CFE SDM Model Solutions
Spring 2021

1. **Learning Objectives:**

4. The candidate will be able to analyze and model dynamic systems and evaluate the risks and sustainability of these complex systems.

5. The candidate will understand the role that organizational behavior and communication play in organizational decision making and efficacy, as well as learn how ineffective communication is a risk to organizations.

Learning Outcomes:

(4a) Identify and model the dynamic processes within a complex system:
- Develop and apply causal loop diagrams that model the feedback structure of complex systems
- Apply stocks and flows to dynamic modeling
- Apply dynamic modeling to business decisions

(4b) Explain the underlying factors that drive the sustainability and stability of a dynamic system:
- Evaluate the structure and behavior of dynamic systems
- Identify the factors that contribute to risk and instability in dynamic systems

(4c) Evaluate complex systems and describe how actuarial principles can mitigate risks and improve sustainability.

(5b) Evaluate the impact of human behavior factors on the effectiveness of decision making processes within organizations:
- Explain the role of cognitive biases on making suboptimal individual decisions
- Evaluate the role of organizational behavior on organizational decision-making processes and efficacy

Sources:

Business Dynamics Steman: Chapter 4 Structure and Behaviour of Dynamic Systems pg. 108-116

Business Dynamics Steman: Chapter 5 Causal Loop Diagrams pg. 137-190

Business Dynamics Steman: Chapter 6 Stocks and Flows pg. 191

1. **Continued**

Business Dynamics Steman: Chapter 9 s-Shaped Growth: Epidemics, Innovation Diffusion, and the Growth of New Products pg. 300

Commentary on Question:
The question is trying to test the material under Business Dynamics, where we focus on the structure, Causal Loop Diagram, Stocks and Flows and the different type of growth dynamic systems.

Solution:
(a)   Describe the basic modes of behavior in dynamic systems.

   Commentary on Question:
   This question is relatively straight-forward, where most of the candidates received full points. The model solution below represents the best answers to this question. Candidates do not need to have the exact same wordings to the answer in order to score full points.

   1. Exponential Growth
        a. Created by positive feedback
        b. The larger the quantity, the greater its net increase
        c. Doubling time is constant
   2. Goal Seeking
        a. Created by negative feedback
        b. Positive feedback loops generates growth, amplify deviations, and reinforce change
        c. Negative feedback seek balance, equilibrium and stasis
        d. Negative feedback loops act to bring the state of the system in line with a goal or desired state
   3. Oscillation:
        a. Created by negative feedback with time delays
        b. The state of the system is compared to its goal, and corrective action are taken to eliminate any discrepancies
        c. The state of system constantly overshoots its goal or equilibriums state, reverse, then undershoots and so on
        d. Oscillation are among the most common modes of behavior in dynamic systems
        e. Oscillation can arise if there is significant delays in perceiving the state of the system caused by the measurement and reporting system

(b)   List two benefits and one limitation of causal loop systems.

1. Continued

Commentary on Question:
This question is relatively straight-forward, where many candidates received full points. The model solution below represents the best answers to this question. Candidates do not need to have the exact same wordings to the answer in order to score full points.

Benefits:
- o Well suited to represent interdependencies and feedback processes
- o Used effectively at the start of a modelling project to capture mental models.

Limitation:
- o Inability to capture the stock and flow structure of the systems

(c)

(i) Draw a stock and flow diagram to illustrate the relationship between the population, the infection rate, the recovery rate, and the death rate.

(ii) Explain what the model predicts at the start of a wave.

(iii) Explain what the model predicts near the end of a wave.

(iv) Recommend a mode of behavior to model the cumulative number of cases in a given country from the start to the end of the first wave. Justify your answer.

(v) Describe the shape of the curve used to model the cumulative number of cases in a given country from the start to end of the pandemic using the modes of behavior.

Commentary on Question:
Candidates generally performed well on parts (i) –(iii), with many candidates earning full credit on their stock and flow diagrams and explaining the net impact on infections at the beginning and end of each waves.
Most candidates performed poorly on parts (iv) and (v), either failing to note that the cumulative number of cases was asked for, or failing to differentiate cumulative cases between the first wave and the entire pandemic.

1. Continued

  (i) A sample diagram is given below.
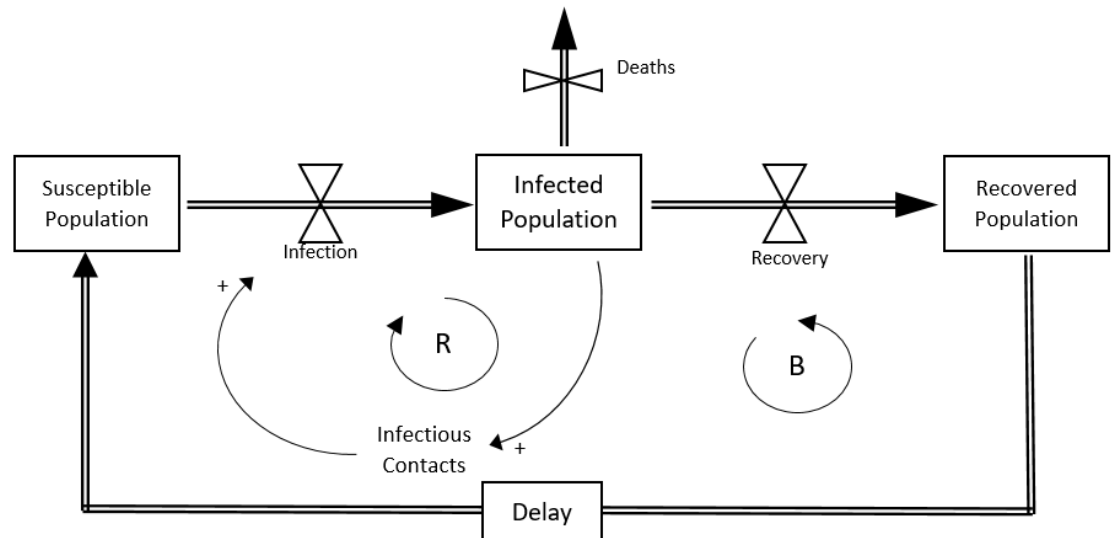
  (ii) The model should predict the following at the start of a wave:
    a. The positive loop of a growing infected population is more dominant than the negative loops of infected deaths and recoveries.
    b. As the positive loop is more dominant, cases increase slowly at the start, then more rapidly until an inflection point is reached, following exponential growth

  (iii) Toward the end of a wave, the total cumulative infected population plateaus as the positive infection loop is dominated by the two balancing loops: infection recoveries and death.

  (iv) The cumulative number of cases follows an S-shaped curve: At the start of the first wave, infections grow exponentially until the infection susceptible population decreases. Growth then slows until the population's carrying capacity.

  (v) Cumulative cases with multiple waves would look like consecutive S-shaped curves. The second wave would replicate the pattern of the first wave, with cumulative case growing past the first wave.

(d) Identify two specific errors within the causal loop drafted by John.

Commentary on Question:
Most candidates were to identify at least two errors in John's causal loop. Some common errors from the diagram are identified below, any two allowed candidates to score full credit for this question.

1. Continued

- o There is no sign on the causal link frequency of route toward profit
- o The link between increase in videoconferences and profits is not direct. The relationship should be instead that an increase in videoconferences reduces the business travel.
- o Video conference should have a negative causal link to business travel (as more virtual conferences lead to less business travel etc.)
- o Business travel and video conferences are not directly tied to travel infections, but should link to travel restrictions.
- o Increase in credit vouchers issued should would reduce the customer satisfaction, customer loyalty and profits, not increase them.

(e) Recommend two improvements, other than error correction, to the causal loop drafted by John. Justify your answer.

Commentary on Question:
Candidates were generally able to identify improvements to John's diagram, but failed to justify their recommendations. Justifications needed to tie to the pandemic's impact on BJA's business travel profits. A sample answer earning full points is below, but other recommendations were accepted with justification.

- o John should add a loop related to additional pandemic costs. As BJA is required to take temperatures, provide masks, and sanitize planes, these additional measures increase costs and decrease profits.
- o John should add delays in his CLD, such as the delay between customer loyalty and profits. While BJA profits will improve with higher customer loyalty, it will take time for those profits to materialize.

(f) The following are three of Porter's Five Forces:

    A. Bargaining Power of Buyers
    B. Threat of Substitute Products
    C. Rivalry Among Existing Competitors

(i) Identify where the global pandemic is represented in the Five Forces model.

(ii) Explain the effect of the global pandemic on each of the forces (A – C), with respect to BJA.

(iii) Critique the causal loop drafted by John, including his assumptions, with respect to consistency with each of the forces (A – C).

1. Continued

Commentary on Question:
Candidates performed poorly this question.
In part (i), most candidates could not correctly identify that the global pandemic is a change to the external environment. In part (ii) candidates did not explain the effect as it related to BJA specifically. In part (iii), most candidates gave only a positive or a negative, rather than critiquing each of the forces.

(i) The global pandemic changes the external environment of the 5 forces model.

(ii) Bargaining power of buyers will increase – Many business travelers will choose not to travel. Those who do choose to travel will expect enhanced safety measures, specific to the pandemic. These travelers may also expect lower prices knowing there are fewer travelers. BJA will have to contend with these additional expectations from buyers or risk losing their business entirely.

Threat of substitute products will increase –Business travelers have more alternatives to traveling to meetings via BJA .In this case, there are virtual substitutes to traveling such as video calls/meetings, online tours of locations, etc. For domestic travel, personal automobile travel can be used instead of flying.

Rivalry among competing firms will increase – While all companies will likely adhere to new safety guidelines, reduced airline travelers will mean fewer dollars spread amongst the same competitors. BJA should expect competition to either sustain loyalty or increase travel to meet costs (e.g., advertising, refund policies)

(iii) Bargaining Power of Buyers:
   o The model is accurate to decrease business air travel because of increased infections.
   o The model does not capture the fact that many business customers may continue to reduce business travel even after the pandemic is over and expect additional sanitation when they do.
   Threat of Substitutes:
   o The substitute of virtual conferencing and its effect on BJA profits is captured in this model, which is good.
   o There should be a connection with business travel and the virtual conferencing. More virtual conferencing means less business travel, and therefore less profits since virtual conferencing is a substitute for BJA's business travel.

1. Continued

Rivalry among firms:
- o The model shows that maintaining customer loyalty does, in isolation of everything else, help ensure that BJA's profits stay reasonable.
- o The model fails to acknowledge how increased rivalry from other firms, including competing airlines' changing their refund policies, could impact BJA's customer loyalty, and therefore reduce BJA profits..

(g) Describe two biases exhibited by John Feather. Justify your answer.

Commentary on Question:
Candidates were generally able to describe biases but many failed to justify their answers.
Any bias being discussed have to be justified with content from the case study and the question. If there is no such relationship, even if the biases being correct, no credit will be given to the candidates. Any two are sufficient. The following 3 are not the exhaustive list,other biases were accepted with reasonable justification.

Present bias – we value immediate rewards very highly and undervalue long-term gains. John Feather is worried about preserving the immediate cash outflow and undervalues the long term value from customer loyalty and the potential future gains from goodwill.

Status quo bias – John would like to keep the voucher policy the same as what BJA currently has. He is failing to consider that the pandemic environment requires a different policy than the normal business environment when the original policy was created.

Loss Aversion bias – John is is concerned with loss of cash flow rather than potential future gains from a successful weathering of the pandemic.

(h)

(i) Explain the difference between System 1 and System 2 thinking.

(ii) Explain how System 1 thinking is used in the proposed approach. Justify your answer.

(iii) Explain how System 2 thinking is used in the proposed approach. Justify your answer.

(iv) Explain an improvement to the proposed approach that could bypass both systems.

1. **Continued**

Commentary on Question:
Almost all candidates scored wellin this question. Higher scoring candidates differentiated themselves in part (iii), where some e candidates did not provide System 2 nudges.

(i)   Two systems:
- System 1 thinking is automatic, instinctive, and emotional. It relies on mental shortcuts that generate intuitive answers to problems as they arise.
- System 2 thinking is slow, logical, and deliberate.

(ii)   System 1 nudges include:
- Arouse Emotions – The proposal shows pictures of people traveling before offering the choice to receive a credit or refund, nudging people to the travel credit..
- Simplify the process – BJA has made it a lot easier to obtain the credit instead of a full refund

(iii)   System 2 nudges include:
- Use joint evaluation – Customers are simultaneously offered choices which favors accepting the credit (worth 115% of the ticket price) over the cash refund (for 100% of the ticket price)
- Create opportunities for reflection – Customers are required to reflect while completing a survey about travelling after the pandemic.
- Use planning prompts – Email communication is sent after customers have completed the transaction which may remind customers to schedule a use for their voucher.

(iv)   To bypass both systems, set the crediting option as the default option. Customers who do nothing will automatically receive a voucher.

2.   **Learning Objectives:**
3.   The candidate will understand how to apply decision making models to general managerial decisions within specified business constraints.

Learning Outcomes:
(3b)   Apply statistical and quantification methods to analyze managerial decisions with uncertain conditions:
- Apply probability distributions to business situations with random variables.
- Construct optimization models utilizing probability theories.

(3c)   Evaluate business situations and describe how quantitative and statistical methods can improved decision making.

Sources:
Ch. 8 of Data, Models, and Decisions: The fundamental of Management Science

Ch. 10 of Data, Models, and Decisions: The fundamental of Management Science

Commentary on Question:
Commentary listed underneath question component.

Solution:
(a)   Explain the difference between management science models and active management in the investment management industry with respect to each of the following:

   (i)   Selection of assets

   (ii)   Consideration of risks

   Commentary on Question:
   Candidates either scored very well or very poorly on this question. When candidates did not score well, they provided general differences that were not related to selection of assets or consideration of risks.

   (i)   Active management uses specific special advisors with expertise in its own area of practice to pick assets. This is subject to bias. Management science uses available data to construct a portfolio based on all available constraints and objective function.

   (ii)   The active management advisors might perceive risk differently than the broader market while management science will use available public data. Management science can also look more broadly at how different risk can be mitigated and diversified with different types of assets.

2. **Continued**

(b)   Describe two techniques of management science Darwin Life can use to assist
        with its business operations, specifically as it pertains to managing investments.
        Justify your answer.

        Commentary on Question:
        *Candidates generally performed poorly on this question. Many candidates did not
        mention management science techniques in their answers. In addition to the
        techniques listed below, candidates were given points if they mentioned either a)
        the use of trading strategies to minimize trading costs, or b) the evaluation of
        financial assets such as options and other derivative securities.*

        Analysis of Financial Data – Darwin Life can reduce cost by taking advantage of
        the computerization and automation of financial data. Nonlinear optimization
        allows Darwin Life to use the metric available underlying each asset to best fit an
        investment portfolio that will fit its investment and risk needs. The benefit of
        relying on data and nonlinear optimization can allow Darwin Life to adjust its
        portfolio quickly achieve its needs.

        Forecasting Future Performance of Assets – Darwin can benefit using data to
        more accurately model future asset scenarios. This can also allow Darwin to
        quickly react to market conditions and predict capital ratios based on available
        information.

        Construction and management of Efficient Portfolios – Darwin's goal is to
        construct a portfolio that can back the liabilities while also minimizing asset
        management cost associated with managing the assets. Management science
        allows the construction of an efficient portfolio where the Sharpe ratio can be
        minimized which satisfy Darwin's goal.

(c)   You have been asked to maximize the Sharpe ratio of the asset portfolio using
        only nonlinear optimization.

$$\text{Sharpe Ratio} := \frac{E[R_a - R_b]}{\sigma_a}$$

        where…

        - R_a is the rate of return of the portfolio.
        - R_b is the risk-free rate of return.
        - σ_a is the standard deviation of the portfolio rate of return in excess of
          the risk-free rate of return.

2.   Continued

    (i)   State the objective function.

    (ii)   State all of the unique constraints necessary to implement the above investment strategy.

    (iii)   Compare and contrast linear optimization and nonlinear optimization as approaches for maximizing the Sharpe ratio.

    (iv)   Propose an approach that uses the results of both linear optimization and nonlinear optimization to maximize the Sharpe ratio. Justify your answer.

Commentary on Question:
For part (i), two answers were accepted. Either choosing sigma as an objective function, or choosing the entire Sharpe ratio as an objective function. Maximizing the expected return was not accepted, as it doesn't require non-linear optimization.

    (i)   Minimize either the volatility, or the Sharpe ratio.
- σ = sqrt (Var (Port_return) = sqrt(A^2 * var(A_return) + B^2 * var(B_return) + M^2 * var(M_return) + AB*Cov(A_return, B_return) + AC* Cov(A_return, C_return) + BM* Cov(B_return, M_return))
σ = sqrt (A^2 * 0.25 + B^2 * 0.0025 + M^2 * 0.09 + AB * -0.5 * 0.05 * 0.5 + AM * -0.35 * 0.3 * 0.5 + BM * 0.5 * 0.3 * 0.05.
σ = sqrt (A^2 * 0.25 + B^2 * 0.0025 + M^2 * 0.09 + AB * -0.5 * 0.05 * 0.5 + AM * -0.25 * 0.3 * 0.5 + BM * 0.5 * 0.3 * 0.05.

- Sharpe ratio = (0.02B + 0.07M + 0.16A - 0) / σ

    (ii)
- Return: 2%B + 7%M + 16%A >= 5%
- Fractions: B + M + A = 1.0
- Rating: 2B + 4M + 8A <= 3.5
- Duration: 12B + 5M + 2A <= 8.5
- Duration 12B + 5M + 2A >= 5.5
- Nonnegativity: B, M, A > 0

    (iii)   Both approaches are subject to the same constraints, which mean they both have the same feasible region. One could use linear optimization to maximize the portfolio return or non-linear optimization to minimize the volatility or to maximize the Sharpe ratio.
Non-linear optimization may find a local maximum which is not necessarily a global maximum.

2. **Continued**

    (iv)   Use linear optimization to maximize the numerator and use non-linear optimization to minimize the denominator. Linear optimization will find the optimal rate of return, nonlinear will find the optimal standard deviation. The Sharpe ratio will be maximized with the asset mix that is on the "edge" connecting these two points. Candidates were expected to apply logic similar to finding an integer solution: find the "best" answer, and then move around the neighborhood to find the answer that fits the business limitations.

3. **Learning Objectives:**

1. The candidate will understand and apply strategic management concepts and frameworks to corporate financial and ERM business problems.

2. The candidate will understand measures or corporate value and their uses in corporate decision making.

5. The candidate will understand the role that organizational behavior and communication play in organizational decision making and efficacy, as well as learn how ineffective communication is a risk to organizations.

Learning Outcomes:

(1a) Evaluate and apply strategic management concepts, recognizing factors that affect development and implementation of strategies:
- Analyze the firm's external environment and the internal organization.
- Describe and apply models such as Porter's five forces.
- Define types of business-level strategies and recommend an appropriate business-level strategy for a given situation.
- Explain the impact of competitive dynamics on strategic management.

(1b) Evaluate commonly used business growth strategies and their application under different economic risk and business environments:
- Critique and evaluate internal/organic and external/inorganic growth strategies.
- Assess and recommend growth strategies under different business situations and market opportunities, utilizing the applicable strategic management models.

(2a) Assess various measures that firm can use to assess value and recommend appropriate measures to evaluate corporate value.

(2b) Assess how performance metrics and incentives could impact key business decisions and create value for shareholders:
- Explain how managerial accounting can impact strategic decisions.
- Explain and recommend methods a firm may use to allocate its costs and how these methods impact the perceived performance of a firm or its component lines of business.

(5b) Evaluate the impact of human behavior factors on the effectiveness of decision making processes within organizations:
- Explain the role of cognitive biases on making suboptimal individual decisions
- Evaluate the role of organizational behavior on organizational decision-making processes and efficacy

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3.   Continued

Sources:
Accounting for Decision Making and Control, Zimmerman, Jerold, 9th Edition, 2014
Ch. 4: Organizational Architecture, Ch. 9: Absorption Cost Systems, pg. 127-148, 392-447

Commentary on Question:
The goal of this question is to test candidates' understanding on overhead cost and its implications. Candidates should understand different allocation basis and its impact to overhead calculation, profit and management decision.

Solution:
(a)   Calculate the following values (i-iii) for each store, X and Y, using the existing overhead allocation method:

        (i)   2020 Overhead allocation

        (ii)   2020 Pre-tax profit

        (iii)   2020 Pre-tax profit margin

Show your work.

Commentary on Question:
Most candidates get full credits on this question. For candidates who do not get full credits, main issues come from the calculation of profit margin.

Overhead rate (OHR) = 8,826/81,548 = 0.10823 per sale unit
Overhead cost of each store is calculated as:

Overhead	Coffee	Non-Coffee	Total
X	0.10823*800=86.59	0.10823*800=108.23	**194.82**
Y	0.10823*1000=108.23	0.10823*500=54.12	**162.35**

Profit for each product is calculated as   Sales*(1-Cost of Sales – Store operating expenses -Depreciation – General and Administrative Expenses)
For example:
Profit of coffee sale for X = 800*(1-0.13-0.6-0.07-0.015) = 148

3. **Continued**

Profit for each product of each store is:

Store	Coffee Profit	Non-Coffee Profit	OH	Pretax Profit	Pre-tax Profit Margin
X	148	185	194.82	**138.18**	**7.68%**
Y	185	92.5	162.35	**115.15**	**7.68%**

Pretax profit of each store= Coffee profit + Non-Coffee profit – OH
Pre-tax Profit margin of each store= Pretax Profit/ Store Total Sales

(b) Calculate the following values (i-iii) for each store, X and Y, using the allocation method proposed by Jeff Bemowski, assuming overhead is shared equally by all stores:

(i) 2020 Overhead allocation

(ii) 2020 Pre-tax profit

(iii) 2020 Pre-tax profit margin

Show your work.

Commentary on Question:
Most candidates get full credits on this question. For candidates who do not get full credits, main issues come from the calculation of profit margin.

Overhead cost of each store is calculated as:

Overhead	Total
X	8,826/50=176.52492
Y	8,826/50=176.52492

Profit and profit margin follow the same formula used in question (a)
Profit for each product of each store is:

Store	Coffee Profit	Profit Non-Coffee	OH	Pretax Profit	Profit Margin
X	148	185	176.52	**156.48**	**8.69%**
Y	185	92.5	176.52	**100.98**	**6.73%**

(c) Compare and contrast how Frenz' head office, Store X, and Store Y would perceive each of the two proposed overhead allocation methods. Justify your answer.

3. **Continued**

Commentary on Question:
Question is asking the perceptions from 3 parties: Head office, Store X and Store Y. Some candidates omit at least one of the three parties in the answer

Sample answer:
Head office might prefer Kitty's method as this method is (1) easy and straightforward; (2) absorbing profit volatility. Each store has different features (locations, rent, etc) and it might not be fair to have same overhead. (Full credit is also given if candidates state Jeff's method is preferred with reasonable argument).

Store X prefers Jeff's method as it is reported a higher profit margin in this method. Store X has more sales from non-coffee items. Non-coffee items are higher priced, so they will be allocated more overhead under the first method (allocating based on sales). They may perceive this as being penalized for higher sales. This will, as Jeff said, hurt store manager's motivation to increase sales.

Store Y prefers Kitty's method as it reports a higher profit margin compared to Jeff's method. They would perceive the second method as unfair because even when coffee sales are strong, they are at a disadvantage compared to stores that sell the higher priced non-coffee items.

(d)

(i) Explain whether an insulating or non-insulating allocation approach is better to achieve Frenz' objective. Justify your answer.

(ii) Recommend which of the two proposed overhead allocation methods should be used to meet Frenz' objective.

Commentary on Question:
For (i) Some candidates do not understand the difference between insulating and non-insulating method. For (ii), candidates need to specify which of the proposed methods (Kitty (non-insulating) or Jeff (insulating)) should be used.

(i) Non insulating allocation approach is recommended. Sales in store Z are expected to be lower than other stores due to the intense competition. To align Frenz's objective, non-insulating allocation approach, which works as a shock-absorber, removes some of the risk from lower-performing cost objects. Thus their overhead will go down with poor performance and better performing stores will pay a larger share

3. **Continued**

      (ii)   Kitty's method, which is non-insulating, should be used. As the newly opened store Z will have fewer than average store sales, to align Frenz's objective, it should be allocated less overhead for a better performance metric than Jeff's method.

(e)   Recommend whether or not a distinct cost pool is appropriate for new stores. Justify your answer.

Commentary on Question:
Candidates generally received some, but not all of the points on this question. Points were lost for not providing a full justification or not connecting the recommendation to new store's relationship to existing stores.

For Frenz, who is looking to aggressively expand into developing countries, using a distinct cost pool for new stores in new parts of the world may be appropriate. When entering a new market, it is expected that stores initially opened may not quite be as profitable as stores in established markets. David Gillet, CEO of Frenz, is looking to expand into new markets, and to help the company succeed in their vision of expansion, it may help their newer stores by using a different overhead allocation specifically for new stores in new markets. By using a lower overhead allocation for these stores, it will help adjust their performance compared to the older stores as these new stores become established in their new market. Overhead allocation for these stores will have to vary depending on which new market they are expanding in. Careful consideration should be made in doing this distinct cost-pooling, but it is an appropriate consideration given Frenz' strategic goal of expansion.

(f)

      (i)   Identify the communication network model used to communicate decisions regarding overhead allocation.

      (ii)   Describe an organizational barrier to effective communication when using this model to communicate overhead allocation. Justify your answer.

Commentary on Question:
Candidates performed very well on part i, but not as well on part ii. Points were lost on ii where a barrier was described that could only be partially justified, given the context.

3. **Continued**

      (i)   The communication network model is a wheel network model; sparse and centralized.

      (ii)   Cross-cultural barriers. Store managers are spread out all over the world, and Kitty must adapt her message considering cultural differences where necessary.

(g)

      (i)   Describe two cognitive biases that may limit the success of the rewards program. Justify your answer.

      (ii)   Recommend actions Frenz can take to combat each bias described in (i). Justify your answer.

Commentary on Question:
Most candidates performed well on part g. Points were lost where biases were tied to the digital strategy, and not the rewards program.

      (i)   Loss Aversion – Customers will be upset with the lower value once the initial reward has already been in place. They will feel like they lose value from the rewards and are less appreciated.

              Illusion of control – Customers should not be rewarded for negative behavior (not making a purchase)

      (ii)   Loss Aversion – Keep program at a constant level with low risk of needing to reduce the rewards

              Illusion of control – Ensure customers are rewarded for positive behavior (e.g. provide coupons for loyal customers)

4.　**Learning Objectives:**
1. The candidate will understand and apply strategic management concepts and frameworks to corporate financial and ERM business problems.

3. The candidate will understand how to apply decision making models to general managerial decisions within specified business constraints.

Learning Outcomes:
(1b) Evaluate commonly used business growth strategies and their application under different economic risk and business environments:
- Critique and evaluate internal/organic and external/inorganic growth strategies.
- Assess and recommend growth strategies under different business situations and market opportunities, utilizing the applicable strategic management models.

(3a) Apply fundamental techniques and frameworks of management science to make informed business decisions:
- Apply linear optimization models to managerial decisions.
- Develop decision trees, scenario tests, and simulation models.

(3b) Apply statistical and quantification methods to analyze managerial decisions with uncertain conditions:
- Apply probability distributions to business situations with random variables.
- Construct optimization models utilizing probability theories.

(3c) Evaluate business situations and describe how quantitative and statistical methods can improved decision making.

Sources:
Strategic Management: Competitiveness and Globalization, Concepts
Ch. 3, Internal Organization: Resources, Capabilities, Core Competencies and Competitive Advantages, Ch. 9, Cooperative Strategy

Data, Models, and Decisions: The fundamental of Management Science
Ch 5 –Simulation Modeling

Commentary on Question:
The calculation and modelling components of this question were generally done well. Nearly all candidates took advantage of using tools in MS Excel to efficiently and accurately solve the problem.

4. **Continued**

Solution:
(a)

(i)   Design a model to project the supplier's earnings from the dedicated
        facility.

(ii)   Calculate projected earnings over the next 10 months using the random
        numbers provided. Show your work.

Commentary on Question:
*In general, this part was done well. The most common mistake was in part (ii):
inventory was not properly incorporated into the solution. Some candidates
ignored it entirely (i.e., whatever the market demands would be provided) others
only considered the remaining surplus in the month.*

*Full marks for (i) were awarded if price and market demand for coffee beans
were identified as the random variables to model and each modelled correctly
using the information in the question.*

*Revenue from Frenz is included in the calculation below, but not explicitly called
out in separate columns due to size.*

Month	Opening Inventory	Beans Produced	Available for Open Market Sale	Market Demand	Sold in Open Market	Closing Inventory	Market Price	Revenue from Frenz	Revenue from Open Market	Earnings	Gross Margin
1	0	1000	250	250	-250	0	$25.00	$22,500	$6,250	$3,750	15%
2	0	1000	250	0	0	250	$42.50	$22,500	$0	($2,500)	-10%
3	250	1000	500	0	0	500	$35.00	$22,500	$0	($2,500)	-10%
4	500	1000	750	500	-500	250	$20.00	$22,500	$10,000	$7,500	30%
5	250	1000	500	250	-250	250	$45.00	$22,500	$11,250	$8,750	35%
6	250	1000	500	500	-500	0	$55.00	$22,500	$27,500	$25,000	100%
7	0	1000	250	250	-250	0	$17.50	$22,500	$4,375	$1,875	8%
8	0	1000	250	0	0	250	$37.50	$22,500	$0	($2,500)	-10%
9	250	1000	500	0	0	500	$27.50	$22,500	$0	($2,500)	-10%
10	500	1000	750	0	0	750	$30.00	$22,500	$0	($2,500)	-10%

(b)   Recommend two metrics the bean producer could use to evaluate earnings risk
        from the dedicated facility. Justify your answer.

Commentary on Question:
*The most common error in this part was recommending a measure that did not
actually measure risk or uncertainty (e.g., ROI). No marks were awarded for
these answers.*

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4. **Continued**

1. **Probability [Earnings <= 0]** = 5/10 = 50% by counting the number of simulations that resulted in losses. Supplier can expect to make a profit 50% of the time. This is a good metric to understand the propensity of loss-making months and can be used to inform a risk appetite around earnings volatility.
2. **Sample standard deviation of earnings** = 8k. This is a large number so there is substantial variability in the earnings. Tells us how much variability there is around the mean.

(c)   Describe two considerations as to whether or not Frenz should proceed with the alliance. Justify your answer.

Commentary on Question:
The majority of marks lost on this question were in this part. To receive full marks, candidates needed to consider both material from the case study on Frenz and the syllabus material applicable to Frenz entering into an alliance with the coffee producer.

Many candidates simply re-stated the premise of the question (e.g., acheive price certainty). No marks were awarded for these answers.

1. **Control of supplier can improve product quality.** Frenz's business strategy is differentiation. It distinguishes itself from competitors by offering high quality coffee and experience. They currently have several supplier relationships and strive to ensure customer satisfaction of the product. By acquiring a supplier and having a dedicated facility, they would be able to control the quality of product with suitable investment and oversight.
2. **Sale of surplus inventory in secondary markets can dilute brand value.** Frenz's competitive advantage is that their coffee quality and café experience is costly to imitate and non-substitutable. Having the same beans used by other competitors may undermine this competitive advantage; however the current economics for the supplier requires secondary market sales to turn a profit.

5. **Learning Objectives:**
1. The candidate will understand and apply strategic management concepts and frameworks to corporate financial and ERM business problems.

2. The candidate will understand measures or corporate value and their uses in corporate decision making.

5. The candidate will understand the role that organizational behavior and communication play in organizational decision making and efficacy, as well as learn how ineffective communication is a risk to organizations.

Learning Outcomes:
(1b) Evaluate commonly used business growth strategies and their application under different economic risk and business environments:
- Critique and evaluate internal/organic and external/inorganic growth strategies.
- Assess and recommend growth strategies under different business situations and market opportunities, utilizing the applicable strategic management models.

(2a) Assess various measures that firm can use to assess value and recommend appropriate measures to evaluate corporate value.

(5a) Apply best practice techniques to structure and communicate ideas logically and persuasively:
- Explain differences between good and poor communication techniques and their implications
- Apply techniques to structure ideas logically
- Develop clear fact-based messages that can be communicated persuasively

Sources:
Damordaran on Valuation: Chapter 7 Relative Valuation

Damordaran on Valuation: Chapter 9 Value Multiples

Strategic Management: Competitiveness and Globalization, Concepts: Chapter 7 Mergers and Acquisition Strategy

Strategic Management: Competitiveness and Globalization, Concepts: Chapter 9 Cooperative Strategy

The Pyramid Principle: Logic in Writing and Thinking: Chapter 5 Deduction and Induction: The Difference

5. **Continued**

Commentary on Question:
This question was designed to cover firm valuation, strategic management and communication topics. Candidates that earned full marks were knowledgeable in these areas of the syllabus and able to relate them to the case study scenario. Partial credit was awarded when answers demonstrated knowledge of the syllabus without citing specific details relevant to the scenario in this question.

Solution:
(a)   Compare and contrast discounted cash flow valuation and relative valuation.

Commentary on Question:
Candidates generally did well on this question. To get full marks, candidates needed to include at least 1 similarity and 1 difference. Some candidates explained how to perform a discounted cash flow (DCF) valuation and relative valuation (RV) without comparing or contrasting the two.

- Implicit (RV) vs explicit (DCF) assumptions
- Market efficiency assumption: both assume market is efficient overall.
- DCF implies market can be inefficient for specific stocks but correct over time. RV assumes specific stocks may be inefficient, but sectors/industries are correct on average
- Relative valuation is easier to explain and perform

(b)   Calculate the Price-to-Book Equity multiple for Frenz at the end of 2018, 2019 and 2020. Show your work.

Commentary on Question:
Both the stock price and # of shares outstanding are found in the case study. Common errors included not dividing by number of shares outstanding, or not adjusting Balance Sheet figures from the case study, which are expressed in 1000s. Partial credit was given if applicable.

Frenz has 25 million shares of stock outstanding. Its stock price at the end of each of the past three years is shown below.

Year	Book Equity	Book Equity / Share	Share Price	Price / Book Equity
2018	113,968,000	4.55872	63.69	**13.97103**
2019	132,398,000	5.29592	48.62	**9.180652**
2020	158,031,000	6.32124	57.38	**9.077333**

5. **Continued**

(c) Another analyst at XYZ has been asked to quickly determine whether or not Frenz is over-valued. They plan to compare the Price-to-Book Equity metrics you just calculated against the average Price-to-Book Equity for the entire restaurant industry in 2015.

Describe two shortfalls of the approach the analyst at XYZ plans to use.

Commentary on Question:
Most candidates did well on this question and were able to list two different shortfalls. Any of the two sample answers below would have earned full marks.

- Information is 5 years old. Multiples have changed over just the last 3 years.
- Restaurant industry is too wide – (trade-off: defining an industry too broadly increases the number of comparable firms, but it also results in more diverse group of companies)
- Need to also consider median and range, not just average
- Book value is not the best basis as it can be influenced by accounting rules

(d)
  (i) Explain why XYZ should use value multiples rather than equity multiples to value an acquisition target in general.

  (ii) Explain why XYZ should use value multiples rather than equity multiples to value Frenz specifically, in addition to the points from (i).

Commentary on Question:
Many candidates struggled with this question. Several candidates provided reasons to not use equity multiples that would also serve as arguments against using value multiples. A full-credit answer needed to recognize value-multiples take into account debt while equity multiples would not.

Part i) – General Answer

Equity value is the value only to shareholders, whereas enterprise value is the value for both shareholders and debtholders. For M&As, value multiples are more appropriate.

It is Important to take into account debt. If comparing companies with wildly different debt ratios, then value multiples are more appropriate.

5. Continued

Part ii) – Specific to Frenz

Frenz is a coffee company with many stores and seeking continued growth (i.e., through opening new stores). Opening new stores is capital intensive, and many of its strategies require tons of capital and debt. XYZ should use value multiples when evaluating Frenz to account for Frenz's higher capital and debt.

(e)

    (i)   Calculate Frenz's 2020 Firm Value.

    (ii)   Calculate Frenz's 2020 Enterprise Value (EV).

    (iii)   Calculate Frenz's 2020 EV / EBIT ratio.

Show your work.

Commentary on Question:
Candidates received partial credit for stating and using the correct formulas in each part of the question, even if the prior part of the question was answered incorrectly. Common mistakes included using Book Value (BV) of Equity instead of Market Value (MV) of Equity, Net Income instead of EBIT (equal to Operating Income), and Total Liabilities instead of Total Debt.

Part i) Firm Value = MV of Equity + MV of Debt = $57.38*25M + 134,400,000 = 1,568,900,000

Note: Long-term Debt from the Frenz's Balance Sheet is shown here for BV of Debt (the question states that MV Debt should be assumed to be equal to BV debt). Candidates were not penalized for not including Current Borrowing in the Debt figure. However, using Total Liabilities is incorrect.

Part ii) Enterprise Value = MV of Equity + MV of Debt – Cash = Firm Value – Cash = 1,568,900,000 - 15,835,000 = 1,553,065,000

Part iii) EV / EBIT = EV / Operating Income = EV / 99,668,000 = 15.582

(f) The EV / EBIT ratio for King Coffee at the end of 2020 is 25.8. Your colleague remarks "this ratio is all we need to look at to be sure that Frenz is undervalued compared to King Coffee".

Critique your colleague's statement.

5. **Continued**

Commentary on Question:
Many candidates provided only high-level and short answers to this question, which was worth 3 exam points. To earn full marks, candidates needed to provide clear support for their critiques. Responses other than the sample answers shown below received credit if valid and adequately justified. For example, some candidates pointed out flaws in looking at one ratio only and in one year. Partial or full credit was given for these arguments depending on how much justification was provided.

Although Frenz's EV/EBIT ratio is lower, this does **not** necessarily mean Frenz is undervalued relative to King Coffee.

- **Higher Growth** results in higher multiples. King Coffee is a smaller coffee chain focused in Equabodia and has been expanding rapidly in the past several years and now has as many stores as Starbucks. This could be driving King Coffee's EV/EBIT ratio higher
- A company of **higher quality** would provide a higher return on capital, resulting in higher EV multiples. We do not know King Coffee's return on capital but the higher ratio could suggest King Coffee is a higher quality company (i.e. King Coffee is not overvalued and Frenz is not undervalued)
- Given King Coffee is established in Equabodia, a country "fraught with political corruption and legal challenges", it should be a riskier company than Frenz. **Higher risk** leads to higher cost of equity/debt, which would lead to lower multiples. Thus, if King Coffee was established in a more stable country, one would expect its EV/EBIT ratio to be even higher. In this regard, King Coffee may not be overvalued (and Frenz is not undervalued)
- **Higher Taxes** could also result in lower EV multiples. We do not know Frenz/King Coffee's tax rates but this could be affecting the EV multiples

(g)

(i) Compare and contrast reasons for acquisition versus reasons to form a strategic alliance in a Standard-Cycle market.

(ii) Recommend if XYZ should pursue an acquisition or an alliance to achieve its objective. Justify your answer.

Commentary on Question:
For Part i) candidates often defined acquisition and strategic alliance in isolation, but did a poor job of pointing out similarities and differences between the two. For Part ii) candidates needed to focus on the differences rather than the similarities between an acquisition and an alliance. The best answers included specific information from the case study. Some candidates listed generic reasons for their recommendation that were also true for the other option – these were not persuasive arguments.

5.   Continued

The ideal answer was to recommend that XYZ pursues an alliance. However, candidates received marks for recommending an acquisition if justification was provided. No credit was given to candidates that did not make a recommendation.

Below are sample responses.

Part i)
Similarities
- Increased market power
- Overcoming barriers (trade/entry)
- Learning new capabilities/techniques

Differences
- Acquisition seeks to increase diversification and scope / Alliance increases scale
- Acquisition reduces the cost, risk, and speed to market of new products by acquiring an existing one / Alliance share resources and expertise to jointly develop new opportunities and respond to competition
- Acquisitions are more costly and permanent, requiring integration of culture / Alliances are less capital intensive, but can run into issues when objectives are not aligned

Part ii)
Recommend alliance
- Scope/Scale
    - XYZ already offers coffee (albeit a poor offering)
    - An alliance with either Frenz and/or King offers increases the scale of the coffee products of either chain (mutual benefit); XYZ benefits by partnering to create the increased scale
- New products/speed
    - Coffee is already offered, not new to the market
    - Per case study, non-coffee stores (e.g., McDonalds) is entering into space with a premium coffee product. An alliance would allow both XYZ and Frenz or King Coffee to jointly respond to competition
- Costs and core competency
    - An alliance is less capital intensive than an acquisition. XYZ can improve its coffee offering through an alliance without having to take on additional costs (debt, capital) and the responsibilities of managing a coffee chain

5. Continued

(h)
    (i)   Define deductive reasoning.

    (ii)   Explain the fallacy in your colleague's statement.

Commentary on Question:
Candidates generally did well on this question.

Part i)
Deductive reasoning - An argument in which a conclusion is inferred from two premises, one major and one minor.

Or

Deductive argument as needing to do 3 things
- Make a statement about a situation that exists in the world
- Make another statement about a related situation that exists in the world at the same time. The scond statement relates to the first if it comments on either its subject or its predicate
- State the implication of these two situations existing in the world at the same time.

Part ii)
Candidates must be clear that the CEO's premise is about companies that meet all criteria. Frenz and King are do not fit into this grouping (as they do not meet all criteria) so the premise is invalid.

No conclusions can be drawn about whether or not XYZ will contact companies not meeting all criteria (such as Frenz or King).

(i)
    (i)   Define inductive reasoning.

    (ii)   Sketch an inductive argument to communicate your concern with at least three supporting ideas.

Commentary on Question:
Candidates generally did well in part i), pointing out that the key to the argument is remaking on the significance of the similarity of the items grouped together. For Part ii), some candidates confused the overall pyramid principle with an inductive argument. Another common error was writing supporting ideas that were too generic and that did not link to the case study or to the argument. An inductive argument should have supporting ideas that when viewed in isolation, naturally lead to the main argument.
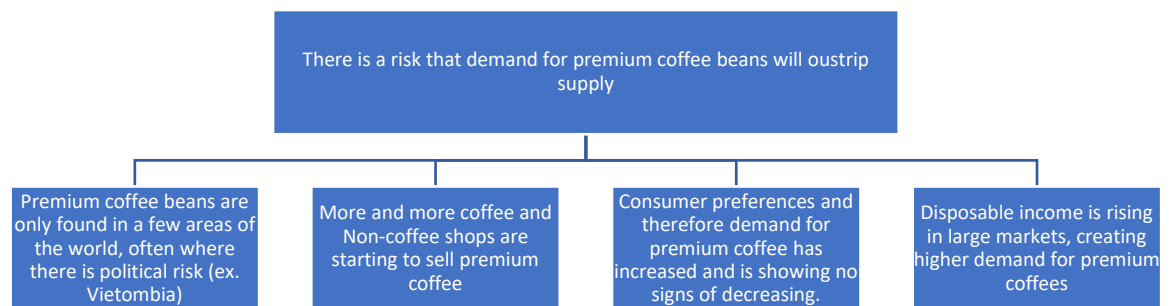
5.   Continued

Part i)

Inductive reasoning – making an argument by:

(1) grouping several different things (ideas, events, facts) that are similar in some way, and
(2) commenting on the significance of their similarity.

Part ii)

The below is a sample response only, with 4 supporting arguments. Only 3 were needed for full credit.

There is a risk that demand for premium coffee beans will oustrip supply

Premium coffee beans are only found in a few areas of the world, often where there is political risk (ex. Vietombia)	More and more coffee and Non-coffee shops are starting to sell premium coffee	Consumer preferences and therefore demand for premium coffee has increased and is showing no signs of decreasing.	Disposable income is rising in large markets, creating higher demand for premium coffees

6.

Learning Objectives:
4.   The candidate will be able to analyze and model dynamic systems and evaluate the risks and sustainability of these complex systems.

Learning Outcomes:
(4a)   Identify and model the dynamic processes within a complex system:
- Develop and apply causal loop diagrams that model the feedback structure of complex systems
- Apply stocks and flows to dynamic modeling
- Apply dynamic modeling to business decisions

(4b)   Explain the underlying factors that drive the sustainability and stability of a dynamic system:
- Evaluate the structure and behavior of dynamic systems
- Identify the factors that contribute to risk and instability in dynamic systems

(4c)   Evaluate complex systems and describe how actuarial principles can mitigate risks and improve sustainability.

Sources:
Business Dynamics Sterman: Chapter 6 Stocks and Flows, pg. 191-230

Business Dynamics Sterman: Chapter 17 Supply Chain and Origin of Oscillations, pg. 663-708

Business Dynamics Sterman: Chapter 15 Modeling Human Behavior: Bounded Rationality or Rational Expectations?

Organizational Behaviour Chapter 12: Communication, pg. 396-429

Commentary on Question:
Overall, candidates performed poorly on this question. Candidates lost marks in a), f) and g) for not drawing the connection to the case study and CCC's situation. Calculation questions were also done poorly as many candidates failed to recall or apply the correct formulas from Business Dynamics Ch17.

Solution:
(a)   Explain CCC Tire Stores' stock structure based on the four reasons above (I – IV).

   Commentary on Question:
   Most candidates received full or part marks for this question. To receive full credit, a candidate needed to apply the four reasons given onto CCC's current stock structure. Those who explained the dynamic stock system without drawing connections to CCC received no or part marks.

6. **Continued**

I.   The stocks in a system tells the decision maker where they are, providing them with the information needed to act. CCC currently has less beef tires than desired, so this suggest to the decision maker that CCC needs to order more RU42WR tires. The opposite is true for RU42WD tires

II.   Stocks accumulate past events. For example, CCC's large RU42WD tire stock is an accumulation of past mis-match between orders and sales this can only be fixed by revising either the inflow or outflow.

III.   A delay is a process whose output lags behind its input. Because of this delay, the stock accumulates the difference between input and output changes. Perhaps CCC ordered more RU42WR tires already in order to meet its desired stock, but the shipment has been delayed.

IV.   Stocks absorb the differences between inflows and outflows, thus permitting the inflows and outflows to differ. In equilibrium, total inflow of and outflow of a stock should equal, but that's rarely the case.

(b)   Calculate CCC's acquisition rate for RU42WR and RU42WD assuming there is no time delay. Show your work.

Commentary on Question:
Candidates' performance on this question was polarized. Those who were able to apply the acquisition rate formula (without time delay) received full or near-full marks. A few candidates did not realize that the number of tires sold was given as "per week", and the unit for inventory adjustment time is in days. Full credits were given as long as the time units used was consistent (day calculation shown below as an example).

RU42WR:
AR=max(0, DAR)
DAR=EL+AS
EL=280/7=40
AS=(S*-S)/SAT=(940-800)/5=28
AR=max(0, 40+28)=68/day

The acquisition rate is 68 per day

6. **Continued**

RU42WD:
AR=max(0, DAR)
DAR=EL+AS
EL=130/7=18.57=19
AS=(S*-S)/SAT=(200-250)/5=-10
AR=max(0, 19-10)=9/day

The acquisition rate is 9 per day

(c) CCC Tire Stores has opened a new store outside of Arizona. The new store is far from BJT's warehouse, so a delay between order and acquisition is expected. The new store's co-managers, Abby and Benny, want to investigate how the existence of a supply line of unfilled orders will affect their stock structure.

State the purpose of a supply chain.

Commentary on Question:
This was a recall question from Business Dynamics Ch 17. Many candidates stated the definition of a supply chain instead of the purpose, and received no or part marks for this.

To provide the right output at the right time

(d)
    (i)   Explain why Benny's rule of thumb method is suboptimal in this case.

    (ii)   Calculate the order rates for RU42WR and RU42WD using Abby's approach. Show your work.

Commentary on Question:
Candidates performed fairly well for part i). Part ii) however, was poorly done, as many candidates did not recall the correct formula for the calculation steps from Business Dynamics Ch 17. Those who were able to demonstrate the correct thought process received partial marks.

    (i)   By using the desired acquisition rate, Abby is acting with a higher degree of rationality. She adjusts the supply line to achieve the desired acquisition rate, which includes replacement of expected losses and correction of temporary gaps between desired and actual inventory. Benny's solution leaves out this correction component. He is basing his decision only on his estimate of customer orders.

6.   **Continued**

The formulation for the desired supply line must depend on empirical investigation of the actual decision-making process, so Benny's rule of thumb method would have been reasonable if there were no evidence to support the determination of the desired acquisition rate. However, since we are given the empirical evidence (e.g. we have information on the adjustment time), and the calculation is simple, we don't need to use the rule of thumb.

(ii)   We'll use Abby's method because we are given the empirical evidence to calculate desired acquisition rate.

RU42WR:

DAR=Max(0, EL+AS)=Max(0, 40+28)=68

SL*=EAL*DAR=3*68=204
ASL=(SL*-SL)/SLAT=(180-400)/5= -39

IO=DAR+ASL=68+(-39)=29
OR=Max(0, IO)=Max(0, 29)=29/day

The order rate is 29 per day.

RU42WD:

DAR=Max(0, EL+AS)=Max(0, 19+(-10))=9

SL*=EAL*DAR=3*9=27
ASL=(SL*-SL)/SLAT=(27-50)/5= -4.6 = -5

IO=DAR+ASL=9+(-5)= 4
OR=Max(0, IO)=Max(0, 4)=4/day

The order rate is 4 per day.

6. Continued

(e)

    (i)   Compare the bargaining power of CCC (as a buyer) with respect to BJT and RFT.

    (ii)   Recommend whether the new CCC store should switch its supplier under each of the following scenarios (A – D). Justify your answers.

        A. Customer demand is forecasted to be more volatile in the next three years.
        B. The new store invests in a larger warehouse, and halves its storage cost per tire.
        C. The new store implements a pre-order service where customers order tires online every Monday and the tire will be guaranteed for customer pick-up the next day.
        D. CCC rebrands itself as a tire wholesaler.

Commentary on Question:
For part i), many candidates failed to recognize that RFT is much larger than BJT and depends less on CCC by comparison. Part ii) was well done as most candidates made the correct recommendations for scenarios A, B and C. Some candidates struggled with Scenario D as they did not recall that the upstream end of the supply chain tends to experience more demand fluctuation.

    (i)   Overall, CCC has less bargaining power with RFT than BJT. RFT is a nation-wide supplier that does not need to depend on CCC. BJT does not depend purely on CCC either, but by comparison is a much smaller manufacturer. Furthermore, there is risk that RFT may conduct forward integration into the tire retail industry, but BJT does not have this risk since it has already completed forward integration with CCC.
        CCC may also need to consider switching cost (e.g. setting up new admin system), but this should not be a material hurdle.

    (ii)

        A. As CCC expects more volatility in its consumer demands. It should choose RFT since it has less acquisition lag.

        B. Reducing the storage cost makes it easier for CCC to keep a large inventory. In this case it's likely more advantageous for CCC to stick with BJT as it can offset BJT's time lag problem with holding a larger inventory to absorb demand volatility.

6. **Continued**

    C. RFT's FT2 works well with this set up as CCC can set up every Monday as it's order date (supply line adjustment time is 7 days), the acquit ion lag time works perfectly with the pick up guarantee. For FT1, RFT's timeline works better as well for the 1-day guarantee.

    D. CCC is currently a retailer. The upstream end of the supply chain tends to fluctuate more, so CCC can expect more volatility and more amplification its consumer demands. In this case, similar to scenario A, CCC should choose RFT since it has less acquisition lag.

(f)

    (i)   Describe two structural factors that contribute to conflict between CCC and BJT-USA. Justify your answer.

BJT Leadership directs CCC to destroy the analysis and continue using BJT-USA as the sole supplier or the new store will be closed.

    (ii)   Explain the type of power used by BJT Leadership.

    (iii)   Recommend a political tactic that could be used by Abby and Benny in response to BJT Leadership's decision. Justify your answer.

Commentary on Question:
For part (i), many candidates did not link back to the source material. This particular question stems from the Organizational Behavior reading, chapter 12. The source material describes the different types of structural factors. Candidates needed to list one of these. The structural factor needed to make sense/be reasonable and be accompanied with a description/explanation as to why it contributes to the conflict between CCC and BJT-USA. Many candidates did well on part (ii), recognizing the type of power used as coercive. Some stated legitimate power as BJT owns CCC but did not comment/take it one step further to recognize the do it, or else nature BJT was exhibiting. There were mixed results on part (iii). Similar to part (i), some candidates failed to link back to the source material (Organizational Behavior). To receive full credit, candidates needed to choose a political tactic from the defined list in the reading and provide a well-developed justification.

    (i)   Decentralization: BJT-USA and CCC both roll up to BJT, have shared goals, but operate independently of each other. No clear owner of the decisions for the overall BJT strategy with CCC.

            Interdependency: BJT-USA needs CCC for exposure to the SW USA, CCC needs to operate as a profitable, stand-alone distribution operation.

(ii) BJT used coercive power (do it, or else), rather than looking at what's best for the entire organization

(iii) I recommend Abby and Benny use rational persuasion in response to BJT's leadership decision. They can put together a presentation that demonstrates the benefits that the success of CCC will have on BJT, and how adding a new supplier will lead to that success. Abby and Benny can use facts and projections to logically show this is in the best interest of both companies.

(g)

(i) Evaluate the tire industry with respect to exposure to vertical market failure.

(ii) Recommend whether or not CCC should purchase the small tire producer. Justify your answer.

Commentary on Question:
Most candidates understood the factors used for evaluating exposure to vertical market failure. Many were able to successfully apply these to the tire industry; however, some did struggle to recognize the overall risk was relatively high. For part (ii), some candidates failed to link their decision to their response in part (i) with respect to the risk of vertical market failure and only gave general reasons/justifications as to why or why not choose to integrate. Several also focused solely on BJT's potential response and not on how the integration could benefit CCC. Candidates needed to properly evaluate the overall vertical market failure risk and how this should impact his/her recommendation to purchase the small tire producer.

(i) Vertical market failure is high when there are few buyers and sellers. In this case, sellers dominate as tire supplier is an oligopoly and the number of buyers is many. As a seller of tire, CCC would expose themselves from BJT and/or RFT from supplying tires to them. This could effectively cause them to lose tire sales.

Vertical market failure is high where there is high asset specificity – producing tires is not specialized and there is not a significant barrier to produce them. However, it could be capital intensive.

High transaction frequency between BJT and CCC could promote vertical market failure (VMF) due to the increase chance of friction between the two parties given that BJT will likely know that CCC is producing their own tires as well.

6. **Continued**

Based on the above factors, there is a high level of risk in having vertical market failure.

(ii) Producing tires is not specialized (low asset specificity) but there is an oligopoly on tire production and high transaction frequency between the suppliers and buyers, which would exposure CCC to future conflicts with BJT. Therefore, there is a high level of risk in having vertical market failure based on the described environment. Based on this, I would recommend CCC purchase the small tire producer.