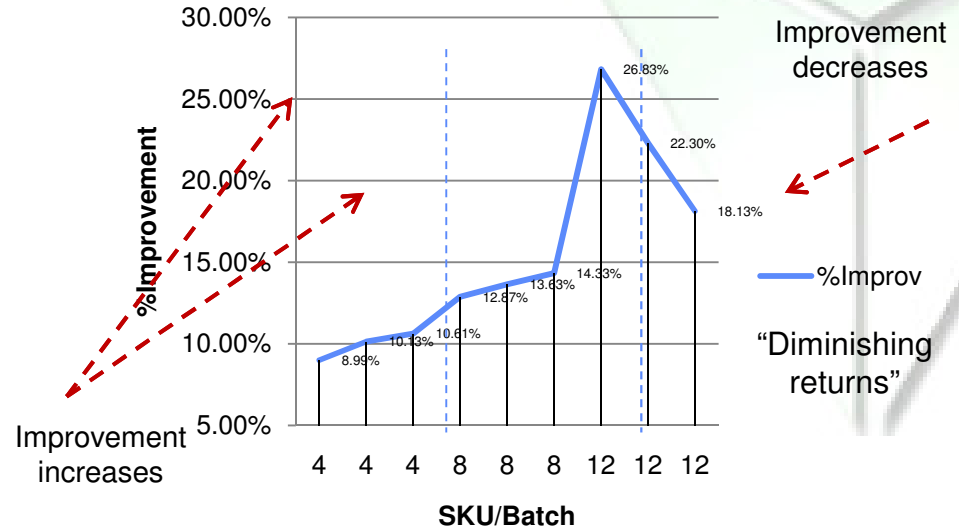
- Proposed a SKU assignment technique:
- Combined Optimization and Zoning, such that:
  - Correlations.
  - Throughput (fast/slow movers).
  - Different weights.



# WH study - Results

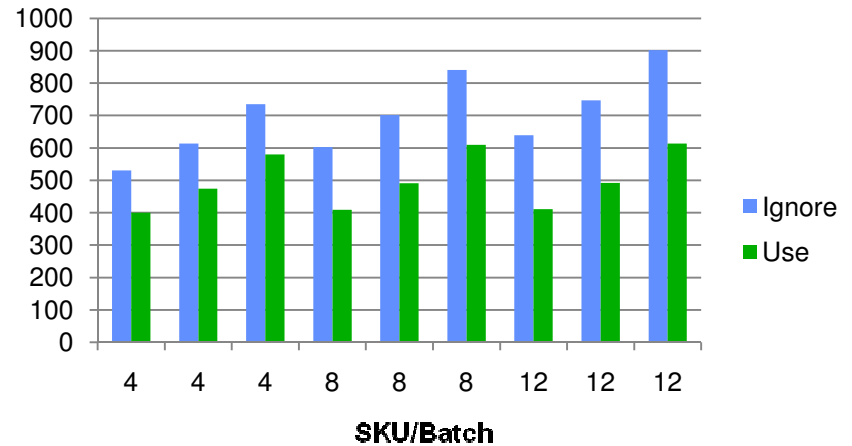
## Time average

Number	SKU per order	Batches	Ignore	Use	Name	%Improv
1	4	4	0.76	0.70	C11	8.99%
2	4	5	0.87	0.79	C12	10.13%
3	4	6	0.99	0.90	C13	10.61%
4	8	4	1.14	1.01	C21	12.87%
5	8	5	1.26	1.11	C22	13.63%
6	8	6	1.38	1.21	C33	14.33%
7	12	4	1.65	1.30	C31	26.83%
8	12	5	1.70	1.39	C32	22.30%
9	12	6	1.81	1.53	C33	18.13%



## Traveled distance

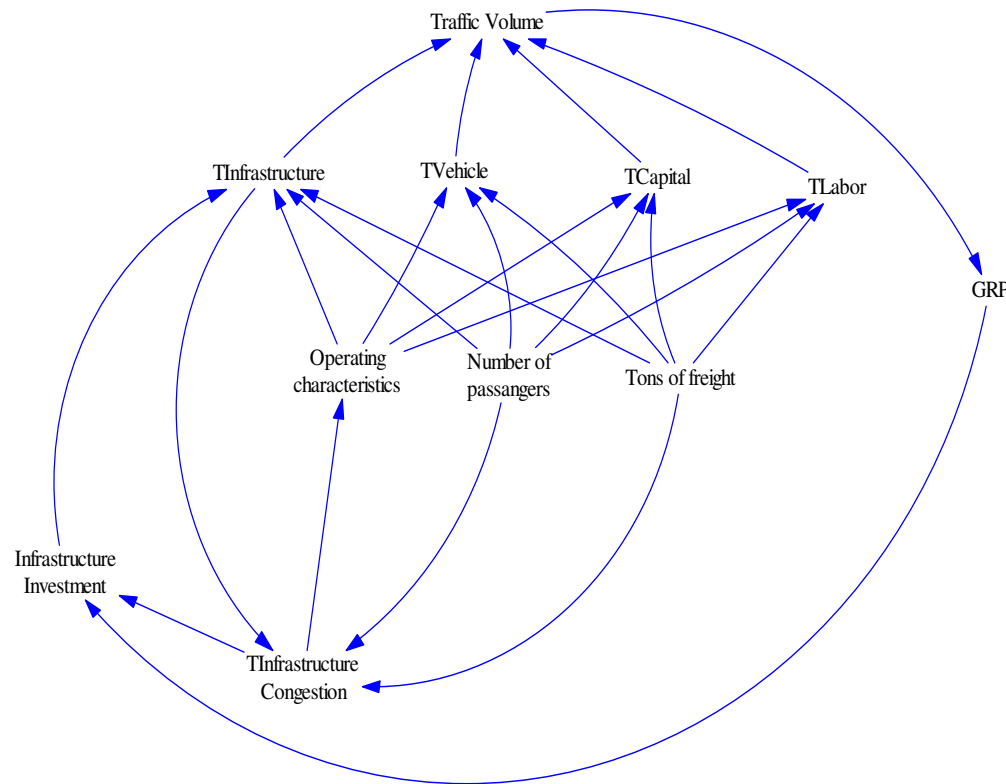
Batch Size	SKUs	Ignore	Use	%Improv
4	4	530.67	400.52	32.50%
5	4	613.63	474.38	29.40%
6	4	734.59	580.33	26.60%
4	8	602.19	409.16	47.20%
5	8	700.89	490.52	42.90%
6	8	841.04	609.18	38.10%
4	12	639.15	410.48	55.70%
5	12	746.71	491.69	51.90%
6	12	902.14	613.41	47.10%



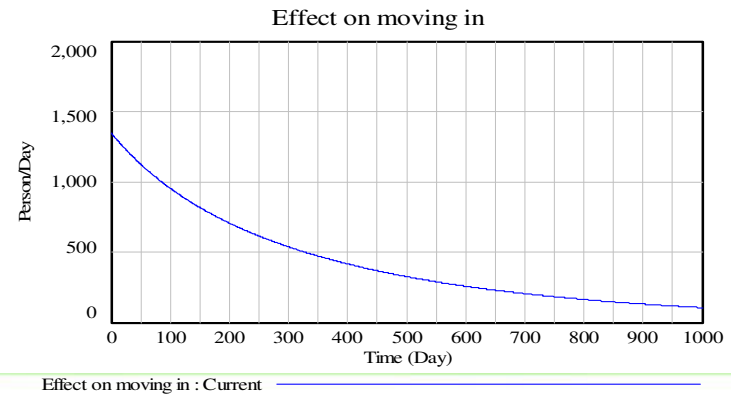
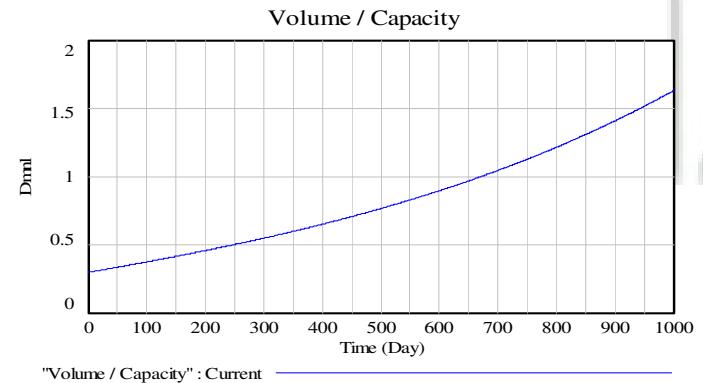
## **2. Economic modeling: Determining economic impact of transportation alternatives**



# System dynamics model that consider direct and indirect economic impacts



*Preliminary results:*



# 3. JIT Production and Supply Chains





# Looking Ahead

- ▼ INFORMS- San Diego, CA. Oct. 2009.
- ▼ MODSIM WORLD conference, VA - Oct. 2009.
- ▼ Capstone conference - April 2010.
- ▼ POMS – Vancouver, Canada. May 2010.
- ▼ Course: Supply Chain and Reverse Logistics –Spring 2010