

Read carefully the questions and adequately justify your answers.

Consultation of class or other materials is not allowed.

The use of simple, non-alphanumeric, non-programmable calculators is permitted, including scientific calculators. The use of graphing calculators is not allowed.

Answer Group 1, Group 2, and Group 3 on three separate sheets.

Portugal Bugs

(Adapted from Revista Exame, October 2021, Meios e Publicidade, August 2021, Expresso, June 2022, and Hipersuper, March 2022)

After creating a protein bar with insect flour at the Faculty of Sciences of the University of Porto in 2016, Guilherme Pereira went to the Netherlands to investigate the production of the insect *tenebrio molitor*. He teamed up with his girlfriend and colleague of Food Engineering and, among their own funds and incentives, they invested €100,000 in the creation of the startup Portugal Bugs.

Their products, based on *tenebrio*, are on sale in their online shop as well as in 10 Continente retail shops. They are sold as snacks, protein bars, and flour. "We are amazed with the receptivity. We know there is reluctance, but people want to eat the insect, for the sake of the challenge. Those with flavours are the most sought after", says Guilherme Pereira, co-founder of Portugal Bugs, based in Matosinhos. Their products have been well accepted, particularly by the younger generation, between the ages of 12 and 40.

The Tasty Mealworms snacks are composed of dehydrated insects flavoured with cayenne pepper or sea salt. Mealworm Bites protein bars are made from natural ingredients and are available in a variety of flavours. The flour, also produced from the insect *tenebrio molitor*, can be used to enrich recipes for bread, biscuits, cakes, pancakes, milkshakes. Prices range from €1.79 to €9.95.

Currently, the company is focused exclusively on the production and development of food products with insects, acquiring the raw materials exclusively from European suppliers, intending in the near future to use exclusively Portuguese suppliers.

The market entry strategy was outlined in partnership with Continente retailer with the aim of "reaching a considerable percentage of consumers". Portugal Bugs then extended the distribution of its products to other retailers, such as Auchan, and recently introduced a bug meal in the canteens of Lisbon's Polytechnic Institute.

A source from Sonae MC (Continente retailer group) says that product sales have exceeded expectations, and Portugal Bugs revealed that, in April 2021, they had sold 130,000 insect bars and over 4,000 insect snacks in half a year, including cricket based products. The company also made an announcement: they will now launch the first bug burger, to be followed by other products.

In fact, about a third of the world's population already consumes insects as an alternative source of protein, helping to sustain a business that is expected to reach eight billion dollars by 2030 and to grow 28.3% per year. With world's population booming, the planet facing a climate emergency, and finite water and arable land resources, today's eccentricity could be tomorrow's inevitability.

"When we talk about the environmental benefits, people become more convinced and they venture into tasting it," says Guilherme. Compared to a cow, for example, obtaining the same kilogram of protein from insects, contributes six times less to global warming and has wide food applications: beer, bread, biscuits, croquettes, ice cream, granola, among others.

The most recent events with the war in Ukraine and the food crisis that may result from it, as well as the inflation and potential economic recession make insect food production and consumption even more promising as a more economically and environmentally accessible alternative.

In the European Union, insects are considered novel food that needs a risk assessment by the food authority EFSA and green light from the European Commission to be marketed. In June 2021, the dried tenebrio larvae was the first to become eligible to be sold on the market. In the meantime, due to a Community court decision, transitional measures allow, with some preconditions, to produce, sell and use in food products in Portugal seven other species of insects, among crickets, beetles or grasshoppers, but only as a whole or milled.

"It was, to everyone's amazement, a breath of fresh air for us to be able to commercialise", says Vasco Esteves, vice-president of the association of insect producers Portugal Insect (an association of which Portugal Bugs is a founding member). Vasco Esteves hopes that, in a matter of months, other species will join the European authorisations - in January 2021, there were 14 under analysis. But, "from there to materialising in legislation that allows consumption, it takes time", he notes. However, for Portugal to have a significant industry is a huge step away. Despite the tradition of producing insects for animal feed, there is a lack of technological know-how for the production and processing of insects for food, as well as a lack of legislation and financial muscle. Producing protein from insects is still expensive, but the scale effect - with major investment in automation and personnel - is expected to reduce the burden over time.

In the case of a structure for manual production, with an area of 200 to 300 square metres, Vasco Freitas estimates that the investment required may be around 100 to 200 thousand euros. In the case of automation and construction in height, which allows intensive production while maintaining animal welfare, it implies spending around two thousand euros per square metre.

As far as cash in hand is concerned, the result is not negligible. In Europe, according to the association, a kilo of grasshoppers costs around 200 euros; crickets, 100 to 200 euros; and tenebrio, 50 to 100 euros. "These are markets with very low margins, based on volume. There isn't much margin for incorporating insect flour into human food if there isn't an attractive price," explains Vasco Esteves. "The sector is in a state of initial development that will take five to eight years to produce at acceptable costs," he points out, stressing the need for tax incentives for an industry that can contribute to the circular economy and bioconversion, which are important to the European agenda.

But before the barriers of defining regulations and legislation, as well as financial muscle, there is another barrier that must be overcome: the mental barrier that prevents many from even trying to ingest an insect, let alone admitting to having it in their diet on a regular basis. Some of the 320 start-ups dedicated to this activity worldwide are already experimenting with the original food in order to obtain different flavours.

In Portugal, companies such as Portugal Bugs rejoice at the 11.7% of Portuguese who, according to a March 2022 article by four Portuguese researchers, would accept to substitute meat for whole insects (35.2%, when the alternative is products containing insects). Guilherme Pereira, who invoiced 40 to 50 thousand euros in 2021, intends to expand the range of products to triple or quadruple sales in 2022.

GROUP 1 (6 points)

1. Given the information provided, perform a PESTEL analysis of Portugal Bug's environment. What implications does it have for the strategy of the company?

Theoretical component (20%)	Practical component (70%)
Brief explanation of what PESTEL – analysis of the external <u>macro</u> environment, with its 6 trends, to understand how it can influence the industry.	<p>Explain the different trends and how they may impact the insect bug food industry.</p> <p>Political (12,5%) – War in Ukrain and potential food crises leads to search of alternative food sources (+)</p> <p>Still lack of tax incentives for insect production for food purposes (-)</p> <p>Economic (10%) – inflation, especially regarding food, leads to search of more cost-effective food sources (+)</p> <p>Social (15%) – some market segments, especially you consumers, are open to new (challenging) food. First products have been well accepted in the market and go beyond expectations. (+)</p> <p>Insects as food has been growing globally. (+)</p> <p>Still the large majority of consumers in Portugal do not consider insects in their diet. (-)</p> <p>Technological (10%) – technology to transform bugs into food is still not widespread and is expensive. (+)</p> <p>Environmental (12,5%) – climate crisis and the increasing awareness of the unsustainability of traditional food sources such as meat. Insects and widely available and environmentally more friendly. (+)</p> <p>Legal (10%) – The EU has regulated insect production for food purpose and has also regulated some insects for food (more seem to be on the way) (+)</p> <p>In this application, responses should focus on the <u>macro trends that may affect the industry</u> and not on the specifics of the company or industry.</p>

	Identifying the trends without explaining how they may affect the food big industry corresponds to half the grade.
	Implications for the company (10%) – analysis of positive and negative trends, and concluding outlook – students may have a more optimistic or pessimistic outlook, but on the positive side, there seems to be a significant growing market that is in tune with environmental concerns and may respond to food crisis; on the other hand many questions still remain regarding wider consumer acceptance and technology trends.

GROUP 2 (6 points)

2. According to the information provided in the text, characterize the business model of Portugal Bugs, using the Business Model Canvas.

Identification of the nine blocks of Business Model Canvas (10%):

Value proposition; customer segments; customer relationships; channels; revenue streams; key partners; key activities; key resources; costs.

Identification of the information, in the text, related with each block:**Value Proposition (15%):**

- Insect based snacks, protein bars and flour
- Environmental benefits (obtaining one kilogram of protein from insects contributes six times less to global warming than when obtaining it from a cow)
- Has wide food applications

Customer segments (10%):

- Job-to-be-done: “people want to eat the insect, for the sake of the challenge”
- General public, particularly younger generation, between the ages of 12 and 40
- Market: 11.7% of Portuguese would accept to substitute meat for whole insects (35.2%, when the alternative is products containing insects)

Customer relationships (10%):

- Introduction of a bug meal in the canteens of Lisbon's Polytechnic Institute
- Announcements of launching new products
- Appeal to environmental benefits

Channels (10%):

- Online store
- Retail shops

Revenue streams (10%):

- Price: range from €1.79 to €9.95

- Product sales have exceeded expectations, and, in April 2021, they had sold 130,000 insect bars and over 4,000 insect snacks in half a year

Key partners (15%):

- Raw materials suppliers: exclusively European suppliers, intending in the near future to use exclusively Portuguese suppliers
- Market entry strategic partner: Continente retailer with the aim of "reaching a considerable percentage of consumers"
- Associations: Portugal Insect (founding member)

Key activities (5%):

- Production and development of food products with insects

Key resources (10%):

- Financial: founders invested €100,000 in the creation of the startup
- Physical: structure for manual production or for intensive production with automation

Costs (5%):

- Invest around 100 to 200 thousand euros in structure for manual production or around two thousand euros per square meter for intensive production

GROUP 3 (8 points)

3. Consider the inventory of company Portugal Bugs, referring to December 2021, in which all items are characterized by their gross value (values in thousands of euros).

#	INVENTORY ON DECEMBER 31, 2021	VALUES
1	Common stock	100
2	Packaging and boxes	15
3	Furniture and equipment	120
4	Invoicing software	10
5	Debts to suppliers	39
6	Debts to Social Security	4
7	Light commercial vehicle	20
8	Customer debts	5
9	6 month bank loan	55
10	Cash and deposits	40

- a. From the inventory, build in maximum detail the company's Balance Sheet as of December 31, 2021, calculating the values of Non-Current Assets (22%), Current Assets (22%), Net Assets (10%), Equity (4%), Net Income (10%), Liabilities (22%), and Equity and Liabilities (10%). (5 points)

Balance Sheet

Assets		Equity and Liabilities	
Non-current Assets			
Tangible Assets		Common stock	100,00 €
Furniture and equipment	120,00 €	Net Income	12,00 €
Light commercial vehicle	20,00 €		
Intangible Assets		Total Equity	112,00 €
Invoicing software	10,00 €		
Total Non-current Assets	150,00 €	Liabilities	
Current Assets		Non-current Liabilities	
Inventory		Current Liabilities	
Packaging and boxes	15,00 €	Accounts payable	
		Debts to suppliers	39,00 €
Accounts receivable		Debts to Social Security	4,00 €
Customer debts	5,00 €	Short-term Loans	
		6 month bank loan	55,00 €
Cash and deposits	40,00 €		
Total Current Assets	60,00 €	Total Liabilities	98,00 €
Net Assets	210,00 €	Total Equity and Liabilities	210,00 €

Net Income (x):

Equity = Assets – Liabilities

$100 + x = 210 - 98$

$x = 12 = \text{Net Income}$

b. Explain what the Balance Sheet and Income Statement consist of. (1 point)

1st - Indicate that these financial statements are part of the general accounting and are intended to describe the company's assets and results to external stakeholders. (20%)

2nd - Balance sheet: indicate that the company's assets are presented on a certain date (usually 12/31). Refer to the balance sheet components: assets (resources), liabilities (obligations) and equity. (40%)

3rd - Income statement: Indicate that it presents the components of the results (Revenues and Expenses)/ measurement of the company's financial performance over a given period. Refer to the components of the IS: Revenues and Expenses. (40%)

4. For the same company, consider the following movements, made at the beginning of January 2022. Make the accounting entries in as much detail as possible: (2 points)

a. Payment of salaries in the amount of €1,000. (25%)

Balance Sheet

Current Assets

Cash and Bank Deposits

1000

Income Statement

Expenses

Employee expenses

1000

b. Sale within 30 days of finished goods for €50, with a book value of €30. (25%)

Balance Sheet

Current Assets

Inventory

30

Balance Sheet

Current Assets

Clients

50

Income Statement

Revenue

Sales

50

Income Statement

Expenses

Cost of goods sold

30

c. Theft of 30 boxes of merchandise, valued at a unit price of €20. (25%)

Balance Sheet

Current Assets

Inventory

600

Income Statement

Expenses

Other expenses

600

d. Payment of interest on a bank loan in the amount of €200. (25%)

Balance Sheet

Current Assets

Cash and Bank Deposits

200

Income Statement

Expenses

Financial expenses

200