Next Generation Analytics For Warehouse Operations

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What You Will Learn

• Analytics is more than reporting
• Descriptive and diagnostic analytics
  • Use data from multiple operational/execution systems
  • Insights from historical and real-time data
  • Multi-site trends and comparisons
• Next-gen predictive analytics
  • Leverage IoT data and machine learning
Data, Reporting and Analytics

Descriptive and Diagnostic
- Raw Data
- Cleaned Data
- Standard Reports
- Ad Hoc Reports & Olap

Generic Predictive Analytics

Predictive Modeling

Predictive and Prescriptive

Sense & Respond

Predict & Act

Analytics Maturity

Optimization

What is the best thing that could happen?

What will happen?

Why did it happen?

Source: Predictive Analytics For Dummies
Analytics For The DC

- **Descriptive**
  - What are my productivity trends? Are we falling behind?

- **Diagnostic**
  - Why did fill rates decline? How does volume affect productivity?

- **Predictive**
  - Will we ship on time? What if I move workers mid-shift?

- **Prescriptive**
  - How many temps do I need to complete orders on time?

Source: Gartner, Inc.
DC Analytics Is Hard

- Operational systems are designed for operations, not analytics
- Multiple sources of data: ERP, WMS, WCS, mobile apps, etc.
- Data volumes are growing: IoT, ”Big Data”
- Different audiences to serve
  - DC managers
  - Regional directors
  - Supply Chain executives
Technology For Next Gen Analytics

- Data storage (in the cloud or on-site)
- More processing power (in the cloud or on-site)
- Web reporting and visualization tools
- AI/Machine learning algorithms
Multi-Site Visibility And Analysis
Multi-Site Visibility And Analysis

Lines/Hr by Site

- **PHILADELPHIA**: 56
- **LOS ANGELES**: 50
- **CHICAGO**: 44
- **AUSTIN**: 36

Productivity Stats- Lines

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Data, Reporting and Analytics

Source: Predictive Analytics For Dummies
Predictive Analytics With Machine Learning

• Apply machine learning algorithms to large sets of data to create a predictive model
• The model continually adapts and predictions improve over time
• Machine learning can be an alternative to manual and static engineered approaches to optimization for things like:
  • Dynamic slotting
  • Workforce planning and management
Machine Learning Approach
Engineered Approach vs. Machine Learning

**Operational Modeling**
- Manual
- Learn Model from Data

**Business Logic - Optimization**
- Highly Detailed and Static
- Simplified

**Adaptation**
- Manual - Historical - Reactive
- Automated - Predictive - Proactive
Why Predictive Analytics?

- Great potential to improve planning and operations
  - Adapt to differences across locations and other factors that may not be apparent
  - More accurate than static models and historical averages
- Costs are reasonable, even for smaller operations
  - Lower-cost to implement and maintain
  - Machine learning models are dynamic – self-tuning vs. static
Summary

• Analytics help managers improve KPIs
• Descriptive and diagnostic tools
  • Combine current and historical data to analyze trends
  • Provide multi-site visibility and insight
• Predictive analytics is the next big thing
  • Machine learning makes it available to all DCs, big and small
  • Improves day-to-day operations and planning
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