

Interactive Objective Case

Notice: This is the test for the event of Interactive Objective Case in the 2021 IBO.

Probelie

Probelie is an online shopping store with a wide range of categories where customers can select items and make purchases online. As an online store, *Probelie* has been in continuous operation for five years. During the initial opening period, many new customers signed up every day, which led to rapid growth in sales. However, as the number of customers plateaued, new customer sign-ups decreased and sales and profit growth slowed.

To better understand customers' purchasing behaviors and tap into new business growth, *Probelie*'s managing director hired a project team to guide the business. She believes that understanding customers' purchasing motives can make their marketing more targeted and achieve better results. More than once in her meetings, she emphasized that the most valuable customers must have certain buying behaviors that they can identify. If marketing teams can take steps to encourage more customers to adopt these behaviors, then more and more of them will become more valuable, which can inject a new source of growth into their business.

The project team collected data on a sample of 500,000 customers who registered with *Probelie* in the past year, as shown in Exhibit 1.

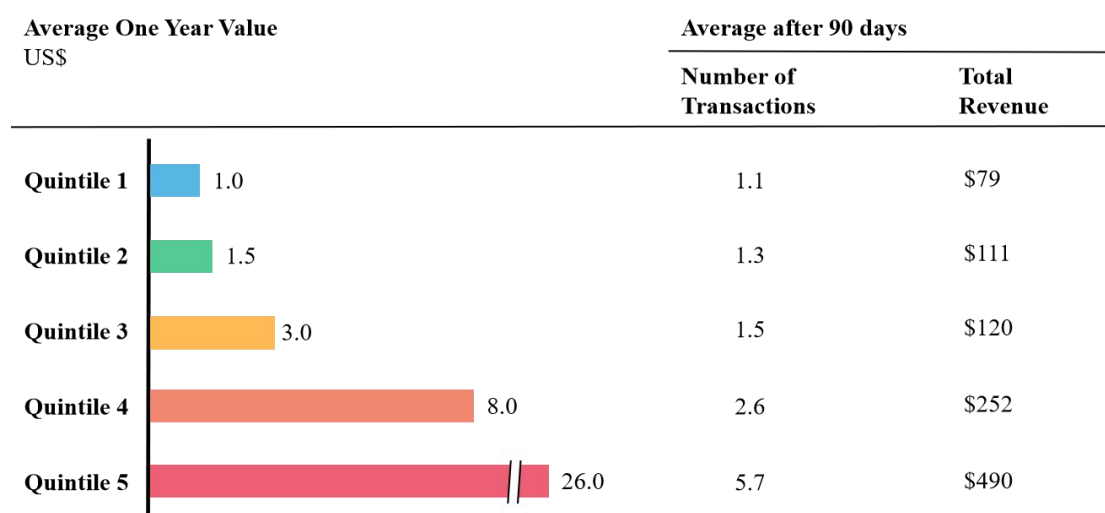


Exhibit 1

The customers are split into quintiles according to their one year customer value, from lowest to highest. 'One year customer value' is defined as the profit made by *Probelie* on purchases made

by a customer in their first year since signing up. Also presented is data on purchasing by customers in each quintile in their first 90 days since signing up, namely the average number of purchase transactions and the total revenue received by *Probelie* from those transactions.

Pilot test

In order to find the motivation that would drive the purchase behavior of the target customers, the project team decided to conduct a set of pilot tests with 100,000 new customers, who have made at least one purchase since joining. In this pilot, these new customers are split into two equal groups: a ‘pilot’ group and a ‘control’ group. The pilot group receives a specially designed email to encourage further purchasing, while the control group does not receive the email. Each email sent to the pilot group was specifically designed based on the customer's demographics and his or her prior purchasing behavior, thus each email was different. The emails of the pilot sites were sent at the same moment, and the results obtained are shown in Exhibit 2.

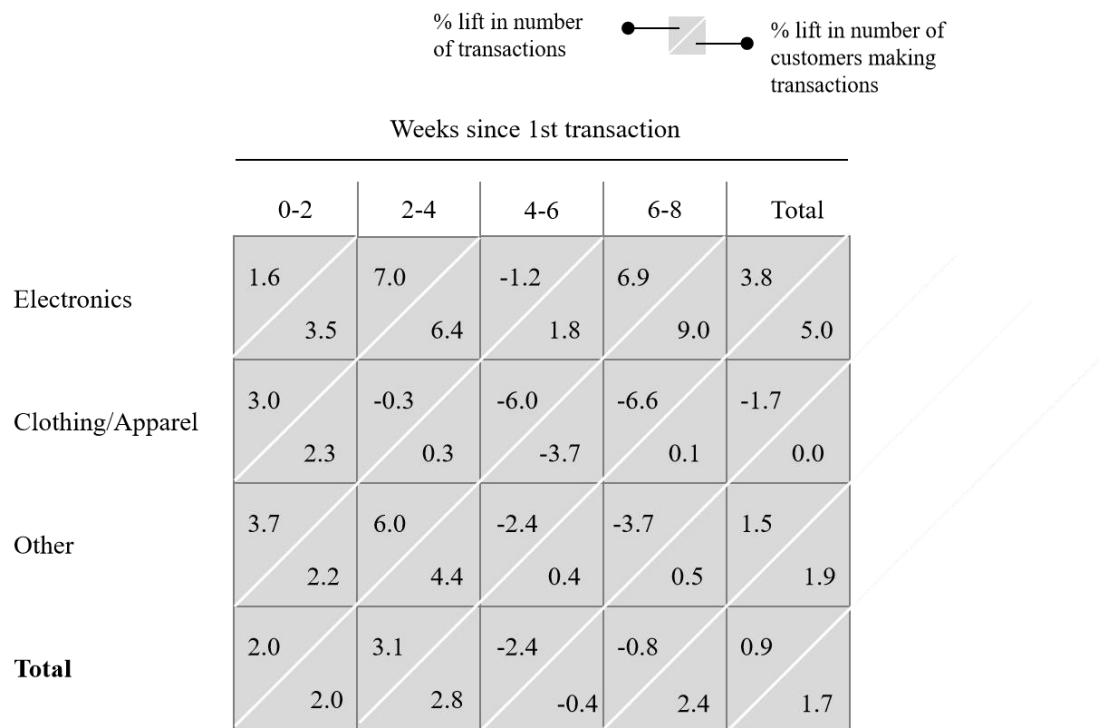


Exhibit 2

Comparing the pilot group with the control group, it can be seen that after sending the emails, the consumers in the pilot group showed the ‘lift’ in their purchasing behavior. In Exhibit 2, each gray box can be divided into an upper left portion and a lower right portion. The upper left portion shows the percentage lift in number of transactions while the lower right portion shows the percentage lift in number of customers making transactions. All data are counted from the first email sent to the pilot group. Horizontally, the information is divided according to how long ago the customer made their first *Probelie* transaction. Vertically, the information is divided according to what kind of product was purchased in the customer’s first *Probelie* transaction.

After the pilot test was completed, the project team held a meeting with the Managing Director of *Probelie* to update her on the results of the pilot. While presenting the results, one member of the team additionally mentioned that in terms of emails, all new customers were likely to receive emails from *Probelie* that were not related to the pilot.

Questions:

1. According to the first paragraph, which of the following is FALSE?
 - A. *Probelie* 's customers do not need to visit offline brick-and-mortar stores to make purchases.
 - B. *Probelie* has been in existence for five years.
 - C. In the past, there were many new customers signing up every day.
 - D. *Probelie* is operating at a loss.

2. What industry (sector) does *Probelie* belong to?
 - A. E-commerce industry
 - B. Financial Industry
 - C. Telecommunications industry
 - D. Advertising Industry

3. Which of the following options BEST describes the reason why the Managing Director of *Probelie* has hired a project team?
 - A. She believes that *Probelie* can become better at identifying customers who stop making purchases.
 - B. She believes that *Probelie* can become better at identifying ways to encourage customers to spend more.
 - C. She believes that, by focusing on the customers of greatest value, *Probelie* can drive renewed growth in their business.
 - D. She believes that *Probelie* can predict the purchasing behavior of its customers better.

4. Which of the following statements is an INVALID description?
 - A. The average one year value for customers whose average number of transactions equals 1.1 is \$1.
 - B. Quintile 3 generated \$120 total revenue in the first 90 days.
 - C. 'One year customer value' is defined as the profit made by *Probelie* on purchases made by a customer in the first 90 days.
 - D. All customers in the sample generated total revenue of \$1052 in the first 90 days.

5. Which of the following CANNOT be concluded from the information presented in Exhibit 1 regarding the sample of customers analyzed?
 - A. Purchasing by customers in their first 90 days is an indicator of their value to *Probelie* in their first year.
 - B. Quintile 1 are the customers with the lowest profit margin for *Probelie*.
 - C. The average customer makes between 2 and 3 transactions in the first 90 days since

signing up.

- D. The average one year customer value is \$7.90.
6. What is the correct ranking of the five quintiles in Exhibit 1 according to the average transaction revenue, from lowest to highest?
- A. 1, 2, 4, 3, 5
 - B. 1, 2, 3, 4, 5
 - C. 1, 3, 2, 4, 5
 - D. 1, 3, 2, 5, 4
7. If *Probelie* had driven higher purchasing from the new customers in Exhibit 1 so that the one year value of customers in Quintiles 1 thru 4 were each to increase to the next highest quintile, how much greater would *Probelie*'s total one year customer value have been?
- A. \$250,000
 - B. \$650,000
 - C. \$2,500,000
 - D. \$6,500,000
8. Which of the following statements about the pilot test is FALSE?
- A. The pilot test is for new customers who have not made a purchase.
 - B. The pilot test divided the customers into two groups.
 - C. The emails sent to the pilot group were different for each one.
 - D. The emails sent to the pilot group were all sent at the same time.
9. Which of the following is NOT a pilot test?
- A. To explore whether extracurricular practices can promote students' academic performance, Mr. Benson leads 50 students out every Friday afternoon.
 - B. In the post-epidemic era, the school wanted to try online teaching, and to ensure the learning effect, it chose finance majors to try it first.
 - C. In order to implement the strategy of expanding openness, the state chose three cities to set up FTZ as pilots.
 - D. Steven is very interested in chemistry and often goes to the lab to do experiments in his free time.
10. Which of the following CANNOT be concluded from the information presented in Exhibit 2?
- A. The pilot had 3% lift in number of transactions for customers whose first choice was in Electronics 0-2 weeks before emails were sent.
 - B. The pilot had 6.9% lift in number of transactions for customers whose first choice was in Electronics 6-8 weeks before emails were sent.
 - C. The pilot had 3.7% lower in number of customers who purchased Clothing/ Apparel in 4-6 weeks before emails were sent.
 - D. There is a relatively large lift in number of transactions for customers whose first choice was in Electronics.

11. When comparing the pilot group to the control group, which of the following CAN be determined from the information provided in Exhibit 2 for customers who purchased Electronics in their first transaction?
 - A. Percentage difference in average number of transactions per customer.
 - B. Difference in number of customers making transactions.
 - C. Two week time segment which had the greatest difference in number of transactions.
 - D. Percentage of total lift in number of transactions represented by each two week time segment.

12. If 10% of customers in the control group made transactions during the pilot, how many of the customers in the pilot group made transactions during the pilot?
 - A. 5,085
 - B. 5,850
 - C. 10,170
 - D. 11,700

13. Which of the following CANNOT be concluded from the information presented in Exhibit 2?
 - A. The pilot had no overall impact on the likelihood of making further transactions among customers whose first purchase was in Clothing/ Apparel.
 - B. The pilot had a positive impact on the number of transactions per customer for customers who made their first transaction 4-6 weeks before emails were sent.
 - C. The pilot had greatest impact among customers whose first transaction was in Electronics.
 - D. Among customers whose first transaction was in 'Other', the pilot had greatest impact among those whose first transaction was more recent.

14. Which of the following data from the pilot period would be LEAST useful in further investigating the impact of the pilot on *Probelie's* business?
 - A. Average transaction value for pilot group and control group customers.
 - B. Percentage of pilot group emails that were not delivered and bounced back.
 - C. Breakdown of data in 'Other' category to further levels of detail.
 - D. Breakdown of two week time periods into weekly time periods.

15. Which of the following is MOST LIKELY to be the reason for the statement by the team member to the Managing Director?
 - A. The Managing Director is concerned that customers in the control group were neglected.
 - B. The team are concerned about how well *Probelie's* staff executed the pilot.
 - C. Customers who receive too many emails from the same company become less likely to open and read them.
 - D. Customers may discover that they were not selected for the pilot and may be unhappy about this.

16. As an online store, store rent is an important item when calculating costs.
 - A. TRUE

- B. FALSE
17. Advertising email marketing belongs to the 'Product' strategy in the 4Ps of marketing mix.
A. TRUE
B. FALSE
18. Based from the results of the pilot test, it can be seen that emails have a positive impact regardless of the category in which the customer first purchase.
A. TRUE
B. FALSE
19. For a customer who frequently purchases discounted items, the email sent to her may mention recent product specials.
A. TRUE
B. FALSE
20. According to the last paragraph, *Probelie* may screen the emails sent to customers in its future marketing strategy.
A. TRUE
B. FALSE

Answer Keys:

1. D
2. A
3. B
4. C
5. B
6. D
7. C
8. A
9. D
10. A
11. A
12. A
13. B
14. B
15. C
16. B
17. B
18. B
19. A
20. A

Innovation Capital

International organizations are important parts of modern international life. They are various institutions established by two or more countries or their governments, people, or civil society for specific purposes in the form of certain agreements. Among them, the G8 is an important political organization. Its member countries include the United States, the United Kingdom, Canada, Germany, France, Italy, Japan, and Russia. The G8 holds regular meetings to discuss issues of importance to its member countries, usually economic issues.

In recent years, countries have experienced slow economic growth, and the emergence of epidemics has created a significant headwind to economic development. Therefore, how to promote economic growth has become an important topic to be discussed at the next G8 meeting. For this meeting, a research institute has prepared a report on the importance of innovation for economic growth. The team intends to introduce to G8 delegates a concept known as "**Innovation Capital**," the value of all innovation-related assets that contribute to productivity growth in the economy.

According to the report, Innovation Capital can be divided into three types:

- **Physical Capital:** Investments in information and communication equipment
- **Knowledge Capital:** Investments that build the intellectual property and brand value of a company or organization
- **Human Capital:** Investments that build individual or group abilities and skills within companies or organizations

Exhibit 3 shows the main components of Innovation Capital and their total value across 16 countries that the team has been studying, including the members of the G8.

Total innovation capital, (US\$ trillions)

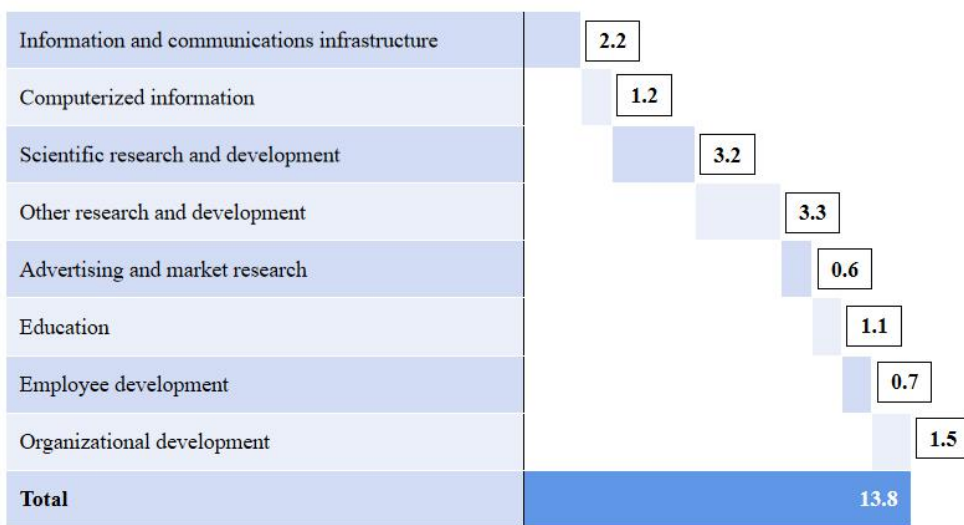


Exhibit 3

In addition, the research institute has examined changes in the growth of the total value of goods and services produced by the business sector in European countries.

The growth in the value of goods and services produced is closely related to two factors.

- **Working hours.** In general, the longer workers work, the more the total value of goods and services produced increases.
- **Productivity.** For the same amount of time worked, more productive workers will produce more goods and services.

Exhibit 4 shows the average contribution of these two factors to business sector growth in 10 European countries over the past 12 years. At the top of each bar is the average annual growth rate of the business sector. In each bar, the orange part represents the proportion of growth driven by changes in Productivity, while the blue part represents the proportion of growth driven by changes in Hours.



Exhibit 4

To further illustrate the importance of Innovation Capital, the research organization decided to use some specific examples of major innovations to supplement the explanation.

One team member thought of the *ipod* music player developed by Apple many years ago which is an excellent example of early Innovation Capital. This proposal was unanimously approved by the team members. They argued that the development of the *ipod* music player not only illustrated all three types of Innovation Capital, but also showed how investments in innovation capital can provide investors with a long-term cumulative follow-on advantage.

Notes on ipod:

The iPod is a series of portable, multifunctional digital multimedia players designed and marketed by Apple Inc. The first generation of iPod was a sensation at the time, not only for its beauty, but also for its unique and user-friendly operation and huge capacity. iPod brought a whole new way of thinking about MP3 players, and since then there have been many similar products on the market, but iPod is still always sought after because of its unique style.

Questions:

1. Which of the following organizations is not a international organization that plays an important role in global economics?
 - A. World Trade Organization
 - B. The World Bank
 - C. International Monetary Fund
 - D. Food and Drug Administration

2. Which of the following MOST accurately describes the reason for the research institute’s work in preparing for the G8 meeting?
 - A. The research institute has discovered a new economic measure known as Innovation Capital and wants to introduce it.

- B. The research institute wants to explain how Innovation can drive economic growth.
 - C. The research institute wants to explain how Innovation can represent a large proportion of an economy's size.
 - D. The research institute wants to convince the group to invest more in Innovation Capital in the future.
3. Which of the following is NOT a type of Innovation Capital?
- A. Physical Capital
 - B. Knowledge Capital
 - C. Human Capital
 - D. Liquid Capital
4. Which of the following analyses would be LEAST appropriate in better understanding the size of investments in Innovation Capital in the countries the research institute has been studying?
- A. Analysis of expenditure by organizations on training programs for their employees.
 - B. Analysis of expenditure by organizations on activities which build awareness of their aims and purpose.
 - C. Analysis of expenditure by organizations on networking and socialization meetings and events.
 - D. Analysis of expenditure by organizations on the management of their databases and information systems.
5. Which of the following can NOT be concluded based on the information provided in Exhibit 3 regarding the countries being studied?
- A. Of all Innovation Capital invested, 'Advertising and market research' were the least invested.
 - B. Of all Innovation Capital invested, 'Other research and development' was the most heavily invested.
 - C. The investment in 'Education' was half of the investment in 'Information and communications infrastructure'.
 - D. The total innovation capital investment is 13.8 million USD.
6. Which of the following can be concluded based on the information provided in Exhibit 3 regarding the countries being studied?
- A. 45% of all Human Capital is invested in Organizational Development.
 - B. 51% of all Innovation Capital is Knowledge Capital.
 - C. More than 10% of Innovation Capital is invested in Computerized Information.
 - D. More than a quarter of Innovation Capital is Scientific Research & Development.
7. If total Innovation Capital in Exhibit 1 were to grow by 5% per year in the future, which of the following would be the MINIMUM required annual growth in Human Capital that would see it represent more than half of total Innovation Capital in 10 years?
- A. 10%

- B. 15%
 - C. 20%
 - D. 25%
8. Which of the following statements may be FALSE?
- A. In addition to hours worked and productivity, there are many factors that can affect the increase in the value of goods and services produced.
 - B. In general, Jason produces more goods and services when he works 8 hours than when he works 4 hours.
 - C. John can produce 20 parts in an hour while Simon can produce 40 parts. The capitalist will prefer Simon because he can produce more value.
 - D. Capitalists can do anything to squeeze workers in order to produce more value of goods and services.
9. Which of the following statements, if true, would BEST explain why the information in Exhibit 4 is important?
- A. Most of the countries in Exhibit 4 have experienced negative economic growth in the last 4 years.
 - B. In most countries, the business sector is the biggest contributor towards Innovation Capital.
 - C. Growth in Hours is mostly driven by growth in the size of the working population.
 - D. Growth in Productivity is mostly driven by growth in Innovation.
10. Which of the following statements is TRUE based on the information provided in Exhibit 4?
- A. Hours grew by 24% across all ten countries over the last 12 years.
 - B. Slovenia had the greatest growth in Productivity over the last 12 years.
 - C. Spain had the least growth in Productivity over the last 12 years.
 - D. Germany had the least growth in Hours over the last 12 years.
11. Which of the following statements is TRUE based on the information provided in Exhibit 4?
- A. Hours in the Czech Republic have had a positive impact on growth over the last 12 years.
 - B. France's growth has been driven more by hours worked than by the economy over the last 12 years.
 - C. Italy's growth has been driven more by hours worked than by the economy over the last 12 years.
 - D. Spain has the longest working hours of the ten countries over the last 12 years.
12. To the nearest tenth of a percentage point, what is the difference between Germany's and Spain's average annual business sector growth due to productivity over the last 12 years?
- A. 0.1 percentage points
 - B. 0.5 percentage points
 - C. 0.9 percentage points
 - D. 1.3 percentage points

13. Which of the following, if true, LEAST explains the data for Slovenia and Czech Republic in Exhibit 4?
- A. Over the last 20 years, the average age of the population in these countries has been steadily increasing.
 - B. Prior to the period in Exhibit 4, these countries were emerging from Communist economies with comparatively poor infrastructure and productivity.
 - C. Net migration into these countries has been negative over the last 12 years.
 - D. Changes in employment laws in these countries have led to greater flexibility for employers in setting working hours for their employees.
14. Which of the following statements LEAST illustrates the Innovation Capital underlying the development of Apple's iPod?
- A. New software and technology was required to allow the distribution of music through online channels.
 - B. New pricing was negotiated with the music industry to encourage online music purchasing.
 - C. New design concepts were developed that gave the product an appealing look and feel.
 - D. A new way of working with the music industry was developed to allow rapid distribution of new music to iPod users.
15. Which of the following analyses would BEST illustrate the research institute's beliefs regarding Apple's iPod?
- A. An analysis of the market share achieved by Apple for its products subsequent to the iPod.
 - B. An estimate of the size of the investment made by Apple in the development of the iPod.
 - C. An estimate of the profit margins of the music industry subsequent to the launch of the iPod.
 - D. An analysis of the reactions of technology experts to the iPod and subsequent Apple products.
16. In the context of economic globalization, international organizations have an important impact on the development of cross-border trade.
- A. TRUE
 - B. FALSE
17. The investment in R&D for 5G Networks belongs to the investment in Knowledge Capital. (*R&D, Research and Development*)
- A. TRUE
 - B. FALSE
18. Companies spend lot of time and money training their employees but hardly achieve tangible results so employee training is not necessary.
- A. TRUE

B. FALSE

19. Regulations and restrictions on workers' normal working hours are a form of protection for workers

A. TRUE

B. FALSE

20. The example of Apple Inc. shows us that companies need to continue innovating if they want to maintain a competitive advantage

A. TRUE

B. FALSE

Answers:

1. D

2. B

3. D

4. C

5. D

6. A

7. B

8. D

9. D

10. B

11. C

12. C

13. D

14. B

15. A

16. A

17. B

18. B

19. A

20. A

Beryl Modern Art Gallery

The *Beryl Modern Art Gallery* is located in Riverside, a district of the city, which has a total population of roughly 3 million people.

The idea of building a modern art gallery in the center of the city was proposed in 2005. In 2010, the government officially approved the construction plan and announced it to the public. The construction of the Gallery took five years and was opened to the public in summer 2016. The Gallery cost \$20 million to build and prepare, with 75 percent of the funding coming from the government's Arts Council and 25 percent from private donations by interested sponsors.

Except for certain special exhibitions, the Gallery is free to the public and does not charge admission. The Gallery's operations are mainly supported by sales from the in-house restaurant and gift store, as well as some regular private donations.

In order to improve the Gallery's operations, the Gallery's management has decided to apply to the Government Arts Council for an additional funding. But during the application process, they are told that they need to demonstrate to the Arts Council that the gallery's operations will provide the city with benefits worthy of the additional funding the Council will invest in it. They have determined that Gallery would benefit the city in two ways:

- **Economic benefits:** impact on local business and economy
- **Social benefits:** impact on local social, educational and recreational activities

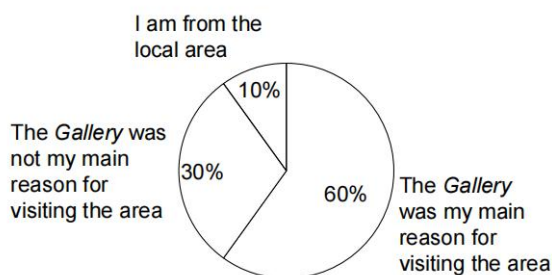
The Arts Council has made it clear that the economic benefit to the city is the critical factor in determining whether they will invest additional funds in Gallery. Now the Gallery's management invites you to help them make a case for additional funding.

In the course of your research, you were given the results of a random survey of Gallery visitors conducted in the last month. Some of the results of that survey are shown in the Exhibit 5.

Data from Recent Visitor Survey in the Gallery

Total number of respondents = 6,000

Split of visitors by priority of visit % of all respondents



Split of visitors by source

% of those who visited the area primarily to see the Gallery

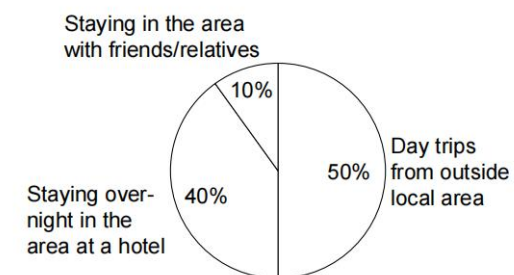


Exhibit 5

After further research, you and your team concludes four important facts:

- Gallery had \$5 million in sales in its first year of operation.
- Spending in the Riverside occurred outside the gallery, but because the gallery was there, the total amounted to \$40 million.
- Gallery employed an average of 25 people (full time equivalent) in its first year of operation.
- Gallery's employees generated the most employee revenue of any related business in the city.

Questions:

1. Which of the following is NOT a world-famous art gallery?
 - A. The British Museum
 - B. Vatican Museum of Art
 - C. Musée du Louvre
 - D. Egyptian Pyramids
2. Which of the following fund sources is possible to museums
 - A. Personal funds
 - B. Loans
 - C. Government funding
 - D. All of the above
3. Which of the following statements about the *Beryl Modern Art Gallery* is FALSE?
 - A. The Gallery is located in Riverside, a district of the city.
 - B. The Gallery completed all construction and preparatory work in 2010.
 - C. The Gallery was opened to the public for tours in 2016.
 - D. Not all of the funding for the construction and preparation of the Gallery came from the government's Arts Council.
4. If the construction and preparation of the Gallery cost 1.5 times as much as it would have, how much would private donations from sponsors have to provide according to the original ratio of funding sources?
 - A. \$5 million
 - B. \$7.5 million
 - C. \$15 million
 - D. \$22.5 million
5. Which of the following descriptions of the Gallery's operation is FALSE?
 - A. Special exhibitions may be held in the Gallery.
 - B. Most of the time, the Gallery is open to the public for free.
 - C. The Gallery has in-house restaurants and gift stores.
 - D. The Gallery's funds have become insufficient to keep it going.

6. What was the Gallery's management told when they applied to the Government Arts Council for additional funding?
 - A. The Government Arts Council could not provide additional funding.
 - B. The Gallery could not be given additional funding because of its lack of economic and social benefits.
 - C. The Gallery does not need additional funding for its current operations.
 - D. The Gallery's management needs to demonstrate that the Gallery is worthy of additional funding.

7. Which of the following statements is accurate regarding the Gallery's bid for additional funding?
 - A. If the Gallery has provided economic benefit to the city, it will receive additional funding from the Arts Council.
 - B. If the Gallery has not provided social benefit to the city, it will not receive additional funding from the Arts Council.
 - C. If the Gallery has not provided economic benefit to the city, it will not receive additional funding from the Arts Council.
 - D. If the Gallery has provided social benefit to the city, it will not receive additional funding from the Arts Council.

8. If the Gallery estimates that 150,000 people visited in the last year and that two-thirds of them only visited once, which of the following statements is a valid conclusion about a randomly selected visit during this time period?
 - A. There is a 25% chance that a visit to the Gallery was that person's only visit for the year.
 - B. There is a 33% chance that a visit to the Gallery was that person's only visit for the year.
 - C. There is a 66% chance that a visit to the Gallery was that person's only visit for the year.
 - D. There is a 75% chance that a visit to the Gallery was that person's only visit for the year.

9. Which of the following statements would be most useful in determining if the Gallery has provided an economic benefit to city?
 - A) Property values in the city and how they have changed recently.
 - B) Recent changes in employment levels both in the city.
 - C) Recent changes in the popularity of arts-related events in the city.
 - D) Recent changes in the average income for households in the city.

10. Which of the following statements is FALSE based on the information provided in Exhibit 5?
 - A. The total number of respondents to the survey was 6,000.
 - B. 10% of the respondents were from the local area.
 - C. 10% of the respondents were staying with friends/relatives.
 - D. 60% of respondents came to Riverside because they wanted to visit the Gallery.

11. Which of the following statements is TRUE based on the information provided in Exhibit 5?
 - A. About 1800 people came to Riverside primarily to visit the gallery.
 - B. About 1800 respondents chose day trips from outside the local area.

- C. About 2,400 respondents chose to stay overnight in the area at a hotel.
 - D. This survey is not a random survey.
12. Which of the following statements is a valid conclusion based on the data presented in Exhibit 5?
- A) 24% of people spent money on an overnight hotel stay because of the Gallery's presence.
 - B) 40% of people did not spend any money because of the Gallery's presence.
 - C) 50% of visitors to the Gallery came on day trips from outside the city.
 - D) 60% of visitors only came to the city to see the Gallery.
13. How many respondents to the survey stayed with friends/relatives in the city because they wanted to visit the Gallery?
- A) 60
 - B) 360
 - C) 600
 - D) 2,400
14. According to the four facts, which of the following conclusions CANNOT be drawn?
- A. The Gallery's sales account for one-eighth of riverside's total spending.
 - B. The Gallery's employees have better employee revenues.
 - C. The gallery employs the largest number of employees of any institution in its category.
 - D. Overall, galleries have a positive economic impact on the city.
15. Which of the following conclusions, if true, would best further support the Gallery's bid for additional funding?
- A) The Gallery's benefit to the local area, both economic and social, has been higher than originally expected.
 - B) The Gallery has provided more economic benefit to the local area than the last such institution to open in the city.
 - C) If the trends in Gallery visitor numbers continues, the area around the Gallery will have the highest tourist spending levels within 2 years.
 - D) If the Gallery does not obtain additional funding, it will not be able to support the expected growth in visitor numbers.
16. The gallery industry falls into the service sector.
- A. TRUE
 - B. FALSE
17. Since the Gallery does not charge money for admission, it struggles to remain in operation.
- A. TRUE
 - B. FALSE
18. Like museums and libraries, galleries can contribute to a strong cultural atmosphere in the city.

- A. TRUE
- B. FALSE

19. For the Government Arts Council, the additional funding provided to Galleries is an investment in the development of the city.

- A. TRUE
- B. FALSE

20. Generally speaking, the sale and purchase of artworks is also an important business of gallery operation.

- A. TRUE
- B. FALSE

Answers:

- 1. D
- 2. D
- 3. B
- 4. B
- 5. D
- 6. D
- 7. C
- 8. A
- 9. B
- 10. C
- 11. B
- 12. A
- 13. B
- 14. C
- 15. C
- 16. A
- 17. B
- 18. A
- 19. A
- 20. A

Quick-Mail

Quick-Mail is a postal service company. It is headquartered in Morvania and offers services in all postal areas, from collection to delivery, for both individual and business customers. The postal business it operates can be divided into the following main stages.

- **Retailing postal fees:** Customers ask *Quick-Mail* to deliver their letters or packages for them and pay the appropriate fees. For individual customers, it is usually necessary for the customer to purchase their own stamps at the post office. While for business customers, they can have their mail automatically stamped to complete this service. The cost of sending a letter or package is calculated based on the destination, its weight, and the required speed of its delivery. But it is generally cheaper for business customers because they use auto-stamping and often bring the mail to *Quick-Mail* themselves.
- **Collection:** Collects stamped mail from designated mailboxes. Customers will deposit most of these mails into the designated mailboxes, and then some business customers may bring them directly to the sorting office of *Quick-Mail*.
- **Sorting and stamp cancellation:** *Quick-Mail* has designated offices throughout the country. At the offices, *Quick-Mail* sorts the mail according to its destination. Most domestic mail has an address code written by the sender which can be read and sorted automatically by machines. When mail is sent without a code or the machine cannot read the code, the sorting must be done by hand. At this stage, the stamp on the letter or package is also “cancelled” using an ink mark to ensure that the stamp cannot be re-used.
- **Transportation and delivery:** Once the mail has been sorted, it will be delivered to the area where it needs to be delivered. Delivery is usually done by a combination of road, rail and air transport. Once the mail arrives in the appropriate area, the local delivery office delivers the mail to the designated address.

Quick-Mail's CEO noticed that the company's business profitability was significantly lower in December compared to other months. He was so puzzled by this finding that he hired a team of investigators to look into the possible causes and hoped that the team could give appropriate remedies.

He told the survey team that Morvia, a predominantly Christian country, has a long Christmas holiday in late December. Sending messages and cards with Christmas greetings has always been a tradition, so the number of individual emails increased during the month. In light of these facts, the CEO could not reconcile the lower profitability in December. Table 6 shows some of *Quick-Mail's* key financial data, comparing the December average with the other 11-month averages.

Key Financial Data for <i>Mail-It</i> (Average per Month)		
	January – November	December
Number of days in month	30.4	31.0
Revenue (\$US millions)	246.2	266.1
Number of items handled (millions)	991.0	963.0
Costs (\$US millions)	212.3	251.2
Profit (\$US millions)	33.9	14.9

Exhibit 6

The survey team continues to examine various factors related to *Quick-Mail's* business operations. One of these is the machines used to sort mails at the various sorting offices. These sorting machines use a red laser to read the address codes written or printed on the letters or packages. Once the machine has read the address code, the letter or package is sent to the appropriate area for distribution. However, if the machine fails to read, it must be sorted by hand. Exhibit 7 shows the "flow" of mail through Mail- It's sorting offices and how it differs in December versus the rest of the year.

'Flow' of Mail through *Mail-it's* Sorting Machines

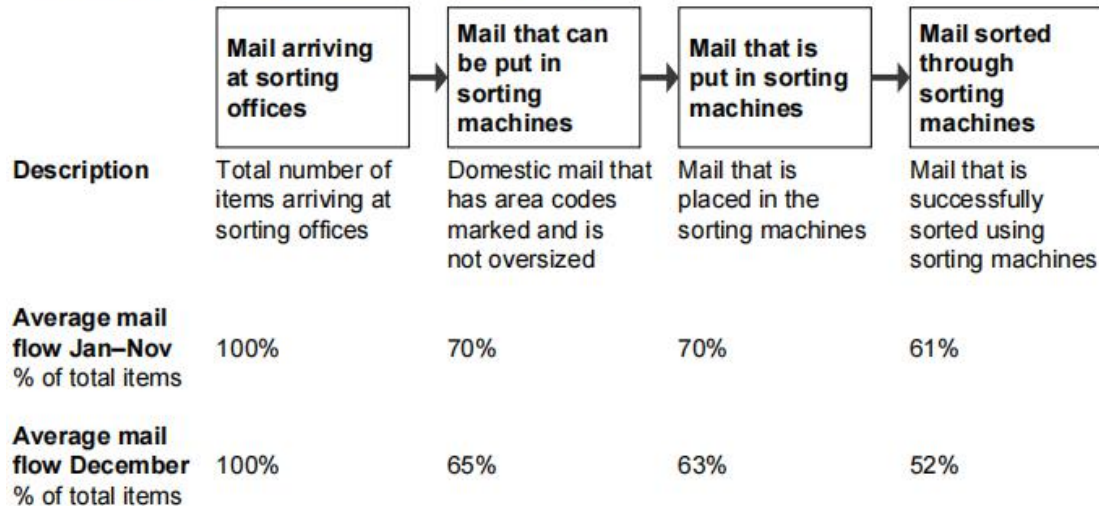


Exhibit 7

Referring to the process of sorting mail, *Quick-Mail's* CEO asked if it was possible to eliminate the manual processing of stamps for mail. Although reading and canceling stamps is an automatic step for machines, manual processing of unreadable stamps is a cumbersome process that can take up a lot of employee time. Especially during the busiest time of the year, it would overload employees. Therefore, he wondered if the benefits of eliminating this step would outweigh the risks.

The survey team investigated sorting office staff costs for December versus the rest of the year, comparing some measures of sorting office staff costs and staff productivity for December to the rest of the year, as shown in Exhibit 8.

Some Measures of Staff Cost and Staff Productivity in Sorting Offices (Average per Month)		
	January – November	December
Hourly rate of pay (p)	\$8.20	\$7.60
Items handled (h)	991 million	963 million
Paid hours spent working (w)	8.1 million	9.4 million
Paid hours spent not working (e.g., sickness, training) (n)	1.9 million	1.2 million

Exhibit 8

The team then proceeds to examine staffing in sorting offices in December. Exhibit 9 tracks the total number of items arriving and hours worked in sorting offices nationwide in the three weeks before and two weeks after Christmas. In this Exhibit, Week 0 is the week containing Christmas Day. The solid black line represents the total items arriving, and is given as a percentage of the total items in week -3. The broken line at the top represents the total hours worked, and is given as a percentage of the total hours worked in week -3. Finally, the dotted line at the bottom represents the hours worked by hourly staff who are not permanent employees of *Quick-Mail*, and is given as a percentage of total hours worked in week -3.

Hours Worked and Items Arriving at Sorting Offices in the Weeks Around Christmas

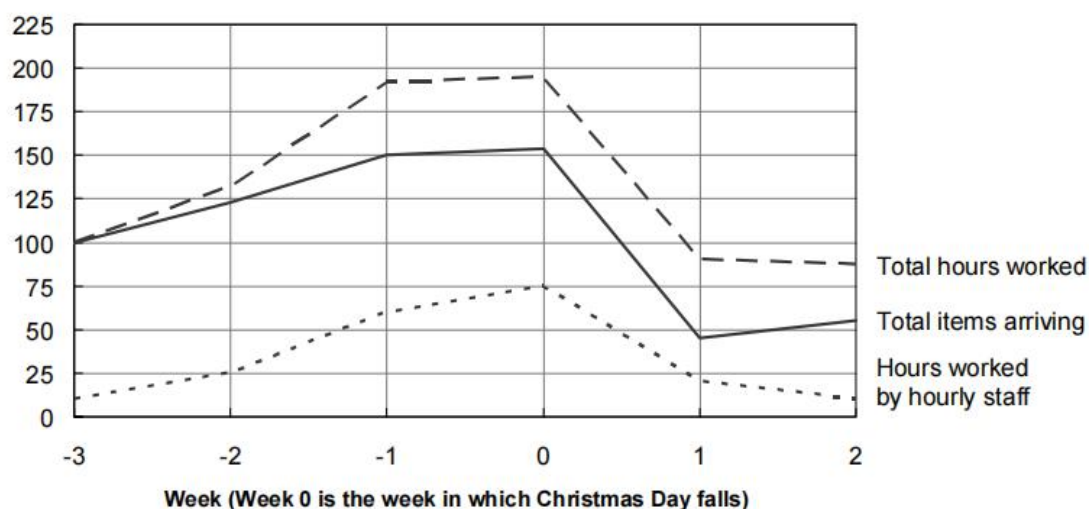


Exhibit 9

Questions:

1. Which of the following statements about the company *Quick-Mail* is FALSE?
 - A. *Quick-Mail* is a multinational company.
 - B. *Quick-Mail* is a company that is located in a country where Christianity is the main religion.
 - C. Both individual customers and business customers can call *Quick-Mail* for postal services.
 - D. 'Retailing postal fees', 'collection', 'sorting and stamp cancellation' and 'transportation and delivery' are the four phases of its postal business.

2. Which of the following statements about the phases of the postal business operated by *Quick-Mail* is FALSE?
 - A. Retailing postal fees are usually lower for business customers than for individual customers.
 - B. The collection stage is the collection of stamped mail from a designated mailbox.
 - C. The sorting of stamps is done completely automatically by machines.
 - D. There are various modes of transportation for delivering mail.

3. Which of the following statements, if true, would BEST explain the differences in the revenue and number of items handled between December and the other months of the year?
 - A. There is a greater proportion of personal mail sent in December than at other times of the year.
 - B. There is a greater proportion of business mail sent in December than at other times of the year.
 - C. The average weight of items in December is lower than it is at other times of the year.
 - D. Customers do not send as much urgent mail in December as they do at other times of the year.

4. What is the difference, in percentage points, between the profit margin for December versus the average profit margin for the other months?
 - A. 3.7 percentage points
 - B. 5.2 percentage points
 - C. 6.7 percentage points
 - D. 8.2 percentage points

5. Which of the following statements is MOST accurate regarding the data in Exhibit 6?
 - A. There are approximately 3% fewer items per day in December versus the average of the other months of the year.
 - B. There are approximately 5% fewer items per day in December versus the average of the other months of the year.
 - C. There are approximately 3% more items per day in December than in any of the other months of the year.
 - D. There are approximately 5% more items per day in December than in any of the other

months of the year.

6. Which of the following reasons, if true, would best explain the differences in the data identified as “Mail that can be put in sorting machines”?
 - A. People send more mail to old friends in December and do not know their address codes.
 - B. A lot more personal mail is sent with handwritten addresses in December, which are more difficult for machines to read.
 - C. More sorting machines develop faults and break down in December.
 - D. More domestic mail is sent in December because of the Christmas greeting card surge.

7. How many more items of mail need to be hand sorted in December versus the average of the other months of the year?
 - A. 76 million
 - B. 104 million
 - C. 132 million
 - D. 160 million

8. Which of the following statements is FALSE based on the information provided in Exhibit 8?
 - A. Employees were paid less per hour in December than in the the average for the rest of the year.
 - B. Employees handled 963 million items in December.
 - C. ‘Employees worked more hours with pay’ in December than in the average for the rest of the year.
 - D. ‘Paid Hours spent NOT working’ were more in December than in the rest of the year.

9. Which of the following ideas would NOT help address the differences in the mail flow between December and the remainder of the year as indicated in Exhibit 8?
 - A. Work with Christmas greeting card manufacturers to add instructions to envelopes informing the sender to write the address clearly.
 - B. Discourage the production of red envelopes for Christmas greeting cards, which cannot be read using red laser beams.
 - C. Discourage the production and retail of very large novelty Christmas greeting cards.
 - D. Encourage manufacturers to create greetings cards with envelopes that have pre-paid postage.

10. Which of the following questions best summarizes the CEO’s concerns?
 - A. Does stamp cancellation take up too much unnecessary time in the processing of manual mail?
 - B. Would the gain in productivity from stopping stamp cancellation in manual mail be worth more than the lost revenue from fraudulent re-use of stamps?
 - C. Would the amount of time saved from stopping manual stamp cancellation result in a significant decrease in the time spent processing manual mail?
 - D. Does it make sense to stop the cancellation of stamps on manual mail given that the majority of mail now goes through machines?

11. Which of the following reasons, if true, would best explain the differences in Paid Hours spent NOT working between December and the average for the rest of the year?
- More hourly staff are employed in December and they are paid per hour spent working.
 - More holidays are taken by employees in December because of the Christmas period.
 - More sick days are taken by employees in December because of the cold weather.
 - More items are handled overall from January to November versus December.
12. Which of the following statements would NOT be a potential reason for the lower rate of items handled per hour spent working in December?
- The staffing of the different sorting offices is more chaotic in December and is not aligned with the volume of mail expected in each office.
 - Staff performance reviews take place in November and their productivity bonuses for the year have already been decided by the beginning of December.
 - Staff spend less hours working in the last week of December, immediately after the Christmas holiday.
 - In the last week in December, immediately after the Christmas holiday, there is 40% less mail to be handled than in the rest of the year.
13. If an average employee is paid for 160 hours per month, which of the following formulae accurately calculates the average number of items handled per employee, per month, for the periods being investigated?
- $h / [(w + n) \times 160 \times p]$
 - $h / [(w + n) \times 160]$
 - $(w + n) \times 160 / h$
 - $(h \times 160) / (w + n)$
14. The CEO of *Quick-Mail* has traditionally used “Average total pay per item handled” as the key measure of staff productivity for the sorting offices. Which of the following points best explain why this is NOT the ideal measure?
- Scoring lower on this measure does not necessarily imply that staff in sorting offices are being more productive.
 - This measure does not take into account the other costs of operating a sorting office, such as machine costs.
 - A sorting office can score well on this measure by simply employing a large number of staffs.
 - This measure clearly favours sorting offices with larger amounts of manual mail to handle.
15. Which of the following statements is a valid conclusion of the weeks being analysed from Exhibit 9?
- Week -1 saw the highest proportion of time worked by hourly staff compared to other staff.
 - In Week -3, the hours worked were exactly enough to match the number of items

received.

- C. Between Weeks 1 and 2, the change in total hours worked was not proportional to the change in items arriving.
 - D. Between Weeks -2 and -1, the increase in hours worked by hourly staff was not enough to cover the increase in items received.
16. With the popularity of online shopping, the postal courier business is also growing by leaps and bounds
- A. TRUE
 - B. FALSE
17. For postal service companies, labor costs and transportation costs are important costs that affect profitability.
- A. TRUE
 - B. FALSE
18. Suppose Quick-Mail has 20 sorting offices across the country, and each sorting office has 20 sorting machines, then these machines belong to the liquid assets of Quick-Mail.
- A. TRUE
 - B. FALSE
19. Quick-Mail's business situation shows that the company has to be aware of any factors such as culture and religious beliefs that may affect the business in the course of its operations.
- A. TRUE
 - B. FALSE
20. Permanent employees are required to sign employment contracts with their employers, while hourly staff are not.
- A. TRUE
 - B. FALSE

Answers:

- 1. A
- 2. C
- 3. A
- 4. D
- 5. B
- 6. A
- 7. A
- 8. D
- 9. D
- 10. B
- 11. A
- 12. C

- 13. D
- 14. A
- 15. C
- 16. A
- 17. A
- 18. B
- 19. A
- 20. B

Garbage Removal

Garbage Removal Inc (GRI) is a company that operates garbage disposal services in all major cities in the United States. It offers two main types of garbage disposal services.

- **Garbage collection.** *GRI* operates this service in every major city in the U.S. *GRI* operates a fleet of trucks that collect garbage from businesses on different routes in a city and transport it to landfills that are owned and operated by *GRI* or other operators.
- **Landfill Management.** *GRI* owns landfills in some of the cities where it operates waste collection services. These sites receive waste from *GRI* refuse trucks and other operators. The waste is then treated and disposed of (primarily by burial) at these sites.

GRI's operations in each city are managed as its own company and report to *GRI*'s headquarters in Boston. *GRI*'s garbage collection service is paid for by its customers, businesses of all sizes, on a monthly basis. The monthly fee depends on the volume of waste to be disposed of and ensures collection from the customer's premises twice a week. It also includes the cost of disposing of the waste in a landfill.

GRI earns additional revenue at landfills it owns and operates by charging non-*GRI* waste trucks a fee per ton of waste disposed of. The cost of waste collection and landfill management services can vary from city to city due to varying levels of local competition.

The data collected by *GRI* reveals that their company's performance varies significantly from city to city. *Exhibit 10* shows some key data for the three cities where *GRI* operates both waste collection and landfill management businesses.

Summary Data Collected on <i>GRI</i>'s Services in Three Cities			
	Milwaukee	San Diego	Orlando
Average trash collection fee per customer per month (t)	\$420	\$370	\$400
Number customers (n)	10,000	13,000	11,500
Landfill fee to non-<i>GRI</i> trucks per ton of waste (l)	\$25	\$30	\$22
Total waste processed at landfill site per week (w)	5,000 tons	4,200 tons	6,800 tons
Net profit margin (trash collection)	6%	9%	2%
Net profit margin (landfill mgmt)	15%	18%	12%

Exhibit 10

GRI recently appointed a new CEO who asked the professional team to review the business to determine the main reasons for the differences in performance across cities. He also wanted the

professional team to investigate the best performing cities and make recommendations on how to improve the profitability of the underperforming cities.

The team proceeds to analyse the average profitability of a garbage truck. They gather the following information regarding a typical garbage truck in Orlando:

- The average weekly fee per customer is \$100
- Customers get two pickups per week, each weighing 0.1 tons per customer on average
- Truck, fuel, and crews cost \$2,000 per day and operate five days per week
- The cost to *GRI* trucks of disposing at *GRI*'s landfill site is \$15 per ton

In an effort to investigate ways in which *GRI* could increase its number of trash collection customers, the team has analyzed the results of a recent survey on selected businesses located on *GRI* trash collection routes in Orlando. The survey asked questions about the businesses' awareness of *GRI* services and whether they had used *GRI* services before. The results were split between small businesses (employing 50 people or less) and large businesses as presented in *Exhibit 11*.

Results of Survey on Small and Large Businesses on Selected <i>GRI</i> Trash Collection Routes in Orlando		
	Small Businesses	Large Businesses
Total number surveyed	10,240	2,865
Those aware of <i>GRI</i>'s services	6,983	1,355
Those who have considered using <i>GRI</i> for trash disposal	4,745	1,203
Those who currently use or have used <i>GRI</i>'s trash disposal services in the past	4,295	1,141
Those who currently use <i>GRI</i>'s trash disposal services	2,045	565

Exhibit 11

The team then investigates the profitability of running landfill sites for *GRI*. During a discussion with the manager of the Orlando company, following facts has been found out:

- Landfill sites must have at least one environmental specialist 24 hours a day, seven days a week, to satisfy environmental regulations
- The *GRI* landfill site in Orlando is the only such site in the city, and is open 9am to 5pm Monday to Friday. It employs four environmental specialists and eight other staff
- Total weekly employee cost for the Orlando landfill site is \$7,000

The manager also gives a chart like *Exhibit 12* , which shows the amount of trash, in tons, arriving

at the landfill site on average each day.

Waste Levels Arriving on Each Day of the Week (Orlando Landfill Site)

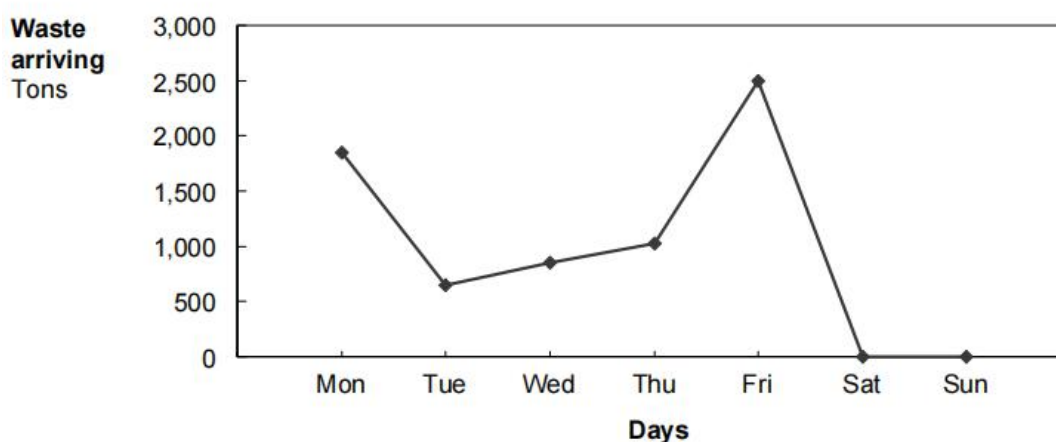


Exhibit 12

Questions:

- Which of the following statements is TRUE based on the information provided in Exhibit 10:
 - Milwaukee enjoys the maximum net profit margin among three cities.
 - Orlando has least customers of trash collection among three cities.
 - The lowest average trash collection fee per customer per month among three cities is San Diego.
 - The living cost for San Diego is lowest.
- Which of the following equations best approximates *GRI*'s weekly revenue, r , in a city?
 - $r < t \times n + l \times w$
 - $r = t \times n + l \times w$
 - $r < (t \times n) / 4 + l \times w$
 - $r = (t \times n) / 4 + l \times w$
- Based on the data presented in Exhibit 10, which of the following statements is a valid conclusion?
 - Trash collection contributes approximately 25% less towards overall profit than landfill management in these three cities.
 - San Diego has the lowest revenue from trash collection operations of the three cities.
 - Orlando has the highest revenue from landfill management operations of the three cities.
 - In these three cities, landfill management brings in two to six times more profit per customer dollar spent than trash collection.
- Which of the following statements, if true, would NOT help explain the differences in net profit margins for trash collection across the three cities in Exhibit 10?

- A. Different cities require different staffing levels due to complexities of collection routes.
 - B. Price competition for trash collection services differ by city.
 - C. There are differing levels in the average volume of trash per customer in the different cities.
 - D. There are differing levels in the average fuel cost per transport in the different cities.
5. How much does a garbage truck spend on trucks, fuel and staff in a week?
- A. \$10,000
 - B. \$14,000
 - C. \$2,000
 - D. \$100,000
6. Assume that in calculating the average profitability of a garbage truck, there are no costs other than those already listed, which of the following quantities represent the SMALLEST number of customers required for an Orlando garbage truck to make a profit on its weekly run?
- A. 96
 - B. 100
 - C. 104
 - D. 108
7. Based on the survey results in Exhibit 11, what is the total number of small and large businesses surveyed?
- A. 10,240
 - B. 2,865
 - C. 13,105
 - D. 7,375
8. Based on the survey results in Exhibit 11, what percentage of the survey participants are aware of *GRI*'s services?
- A. 68%
 - B. 47%
 - C. 45%
 - D. 63%
9. What is the difference, in percentage points, between the awareness rate of small businesses on these routes and that of large businesses regarding *GRI*'s services?
- A. 1 percentage point
 - B. 4 percentage points
 - C. 21 percentage points
 - D. 26 percentage points
10. Which of the following reasons, if true, would NOT help explain why the number of current large business customers in Exhibit 11 is smaller than the number of current small business

customers?

- A. There are fewer large businesses than small businesses in Orlando.
 - B. Large businesses are more likely to have their own waste disposal facilities than small businesses.
 - C. Large businesses receive greater levels of advertising and marketing than small businesses.
 - D. Waste disposal represents a lower proportion of overall spending for large businesses than for small businesses.
11. According to the information provided in Exhibit 12, from Monday to Friday, which day the amount of trash, in tons, arriving at the landfill site is the least?
- A. Tuesday
 - B. Friday
 - C. Saturday
 - D. Monday
12. According to the information provided in Exhibit 12, from Monday to Friday, how many times is the maximum amount of garbage than the minimum amount of garbage?
- A. 1-1.2
 - B. 2-3
 - C. 4-5
 - D. Infinity
13. Which of the following quantities best approximates the average daily amount of waste arriving at the landfill site from Monday to Friday?
- A. 985 tons
 - B. 1,095 tons
 - C. 1,375 tons
 - D. 2,175 tons
14. Based on the information provided by the Orlando manager regarding staffing at the Orlando landfill site, which of the following statements is a valid conclusion?
- A. One third of total employee cost for the landfill site is for environmental specialists.
 - B. At least one environmental specialist must work more than 40 hours per week.
 - C. Staff who are not environmental specialists do not work more than 40 hours per week.
 - D. The majority of the landfill site's employee cost is for staff who are not environmental specialists.
15. Which of the following values best approximates the labor cost per ton of waste for the Orlando landfill site?
- A. \$0.82
 - B. \$1.02
 - C. \$1.22
 - D. \$1.32

16. *GRI* generates additional revenue by charging non-*GRI* garbage trucks at landfills it owns and operates.

- A. TRUE
- B. FALSE

17. The newly appointed CEO invite a team to learn how to improve the performance of the underperforming cities.

- A. TRUE
- B. FALSE

18. Only big companies need the service provided by *GRI*.

- A. TRUE
- B. FALSE

19. The costs of waste collection and landfill management services vary among cities due to different volumes of wastes to be disposed of.

- A. TRUE
- B. FALSE

20. The data collected by *GRI* shows that their company has a very stable performance.

- A. TRUE
- B. FALSE

Answers:

- 1. C
- 2. C
- 3. D
- 4. C
- 5. A
- 6. C
- 7. C
- 8. D
- 9. C
- 10. D
- 11. A
- 12. C
- 13. C
- 14. B
- 15. B
- 16. A
- 17. A
- 18. B
- 19. B

20. B