Teaching Guide

For

Increased Distribution of Products for Wal-Mart

Illinois Transportation, Distribution and Logistics Math and Science Project

2007

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Scenario Focus

Primary Career Pathway: Transportation Operations

Occupation/Job Titles Related to this Scenario: Transportation Manager, Logistics Manager, Logistics Analyst, Distribution Manager, Transportation Manager; Warehouse Manager, Wal-Mart Distribution Center Manager

Recommended Teaching Subject Areas: Algebra, Business Math, Industrial Technology

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Scenario Problem Statement and Performance Elements

Wal-Mart is an international discount retail store. Wal-Mart Corporation was founded in 1962 (as were K-Mart and Target) in Rogers, Arkansas, USA. Technology plays a big part in keeping Wal-Mart customer-focused. Sales are recorded instantly and the information is shared so that restocking is initiated. As a result, Wal-Mart distribution centers (and, consequently the stores) very rarely run out of popular products. Historically, Wal-Mart stores were built within one day's drive of any distribution center.

Shipments of products from Wal-Mart's Distribution Center 27 to its designated 140 stores will increase by 25% next year. The transportation manager has asked you to work with a team to determine the most efficient way of transporting those goods. Possible solutions might include increasing the number of tractors, trailers and drivers or hiring independent tractors. Due to rising fuel costs and the increased distribution volume, consideration will be given to improving fuel economy of transportation vehicles and creating a positive environmental impact. The proposed solution must be ready for presentation in the next couple of weeks.

TDL Cluster Knowledge and Skills and Performance Elements

Develop and manage transportation plans to move people and/or goods to meet customer requirements.

- Develop transportation plans including routes and schedules for transporting people and goods
- Monitor and adjust transportation plans to meet customer requirements.
- Manage traffic flow at transportation hubs, facilities, and staging areas.
- Negotiate contracts for transportation operations services.

Improve the performance of transportation operations to meet customer and business requirements.

- Monitor and report on the performance of transportation operations.
- Develop strategies to improve service levels and quality
- Develop strategies to reduce costs.

Maintain and improve compliance with company policies and government laws and regulations.

- Monitor and evaluate compliance with company policies and government laws and regulations.
- Revise company policies, procedures, and information/documentation systems to improve compliance with changing customer/business requirements and government laws and regulations.

Illinois Learning Standards:

Math

- Select and use appropriate technology, instruments, and formulas to solve problems, interpret results, and communicate findings. (7c)
- Describe numerical relationships using variables and patterns. (8a)
- Organize, describe and make predictions from existing data. (10a)

Language Arts

- Communicate information and ideas in narrative informative and persuasive writing with clarity and effectiveness.
- Deliver planned oral presentations. (4.B.3a)

What I Want Students to Know	What I Want Students to be Able to Do
• Career Opportunities in logistics and transportation • Major costs of transportation • The factors concerning route planning for moving products most efficiently • Transportation as part of the retail supply chain process • Vocabulary associated with transportation industry • Data analysis plays a role in the transportation industry	• Use internet to research information as needed • Calculate percentages • Calculate cost associated with of transportation • Determine human resource changes/additions • Write a business report • Make a presentation with visuals.

Objectives:

- Understand major costs of transportation and factors that affect the moving of products.
- Determine human resource and equipment needs and their costs to meet retailer and consumer demands.
- Be able to calculate cost and analyze data associated with the transportation of products.
- Prepare a written business report.
- Deliver an oral presentation of the distribution plan.

Measurement Criteria for an acceptable solution:

1. Provided a solution with supporting documentation which indicates the students understood the transportation process and cost factors, including correct calculations of costs.
2. Evidence of active participation in determining solution, preparing report and making presentation.
3. Evidence that several options had been analyzed.
4. Business report included all of the elements needed to clearly communicate the recommended transportation plan.
5. Business report included a cover letter, introduction stating the purpose of the report, documentation to support recommendations, a detailed explanation of costs, and tables, charts and spreadsheets to more clearly communicate recommended distribution plan.

6. Presentation presented the information with visual aids and/or handouts. The presentation met the 7 requirements of effective business presentations:
    - Evidence of preparedness and practice
    - Started on time
    - Dressed appropriately
    - Showed enthusiasm and confidence
    - Maintained eye contact, showed friendliness and respect
    - Spoke slowly and distinctly without grammatical errors or slang
    - Welcomed questions and answered completely; Accepted reactions without being defensive.

Teacher Notes:

Wal-Mart is a phenomenon of our time. The Wal-Mart story is well documented in books and websites. In this problem-based module we seek to introduce your students to the many decisions that must be made to increase the flow of goods from their distribution center to their stores. In turn, we will have introduced your students to many career choices they may not have previously been aware of. We have varied the media with which we introduce and build problem-solving techniques. Enjoy discovering transportation, distribution, and logistics as one of the career clusters! Please feel free to contact us if you have something to add to the module.

The resource materials are limited to just those necessary for understanding the scope of this scenario. A more in-depth approach could expand the study as the project unfolds. Solutions provided are based on the given information. Different scenarios are possible and final solutions will vary based on the scenario chosen.

The problem can be expanded to include route management. Time and distance between a distribution center and retail stores would need to be investigated.

It may be necessary to add a component to help with the evaluation of the student's learning experience. To assess student involvement, ask each student to write a list of each project component (i.e. fuel calculations, personnel calculations, writing the business plan, makings presentation visuals, …) and to name the team member(s) who completed each task. This information could then be used in the Final Evaluation process.

If your school desires a pre- and post-test, copies of these can be found in the Appendix.

Time Required to Complete Problem: 8 hours

(12 45-50 minute class periods or 6 90-minute class periods)

Types of Materials included in this Module:

1. Lesson plans for each topic with discussion questions and student activities.
2. Copy of student handouts with activities for duplication.
3. Copy of material describing problem for students.
4. Evaluation with measurement criteria and scoring guide.
5. Teacher materials to assist in evaluation of problem and possible solution steps.
6. Glossary of terms related to this module.
7. PowerPoint Presentation, Overview of Supply Chain Management for teacher to use in Lesson 1.
8. PowerPoint Presentation of Possible Student Solution.

Support Materials and Resources Necessary for Completion of Scenario:

- Contemporary Logistics, Murphy, Paul R. and Wood, Donald F., Pearson Division of Prentice Hall, 8th Edition, 2004.

- The World is Flat, Friedman, Thomas L. Farrar, Straus and Giroux, 2005. p. 128-141.

- "Is Wal-Mart good for America?" www.pbs.org/wgbh/pages/frontline/shows/view DVD $29.99

- Short videos of distribution centers http://www.baxworld.com/CorporateSite/supplyChain/tour.aspx

- A virtual tour through Wal-Mart's sustainability mission http://walmartstores.com/microsite/walmart_sustainability.html

The videos listed in lessons 1 and 2 from the Wal-Mart website may not be available at some point in the future. Please check these sources before planning to use these three videos. The PBS Frontline video referenced above would have to be purchased but is an alternative.

- Computer access to internet and Word processing, and PowerPoint software
- Handouts (see each lesson)
- Websites (see each lesson)

Lesson 1

TOPIC	Introduction to Supply Chain Management	TIME ESTIMATE	120 minutes

OBJECTIVES
• Students will understand retail supply chain and now the vocabulary in order to effectively communicate during the module.

MATERIALS & RESOURCES
• PowerPoint, Introduction to Supply Chain Management • Handout #1, Introduction to Supply Chain Management • Handout #2, Links for Supply Chain Research • Handout #3, Wal-Mart Interoffice Memo • Access to Inter Video, Wal-Mart Logistics (www.walmart.feedroom.com -- Type "logistics" in Video Search, click on first video "Wal-Mart Logistics" Click box to left of "Send" in Video player for full-screen viewing)

LESSON DESCRIPTION & ACTIVITIES

Steps	No. of Minutes	ACTIVITIES
1	20	- Introduction to Project • Initiate discussion "Where do those sunglasses on the Wal-Mart shelf come from?" (Choice of item discussed can vary.) Allow students to describe their ideas of how a supply chain works. • Discuss a Supply Chain. (May want to make an overhead or PowerPoint slide of diagram on Handout 1)
2	25	- Show the PowerPoint, Introduction to Supply Chain Management - Alternative: Distribute copies of Handout 1, Introduction to Supply Chain and have student read aloud in class. - Lead class discussion to obtain student impressions following PowerPoint or reading activity. Be sure to comment on the many careers shown in the PowerPoint or in the reading.

3	25	- Distribute Handout 2, Links to Supply Chain Management. - Allow time for students to do research and answer questions on handout.
4	15	- Show Internet video "Wal-Mart Logistics - Invite student feedback from research activity and video, especially answers to the following questions: • How many times in the past year have you thought about how the product got to the shelf? • What are some situations that may cause the disruption of the flow of goods…… o Before the raw materials reach the manufacturer? o Between the distribution center and the store shelf? o Between the manufacturer and the retailer's distribution center? • Do you feel the need to know more about how to make an important business decision concerning logistics?
5	30	- Optional: Allow time for students to finish research/question activity of Handout 2. - Lead a class discussion on the responses.
6	5	- Distribute copies of Handout 3, Wal-Mart Interoffice Memo. - Read with class and answer any immediate questions.

Introduction to Supply Chain Management[1]

How did those sunglasses get to the Wal-Mart shelf? The process is called supply-chain management. A supply chain encompasses all activities associated with the flow and transformation of goods from raw materials through to the end user. It also includes the information associated with this flow of goods.

Often the coordination of the business functions necessary to get the product to the consumer are handled within that company but in recent years the coordination has been across several companies. Each company is responsible for one or more steps in supply chain.

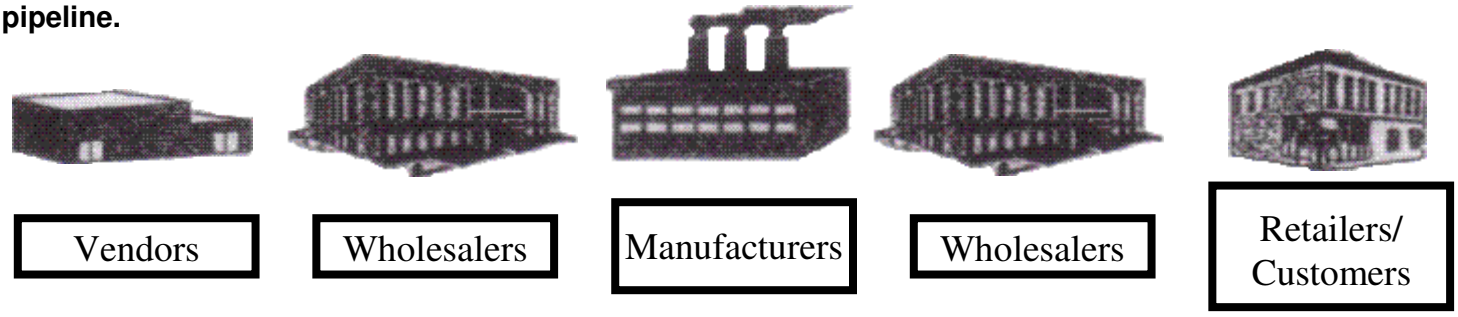
Successful supply-chain management requires companies to apply the systems approach across all organizations in the supply chain. Companies must recognize that each company in the chain is dependent on every other company and therefore the goals and objectives of the individual partners must be compatible with those of every other participant in the supply chain.

The sunglasses on the shelf waiting to be purchased began as raw materials delivered to the sunglass manufacturer. The finished product is then shipped to a distribution center. The glasses are then shipped to the retailer. Logistics, the coordination of these shipments, is the backbone of the supply chain.

[1] Contemporary Logistics, 8th edition. Murphy, Paul and Wood, Donald. Pearson Prentice Hall, 2004.

Integrated Supply Chain

The supply chain can be viewed as a series of integrated enterprises that must share information and coordinate physical execution to ensure a smooth, integrated flow of goods, services, information, and cash through the pipeline.



Links for Supply Chain Research

Access the following to respond to the questions on page 2 of this Research Activity.

Logistics glossary http://www.tli.gatech.edu/apps/glossary/

Supply chain
http://logistics.about.com/od/whatislogisticsscm/a/what_is_scm.htm
http://www.eweek.com/article2/0,1895,1994073,00.asp

Wal-Mart history - Scroll down the web page to find article
http://www.awprofessional.com/articles/article.asp?p=99978&seqNum=5&rl=1

Supply chain management
http://encyclopedia.thefreedictionary.com/supply+chain+management

Transportation http://encyclopedia.thefreedictionary.com/transport

Logistics http://encyclopedia.thefreedictionary.com/Logistics

Sam Walton's Philosophy http://waltoncollege.uark.edu/news/view.asp?article=53

Name _____

Answer the following using complete sentences.

1) What is the purpose of an 18-wheeler in the *supply chain*?

2) In your own words define *logistics*. Include the name of the website that contributed most to your answer.

3) What career in Logistics do you most associate with and why?

4) What math operations are involved in decisions concerning the distribution and supply of goods? Give some specific examples.

5) What role does customer satisfaction play in the supply chain?

6) List at least one other link that you found that was useful. What made it special?

Handout 2, Lesson 1
Possible Responses

Answer the following using complete sentences.

1) What is the purpose of an 18-wheeler in the *supply chain*?
Supply chain management is the flow and storage of goods from where they are made to where they are sold. Wal-Mart and many other businesses choose 18-wheelers as a vital part of their supply chain to transport products to and from distribution centers.

2) In your own words define *logistics*. Include the name of the website that contributed most to your answer.
"Logistics is that part of the supply chain process that plans, implements, and controls the efficient, effective flow and storage of goods, services, and related information from the point of origin to the point of consumption in order to meet customers' requirements."
http://www.tli.gatech.edu/apps/glossary/

3) What career in Logistics do you most associate with and why?
I would like a career in robotics as it pertains to replacing humans in the supply chain process. Robots are very predictable.

4) What math operations are involved in decisions concerning the distribution and supply of goods? Give some specific examples.
In regards to 18-wheelers, as gas prices go higher, mpg effects decisions. Miles per gallon involves division.

If goods need to be stored at a site not associated with the business, you need to multiply the cost of the storage area by how many days the goods must be stored.

5) What role does customer satisfaction play in the supply chain?
Consumers drive the supply chain. It is what they want that must be made and transported. If the customer is not happy, the chain must change.

6) List at least one other link that you found that was useful. What made it special?
Answers will vary.

WAL★MART®
ALWAYS LOW PRICES. Always.

Interoffice Memorandum

To: Transportation Manager
From: Travis Wilhite, Manager, Galesburg Wal-Mart

I need your input on how to increase, by 25%, the amount of goods distributed from Warehouse 27. This warehouse currently services 140 stores with 165 drivers who use 400 semi trailers and 200 tractors.

Considerations need to be given to hiring new permanent employees, working our current drivers overtime, or contracting independent drivers at a per mile rate.

Another concern is the need to improve the fuel economy of our current fleet while, at the same time, making a positive environmental impact.

Once you have arrived at your recommendations, please prepare a written business report with details. This report is to be presented at our next management team meeting.

If you have any questions, please let me know.

Lesson 2

TOPIC	Investigating Solutions	TIME ESTIMATE	120 minutes

OBJECTIVES
• Students will understand transportation as part of the retail supply chain process. • Students will understand the role data analysis plays in the transportation industry. • Students will be able to calculate cost of transportation options. • Students will be able to determine human resource changes/additions pertaining to transportation.

MATERIALS & RESOURCES
• Handout #3, Wal-Mart Interoffice Memorandum from Lesson 1 • Handout #4, Distribution Center Information for Warehouse 27 • Handout #5, Activity: Analyzing a Logistics and Distribution Problem • Handout #6, Activity: Calculate Current Transportation Costs • DVD PBS Video "Is Wal-Mart good for America?" warehouse portion only or Distribution Center graphics (optional) • Internet Video – Wal-Mart policy on Sustainability (www.walmart.feedroom.com - Type "logistics" in Video Search, click on second video "Wal-Mart Sustainability" Click box to left of "Send" in Video player for Full-screen viewing)

LESSON DESCRIPTION & ACTIVITIES

Steps	No. of Minutes	ACTIVITIES
1	20	- Show Internet Video of a Distribution Center or slide show or visit Wal-Mart website. If possible, last view should be of truck at dock of warehouse. • How does this truck get from point A to point B? • Who might be driving this truck? • Are there any methods to reduce the costs of fuel?

		• What are some of the decisions that have to be made before the truck rolls out of the distribution center?
2	15	- Distribute Handout 4, Background Information on the Wal-Mart Project and review project and Interoffice Memorandum (Handout 3) with students.
3	30	- Distribute Handout 5, Analyzing a Logistics and Distribution Problem. - Divide students into groups for solving Wal-Mart Problem and have them work through activities related to Handout 5.
4	25	- As a class, review questions from Handout 5. Where are the answers? Background Information Handout 4, Wal-Mart Website, or is there a need to ask the warehouse manager? - What information will need to be assumed?
5	30	- Show 1.5 minute Internet Video on Wal-Mart policy on Sustainability - Distribute Handout 6 and have students calculate current costs of fuel, based on information from Handout 4.

Distribution Center Information for Warehouse 27

Services 140 stores
Currently has 165 drivers
400 semi trailers
200 tractors

Average for year is 225 loads per day (some stores receive 2 trucks per day)
133,000 miles per year average traveled per tractor
Currently distribution is at a maximum capacity with the current number of drivers
Equipment is available to increase up to 35%

Salary of driver: $45,000
Cost to train new driver: $6,000
Overtime to drivers: $1.50 per mile per driver

Cost to hire independent tractor: $2.50 per mile

Current fuel economy: 6 mpg
Cost to make fuel economy improvement (double mpg): module is $19,000 per tractor

Analyzing a Logistics and Distribution Problem

You have received a short description of the problem to be solved. This is an actual problem that has occurred at sometime during Wal-Mart's history. You are to analyze the problem and determine what questions or steps need to be addressed so that you can provide a recommended answer.

Tips for Analyzing Problem Statements

Here are some tips in analyzing the problem.

- Read the problem statement very carefully. Read the statement sentence by sentence.
- Don't assume anything. Make sure that you can back up any assumption or conclusion about the problem by what is stated in writing.
- Don't be concerned if you do not have all the information you need. You can get more information by researching on the Internet or asking your teacher for the information you think you need to solve the problem.
- Don't be concerned that you do not know all the answers. As you work through this module you will learn the information you need to complete the activity.
- Don't be afraid to ask questions and tell people what you need to know. Good problem-solvers are people who are not afraid to learn new things and ask for assistance.

Determining What You Know and What You Don't Know

Expert problem-solvers start their analysis of a problem by writing down what they already know and what they need to know to solve the problem. Once they identify what they don't know, they then develop questions and seek out people who can answer their questions and help them solve the problem.

As shown in Figure 1.1, one way to do this is to make a list using a two-column sheet of paper with one column for what you know and one column for what you don't know. For example, under the column for what you know, you could write down, "The plan is due in two weeks."

ACTIVITY

With your group, develop questions you would like to ask a company representative by doing the following:

1. Read the problem statement and make a list of what you know and what you don't know. Use Figure 1.1 to write down your group's list.
2. Look at your list of what you don't know and develop questions for a Wal-Mart representative that you can ask.

3. Practice asking your questions with other students. Be sure to state your question slowly and clearly and be prepared to restate your question if people do not understand what you are asking?
4. Make sure you listen carefully to all questions and answers. If you don't understand the answer, ask people to say it again or repeat what you don't understand.
5. Take notes on the answers. Don't try to write down everything that is said. Write down the major concept or idea that you can refer to later.

Name_____

Figure 1.1

Problem Analysis Work Sheet

What I Know	What I Don't Know (Need to Ask)

Calculating Current Transportation Costs Activity

Use the given information to calculate the current costs for Wal-Mart transportation of goods from the warehouse to the retail stores.

1. Calculate the number of gallons of diesel fuel needed for one tractor per year.

2. Using $2.40 per gallon of diesel fuel, what is the cost of diesel fuel for one tractor per year.

3. What is the fuel cost per day?

4. If the $19,000 module is added to a tractor and the fuel economy doubles, what is the number of gallons of fuel needed for a year for one tractor?

5. What is the fuel cost for the updated tractor per year?

6. How long (in miles) will it take for the fuel cost savings to pay for the fuel economy module?

7. If we were to invest in this new technology, what would the cost savings be at the different levels of average miles per truck?
    a. 25,000 miles
    b. 50,000 miles
    c. 133,000 miles

Handout 6 Lesson 2
Solutions

Calculating Current Transportation Costs Activity

Use the given information to calculate the current costs for Wal-Mart transportation of goods from the warehouse to the retail stores.

1. Calculate the number of gallons of diesel fuel needed for one tractor per year.
   133,000 miles /6 mpg ≈ 22,167 gallons
2. Using $2.40 per gallon of diesel fuel, what is the cost of diesel fuel for one tractor per year. **22,167 gallons • $2.40 per gallon= $53,200**
3. What is the fuel cost per day? **5 days • 50 weeks = 250 days**
   $53,200 / 250 days = $212.80 per day
4. If the $19,000 module is added to a tractor and the fuel economy doubles, what is the number of gallons of fuel needed for a year for one tractor?

   133,000 miles / 12 mpg = 11,083 gallons
5. What is the fuel cost for the updated tractor per year?

   11,083 gallons • $2.40 per gallon = $26,600
6. How long (in miles) will it take for the fuel cost savings to pay for the fuel economy module? **$53,200 – $26,600 = $26, 600 saved**
   $26,600 saved – 19,000 cost = $7,600 actual savings
   $19,000 out of $26,600 = .714 or 71.4% of 133,000 = 9,500 miles
7. If we were to invest in this new technology, what would the cost savings be at the different levels of average miles per truck per year?
   a. 25,000 miles
   b. 50,000 miles
   c. 133,000 miles **from above $7,600 saved**

a. (25,000/12 mpg) • $2.40 per gallon = $5,000
(25,000/6 mpg) • $2.40 per gallon = $10,000
$10,000-$5,000 = $5,000 saved
$19,000 – 5, 000 = $12,000 real cost of module, no savings in 1st year

b. (50,000/12 mpg) • $2.40 per gallon = $10,000
(50,000/6 mpg) • $2.40 per gallon = $20,000
$20,000-$10,000 = $10,000 saved
$19,000 – 10,000 = $9,000 real cost of module, no savings in 1st year

Lesson 3

TOPIC	Investigate Personnel and Machines	TIME ESTIMATE	90 minutes

OBJECTIVES
• Students will understand data analysis plays a role in the transportation industry. • Students will develop different personnel and machinery scenarios possible. • Students should be able to identify personnel hiring possibilities and calculate costs. • Students will identify machinery purchases/modifications and calculate costs.

MATERIALS & RESOURCES
• Handout #7, Activity: Calculate Personnel Costs • Handout #8, Activity: Possible Human Resource Scenarios • Handout #9, Activity: Possible Fuel Cost Scenarios

LESSON DESCRIPTION & ACTIVITIES

Steps	No. of Minutes	ACTIVITIES
1	20	- Distribute Handout 7, Calculate Personnel Costs. - Go student responses to Handout 7. - What additional human resource needs will there be to handle increased load?
2	35	- Distribute Handout 8. - Describe on Handout 8 scenarios for human resource needs to increase the amount of goods distributed by 25% - Calculate total cost for two of these human resource scenarios; include costs from original information plus new costs.
3	35	- What additional equipment/machinery modifications will be needed to handle the increase? - Distribute Handout 9 - Calculate total cost for two of these machinery scenarios; include costs from original information plus new costs.

Calculate Personnel Costs

1. During the Christmas season, there are 3 trailers extra per week driving to 10 stores in the distribution area. Is it more cost effective to pay our drivers OT for 1000 miles or hire independent tractors for 500 miles (one way from distribution center)?

2. How many extra trailers are needed to increase the distribution to 30%?

3. If drivers were paid $.50 per mile, would they make more than their present salary on average?

4. How many miles can you pay an independent contractor for to equal the price of training a new driver?

5. If a salaried driver drives 133,000 miles per year, how much per mile is he/she actually making?

6. If driver overtime is at "time-and-a-half", what is a company driver actually making per mile of overtime?

7. What types of calculations would be affected if the driver lost his way for four hours?

8. As it is, before any personnel changes and assuming no overtime pay, what are the total monies spent on drivers?

9. How many drivers take more than one load per day?

10. How many trailers are available for the distribution increase? How many tractors are available for the distribution increase?

Handout 7 Lesson 3 Solutions

Calculate Personnel Costs Solutions

1. During the Christmas season, there are 3 trailers extra per week driving to 10 stores in the distribution area. Is it more cost effective to pay our drivers OT for 1000 miles or hire independent tractors for 500 miles (one way from distribution center)? **1,000 • 1.50 = $1500 OT**
   500 • 2.50 = $1250 Independent
2. How many extra trailers are needed to increase the distribution to 30%?
   225 trailers per day • 30% = 67.5 or 68 trailers more
3. If drivers were paid $.50 per mile, would they make more than their present salary on average? **yes**
   $.50 • 133,000 = $66,500; $66,500- 45,000 = $21,500 more than the $45,000 each company driver is currently paid annually
4. How many miles can you pay an independent contractor for to equal the price of training a new driver?
   $6,000 / $1.50 per mile = 4,000 miles one way
5. If a salaried driver drives 133,000 miles per year, how much per mile is he/she actually making?
   $45,000 / 133,000 = $.34 per mile
6. If driver overtime is at "time-and-a-half", what is a company driver actually making per mile of overtime ?
   $.34 per mile • 1.5 = $.51 per mile of overtime
7. What types of calculations would be affected if the driver lost his way for four hours? **Cost per mile, fuel costs, total mileage per day**

8. As it is, before any personnel changes and assuming no overtime pay, what are the total monies spent on drivers?
   165 drivers • $45,000 each driver = $7,425,000

9. How many drivers take more than one load per day?
   225 loads – 165 drivers = 60 drivers do 2 loads per day

10. How many trailers are available for the distribution increase? How many tractors are available for the distribution increase?
    400 trailers – 225 current loads daily = 175 trailers available
    200 tractors – 165 drivers = 35 tractors available for increase

Possible Human Resource Scenarios

No. Current Drivers	No. of New Hire Drivers	No. of Independent Drivers	Driver Overtime

Select two scenarios from those above. Calculate costs for each. Show all work and label steps of work.

Handout 8 Lesson 3
Possible Solutions

Possible Human Resource Scenarios

No. Current Drivers	No. of New Hire Drivers	No. of Independent Drivers	Driver Overtime
165 x $45,000 = $7,425,000	**20 x ($45,000 + 6,000) = $1,020,000**	**0**	**2,826,250 miles x $1.50 = $4,239,375**
133,000 miles per year x 165 drivers = 21,945,000 miles per year 21,945,000 miles per year x 25% increase =5,486,250 new miles needed 20 new drivers x 133,000 = 2,660,000 new miles 5,486,250 new miles needed - 2,660,000 new miles = 2,826,250 miles of overtime needed $7,425,000+$1,020,000+$4,239,375 = $12,684,375 total cost			
165 x $45,000 = $7,425,000	**35 x ($45,000 + 6,000) = $1,785,000**	**0**	**831,250 miles x $1.50 = $1,246,875**
133,000 miles per year x 165 drivers = 21,945,000 miles per year 21,945,000 miles per year x 25% increase =5,486,250 new miles needed 35 new drivers x 133,000 = 4,655,000 new miles 5,486,250 new miles needed - 4,655,000 new miles = 831,250 miles of overtime needed $7,425,000+$1,785,000+$1,246,875 = $10,456,875 total cost			
165 x $45,000 = $7,425,000	**35 x ($45,000 + 6,000) = $1,785,000**	**17 at ½ of 831,250 miles needed since independent drivers just deliver and do not return.**	**0**
133,000 miles per year x 165 drivers = 21,945,000 miles per year 21,945,000 miles per year x 25% increase =5,486,250 new miles needed 35 new drivers x 133,000 = 4,655,000 new miles 5,486,250 new miles needed - 4,655,000 new miles = 831,250 miles of overtime needed /2 = 415,625 x $2.50 = $1,039,062.50 $7,425,000+$1,785,000+$1,039,062.50 = $9,503,125 total cost			

Possible Fuel Cost Scenarios

#Current Company Tractors	# Module Updated Company Tractors	Overtime miles	Independent Tractors

Select two scenarios from those above. Calculate costs for each. Show all work and label steps of work.

Handout 9 Lesson 3
Possible Solutions

Possible Fuel Cost Scenarios

#Current Company Tractors	# Module Updated Company Tractors	Overtime miles	Independent Tractors
85 **1,884,166.7 gallons x 2.40 =$4,522,000**	**100** **1,108,333.3 gallons x 2.40 = $2,660,000**	**0**	**2,826,250 miles/2 (driving one-way)x $1.50 = $4,239,375**

165 + 20 new drivers = 185 drivers and the rest for independent drivers:
133,000 miles per year/6 x 85 drivers = 1,884,166.7 gallons
133,000 miles per year/12 x 100 drivers = 1,108,333.3 gallons
$4,522,000 + $2,660,000 + $4,239,375 = $11,421,375 fuel cost
cost for modules in 100 trucks x $19,000 = + 1,900,000 module cost
$ 13,321,375 total fuel cost

100 **2,216,666.7 gallons x 2.40 =$5,320,000**	**100** **1,108,333.3 gallons x 2.40 = $2,660,000**	**831,250 miles (all trucks for overtime have module so mpg is doubled)/12mpg x $2.40 = $166,250**	

165 + 35 new drivers = 200 drivers and the rest for overtime:
133,000 miles per year/6 x 100 drivers = 2,216,666.7 gallons
133,000 miles per year/12 x 100 drivers = 1,108,333.3 gallons
$5,320,000 + $2,660,000 + $166,250 = $8,146,250 fuel cost
cost for modules in 100 trucks x $19,000 = + 1,900,000 module cost
$ 10,046,250 total fuel cost

0	**200** **2,216,666.7 gallons x 2.40 =$5,320,000**	**831,250 miles (all trucks for overtime have module so mpg is doubled)/12mpg x $2.40 = $166,250**	

165 + 35 new drivers = 200 drivers (26,600,000 miles) and the rest for overtime:
133,000 miles per year/12 x 200 drivers = 2,216,666.6 gallons
0 + $5,320,000 + $166,250 = $5,486,250 fuel cost
cost for modules in 200 trucks x $19,000 = + 3,800,000 module cost
$ 9,286,250 total fuel cost

Lesson 4

TOPIC	Producing and Presenting a Solution	TIME ESTIMATE	135 minutes

OBJECTIVES
• Students should be able to write a business plan illustrating the group solution for the Wal-Mart Memorandum. • Students will present the group's solution using various media.

MATERIALS & RESOURCES
• Handout #10, What's in a Business Plan? • Access to Computer with Word Processing and Presentation Software

LESSON DESCRIPTION & ACTIVITIES

Steps	No. of Minutes	ACTIVITIES
1	5	- Distribute Handout 10, What's in a Business Plan? - Have students read and answer any questions.
2	40	- Allow time for each group to analyze their scenarios for both human resource and machinery costs and to compile a solution to the Wal-Mart Memorandum.
3	45	- Each group is to put together a presentation demonstrating their solution using visual and oral content and following the "7 Requirements of Effective Business Presentation"
4	45	- Students present their Solution Presentations

What's in a Business Plan?

What is a Business Plan?
A business plan is any plan that works for a business to look ahead, allocate resources, focus on key points, and prepare for problems and opportunities. Unfortunately, many people think of business plans only for starting a new business or applying for business loans. But they are also vital for running a business, whether or not the business needs new loans or new investments. Businesses need plans to optimize growth and development according to priorities.

Introduction

1. Start with a cover page. Provide the business name, street address, telephone number, web address (if any), name(s) of owner(s)/manager(s).

2. Provide background information on the company and include the general information on the company and include the general nature of the business: retailing, manufacturing, or service; what your product or service is; what is unique about it; and why you believe that your business will be successful.

3. Include a summary statement of the business's financial needs, if any. You may need to revise your financial needs summary after you complete a detailed financial plan.

4. Include a statement of confidentiality to keep important information away from potential competitors.

Benefits to the Community

1. Describe the number of skilled and non-skilled jobs the business will create, and indicate how purchases of supplies and other materials can help local businesses.

2. Describe how providing needed goods or services will improve the community and its standard of living.

3. State how your business can develop new technical, management, or leadership skills; offer attractive wages; and provide other types of individual growth.

The Management Team

Manufacturing and Operations Plan

1. What are the advantages and disadvantages of your plan?

2. What facilities does your plan require?

3. Will you need to purchase component parts?

4. Who are you potential suppliers?

5. How will you control quality, inventory, and production? How will you measure your progress?

Human Resources

1. How many employees will you require, and what are their qualifications – including skills, experiences, and knowledge? How many jobs will be full time? Part time?

2. Will you have written job descriptions for each position?

3. Have you prepared a job application form? Do you know what can legally be included in it?

4. What criteria will you use in selecting employees?

5. Have you made plans for the orientation process?

6. Who will do the training?

7. What can you afford to pay in wages and salaries? Is this in line with the going rate in your region and industry?

8. Who will evaluate your employees?

9. Will you delegate any authority to employees?

10. Have you developed a set of disciplinary rules?

11. Do you plan to interview employees when they resign?

Marketing Plan

Financial Plan

1. What is the actual amount of money you need to implement your plan?

2. Prepare an analysis of expenditures, including a comparison to previous costs and alternative plans.

Summary

1. Review problem to be solved.

2. Summarize proposed solution.

Teacher
Assessment Materials

FINAL EVALUATION

Problem Statement to be Solved:

Wal-Mart is an international discount retail store. Wal-Mart Corporation was founded in 1962 (as were K-Mart and Target) in Rogers, Arkansas, USA. Technology plays a big part in keeping Wal-Mart customer-focused. Sales are recorded instantly and the information is shared so that restocking is initiated. As a result, Wal-Mart distribution centers (and, consequently the stores) very rarely run out of popular products. Historically, Wal-Mart stores were built within one day's drive of any distribution center.

Shipments of products from Wal-Mart's Distribution Center 27 to its designated 140 stores will increase by 25% next year. The transportation manager has asked you to work with a team to determine the most efficient way of transporting those goods. Possible solutions might include increasing the number of tractors, trailers and drivers or hiring independent tractors. Due to rising fuel costs and the increased distribution volume, consideration will be given to improving fuel economy of transportation vehicles and creating a positive environmental impact.

The proposed solution must be ready for presentation at the next management team meeting.

Measurement Criteria that would describe an acceptable solution

1. Provided a solution with supporting documentation which indicates the students understood the transportation process and cost factors, including correct calculations of costs.
2. Evidence of active participation in determining solution, preparing report and making presentation.
3. Evidence that several options had been analyzed.
4. Business report included all of the elements needed to clearly communicate the recommended transportation plan.
5. Business report included a cover letter, introduction stating the purpose of the report, documentation to support recommendations, a detailed explanation of costs, and tables, charts and spreadsheets to more clearly communicate recommended distribution plan.
6. Presentation presented the information with visual aids and/or handouts. The presentation met the 7 requirements of effective business presentations:

- Evidence of preparedness and practice
- Started on time
- Dressed appropriately
- Showed enthusiasm and confidence
- Maintained eye contact, showed friendliness and respect
- Spoke slowly and distinctly without grammatical errors or slang
- Welcomed questions and answered completely; Accepted reactions without being defensive.

Suggested Scoring Guide

1. **Solving the Problem – 50 points**
   - Recommendation provided with supporting documentation and evidence of analysis. (30 points)
   - All calculations were correct. (20 points)
2. **Participation in Solving Problem – 10 points**
3. **Business Report – 20 points**
4. **Presentation – 20 points**

Solution Checker: See Scoring Checklist on the next page.

Possible Solution: See Possible Wal-Mart Logistics and Distribution PowerPoint file.

Project Scoring Checklist

The student's written report and presentation met the following criteria.

Scenario Evaluation Criteria		Scenario Evaluation
1.	**Does the information in the report provide evidence that the required content was understood-specifically determining most efficient costs?**	€ **YES** € **NO**
2.	**Did the recommendation address varied scenarios with supporting documentation?**	€ **YES** € **NO**
3.	**Did the recommendation provide evidence that two options had been analyzed?**	€ **YES** € **NO**
4.	**Were all math calculations correct?**	€ **YES** € **NO**
5.	**Was the business report well organized, written clearly and included all the necessary information?**	€ **YES** € **NO**
6.	**Was there a well written informative cover letter accompanying the business report?**	€ **YES** € **NO**
7.	**Did the business report include the purpose, recommendations and supporting documentation?**	€ **YES** € **NO**
8.	**Was the business report professionally and accurately presented?**	€ **YES** € **NO**
9.	**Did the presentation include the purpose, major points and the recommendation?**	€ **YES** € **NO**
10.	**Did the presentation have supporting visuals, graphs, charts, etc. that were easily visible and readable?**	€ **YES** € **NO**
11.	**Did the student have the information ready in time for the meeting date?**	€ **YES** € **NO**
12.	**If assignment was done by team of students, did each member of the team contribute and fulfill their role and responsibility to the solution of the problem?**	€ **YES** € **NO**

A P P E N D I X

GLOSSARY of TERMS Related to this Scenario[2]

Backhaul: A return trip or movement in a direction of secondary importance or purpose

Bill of lading: A contract stating that a carrier has received certain freight and is responsible for its delivery

Break-bulk distribution center: A warehouse where large shipments are sent by a shipper. Shipments are broken down by customer, and each consignee receives what was ordered.

Building-block concept: Combining smaller packages into larger units that can be more efficiently handled at one time.

Bulk cargo: In shipping, cargo stowed loose, without specific packing, and generally handled with a pump, scoop, or shovel.

Carrier: An individual or firm in the business of carrying cargo and/or passengers.

Common carrier obligations: Over-time, common carriers assumed four legal obligations to their customers: service, delivery, reasonable rates, and avoidance of discrimination.

Consolidate: Assemble small shipments into a single, larger shipment.

Containers: Large boxes, about 8 feet high, 8 feet wide, and from 20 to 55 feet long that can be transported by rail, air, or water carrier.

Cube out: Occurs when a bulky cargo takes up a vehicle's or a container's cubic capacity but not its weight capacity

CWT: 100 pounds

[2] Several of the definitions were taken from Contemporary Logistics, 8th edition. Murphy, Paul and Wood, Donald. Pearson Prentice Hall, 2004.

Deadhead: A concept associated with the trucking industry that is characterized by driving an empty front haul in order to pick up a load on the back haul.

Delivery window: The time span within which a scheduled delivery must be made

Distribution center: A warehouse with an emphasis on quick throughput, such as is needed in supporting marketing efforts

Drop shipments: Shipments delivered to a handful of designated sites

Expedited shipment: A shipment that a carrier moves more quickly than usual

Goods in transit: Goods moving between two points, often accompanied by a live bill of lading

Hub and spoke: A carrier's route system with many routes (spokes) radiating out from a single center (hub)

JIT Just In Time (JIT) is an inventory strategy implemented to improve
the return on investment of a business by reducing in-process inventory and its associated costs. The process is driven by a series of signals that tell production processes to make the next part.

Load factor: Percentage of capacity utilized

Loading dock: A warehouse or factory door where trucks are loaded or unloaded

Logistics: The flow of materials and services and the communications necessary to manage that flow

LTL: (less-than-truckload) A load that is too small to qualify as a "truckload" under motor freight classification rules

Metric ton: 2,204.6 pounds

Nesting: Packaging tapered articles inside each other to reduce the cubic volume of the entire shipment

Order cycle: Elapsed time between when a customer places an order and when the goods are received

Order picking and assembly: In a warehouse, the selection of specific items to fill or assemble a complete order

Overnight delivery: Goods shipped on one day and delivered the next morning

Pallet: A small platform, usually 40 by 48 inches, on which goods are placed for handling in a warehouse (also called *skid*)

Place utility: Having products available where they are needed by customers

Private carrier: Carrying one's own goods in one's own vehicles

Requisition: A request that a procurement office supply or acquire some good

Shipment consolidation: Freight rates are less expensive per pound shipped when large shipments are given to the carrier at one time. Therefore, shippers
try to group shipments bound for the same general area.

Staging: Accumulating or assembling goods before sending them

Stuffing: Loading a container

Supply chain: All activities associated with the flow and transformation of goods from the raw material stage, through to the end user, as well as the associated information flows

Sweet spot: A sweet spot is a place, often numerical as opposed to physical, where a combination of factors suggest a particularly suitable solution.

Tachograph: An electronic device that records the road speed and the engine RPMs on a truck and tells a lot about the vehicle that has been driven

Tare weight: Weight of the empty container or vehicle

Time utility: Having products available when they are needed by customers

Tractor: The motorized portion of a freight-hauling vehicle used to pull the trailer

Trailer: The non-motorized portion of a freight-hauling vehicle that is pulled by the tractor

Unit load: A pallet load

Warehouse: Storage facility where products stay for extended periods of time

PRETEST

1. A semi-tractor gets 7 miles to the gallon. How many gallons will be needed for a 1275 mile trip from a Wal-Mart Distribution Center to a Wal-Mart store?

2. If the price of diesel fuel is $3.40, what is cost of this one-way trip?

3. What is the cost if the driver needs to make a round trip?

4. The temporary driver earns $2.25 per mile.
   a) What is the driver's gross salary if he drives 2512 miles in a week?

   b) What is the driver's gross salary for the year if he averages 2512 miles in a week?

5. The salary of a Wal-Mart driver is $45,000 per year. If the average miles per week is 2512, what is the driver's salary per mile if he drives 50 weeks a year?

6. The average number of loads leaving a distribution center is 275 per day. The manager has received notice that the number of loads should be increased 45%. How many loads will leave per day after the increase?

7. If the distribution center currently employs 216 drivers, how many drivers must drive two loads per day?

8. a) If the distribution center currently employs 216 drivers, how many more drivers will need to be hired to handle the increase in loads?
   b) How many drivers will be expected to drive 2 loads per day?

POSTTEST

1. A semi-tractor gets 7 miles to the gallon. How many gallons will be needed for a 1275 mile trip from a Wal-Mart Distribution Center to a Wal-Mart store?

2. If the price of diesel fuel is $3.40, what is cost of this one-way trip?

3. What is the cost if the driver needs to make a round trip?

4. The temporary driver earns $2.25 per mile.
   a) What is the driver's gross salary if he drives 2512 miles in a week?

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5. The salary of a Wal-Mart driver is $45,000 per year. If the average miles per week is 2512, what is the driver's salary per mile if he drives 50 weeks a year?

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8. a) If the distribution center currently employs 216 drivers, how many more drivers will need to be hired to handle the increase in loads?
   b) How many drivers will be expected to drive 2 loads per day?

Pretest/Posttest Solutions

1. 1275 / 7 = Approximately 182 miles per gallon

2. (127 / 7) 3.40 = $619.29

3. 619.29 x 2 = $1238.58

4. a) $5652.00
   b) $5652 x 50 = $282,600

5. $45000 / 50 = $900 a week / 2512 = $.36 per mile

6. 275 x .45 = 124 loads more, 275 + 124 = 399 loads

7. 275 – 216 = 59 drivers drive 2 loads per day

8. 216 x .45 = 97 new drivers needed, 399 – 313 = 86 drivers drive 2 loads per day