

Corporate Finance Project



Project Description

Orange Computers has transformed into one of the largest smartphone companies in the world. Based on recent changes to the federal tax code, building phones in the US has become more attractive. Orange wants to build a single factory in either Pennsylvania, Texas, or North Carolina. Each state is offering incentives to woo Orange. Pennsylvania and Texas have proposed building a new facility, while North Carolina is offering grants to help renovate a recently closed factory.

Build a workbook to calculate the net present value and internal rate of return (rounded to two decimal places) for each location over ten years using the information provided. Determine where Orange should locate their factory and give a brief explanation of why.

Below are the pieces of information necessary to calculate the net present value and internal rate of return:

1. The factories in Pennsylvania and Texas could produce and sell 20 million phones annually, while the North Carolina factory could produce and sell 12 million.
2. Orange can sell all the phones produced at an average of \$400 per phone in 2023¹. Orange forecasts that they can gradually raise the price of their phones by 2% per year over the next 10 years.

¹ Assume upfront investments in land, factory, and equipment are made in 2022.

3. A new factory would be 5 million square feet at a cost of \$160/ft² to build in Pennsylvania or Texas. After grants, Orange would only need to pay \$125/ft² to renovate the existing 3 million square foot factory in North Carolina.
4. Pennsylvania will lease publicly owned land for the factory to Orange tax free, but the local government won't waive the 1% annual property tax which is calculated on the initial cost of the factory. The land in Texas will cost \$20 million, and the local property tax is 0.5%, calculated based on the initial cost of the factory plus the cost of the land. Since there is an existing factory in North Carolina, there will be no cost in purchasing the land, and the state has agreed to pay the local property tax for 10 years.
5. Orange plans to spend \$500 million on equipment for the new factories in Texas or Pennsylvania. Salvage value for the equipment after 10 years is expected to be 10% of the equipment's purchase price. North Carolina is offering to help pay for the equipment which lowers the cost to \$300 million, but it has added a caveat that forces Orange to sell the equipment to the state for \$1 when Orange disposes of the equipment after 10 years.
6. Orange can depreciate 100% of the cost of equipment when it's put into service for tax purposes.² (Since salvage value will be taxed as a gain at the end of 10 years, do not subtract it from the equipment's value for depreciation.) All other depreciation will be on a straight-line basis over 15 years. (Don't forget that there is no depreciation on land.)
7. The federal income tax rate for Orange is 21%. In their pursuit of new manufacturing jobs, all three states have offered different incentive packages that result in a state income tax equivalent to 3% for the first 10 years. State income tax is not deductible on federal taxes, so the effective tax rate is 24%.
8. Orange plans on hiring 8,000 workers in Pennsylvania or Texas with a total annual expense of \$80,000 per worker. The factory in North Carolina would require 5,000 workers at \$90,000 per year. Wage inflation is forecasted to be 5% per year in Pennsylvania, 4% in Texas, and 3% in North Carolina over the life of the project.
9. For operational expenses, assume that fixed overhead will be 10% of annual sales and cost of goods sold (excluding labor) will be 60% of annual sales at each factory. Orange will also need to maintain a total of 10% of next year's sales in working capital. In other words, this is the cash that Orange will have to reserve for this project. It cannot be used elsewhere in the company.³

² The U.S. passed the Tax Cuts and Jobs Act (TCJA) in 2017, which allows companies to depreciate 100% of the equipment cost in the same year that it is put into service. This is also called *Bonus Depreciation*.

³ The case template has been pre-populated with the required formulas to capture working capital movements from one year to another. Note that working capital is released at the end of the project life (10 years).

10. Orange keeps a stable debt-to-equity ratio of 0.8 and will use the same mix of debt and equity to finance this project. The average interest rate on its debt is only 3%, but its required rate of return on equity is 35%. Note that interest expense is not included in operating income as the interest rate has already impacted the weighted average cost of capital (WACC). Including interest expense in the operating income will double-count the effect of interest on the project.

Learning Outcomes

When completed successfully, this project will enable you to:

- Use your knowledge of capital budgeting to project financial outcomes and choose how to allocate resources between competing projects.

Assignment Requirements

- The main component of this case study is the workbook you create with the provided information to calculate your net present values and internal rates of return. Begin by downloading this [template](#). When you open the template, you may be prompted to enable or disable macros—**please click “enable,” as the macros used in this document help streamline the grading process.**
- Once you’ve completed your sheet, complete the sentence in the “Conclusion” box (on the “NC” sheet) with the correct response, as well as a brief rationale for why you chose your answer.
- Be sure to show all the formulas behind your calculations so the grader can root cause any errors.
- To submit this project, email your finalized sheet to projects@quantic.edu. Please note that if you’re working in a group, your feedback will be emailed back to your entire group. If you do not wish to reveal your email to the rest of your group, email us at projects@quantic.edu to let us know.
- If you are submitting your Finance project as a group, you must also submit the final page of the [Group Project Agreement](#) signed by all group members in order to receive credit for the project (attached as a PDF to your submission email).

Tips & Resources

- Make sure to go through our [Capital Budgeting](#) and [Excel for Finance](#) courses before starting this project—these will help you prepare your workbook.
- Don’t forget—Quantic students have access to Microsoft Office Online, including an online version of Excel. Follow [these instructions](#) to access it.
- If you have any questions, be sure to reach out to projects@quantic.edu for help!

Plagiarism Policy

Quantic takes academic integrity very seriously—we define plagiarism as: “Knowingly representing the work of others as one’s own, engaging in any acts of plagiarism, or referencing the works of others without appropriate citation.” This includes both misusing or not using proper citations for the works referenced and submitting someone else’s work as your own. Quantic monitors all submissions for instances of plagiarism and all plagiarism, even unintentional, is considered a [conduct violation](#). If you’re still not sure about what constitutes plagiarism, check out [this two-minute presentation](#) by our librarian, Kristina. It is important to be conscientious when citing your sources.

When in doubt, **cite!** Kristina outlines the basics of best citation practices in [this one-minute video](#). You can also find more about our plagiarism policy [here](#).

Frequently Asked Questions

Below are answers to some of the common questions students ask about the Finance project.

Is there a prerequisite course for this project?

We would recommend completing the [Excel for Finance](#) course before starting this project—this will help you complete the required calculations in the template provided with this case.

What tax rate should be used to calculate taxes on salvage value?

Use the effective tax rate.

Is the interest expense relevant to NPV & IRR calculations?

Yes, it is. However, the after-tax cost of debt (reflected in WACC for the case) already factors in interest expense so should not be included again.

How is the working capital reserved formula set up in the template? Can you describe what it is doing?

As you may recall from your accounting coursework, any project will require a certain amount of working capital (current assets - current liabilities) to get an operation off the ground and then sustain it through time. For year 0, it’s estimated that 10% of the year 1 sales will be required. However, from year 1 onwards, the working capital requirement is only 10% of the incremental sales from one year to the next. At the end of the project (10 years) the remaining funds are assumed to be available as a cash inflow. This is shown as

“working capital returned” line. The worksheet template contains the formulas necessary for these calculations.

Do we apply depreciation for the factory and equipment in the first year (2022)?

Depreciation should only be applied when the equipment is put into service. That is, when units are produced and sold (2023).

Should we use the excel NPV formula or calculate NPV by summing all the present values?

Either method will work. If you're using Excel NPV formula, remember you should only apply it to the cash flows occurring from 1st period, then add the period 0 cash flow to your NPV value. So, the Excel formula would be

$$=CF_0+NPV(\text{rate},CF_1:CF_n,\dots)$$

Alternatively, you can just calculate present values for all cash flows and sum them up. Be sure to point to the cell containing the rate instead of typing in a rounded value into the NPV formula, to ensure all decimals are appropriately captured in your calculation.

Are we to assume that Orange builds out the infrastructure in 2022 and begins selling in 2023?

Yes, upfront investments in land, PP&E, and plant are made in 2022. Operations (production & selling) will begin in 2023.

Should I use the bonus depreciation or straight-line depreciation for the equipment cost?

You must use the method that will yield a higher after-tax cash flow in the near-term and NPV. Note that bonus depreciation only applies to the equipment and not the plant(factory).

How do I apply straight-line depreciation method to plant and/or equipment cost?

You must apply 1/15th of the cost as annual depreciation expense for each of the 10 years.

Should we consider book value of the plant (factory) for salvage value calculations?

No, you are only provided information about equipment salvage value so don't make any assumptions about salvage value for the plant.

Corporate Finance Project Rubric

Scores 2 and above are considered passing. Students who receive a 1 or 0 will not receive credit for the assignment and must revise and resubmit to receive a passing grade.

Score	Description
5	<ul style="list-style-type: none"> Clearly addresses the case study prompts. Workbook is complete, accurate, and intelligible. Workbook has no more than 1 minor error*. All calculations must show formulas to enable root causing any errors. Provides the correct recommendation and rationale for location selection.
4	<ul style="list-style-type: none"> Clearly addresses the case study prompts. Workbook is complete, accurate, and intelligible. Workbook has no more than 1 major error or 3 minor errors*. All calculations must show formulas to enable root causing any errors. Provides a recommendation and rationale for location selection.
3	<ul style="list-style-type: none"> Clearly addresses the case study prompts. Workbook is complete, accurate, and intelligible. Workbook has no more than 2 major errors or 5 minor errors*. Calculated values do not always show underlying formulas. Provides a recommendation and rationale for location selection.
2	<ul style="list-style-type: none"> Clearly addresses the case study prompts. Workbook is complete, accurate, and intelligible. Workbook has no more than 2 major errors or 5 minor errors*. Calculated values do not always show underlying formulas. Provides a recommendation and rationale for location selection.
1	<ul style="list-style-type: none"> Barely addresses the case study prompts. Workbook is missing many pieces of information and riddled with errors. Calculations do not show underlying formulas, making it impossible to troubleshoot errors. Rationale is missing.

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- The assignment is plagiarized, not turned in, or completely off topic.

*The following list provides examples of minor and major errors.

- Minor errors include, but are not limited to:
 - Assuming book value for plant/land when no information is provided in the case prompts
 - Incorrect NPV formula
 - Incorrect signs for positive and negative cash flows
 - Missing or incorrect salvage value and tax calculations
 - Incorrect depreciation calculations
 - Incorrect tax rate applied for property tax calculations
 - Incorrect time bucketing of relevant costs (upfront vs. operating)
- Major errors include, but are not limited to:
 - Not showing formulas for all calculations performed
 - Incorrect decision criterion applied for location selection
 - Incorrect discount rate applied for present value calculations
 - Incorrect cash flow range selected for IRR calculations