

Dra fast ferment

[Health & Medicine](#), [Healthcare](#)



The examination will last for TWO (2) hours. The exam is open book. You are allowed to use the course pack, class handouts, and any other materials that relate to the course. You are not allowed to access the internet or e-mail. The examination paper consists of 10 questions: You should answer ALL of the questions. Make explicit any assumptions underlying your answers, interpret your results, and justify your answers, conclusions, and recommendations. But keep your answers short and to the point. In grading, importance will be attached to the clarity and conciseness of your answers. Good luck!

DECISION & RISK ANALYSIS: EXAM

FastFerment FastFerment is a start-up venture started by UCL scientists and engineers. The firm has discovered an enzyme that accelerates the evolution of the mold *Aspergillus Orzgae*, which is used for making traditional rice-based alcoholic drinks (rice wines) in East Asia such as Sake or Makgeolli. When this powder is included in the production of the rice wines, the production lead time is shortened from 10 days to 3 days without affecting the taste or quality of the wine, as it accelerates the fermentation of the rice. Thus, the powder can substantially increase the production capacity for the rice-wine manufacturers and provide them with a competitive advantage. Recently, FastFerment has perfected the technology of genetic engineering and mass-producing this accelerating enzyme and storing it in a powder form.

They are currently formulating strategies to commercialize the powder by selling the powder to manufacturers. Currently, they estimate there are 156 rice wine manufacturers, but this could be as less as 140, as existing firms

may no longer be active, and as many as 190, as there are recent new entrants to the market as the rice wines have become popular in recent years. Because the powder is new, they expect only a few early adopters would be interested in the product. They expect between 5~10% of the firms to be their potential buyers, with no specific percentage being greater than the other. The price they would charge for 1 kg of the powder would depend on the cost of manufacturing the powder as well as the value it delivers to each manufacturer. After conducting initial market research, they expect an average manufacturer to be willing to pay as high as? 950/kg, but as low as? 400/kg depending on the initial negotiations. They expect the selling price to be? 550/kg. Moreover, it is uncertain how much quantity each manufacturer would want to buy, which will depend on their current production capacity, but they are estimating anywhere between 100kg to 400kg per firm.

The founders agree that they would need to hire professional salespeople with the necessary knowledge of the science of the powder to help them sell to each manufacturer. They do not know how many will join, but they have made an offer to 6, and expect between 4 and 6 to join FastFerment, with each number being equally likely. The annual wage will be given in terms of salary (no commission), and it is expected to be 50, 000, but it is negotiable between 45, 000 and 75, 000 depending on their qualifications and experience. FastFerment is also examining the cost associated with production. While they have perfected the technology to manufacture the powder, they currently do not have the manufacturing plant set up to accommodate the potential demand. Do initial estimates show that the fixed cost associated with setting up a manufacturing plant is at least? 300, 000

and at most? 600, 000, with? 500, 000 is the most likely. The variable cost for producing 1kg of the powder is expected to be 200/kg, but this is also variable by 10% in either direction. Lowest Rice wine manufacturers 140 adopters (%) 5. 0% price/kg 400

The objective of FastFerment is to maximize the annual profit, but it is unclear whether the firm would be profitable based on the numbers.

Question 1. Scenario Analysis Start @Risk for Excel and open the Excel spreadsheet " FastFerment. " Perform a scenario analysis for this venture, and determine the best-case and worst-case scenarios (Risk for this, just plug the numbers in the model and observe the results).

What are your conclusions? The scenario analysis below shows that there is significant uncertainty in the profitability of this venture. Does the worst-case scenario show a loss? 924, 000, whereas the best-case scenario shows a potential profit of? 5, 372, 000. So there is a substantial downside, but also a huge upside. AT this point, therefore, it is not recommended to make any decision, as it is yet unclear how the risks will affect the profitability of this venture. Rice wine manufacturers early adopters (%) price/kg

Question 2. Sensitivity Analysis Which is the biggest risk, (a) the variable cost/kg (b) the price/kg, or (c) the % of early adopters? How did you determine this? Again, do not yet use it. Risk. Setting as the base case 7. 5% for %-adopters, 250 to the quantity of purchase, 5 as the number of salesforces, and the rest of the parameters to the most likely cause, and we examine the potential impact of these three parameters. The price/kg is the biggest risk, with a potential impact? 1, 608, 750 when varied from 400 to

950 (-? 165, 000 versus ? 1, 443, 750). The %-early adopters are the second biggest risk with a potential impact? 682, 500 when varied from 5% to 10% (-? 67, 500 versus ? 615, 000). The variable cost/kg is the lowest risk with a potential impact? 117, 000 when varied from 180 to 220 (? 215, 250 versus ? 332, 250).

Question 3. Simulation Analysis - Distributions

To perform simulation analysis, we need to identify an appropriate distribution to model each of the risk factors. Determine an appropriate distribution and their parameters for each of the risk factors. Triangular distributions (with the lowest, likely and highest estimates as parameters) would work well for all risks except % of early adopters and quantity of purchase, which should be uniform (with the lowest and highest estimates as the parameters), and salesforce, which should be discrete with equal probability of 0.33 to every three cases {4, 5, 6}.

Question 4. Simulation Analysis - Average Using. Risk, perform simulation analysis, and determine the average profit for this venture. How high and low could the profit potentially be? Compare these results with the scenario analysis results. After performing 5000 iterations, the average profit is approximate? 570, 000. This means that if we were to run this business for many years, we would have an average annual profit of around ? 570, 000 per year (provided the conditions do no change over time).

Question 5. Simulation Analysis - VaR What is the likelihood that the profit is positive? What is the probability that the profit is ? 1.5M or more? What is the Value-at-Risk (VaR)? There is about 80% chance of making a profit, and

about 10% chance of making a profit that is ≥ 1.5 M or more. The VaR at 5% is around $-\$300,000$.

Question 6. Simulation Analysis - Tornado Diagram Examine the tornado diagram. What can you conclude? Suppose that increasing the number of salespeople and their salaries increase the quantity of powder that each manufacturer buys. Would this be a good investment? The tornado diagram shows that the quantity of purchase and the price/kg are the biggest risk factors. The risks related to the cost of production of the powder or the number of salesforce and salary are actually not that significant. Increasing the salesforce and the salary in return for an increase in the quantity of purchase, therefore, seems to be a good . Five Grains is one of the leading manufacturers of rice wines.

The CEO of Five Grains, a UCL alumnus, has learned about FastFerment's powder through his personal networks, and immediately recognized the potential opportunity the powder can represent. According to Five Grains' recent internal consumer trend study, the demand for various specialty rice wines (using a different variety of rice), which is currently negligible due to nonproduction, is expected to rise in the next several years. In particular, for the current year, they conjecture that with 50% the demand will be large (translating into a potential profit of ≥ 4.5 M), and with 50% it will be small (translating into a potential profit of ≤ 5 M).

Although other firms are looking into producing the specialty rice wines, it is difficult for them to quickly do so as it requires building additional capacity, as most firms do not want to produce the specialty rice wines at the expense of sacrificing the traditional rice wine production. However, with access to <https://assignbuster.com/dra-fast-ferment/>

the powder, firms can immediately free up their production capacity to mass-produce the specialty rice-wines and capture its potential demand. Five Grains also recognized that the competitors also eventually receive information and gain access to the FastFerment's powder. If this happens, Five Grains will have to share the demand with its competitors. Based on intuition, the CEO believes that there is a 70% chance that more than 1 competing manufacturers will eventually adopt the powder and dive into the specialty rice-wine market. In such a case, Five Grains will only capture 20% of the demand and hence earn 20% of the potential profit. On the other hand, there is a 20% chance that one competitor adopts the powder, in which case they will be able to capture 50% of the demand and hence earn 50% of the potential profit. He believes that there is only a 10% chance that nobody else will.

Enter the market during the year, in which case they can capture 80% of the demand and 80% of the potential profit. To maximize their knowledge of the powder, Five Grains is currently negotiating a deal with FastFerment to ask for a 1-year exclusivity agreement. If the deal can be made, then Five Grains will be the only manufacturer with access to the powder and be certain to capture 80% of demand (80% of the profit).

Question 7. Decision Analysis - What to do? The meeting takes place and FastFerment asks Five Grains for ? 1. 5M for the 1-year exclusivity deal. Using a decision tree, find out whether or not Five Grains should agree to buy the 1-year exclusivity deal at ? 1. 5M. I would recommend Five Grains to not buy the one-year exclusivity deal for ? 1. 5M, as the expected profit

associated with not buying the deal (? 0. 8M) is greater than that with the deal (? 0. 5M).

Question 8. Decision Analysis - Value?

What is the maximum amount that Five Grains should pay for the 1-year exclusivity deal? The maximum amount that Five Grains should pay for the deal is ? 1. 2M, as it is the price when the expected profits are the same when buying and not buying.

Question 9. Decision Analysis - Risk/Sensitivity Examine the risk profile for Five Grains with and without the 1-year exclusivity deal at ?

- 1. 5M. If the demand turns out to be large, what is the (expected) profit with and without the 1 -year exclusivity deal?
- What if the demand turns out to be small?
- How does the value of a 1-year exclusivity deal change with respect to the probability that the demand is large?
- If the demand turns out to be large, then with the 1-year exclusivity deal, Five Grains will earn?
- 2. 1M, whereas without it they will earn ? 1. 44M on average with the risk of earning less than?
- 1M. However, if the demand turns out to be small, then Five Grains will lose ?
- 1. 1M, whereas without it they will earn?
- 0. 16M. Thus, while there is a higher upside with the 1-year exclusivity deal, it also represents a greater downside risk.

- When the probability that the demand is high increases by 1%, there is a 12,800 increase in the expected profit.

Question 10. Decision Analysis - A year later The deal for the 1-year exclusivity had been signed for? 1M and the demand for the specialty rice wines had turned out to be high. After a new study, Five Grains now projects that the demand for the various wine will be large with probability 90% (translating into a potential profit of ? 9M), and small with probability 10% (translating into a profit of ? 1M).

Moreover, the CEO feels that there is a 95% chance that more than one competitor will adopt the powder, which would allow them to earn 20% of the potential profit, and there is a 5% chance that only 1 firm will adopt, which would allow them to earn 50% of the potential profit. He believes that there is 0% that no firm adopts the powder this year, unless Five Grain brokers a 1-year exclusivity deal again with FastFerment, in which case they will earn 80% of the potential profit. (i) What is the value of 1-year exclusivity for this year for Five Grains? Call this VFG. Five Grains contacts FastFerment and offers to pay $(0.8 * VFG)$ for a 1-year exclusivity deal, citing the fact that it represents a steep increase from the? 1M paid in the previous year. (ii) From FastFerment's point of view, they believe that the adoption rate of the powder has now increased and expects between 50~60% of the manufacturers to become their potential buyers. Taking the rest of the parameters from the previous year as a conservative estimate of the current year (change all the parameters in Table 1, except the % -adopters), what is the minimum amount that FastFerment should demand from Five Grains this year for the 1-year exclusivity deal? Run the simulation analysis using. Risk

and find the expected profit with the high adoption rate. Will the deal go through? From the Decision Tree, we find that the value is approximate?

Do we find that with the adoption rate between 50~60%, the expected profit is around? 8.9M, and there is a 10% chance that FastFerment will make ? 15M or more. The deal won't go through this time as the 1-year exclusivity deal would need to be prohibitively expensive for Five Grains.