

The Universal Direction Assistance (UDA) Project

Group Assignment

You are the principal financial analyst of the Gadget Division of The FGM Corporation, the largest multinational automobile manufacturer in the world. You are asked to evaluate a project proposal regarding the production of a new voice-activated electronic device – Universal Direction Assistance (UDA). This upgradeable device, which incorporates the most advanced computer and satellite wireless technology, provides directions and real time traffic reports that guide automobile drivers in choosing the preferred route to their destinations. This device can be used in any country with specialized software that contains local geographical information and real time traffic report (where technology is available) that are translated into the chosen language of the driver. UDA will be sold as an option for the FGM cars and trucks. A comprehensive market analysis on the potential demand for this device was conducted in last two years at a cost of \$10M.

From the comprehensive market analysis, you expect annual sale volumes of UDA to be 2.5M units for the first year and drop by 10% in the second year, with a unit price of \$650 (expressed in constant $t=0$ dollar). Due to the introduction of similar devices by competitors at the end of the second year, the expected annual sale volumes will drop to 1.0M units and the unit price is expected to fall to \$420 (expressed in constant $t=0$ dollar) for the final two years of this 4-year project. Unit production costs are estimated at \$520 (expressed in constant $t=0$ dollar) at the beginning of the project, and will not be impacted by the change in competition. Annual NOMINAL growth rates for unit prices and unit production costs are expected to be 2.5% and 3.5%, respectively, over the life of the project.

In addition, the implementation of the project demands current assets to be set at 18% of the annual sale revenues, and current liabilities to be set at 14% of the annual production costs. Besides, the introduction of UDA will increase the sales volume of cars and trucks that leads to an increase in the annual after-tax cash flow of FGM by \$8M (expressed in constant $t=0$ dollar).

The production line for UDA will be set up in a vacant plant site purchased by FGM at a cost of \$25M twenty years ago. This vacant plant site has a current market value of \$35M, and is expected to be sold at the termination of this project for \$20M in four years. Alternatively, the vacant plant site can be used for supporting a competing project that is expected to generate a NPV of \$30M. The machinery for producing UDA has an invoice price of \$155M, and its modification costs another \$15M for meeting the specifications for the project. The machinery has an economic life of 4 years, and is classified in the MACR 5-year class for depreciation purpose. The sale price of the machinery is expected to be zero at the termination of the project.

The corporate accounting practice handbook of The FGM Corporation states that current corporate overhead costs are included in each division's budget at the rate of 8% of the book

value of assets. Corporate overhead costs are not expected to change with the acceptance of this project. However, corporate cost accountants at the Headquarters believe that every division should bear its fair share of the corporate overhead burden. On the other hand, the Director of the Gadget Division disagrees to this view and believes that the corporate overhead costs should be left out of the cash flow estimation for the UDA project.

The (NOMINAL) discount rate for the UDA project is assumed to be 15%. The estimated marginal tax rate of The FGM Corporation is 34%. The general inflation rate is 3%. It is also assumed that taxable income from other parts of the company is sufficient to allow for tax subsidy on losses incurred in this project.

Question 1:

- A. In light of the appropriate objective of a firm, what would you recommend on the UDA Project basing on the (base) scenario described above? Why?
- B. Would your recommendation be changed if the unit price of the UDA only falls to \$490 (expressed in constant $t=0$ dollar) upon the entrance of competitive products after two years into this project, i.e., the optimistic scenario? What would be your recommendation if the unit price falls to \$400 (expressed in constant $t=0$ dollar) after two years, i.e., the pessimistic scenario? Why?
- C. What would be your recommendation on this UDA Project if there is 70% chance that the base scenario (as described in the introductory section) will occur, 10% chance that the optimistic scenario (as described in Q1B above) will occur, and 20% chance that the pessimistic scenario (as described in Q1B above) will occur? Why?

Question 2: A potential solution to combat the competition is to regain the competitive edge by upgrading the UDA via upgrading the machinery at the end of the second year for a NOMINAL cost of \$100M. Assume that this upgrade is fully depreciated over its 2-year life according to the straight-line depreciation method, and it has zero value at the termination of the project. The upgraded UDA can be sold at \$540 (expressed in constant $t=0$ dollar) while its production cost will be reduced to \$500 (expressed in constant $t=0$ dollar) apiece. Would you recommend the upgrade of the machinery and the product? What is the value of this option to upgrade (relative to the base scenario)?

Question 3: An alternative solution is to back out from the UDA Project at the end of the second year for a NOMINAL tax deductible penalty of \$80M. Besides, the plant site and the machinery will have a zero market value if the project is abandoned. Would you recommend the abandonment of the project? What is the value of this option to abandon (relative to the base scenario)?

Question 4: Since this is a major project for the Gadget Division, the Division Director is greatly concerned about the riskiness of this Project. Hence, she asks you to determine the MINIMUM unit price for the UDA device such that this Project will be acceptable, basing on the base scenario information that you used in your analysis for Q1A. (Hint: You are advised to use the Goal Seek function in Excel to determine the unit price expressed in constant t=0 dollar!)

Question 5: Being a diligent professional, you are not satisfied with the assumed discount rate of 14% that is given to you. From your own research, you note that The FGM Corporation has 600M shares of its common stock outstanding, which is priced at \$50 per share. The stock beta is estimated at 1.2. In addition, the Corporation's 9.5%, \$20B par, 15-year, B-rated semiannual coupon paying bonds are priced at a premium of 5% from its par. In addition, The FGM Corporation also finances its operation with 100M shares of its preferred stock, which pays annual DPS of \$6 and is currently priced at \$90 per share. Currently, the yields on long-term Treasury securities are around 3.5%. You reference the stock market statistics reported in the Ibbotson's SBBI Yearbook (or Chapter 10 in your text) for your estimation of the market risk premium. You believe that the riskiness of the UDA Project is compatible with that of other projects of the company. Base on your own analysis, you redo the above analyses and address the above issues, i.e., Q1 ~ Q4 by showing your work to your supervisor. Are there any differences in your recommendations? Why or why not?

Question 6: In anticipation of tightening government regulations that aim at mitigating adverse environmental impacts of business operations in the U.S., you speculate that there would be an environmental surcharge equivalent to 7.5% of the annual production costs applicable to the UDA Project. Hence, you redo the analysis in Q1A with the inclusion of the proposed environmental surcharge. What would be your recommendation on the UDA Project after accounting for the possible financial consequence of its environmental impact? If a green technology could help you eliminate the environmental impact of the Project and hence the corresponding environmental surcharge, what would be the maximum amount to be invested in this green technology for the Project?

YOU ARE EXPECTED TO TURN IN A WORD (OR PDF) FILE OF YOUR REPORT THAT ADDRESSES THE SIX QUESTIONS IN THIS ASSIGNMENT. IN ADDITION, I EXPECT YOU TO USE EXCEL SPREADSHEET FOR THIS ASSIGNMENT AND SUBMIT YOUR EXCEL FILE ALONG WITH YOUR WORD (OR PDF) DOCUMENT TO ME ELECTRONICALLY. SINCE YOUR SPREADSHEET WILL BE CLOSELY REVIEWED FOR GRADING REFERENCE, PLEASE DO YOUR BEST TO PRESENT YOUR ANALYSIS IN A CLEAR MANNER THAT IS EASY TO FOLLOW, THANKS! BESIDES, YOU ARE ASKED TO DO YOUR ANALYSIS IN NOMINAL TERM!