



INSTITUTO
UNIVERSITÁRIO
DE LISBOA

Business Plan: Cocktail and Mocktail Robot

Daniel Simões Teles Fortes

Master in Applied Management

Supervisor:

Professor Doctor Sofia Lopes Portela, Assistant Professor,
ISCTE-IUL

April 2023



BUSINESS
SCHOOL

Department of Marketing, Operations and General
Management

Business Plan: Cocktail and Mocktail Robot

Daniel Simões Teles Fortes

Master in Applied Management

Supervisor:
Professor Doctor Sofia Lopes Portela, Assistant Professor,
ISCTE-IUL

April 2023

Acknowledgements

I would like to express my thanks to all those who, in some way, allowed this thesis to be developed.

To my brother André, who created a company in 2022, and provided me the possibility to develop the business plan in the scope of the master's thesis, with reference to the first product he intends to commercialize, a cocktail and mocktail preparation robot for professional use. I hope it will be a win-win for both of us and that this work can, in some way, also contribute to his improvement in this extremely challenging initial phase.

To my wife who, during this period, was a great support and had the necessary understanding to give up from part of my time during this highly demanding phase.

Also, to my father, for the fundamental help in the personal sphere and model of commitment throughout his professional and academic life as a university professor.

Thanks also to all the ISCTE professors with whom I had the opportunity to take classes during the curricular part of the master's degree. All of them, without exception, were able to transmit me highly important and extremely useful knowledge for the development of this work. A special thanks to Professor Sofia Portela, for her encouragement and guidance in this thesis.

I would also like to thank my colleagues in the Master's course, particularly those in the class taught in English, for their companionship in this journey made together, as well as the interviewees for their enormous receptiveness and availability.

Abstract

Society is becoming increasingly technological in all aspects of daily life, and year by year there is an increase in investment by companies in robots to improve their production and profits.

A Portuguese startup intends to acquire the exclusive representation for the Portuguese market, of robotic technological products considered innovative, having contractually started its activity with a robot for the preparation of cocktails/mocktails for professional use.

This applied project in management comprises a literature review with special focus on the concepts, history, and impacts of robotization, as well as the history of the cocktail and the mocktail. However, the dominant part of the work is aimed at developing the business plan associated with the mentioned investment project, whose revenues will come from the sale and rental of the robots and from the sale of an optional maintenance contract.

The potential markets (hotel establishments, nightclubs, bars, restaurants, casinos, and event organization companies) are analysed in terms of numbers, characteristics, and based on interviews with owners of these types of businesses, or employees who have some power of influence in a potential purchase.

The viability study, carried out for an investment horizon of 4.5 years, shows it to be a viable investment. The economic viability analysis presents a NPV of €173,430 (considering an unlevered cost of equity of 13.39%), an IRR of 49.61% and a payback-period of 3.74 years. The introduction of the financing effects, results in an APV of €176,650. Sensitivity analysis and optimistic and pessimistic scenarios are also developed.

Keywords:

Startup, Business plan, Service robot, Cocktail preparation, Mocktail preparation

JEL Classification:

M10 - Business Administration: General

M13 - New Firms; Startups

Resumo

A sociedade está a tornar-se cada vez mais tecnológica em todos os aspetos da vida quotidiana, verificando-se uma expansão no investimento das empresas em robôs para melhorar a sua produção e lucros.

Uma start-up portuguesa pretende adquirir a representação exclusiva para o mercado português, de produtos tecnológicos robóticos considerados inovadores, tendo iniciado contratualmente a sua atividade com um robô de preparação de cocktails/mocktails para uso profissional.

O presente projeto aplicado em gestão compreende uma revisão de literatura com especial incidência nos conceitos, história e impactos da robotização, bem como na história do cocktail e mocktail. No entanto, a parte dominante do trabalho tem por objetivo o desenvolvimento do plano de negócios associado ao referido projeto de investimento, cujas receitas provirão da venda e aluguer dos robots e da venda de um contrato de manutenção facultativo.

Os mercados potenciais (estabelecimentos hoteleiros, discotecas, bares, restaurantes, casinos e empresas de eventos), são analisados em números, características e com base em entrevistas a proprietários desse tipo de negócios ou funcionários com poder de influência numa potencial compra.

O estudo de viabilidade, efetuado para um horizonte de investimento de 4,5 anos, revelou tratar-se de um investimento viável. A análise de viabilidade económica revela um VAL de 173.430€ (considerando um custo de capital próprio não alavancado de 13,39%), uma TIR de 49,61% e um período de retorno do investimento de 3,74 anos. A introdução dos efeitos de financiamento, resulta num VPA de 176.650 €. Uma análise de sensibilidade e cenários otimista e pessimista são também desenvolvidos.

Palavras-Chave:

Start-up, Plano de negócios, Robô de serviço, Preparação de cocktail, Preparação de mocktail

JEL Classification:

M10 - Business Administration: General

M13 - New Firms; Startups

Contents

Acknowledgements	i
Abstract	ii
Resumo	iii
Contents	iv
List of Tables	vi
List of Figures	vii
Glossary	viii
1. Introduction	1
2. Literature Review	3
2.1. Robots – Brief History and Basic Concepts	3
2.2. Industrial Robots	4
2.3. Service Robots	5
2.4. Robotization – Wages, Employment, Competitiveness and Productivity	11
2.5. Brief History of Cocktails and Mocktails	14
3. Methodology	15
4. External Analysis	17
4.1. Pestel Analysis	17
4.2. Porter's 5-Force Analysis	28
4.3. Analysis of Potential Markets	33
5. Interview Analysis to Potential Customers	36
5.1. Approach and Data Collection	36
5.2. Data Analysis	36
6. Opportunities and Threats	39
7. Benchmarking	40
8. Implementation Strategy	41
8.1. Mission, Vision, Values and Objectives	41
8.2. Targets Definition and Characterization	41
8.3. Critical Success Factors	42
9. Implementation Policies	43
9.1. Product	43
9.2. Price	44
9.3. Place	45
9.4. People	45
9.5. Promotion	45
9.6. Partnerships	47

10. Economic and Financial Viability Analysis	48
10.1. Expenses Data	48
10.2. Revenue Data.....	52
10.3. Income Statement, Working Capital and Cash Flow	53
10.4. Economic Viability Analysis	55
10.5. Financial Viability Analysis.....	56
10.6. Sensitivity Analysis	57
10.7. Optimistic and Pessimistic Scenarios	58
11. Conclusions.....	59
Bibliography	62

List of Tables

Table 2.1 – Summary of service robots’ definitions.....	6
Table 2.2 – Classification of service robots by professional applications.....	7
Table 4.1 – GDP projections until 2027.....	20
Table 4.2 – Inflation projections until 2027.....	21
Table 4.3 – Unemployment projections until 2027	22
Table 4.4 – Other cocktail/mocktail preparation robots.	29
Table 4.5 – No. of bars, nightclubs, and events firms in Portugal by geographic location.	34
Table 4.6 – No. of restaurants in Portugal by category and geographic location.	34
Table 4.7 – No. of hotels in Portugal by category and geographic location.	35
Table 4.8 – No. of casinos in Portugal by geographic location.	35
Table 10.1 – Robots purchase assumptions.	49
Table 10.2 – Bartender and maintenance services provided.....	51
Table 10.3 – CAPEX depreciations and amortizations.....	52
Table 10.4 – Robot sales, rents, and maintenance contracts.....	52
Table 10.5 – Income Statement.....	53
Table 10.6 – Payables and receivables average time.	54
Table 10.7 – Working capital.	54
Table 10.8 – Cash flow.	55
Table 10.9 – Data to calculate the Unlevered Cost of Equity.	56
Table 10.10 – Investment decision criteria.....	56
Table 10.11 – Debt service schedule.....	56
Table 10.12 – Adjusted Present Value.....	57
Table 10.13 – Sensitivity Analysis - Robot sale price (incl. VAT).	57
Table 10.14 – Sensitivity Analysis - Average time to receive from robot sales and to pay from robot purchases.....	57
Table 10.15 – Optimistic scenario - Investment decision criteria.	58
Table 10.16 – Pessimistic scenario - Investment decision criteria.....	58
Table 10.17 – Pessimistic scenario - Sensitivity Analysis for Robot sale price (incl. VAT).	58

List of Figures

Figure 2.1 – Top 5 applications of service robots for professional use.	9
Figure 4.1 – Portugal's Consumer Confidence indicator evolution.	19
Figure 4.2 – Portugal's full year GDP evolution.....	20
Figure 4.3 – Portugal's inflation evolution.	21
Figure 4.4 – Portugal's unemployment evolution.	22
Figure 4.5 – Historical 3, 6 and 12 months Euribor rates.	23
Figure 4.6 – How alcohol preference varies with age in the U.S. adults.....	25
Figure 4.7 – Digital Economy and Society Index 2022 of EU countries.....	25
Figure 4.8 – Ecological propensity by social characterization.	27
Figure 4.9 – Incoterms 2020 rules responsibility quick reference guide.	27
Figure 9.1 – Mixologiq robot for cocktails and mocktails preparation.	43
Figure 9.2 – Some examples of pre-loaded popular cocktails.....	44
Figure 9.3 – Market positioning map of the Portuguese company.....	46

Glossary

APV – Adjusted Present Value

BP – Bank of Portugal

CAE-Rev 3 – *Classificação Portuguesa de Atividades Económicas, Revisão 3*

CAGR – Compound Annual Growth Rate

CAPEX - CAPital Expenditure

CCT – Common Customs Tariff

CIT – Corporate Income Tax

CIVA – *Código do IVA*

CN – Combined Nomenclature

CPF – Council of Public Finance

DESI – Digital Economy and Society Index

EBIT – Earnings Before Interest and Taxes

EBITDA – Earnings Before Interest, Taxes, Depreciation and Amortization

EC – European Commission

ECB – European Central Bank

ESPAD – European School Survey Project on Alcohol and Other Drugs

EU – European Union

EXW – Ex Works

F&B – Food and Beverage

FCL – Full Container Load

GDP – Gross Domestic Product

GVA – Gross Value Added

HS – Harmonized System

ICC – International Chamber of Commerce

ICE – *Incentivo à Capitalização das Empresas*

IFR – International Federation of Robotics

IMF – International Monetary Fund

Incoterms – International Commercial Terms

INE – *Instituto Nacional de Estatística*

IRR – Internal Rate of Return

IRS – *Rendimento das Pessoas Singulares*

ISO – International Organization for Standardization

JIRA – Japanese Robotics Association

LCL – Less Container Load

MFGP – Ministry of Finance of the Government of Portugal

Ms Office – Microsoft Office
NEC – Not Elsewhere Classified
NEP – New Environmental Paradigm
NGV – Natural Gas Vehicles
NPV – Net Present Value
NUTS – *Nomenclatura das Unidades Territoriais para Fins Estatísticos*
OE 2023 – State Budget for 2023
OECD – Organization for Economic Cooperation and Development
PV – Present Value
RaaS – Robots as a Service
Rd – Cost of Debt
Rf – Risk-free Rate
Rm-Rf – Market Risk Premium
Ru – Unlevered Cost of Equity
SRIJ – *Serviço de Regulação e Inspeção de Jogos*
SS – Social Security
T – Corporate Income Tax
TIR – *Taxa Interna de Retorno*
TPT – *Taxas dos direitos aplicáveis a Países Terceiros*
VAL – *Valor Atual Líquido*
VAT – Value Added Tax
VPA – *Valor Presente Ajustado*
WC – Working Capital
YoY – Year-over-Year
 β_u – Unlevered β

1. Introduction

Nowadays, society is becoming more and more technological and is open to new advances in every aspect of the daily live. New developments are slowly filling the technological gaps and opening new markets. We can observe evolution in constant growth and expansion, and each year, more companies invest in the purchase of robots to improve their production and profits (Garcia-Haro et al., 2020).

However, the general idea that people have of a robot, comes from a science fiction cinematographic vision, where they can look like human beings and are able to do the typical monotonous and boring daily task for us. At least for now, service robots are far from this vision, being only one of the first commercial developments in a huge and promising market (Garcia-Haro et al., 2020).

There are many types of robots, used in very different environments and for numerous distinct uses. However, although being very diverse in application and form, when it comes to their construction, they all share three fundamental areas of knowledge: mechanics, electronics, and programming (Finite Helical Dynamics, 2023).

Mechanics provides the physical aspect of the machine, combining rigid structural parts and linear or rotary actuators. Electronics provides power to the machinery, being responsible for "giving life" to machines, using components such as circuits and motors to enable them to respond to commands. Programming allows the creation of commands to the robotic equipment, indicating it when and how to do something by itself.

A registered brand and company founded on June 2022, based in continental Portugal, aims to acquire the exclusive representation for the Portuguese market, of robotic technological products considered innovative and, perhaps in the future, bet on developing its own products. The company contractually started its activity with a cocktail/mocktail preparation robot, developed from a French supplier called Mixologiq (<https://www.mixologiq.com/en/>).

This type of robots is classified as "service robots for professional use" and, according to the field application, they belong to "hospitality" category and "food and drink preparation" subcategory (IFR Statistical Department, 2022).

Nowadays the tendency is to consider the terms "cocktail" and "mocktail" as two separated classes of mixed drinks. Looking at the OED Oxford English Dictionary (n.d.), which is widely accepted as the most complete record of the English language, this separation is already clearly established. Cocktail is defined as "any alcoholic drink made by mixing a spirit or spirits with other ingredients such as a liqueur, fruit juice, etc." and a Mocktail is "a blended non-alcoholic drink consisting of a mixture of fruit juices, etc."

The present work will comprise a literature review and the elaboration of the Business Plan for this company's first product commercialization.

After this Introduction chapter with the framework, objectives, and structure of this work, in Chapter 2 a Literature Review is given. That chapter comprises a brief history and basic concepts about robots, a short topic on industrial robots, a broader point on service robots where special focus on the so-called professional service robots are highlighted by recent statistics and an even in-depth report on consumers' experience with hospitality service robots is carried out. Also covered in that chapter is robotization and its impact on wages, employment, competitiveness, and productivity, as well as an overview of the cocktail and mocktail history.

Chapter 3 addresses the methodology followed for the development of the Business Plan. In Chapter 4 an External Analysis, composed by a Pestel Analysis, the Porter's 5-Force Analysis and an Analysis of Potential Markets is carried out. Chapter 5 refers to the Interview Analysis to Potential Customers and Chapter 6 synthetizes information about the business Opportunities and Threats.

On Chapter 7 is presented the brief performed benchmarking on the robot's resellers from other countries.

The Implementation Strategy, namely the Mission, Vision and Values' statements are presented in Chapter 8, as well as the Targets Definition and Characterization and the Critical Success Factors. Implementation Policies (Product, Price, Place, People, Promotion and Partnerships) are discussed in Chapter 9. Finally, Chapter 10 sets out the Economic and Financial Viability Analysis and Chapter 11 concerns the Conclusions.

2. Literature Review

2.1. Robots – Brief History and Basic Concepts

“The idea to design and build some sort of beings, or devices that could carry out repetitive or heavy tasks, thus relieving men from this burden, dates back to ancient times. Since the Greek-Hellenistic age some of these devices, which were named *automata*, have been designed and created by ingenious inventors, belonging to several different civilizations through the centuries” (Gasparetto & Scalera, 2019, p.24).

Associated with the word “automata” comes the word “automation” which, although has been defined in different ways, basically is a system or technology that automates some work that was previously done by humans. The common idea is that automation frees humans from time-consuming and repetitive tasks, whether the tasks involve physical functions and/or cognitive functions. Its purpose is to let machines perform monotonous tasks and free humans to focus on more complex, creative, and emotional tasks (Wang & Siau, 2019).

According to Čapek (2004), quoted by Gasparetto and Scalera (2019), the origin of the term “robot” is more recent, coming from the Czech word “robota”, meaning “heavy work” or “forced labour”. The introduction of this term is due to the Czech writer Karel Čapek (1890-1938), in his novel “R.U.R.: Rossum’s Universal Robots”, world premiered on 2 January 1921, in reference to machines created to replace humans.

The word “Robotics” was employed for the first time by Isaac Asimov (1920-1992) in his novel “Runaround” (1942), contained in the famous series “I, Robot”. In that novel he defined three rules concerning the behaviour of robots and the interaction with humans that would later be named the three Laws of Robotics (Asimov, 1942, quoted by Gasparetto & Scalera, 2019).

The International Organization for Standardization (ISO), through ISO 8373:2021 — Robotics – Vocabulary, on its third edition, reviewed and added new terms and definitions to take into account the state of the art and harmonized them with other existing standards. So, the present definition of “robotics” is the “science and practice of designing, manufacturing, and applying robots” while a “robot” is a “programmed actuated mechanism with a degree of autonomy to perform locomotion, manipulation or positioning”. A note also refers that “A robot includes the control system”.

In this context, two more definitions are important to retain from this ISO, namely “autonomy” which is the “ability to perform intended tasks based on current state and sensing, without human intervention” and “control system” which is a “set of hardware and software components implementing logic and power control, and other functions which allow monitoring and controlling of the behaviour of a robot and its interaction and communication with other objects and humans in the environment”.

ISO 8373:2021, also establishes a differentiation between “Industrial Robot”, “Service Robot” and “Medical Robot” (concept not presented in the previous version ISO 8373:2012 — Robots and robotic devices – Vocabulary).

An “industrial robot” is an “automatically controlled, reprogrammable multipurpose manipulator, programmable in three or more axes, which can be either fixed in place or fixed to a mobile platform for use in automation applications in an industrial environment”.

The “service robot” is a “robot in personal use or professional use that performs useful tasks for humans or equipment”. Notes to this definition refer that “tasks in personal use include handling or serving of items, transportation, physical support, providing guidance or information, grooming, cooking and food handling, and cleaning” and “tasks in professional use include inspection, surveillance, handling of items, person transportation, providing guidance or information, cooking and food handling, and cleaning”.

Finally, “medical robot” is a “robot intended to be used as medical electrical equipment or medical electrical systems”, noting that these robots are “not regarded as an industrial robot or a service robot”.

However, the International Federation of Robotics (IFR) use some different details from ISO 8373 that they see more helpful to unambiguously distinguish the different robot categories according to their experience. For example, for IFR statistics, the “medical robots” are a subcategory of “service robots” for professional use (see Table 2.2). IFR is a non-profit organization established in 1987, with the general purpose of promoting research, development, use and international co-operation in the entire field of robotics, to act as a focal point for organizations and governmental representatives in activities related to robotics (IFR website, 2023).

The reality is that regardless of the classification used, “only a century after the invention of the word “robot”, robots were responsible for much manufacturing and are increasingly involved in the service economy” (Ivanov & Webster, 2022, p.1).

2.2. Industrial Robots

According to Gasparetto and Scalera (2019), it was in the 20th century that industrial applications of robotics gained paramount importance. Although some developments in automation had already taken place before, having started to appear since the times of the Industrial Revolution, the beginning of “Industrial Robotics”, as we currently define it, is conventionally established in the 1950s. This milestone is due to George Devol, who designed and patented in 1954 the device that served as the basis for the development of what is considered the first “true” industrial robot in history, called Unimate.

Zamalloa (2017), quoted by Gasparetto and Scalera (2019), says that the evolution of industrial robots can be subdivided in four categories, where first three covers the timespan from the 1950's until the end of the 1990's.

The first-generation spans from 1950 to 1967 and the robots were capable to perform only quite trivial tasks, such as loading-unloading or simple material handling operations. These were machines basically programmable that did not have the ability to really control the modality of task execution and had no communication with the external environment. With respect to the hardware, they were provided with low-tech equipment, and servo-controllers were not present (Wallen, 2008, quoted by Gasparetto & Scalera, 2019).

The industrial robots of the second-generation, that conventionally ranges from 1968 to 1977, "were basic programmable machines with limited possibilities of self-adaptive behavior and elementary capabilities to recognize the external environment" (Zamalloa, 2017, quoted by Gasparetto & Scalera, 2019, p.28).

In 1969, the presence of robots in Japanese companies had a significant increase, which turn Japan became one of the leading countries in the world in the field of industrial robotics. The Japanese Robotics Association (JIRA), founded in 1971, was the first national robotic association in the world (Gasparetto & Scalera, 2019).

The third-generation of industrial robot (conventionally ranging from 1978 to 1999), "were characterized by a larger extent of interaction with both the operator and the environment, through some kind of complex interfaces (such as vision or voice)" (Zamalloa, 2017, quoted by Gasparetto & Scalera, 2019, p.31).

The fourth-generation industrial robots, ranges from 2000 to nowadays and are characterized by high-level "intelligent" features (such as the capability of performing advanced computations, logical reasoning, deep learning, complex strategies, and collaborative behaviour).

2.3. Service Robots

"The service robot industry is more diverse and less tangible than the industrial robot industry" (IFR, 2022).

According to Sun and Wang (2021), it was after the 1990s, that the application of robot has gradually expanded from manufacturing to the service industry, which made service robots develop rapidly.

Garcia-Haro et al. (2020, p.1) refers that "robotics companies are designing robots to handle tasks, including serving, interacting, collaborating, and helping. These service robots are intended to coexist with humans and engage in relationships that lead them to a better quality of life in our society". They also mention that their applications and diversity are

increasing. However, service robots do not have a generally accepted definition, due to this very changing market behaviour, the multitude of structures and application areas.

Table 2.1 shows scholars' definitions of service robots over time.

Table 2.1 – Summary of service robots' definitions.

Author	Year	Definition
Kawamura et al.	1996	Service robots are mechatronic devices based on sensor, which can be reprogrammable and provide useful services for human in daily life.
Park et al.	2009	Service robots are autonomous robots that provide useful services to human beings.
Haidegger et al.	2013	Service robots are the type of robots that can perform various tasks, such as medical care and personal assistance.
Pineda et al.	2015	Implementation efforts produce service robots, which integrate multiple technologies supported by different types of system software and utilities.
Murphy et al.	2017	Service robots are usually mobile, have a degree of autonomy, and may interact socially with people.
Wirtz et al.	2018	Service robots in front-line services environment are autonomous and adaptable interfaces based on system, which can interact with the organization's customers and provide them services.
Kim et al.	2019	Service robots are developed for a variety of applications to accompany or assist humans.

Source: Adapted from Sun & Wang (2021).

For Sun and Wang (2021), based on these definitions, two related aspects can be summarized. First, service robots are autonomous, which means that they are able to judge the state and perform the tasks semi or completely autonomously without human intervention and, second, they interact with humans. This means that service robots perform basic intelligent behaviours to complete tasks in human-centered environment.

According to Garcia-Haro et al. (2020), what it can only be ensured is that service robots are continually changing and evolving, becoming more and more complex, with new capabilities. However, service robots for domestic/personal use and for professional use, are registered separately since the unit value of the first ones is generally only a fraction of the seconds and they are also produced for a mass-market with completely different pricing and marketing channels. Personal/domestic service robots had a huge increment in variety and units sold in the last few years, but it is a low market value, not comparable with respect to professional service robots. So, for the private sector, professional service robots are very interesting, either in the number of units sold as in the new fields in which the robotics are becoming indispensable.

According to the application fields, IFR divides professional service robots into several subcategories, established with the existing technologies (Table 2.2).

Table 2.2 – Classification of service robots by professional applications.

Application		Description
AP	Professional service robots	Robots intended for use by trained professionals.
AP1	Agriculture	Robots for agricultural and farming applications
AP11	Cultivation	Plowing, seeding, harvesting, weeding, fertilizing, pesticide spraying off/for crop plants and fruit indoors (greenhouse) and outdoors (field, vineyard)
AP12	Milking	Milking
AP13	Other livestock farming	Livestock farming, except milking, e.g. feeding, barn cleaning
AP19	Other agriculture	Agriculture, but none of the above
AP2	Professional cleaning	Robots for professional cleaning applications
AP21	Floor cleaning	Cleaning of horizontal areas, e.g. floors in offices, hotels, public buildings, streets and sidewalks. Note: Robots for barn cleaning are included in class AP13
AP22	Window and wall cleaning	Cleaning of windows, walls and other vertical areas
AP23	Tank, tube and pipe cleaning	Inside cleaning of tanks, tubes or pipes
AP24	Hull cleaning	Outside cleaning of hulls (aircraft, train, other vehicles, tank, container)
AP25	Disinfection	UV, spray, wiping or other disinfection methods
AP29	Other professional cleaning	Professional cleaning other than above
AP3	Inspection and maintenance	Robots for inspection and maintenance
AP31	Buildings and other construction	Outside detection of damage in buildings, plants, bridges, tunnels and other civil construction
AP32	Tank, tubes, pipes, sewers	Inside detection of leakage in tanks, pipes, or sewers
AP39	Other inspection and maintenance	Inspection and maintenance, but none of the above
AP4	Construction and demolition	Robots for construction and demolition
AP41	Construction	Installation of buildings and other constructions, earthwork
AP42	Demolition	Tear-off of buildings and other constructions
AP5	Transportation and logistics	Mobile robots for transportation of goods or cargo and other logistics functions
AP51	Indoor environments without public traffic	Cargo/goods transportation in indoor environments without public traffic only, e.g. warehouses, factories, non-public areas of hospitals, airports, etc.
AP52	Indoor environments with public traffic	Cargo/goods transportation in indoor environments with public traffic, e.g. hospitals, hotels, restaurants
AP53	Outdoor environments without public traffic	Cargo/goods transport in outdoor environments without public traffic only, e.g. harbors, airports
AP54	Outdoor environments with public traffic	Cargo/goods transport in outdoor environments with public traffic, e.g. home delivery, parcel delivery in the streets
AP55	Inventory	Counting and refilling of stock and inventory
AP59	Other transportation and logistics	Mobile robots for transportation and logistics applications not mentioned above. No passenger transportation.
AP6	Medical robotics	Robots in medical applications
AP61	Diagnostics	Robotic diagnostic systems. Includes robotic devices.
AP62	Surgery	Robots for invasive therapy (surgery). Includes robotic devices.
AP63	Rehabilitation and non-invasive therapy	Robots for therapy (except surgery) and rehabilitation of patients after surgery or accidents. Includes robotic devices.
AP64	Medical laboratory analysis	Handling or processing of samples in medical laboratories
AP69	Other medical robots	Other robots for medical applications. Note: Robots for transportation in hospitals are included in class AP52
AP7	Search and rescue, security	Robots for emergency situations
AP71	Firefighting	Robots for firefighting. Includes robotic devices.
AP72	Disaster relief	Robots for detection or rescue of survivors. Includes robotic devices.
AP73	Security services	Robots for security functions, e.g. surveillance, bomb squad support. Includes robotic devices.
AP8	Hospitality	Robots for interaction with guests or visitors
AP81	Food and drink preparation	Robots for food or drink preparation
AP82	Mobile guidance, information, telepresence	Robotic information desks or guides, e.g. in museums, shops, hotel receptions. Robots for virtual participation in real-world events. Note: Telepresence robots specifically designed for the medical field are covered in AP69
AP9	Other professional service robots	Robots that do not fit into any of the above classes
AP99	Other professional service robots	Robots that do not fit into any of the above classes

Source: IFR Statistical Department (2022).

2.1.1. Service Robot Statistics

According to the publication “World Robotics 2022 – Service Robots”, IFR Statistical Department is currently aware of 1,010 service robot producers worldwide. From these, 828 companies (82%) are classified as producers of professional service robots and most of these companies, 400 (48%), are in Europe, followed by North America (211 companies; 25%), and Asia (206 companies; 25%). Only 240 companies (24%) are classified as consumer service robot producers, with a distribution of 38% in Asia (91 companies), 36% in Europe (86 companies), and 26% are in North America (62 companies).

Also based on information from this publication, worldwide sales of consumer service robots grew 9% (about 19 million units) in 2021. In the same year, professional service robots grew by 37%, which was equivalent to more than 121 million of the units sold. The size of the RaaS (Robots as a Service) products in the market more than doubled to about 5,200 units (+125%).

In terms of major application areas of the service robots for professional use (Figure 2.1), mobile robot solutions are already established in transportation and logistics (AP5), since more than one out of three professional service robots sold in 2021 was for the transportation of goods or cargo. For this application, RaaS products grew by 86% and 45% more units were sold in 2021.

Hospitality robots (AP8), where the subcategory Food and Drink Preparation (AP81) fits in (Table 2.2), are enjoying growing popularity. Sales were up 85% in 2021 and the RaaS fleet size is also growing rapidly.

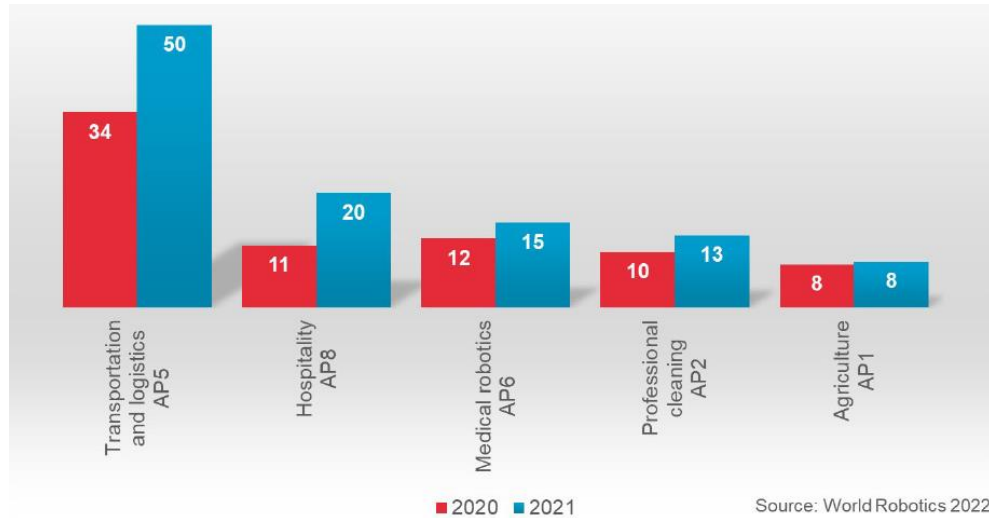
Demand for professional cleaning robots (AP2) grew by 31% and the sales of medical robots (AP6) were up 23%, including surgery robots, robots for rehabilitation and non-invasive therapy, and robots for diagnostics.

In the field of inspection and maintenance (AP3), the portfolio of robots that do these tasks autonomously is still limited but growing and sales were up 21% in 2021.

In the agriculture (AP1) the demand grew only 6% in 2021 since there is a lot of research and development into the use of robots for the cultivation of plants and crops, but the practical use and economic benefit of these robots is often still limited.

Robots for construction or demolition (AP4) tasks as well as the group of search and rescue and security robots (AP7), constitute small but growing market niches.

Figure 2.1 – Top 5 applications of service robots for professional use.



Note: Values in thousand units

Source: IFR Statistical Department (2022).

2.3.2. Customers' Experience with Hospitality Service Robots

According to Ivanov and Webster (2022), quoting one of their publications from 2019, it is mentioned that only in recent years robots have been increasingly used to provide services to hospitality guests. The article also refers that “hospitality industry in developed countries is under pressure due to labour shortages and it is likely more food and beverage operations will have to be automated in the future” (Ivanov & Webster, 2022, p.1). About robots for Food and Beverage (F&B) it comments the fact of being a labour-intensive operation sector, and which typically suffer from high turnover rates.

For Garcia-Haro et al. (2020), two types of robot for F&B sector have emerged: robochefs and robowaiters. Most of robochefs aim to assist human beings with tasks for food preparation and some make cocktails or drinks. These robots have a complex perception system but nowadays usually have limited mobility, sometimes even null. The robowaiters have skills focused on interaction with humans and their environment and can perform numerous tasks, from serving food and drinks, to taking orders, while they are moving around the restaurant.

As a note, for IFR, the “robochefs” fall into the subcategory Hospitality – Food or drink preparation (AP81) but the robots designed for various kinds of food delivery are grouped in the subcategory Transportation and Logistics – Indoor environments with public traffic (AP52).

According to Tristano (2018), quoted by Jain et al. (2021), having restaurant robots can help reduce operating costs, increase efficiency, eliminate errors, and provide customers with innovative experiences.

On the other hand, Jain et al. (2021) refers that, while the operational and monetary advantages of utilizing service robots in restaurant sector have gained increasing recognition,

scant exploration has been carried out regarding the impacts of robotic services on consumers' experience, satisfaction, and subsequent behaviours. So, a study was developed based on online reviews from restaurants with robotic services, used as main data and information source. The sample included a total of 1381 reviews posted between January 2015 and January 2020.

The results shows that the theme *Robot* is strongly correlated with positive reviews and most of the positive comments are associated with customers' fascination with robots and their enjoyment of the innovative concept. The study is consistent with the findings of a previous study from Zemke et al. (2020), quoted by Jain et al. (2021), which found that innovation is a key attracting element associated with robotic services. Also, "despite the passive participation, most customers perceive the value of the robot-provided restaurant products through the increased efficiency of services" (Jain et al., 2021, p.15). In fact, Yrjölä et al. (2019), quoted by Jain et al. (2021), suggest that fast service and supportiveness are the key to producing high service quality in restaurant experiences.

Many of the customers from Jain et al. (2021) study, visited the restaurants due to recommendations from friends and family and stated that they would "*definitely come back*", since most of them were "*happy*", "*satisfied*" and even "*fascinated*" by robotic services. For example, "some customers were fascinated by the automatic sensors of robots" and "a lot of them also described how the robots made various types of beverages, including cocktails and coffee" (Jain et al., 2021, p.12). However, the positive reviews were more closely linked with *Food*, suggesting that customers still prioritize the product and value in restaurants (consistent with previous research from Ma et al., 2011).

Jain et al. (2021, p.14), conclude that "the presence of robotic services is more like an add-on to restaurant service, leading to a more innovative and satisfying dining experience". So, "the decision-making process of adopting robots mainly relies on saving labour-cost and building an innovative image for the restaurant" (Jain et al., 2021, p.17). The limitations of this study concern the fact that only one restaurant review website was used, reviews in English and restaurants in North America.

Ivanov and Webster (2022), also studied the public's perceptions of the use of robots in food and beverage (F&B) operations with data collected from a global survey, run from March 2018 to October 2019, disseminated online in 12 languages and resulting in a sample of 1,579 respondents (including from Portugal). Gender, age, and education levels of the respondents were used as independent variables. Also, a subjective perception of the respondent's economic well-being was added rather than a measure of their income levels, as this would be a sensitive question that tends to lead to a refusal to answer.

This study, like the one presented above, generically revealed positive attitudes toward the use of robots in an F&B setting and that robots in F&B operations are perceived as reliable,

functional and with advantages compared to human employees. Previous studies have found that the reliability and functionality of robots are significant components of the trust in robots (Tussyadiah et al., 2020, quoted by Ivanov & Webster, 2022). "Functionality of a robot shows that it possesses the technical features (e.g. sensors, actuators), software and overall design that allow it to implement its intended tasks (e.g. cook food, make a cocktail, serve dish) while a robot's reliability shows how well it will perform these tasks".

An interesting finding is that the demographic data suggests that only the age of respondents is associated with the dependent variables. The data do suggest the existence of a generational rift, showing that younger respondents were more open to accept robotic technologies in F&B operations.

According to Ivanov and Webster (2022), contrarily to much of the existing research in other type of operations with robots (Hudson et al., 2017; Katz and Halpern, 2014; Pochwatko et al., 2015) the study does not reveal substantial differences between genders which suggests that the gender does not play an influent role in attitudes toward the use of robots in F&B operations.

However, public finds some specific tasks more acceptable for robots. The perception regarding the appropriateness of using robots in F&B operations, revealed a higher mean of 5.37 with a standard deviation of 1.666 for "taking orders for room service" and a lower mean of 3.77 with a standard deviation of 1.966 for "cooking food". The task of "making drinks (coffee, tea, cocktails) in the restaurant/bar" had a mean score of 4.51 with a standard deviation of 1.956.

2.4. Robotization – Wages, Employment, Competitiveness and Productivity

According to TE (2019), quoted by Wang and Siau (2019), much manufacturing work, that once employed vast numbers of workers without college degrees but even so required moderate training, has replaced by robots and computers.

Despite, jobs that require fewer skills and contain routine tasks are easier to automate (Rise of the robots, 2018, quoted by Wang & Siau, 2019), advances in artificial intelligence make it difficult to outline the development trajectory of automation tasks. However, even assuming the success of advanced developments in artificial intelligence focused on autonomous learning, there are certain types of tasks that robots are not expected to be able to perform in a short period of time. Indeed, tasks that require high creativity, empathy, persuasion, application of the most appropriate knowledge to reach productive decisions, and a high level of sensorimotor skills are considered unlikely to be automatable in the near future (IFR, 2018).

"Various scholars have painted a dark picture of what could happen if machines are able to entirely substitute for jobs, resulting in downward pressure on the wages of low-skilled workers and increasing returns to owners of capital" (Sachs & Kotlikoff, 2012; Berg, et al., 2016; quoted by IFR, 2018, p.6), even agreeing that the link between automation and wage inequality are not a given (IFR, 2018).

Bregman (2017), quoted by Wang and Siau (2019, p.68), refers that scholars from Oxford University estimate that "no less than 47% of all-American jobs and 54% of those in Europe are at a high risk of being usurped by machines".

Also, Deloitte in partnership with Oxford University, suggests that 35% of jobs will be at risk during the next 20 years (Wakefield, 2016, quoted by Wang & Siau, 2019).

McKinsey projections of 2017, quoted by Werthner et al., 2022, state that there will be a US\$100 billion market for service robots already by 2025 and that we might have automated 50% of all work activities by 2050.

While also McKinsey claims that as many as 700 million jobs could be gone by 2030, PwC suggests that 30% of those in the UK could be automated, compared to 38% in the US, 21% in Japan, and 77% in China (Rise of the robots, 2018, quoted by Wang & Siau, 2019).

Bowen and Morosan (2018), quoted by Jain et al., (2021) predicted that around 25% of the hospitality jobs in the USA would be computerized mainly by the 2030s.

So, many headlines focus on the potential negative outcomes of automation and these risks overshadowing the very real positive contribution of automation and robotics to job creation, competitiveness, and productivity (IFR, 2018).

According to IFR (2018, p.6), "there is ample evidence that automation does not lead to job substitution, but rather to a re-allocation of both jobs and tasks in which robots complement and augment human labour by performing routine or dangerous tasks".

For example, a study by the McKinsey Global Institute (2017), quoted by IFR (2018), concludes that 3 to 14 percent of the global workforce will need to switch occupational categories by 2030 and a study by CISCO and Oxford Economics (2017), quoted by IFR (2018), puts the job displacement figure at 8.4% of the U.S. workforce by 2027.

According to the economist James Bessen "Although computer automation is not causing a net loss of jobs, it does imply a substantial displacement of jobs from some occupations to others" (Bessen 2016, quoted by IFR, 2018, p.6).

On the other hand, various studies show even a positive correlation between automation and jobs creation. For example, in a 2016 discussion paper for the Centre for European Economic Research it is said that, between 1999 and 2010 in the EU 27, labour demand increased by 11.6 million jobs due to computerization, thus suggesting that the job-creating effect overcompensated the job-destructing effect (Zierahn et al. 2016, quoted by IFR, 2018).

Deloitte LLP (2015), quoted by IFR (2018), argue that, while technology has potentially contributed to the loss of over 800,000 lower-skilled jobs in the UK there is equally strong evidence that suggests it has helped to create nearly 3.5 million new higher-skilled ones in their place.

Referring to the impact of technology in Asian countries, a study from Asian Development Bank (2018), quoted by IFR (2018), found that it led to a net increase of 33 million jobs per year between 2005 and 2015.

Several studies quoted by IFR (2018), shows evidence about the influence of robotization in competitiveness and productivity.

A study focused on Germany found that robot adoption led to a GDP increase of 0.5% per person per robot from 2004 to 2014 (Institute for Employment Research, CEPR and Düsseldorf Institute for Competition Economics, 2017).

Another study from the Centre for Economics and Business Research (2017), found that investment in robots contributed a growth of 10% in GDP per capita in OECD countries between 1993 and 2016.

McKinsey Global Institute (2017) predicts that up to half of the total productivity growth needed to ensure a 2.8% growth in GDP over the next 50 years will be driven by automation.

An Accenture report in collaboration with Frontier Economics forecasts the potential of automation to double Gross Value Added (GVA) across 12 developed economies by 2035, with labour productivity improvements of up to 40% (Accenture, 2016).

The Boston Consulting Group (2015) forecasts productivity improvements of 30% over the next 10 years, spurred particularly by the uptake of robots in SMEs as robots become more affordable, more adaptable, and easier to program.

Finally, fears that increased productivity will result in job losses are not corroborated in studies exploring this link. For example, a study conducted over 19 years in more than 35 countries, found that productivity growth has been more employment-augmenting rather than employment-reducing and key driver of employment growth or decline is not productivity but population growth (Autor & Salomons, 2017, quoted by IFR, 2018). "Given shrinking working age populations in most developed economies, productivity increases will be critical to ensure enough workers to maintain a supply of goods and services" (IFR, 2018, p.5).

Despite many tasks and jobs that only humans could do previously were already replaced, people believe that new jobs or human-robot cooperative opportunities will be created (Wang & Siau, 2019).

2.5. Brief History of Cocktails and Mocktails

At least 10,000 years ago, some of our ancestors that abandoned their nomadic way and became agriculturists, found that grain, ripe fruit, crushed grapes, or honey, fermented by wild yeast, could be made into beverages. Only many centuries after the invention of wine and beer it was discovered the process of distillation (Carlin, 2012), which was a first step to the appearance of spirit drinks, like, Vodka in the 14th century, Tequila in the 16th century or Rum and Gin in the 17th century (Matin, 2022).

However, only around the turn to the 19th century, term “cocktail” was first seen referenced on a newspaper (The Cocktail Society, 2021). In this period four other events were important for cocktails development and the flourishing of bartending as a profession in the following decades: 1) The artificial carbonation was achieved by Jacob Schweppe in Geneva; 2) The ice started to be sold in America (in the form of slabs from frozen lakes); 3) The artificial refrigeration arrived; 4) Robert Stein invented continuous distillation, opening the way for the development of stills that allowed that good quality spirits could reliably be mass-produced (Sutcliffe, n.d.).

According to OED Oxford English Dictionary (n.d.), there was a gradual transition between the term “cocktail” being used to denote a specific type of mixed drink and to refer to any alcoholic mixed drink. So, as the generic sense of the term was adopted, cocktail passed to be distinguished by a particular name, containing trace of the origins or contents of the drinks to which they refer. For example, Manhattan, Singapore Sling, Daiquiri (from a beach in Cuba), Buck’s Fizz (from a London club) or White Russian.

Meanwhile, in the 1930s, the term “mocktail,” had its first written reference in a journal (OED Oxford English Dictionary, n.d.).

Only at 1970s and 80s, with the success of cocktails characterized by more elaborate combinations of ingredients and a dosage of good advertising, their names appeared describing an effect (e.g. Mai Tai, a Tahitian term meaning ‘pleasant’), an aspiration (e.g. Cosmopolitan), or possibly both (e.g. Sex on the Beach) (Hilton, 2012).

3. Methodology

This work aims to develop the business plan associated with the commercialisation of a service robot for professional use in the preparation of cocktails and mocktails.

Although factors as politics, economy or legislation are often beyond companies' control, they have a major influence on its prosperity and should not be neglected in the preparation of business development strategy.

So, all businesses depend not only on the internal policies as well as on the external circumstances and that's why the Business Plan approach methodology began with a macro External Market Analysis where, through the Pestel Analysis, it is sought to frame the political, economic, social, technological, environmental, and legal aspects that could have the greatest impact on business implementation.

Still in the scope of the external environment, a Porter's 5-Force Analysis is developed where the power of competition (current, potential, direct and indirect), suppliers and clients are reflected upon, as well as an Analysis of Potential Markets, where the main potential types of segments are presented and generically quantified based on data from the *Instituto Nacional de Estadística* (INE) among other sources.

With regard to some online and face-to-face interviews, done to different types of potential customers, main findings are also presented. These interviews are intended to find out how deeply people in charge of these companies, or at least with some power to influence a purchase, know this type of product, what think about their commercialization and, generically, absorb their experience in the lines of business in which they work.

The external factors that are favourable (opportunities) and unfavourable (threats) to the implementation and development of the business are then summarised.

Information about the experience of some of the Mixologiq robot's exclusive resellers in other countries is presented, which can serve as a reference in strategic terms, but also in marketing and operational terms (brief benchmarking).

Strategy Implementation is then addressed, by defining the vision, mission, and values statements, as well as presenting the definition and characterization of the target segments' profiles and the critical success factors.

Implementation Policies, present the goods to be commercialized and services to be provided, the planned prices, the human resources that will be assigned to the company's operation, the place, positioning and communication strategy for the product, and partnerships.

Finally, some basic assumptions are set out, revenues and expenses are presented and calculated (for setting up the company, purchasing and importing the robots, wages and salaries, and for operation), and the Economic and Financial Viability Analysis is developed.

In this framework a sensitivity analysis and optimistic and pessimistic scenarios are also done, to understand the impact of changing some key variables.

4. External Analysis

This chapter presents Pestel Analysis, a Porter's 5-Force Analysis and an Analysis of Potential Markets.

4.1. Pestel Analysis

This analysis aims to explain how the sector is affected by several powerful forces that can impact the short and long-term business and its competitiveness.

4.1.1. Political Context

After two years in which society was severely affected by the Covid-19 pandemic, the restrictions on activity and movement that occurred during that period began to disappear and companies began to resume their regular operations, which encouraged an increase in demand for consumer and investment goods and put pressure on supply chains, due to logistical constraints and shortages of intermediate goods, with consequences, in turn, on prices.

Despite this framework of disruptions in global supply chains and the emergence of inflationary pressures, macroeconomic forecasts envisaged a path of recovery and growth.

However, Russia's large-scale military invasion of Ukraine in February 2022 has conditioned the evolution of the global economy and trade, contributing to the worsening of the above scenario, and adding other problems such as constraints in food trade, in the international energy market and in the sectors most dependent on it.

It should be noted that the European Union (EU) is among the most exposed economies, due to its geographical proximity to the war and the strong, though much decreasing, dependence on fossil fuel imports.

In this context, in the EU, there were three important changes in terms of policy lines of action, namely the implementation of economic and financial sanctions against Russia and Belarus, the definition of measures to mitigate the effects of the geopolitical crisis and the increase in inflation, and the change in monetary policy.

We are therefore in the presence of a highly complex scenario and with uncertain results.

On a national level, the State Budget for 2023 (OE 2023), presented in October 2022, foresees the adoption of measures, fundamentally, to respond to high inflation, simultaneously with a reduction of the budget deficit and public debt as a percentage of GDP.

Notwithstanding the various measures directed at households that may indirectly affect the accounts of companies, the main determinations that may directly affect the accounts of micro-companies are the following:

- Value of the taxable amount subject to the special 17% corporate income tax rate increases from €25,000 to €50,000;
- 20% increase in CIT (Corporate Income Tax) deductions on energy costs;
- 50% increase in CIT deductions for fixed remuneration costs and social contributions, for companies that increase salaries in accordance with the *Acordo de Rendimentos e Competitividade*, which provides for a benchmark update of 5.1% in 2023 (companies that worsen the pay gap between the highest and lowest salaries are excluded, as a measure to combat income inequality);
- Companies have no longer a time limit for deducting tax losses, but the deductible limit fall from 70% to 65% and the deduction to be made in each tax period may not exceed the amount corresponding to 65% of the respective taxable profit;
- Creation of the *Incentivo à Capitalização das Empresas (ICE)*, which establishes the possibility of deducting, at the annual rate of 5% and for 10 tax years, the amount of net increases in equity of micro-companies, which include, among others, contributions in cash and in specie made by shareholders, share issue premiums, as well as the profits invested in retained earnings, in reserves or in share capital increases, and the referred deduction can be made up to the greater of the following amounts: 2 million euros or 30% of EBITDA (the surplus, in relation to the latter value, may be deducted in the 5 subsequent tax years);
- Decrease in the taxation of electric, plug-in hybrid and natural gas vehicles (NGV) to 2.5%, 7.5% and 15%, respectively.

4.1.2. Economic Context

Domestic and international politics dominates the macroeconomic indicators that affect business success. Updated data from the main organizations was obtained on early December 2022 and used in this chapter to present the most important indicators that should be tracked: Consumer confidence, Economic growth, Inflation, Unemployment, and Interest rates.

➤ Consumer confidence

Consumer confidence measures the overall consumer optimism about the state of the economy in the next 12 months, considering the expectations about country's economic situation, households' financial situation, unemployment and inflation outlook, future evolution of major purchases and savings propensity.

The consumer confidence indicator in Portugal reached -38.1 in December 2022, the weakest reading since August 2013. Since there, the indicator improved until -35 in February 2023 (the highest reading since September last year) (Figure 4.1).

However, it cannot yet be said that a change in the trend has already taken place in the medium to long term. As such, we also cannot yet say that we are looking at a favourable outlook, as confident consumers tend to be more willing to spend money, which means that businesses are more likely to prosper.

Figure 4.1 – Portugal's Consumer Confidence indicator evolution.



Source: Trading Economics (n.d.), based INE data. Accessed on: March 7, 2023.

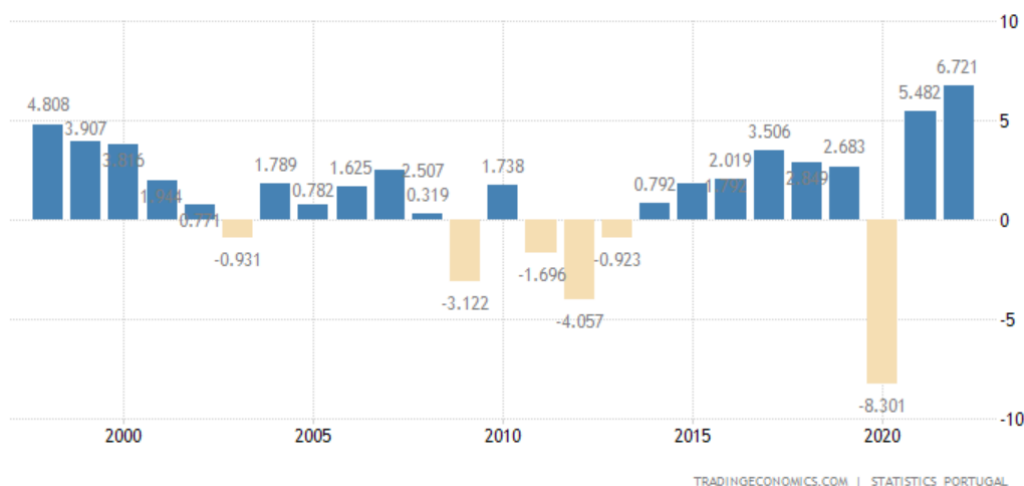
➤ Economic growth

The most classical way to measure a country's economic growth (although it says nothing about the variation in social inequality), is to measure the growth of its Gross Domestic Product (GDP). The GDP is the total market value of the goods and services produced by a country's economy during a specified period and it is defined by the sum of the private consumption, the private investment, the government spending and the net exports (nation's exports minus its imports).

Figure 4.2 shows the Portugal's full year GDP evolution and Table 4.1 presents the GDP projections until 2027, according to the following entities: Bank of Portugal (BP); European Commission (EC); Council of Public Finance (CPF); International Monetary Fund (IMF), Ministry of Finance of the Government of Portugal (MFGP) and Organization for Economic Cooperation and Development (OECD).

Although economic growth is expected in the coming years, it is expected to be quite moderate and below pre-pandemic levels.

Figure 4.2 – Portugal's full year GDP evolution.



Source: Trading Economics (n.d.), based INE data. Accessed on: March 7, 2023.

Table 4.1 – GDP projections until 2027.

ORGANIZATION (Publication Date)	GDP							
	2020	2021	2022 *	2023 *	2024 *	2025 *	2026 *	2027 *
CPF (Sep. 2022)	-8,3	5,5	6,7	1,2	2,0	1,8	1,8	-
MFGP (Oct. 2022)			6,5	1,3	-	-	-	-
IMF (Oct. 2022)			6,2	0,7	2,4	2,2	1,9	1,9
OECD (Nov. 2022)			6,7	1,0	1,2	-	-	-
BP (Dec. 2022)			6,8	1,5	2,0	1,9	-	-
EC (Feb. 2023)			6,7	1,0	1,8	-	-	-

* Forecast; Sources: Adapted from *Conselho das Finanças Públicas* (2023).

➤ Inflation

Inflation is the rate at which the overall price level of goods and services changes over time and it is an important variable that not only affects the reduction in purchasing power and consumption of the population, but also directly influences the interest rates practiced in the market, since it promotes the adoption of measures to control it by the European Central Bank (ECB).

Figure 4.3 shows Portugal's inflation evolution and Table 4.2 the inflation projections until 2027. After the peak seen in October 2022, annual inflation rate in Portugal slowed for the fourth straight month to the lowest value since May 2022. However, although overall inflation is already receding, underlying inflation (i.e., excluding unprocessed food and energy) is still accelerating, creating concern.

According to BP, EC, CPF IMF, MFGP and OECD, a continuation of the downward trend is expected in 2023, reflecting a less buoyant behaviour of demand, conditioned by the

increase in financing costs and the loss of purchasing power associated with price increases. Nevertheless, the approach to the 2% inflation rate over the medium term that ECB wants to ensure, should only occur in 2025.

Figure 4.3 – Portugal's inflation evolution.



Source: Trading Economics (n.d.), based on INE data. Accessed on: March 7, 2023.

Table 4.2 – Inflation projections until 2027.

ORGANIZATION (Publication Date)	Inflation							
	2020	2021	2022 *	2023 *	2024 *	2025 *	2026 *	2027 *
CPF (Sep. 2022)	-0,1	0,9	7,7	5,1	2,2	1,9	1,9	-
MFGP (Oct. 2022)			7,4	4,0	-	-	-	-
IMF (Oct. 2022)			7,9	4,7	2,6	2,3	2,1	2,0
OECD (Nov. 2022)			8,3	6,6	2,4	-	-	-
BP (Dec. 2022)			8,1	5,8	3,3	2,1	-	-
EC (Feb. 2023)			8,1	5,4	2,6	-	-	-

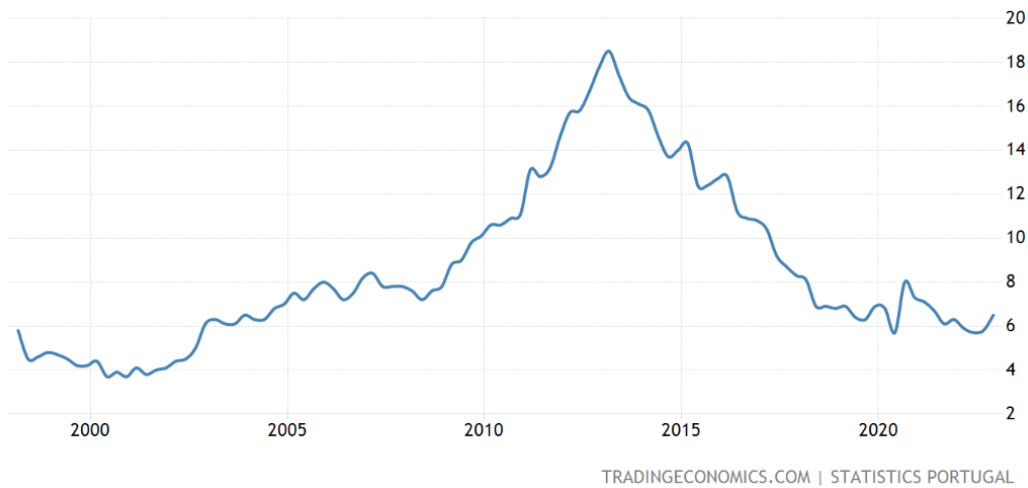
* Forecast; Source: Adapted from *Conselho das Finanças Públicas* (2023).

➤ Unemployment

Employment has direct impact on the purchasing power of individuals, so the unemployment rate is also one of the most important macroeconomic variables because when it is high, household consumption of products and services decreases and, in the short term, this cools down the productive sectors, causing more workers to be laid off.

In Figure 4.4, it is possible to see that Portugal has an unemployment rate below pre-pandemic levels. In Table 4.3 which presents the unemployment projections, according to the BP, EC, CPF IMF, MFGP and OECD, following on from the second half of 2022, the unemployment rate in Portugal is expected to rise slightly in 2023 and then fall again slightly in the following years.

Figure 4.4 – Portugal's unemployment evolution.



Source: Trading Economics (n.d.), based INE data. Accessed on: March 7, 2023.

Table 4.3 – Unemployment projections until 2027

ORGANIZATION (Publication Date)	Unemployment							
	2020	2021	2022 *	2023 *	2024 *	2025 *	2026 *	2027 *
CPF (Sep. 2022)	7,0	6,6	5,6	5,3	5,1	5,1	5,0	-
MFGP (Oct. 2022)			5,6	5,6	-	-	-	-
IMF (Oct. 2022)			6,1	6,5	6,4	6,3	6,3	6,3
OECD (Nov. 2022)			6,1	6,4	6,2	-	-	-
BP (Dec. 2022)			5,9	5,9	5,9	5,9	-	-
EC (Feb. 2023)			-	-	-	-	-	-

* Forecast; Sources: Adapted from *Conselho das Finanças Públicas* (2023).

➤ Interest rates

Interest rates represent the amount that a lender (banks and other financial institutions as a source of financing) charges consumers and businesses to borrow money.

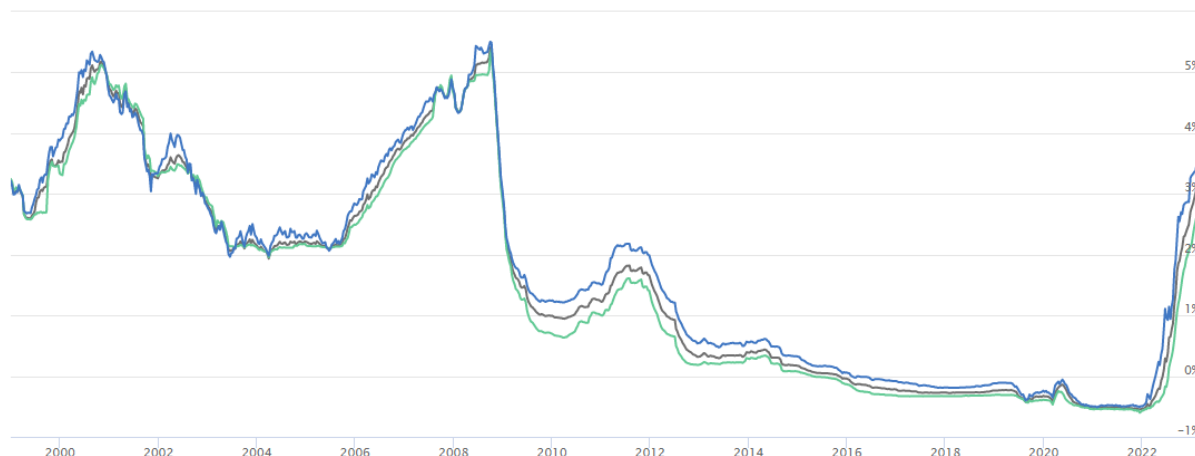
The ECB's monetary policy aims to maintain price stability with a 2% inflation rate over the medium term, which means ensuring that inflation remains low, stable, and predictable to guarantee economic growth and job creation.

Interest rates are one of several instruments that ECB can use in its monetary policy which directly influence on setting the cost of borrowing and when the ECB intends to control growth inflation, it tends to increase this variable in order to reduce consumption and investment by individuals and companies, due to the more unfavourable financing conditions. However, this measure may lead to the occurrence of an economic recession due to the fall in GDP and the consequent potential increase in unemployment.

Given the current high inflation, the ECB has made several consecutive increases in the benchmark interest rates, between July and February 2023 (the fastest rising cycle since its creation in 1999), moving considerably ahead with the removal of monetary policy accommodation, and setting the central bank rate at 3%. This path of significant interest rate increases, it should continue at a steady pace to ensure a timely return of inflation to its medium-term objective of 2%.

The ECB interest rates have an indirect impact, for example, on the Euribor rates which are the reference rates for property loans in Portugal which are usually indexed to the 3- or 6-month Euribor (Figure 4.5). Considering the short-term combination of high inflation and the fact that a significant percentage of the Portuguese population has this type of credit (after a long period of negative Euribor rates), this could have a huge impact on the economy, even considering some government's measures to support families.

Figure 4.5 – Historical 3, 6 and 12 months Euribor rates.



Source: Euribor-rates (n.d.). Accessed on: March 7, 2023.

*
* *

In short, the financial environment has been deteriorating through increases in inflation and interest rates, which have adverse effects on the real disposable income of households and companies. These effects were mitigated in 2022 by the relatively good performance of the labour market and the resilience of private consumption, mainly due to the channelling into spending of part of the savings accumulated by households during the pandemic crisis. In contrast, investment grew only slightly, stemming from increased uncertainty, supply constraints and rising financing costs.

Faced with persistent inflationary pressures, ECB monetary policy is expected to continue its tightening path throughout 2023. Added to the signs of exhaustion of surplus household

savings, which are fundamental in facing a period of higher prices, are the increase in financing costs and the weakening of activity in Portugal's important trading partners. These factors will contribute to a significant economic slowdown, through a shrinking consumer market and greater aversion to risk and investment.

On the other hand, the unemployment projections consider that it will remain relatively low which should condition the ease with which companies can recruit more qualified staff. In the case under study, it might be more difficult to hire bartenders with knowledge in the preparation of cocktails and mocktails, which could favour a possible increase in the sales of the product object of this work.

4.1.3. Sociocultural Context

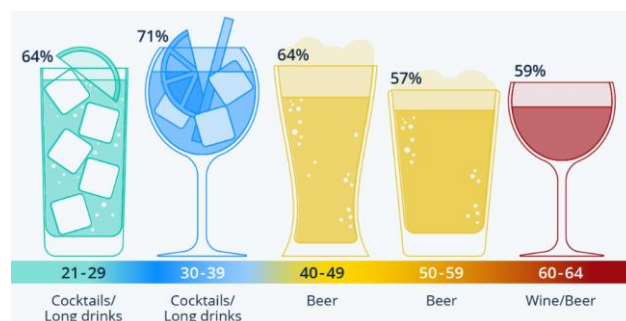
Today, as throughout history, drinks are not only part of the meals we eat but are also often used in socializing contexts.

While there are, the alcoholic cocktails and non-alcoholic mocktails, it is important to realize, that alcoholic mixed drinks include the so-called spirits or distilled beverages, which contain much more alcohol than the fermented beverages such as wine, beer, or cider.

According to the findings of the ESPAD (European School Survey Project on Alcohol and Other Drugs) Report 2019, a European project supported by the European Monitoring Centre for Drugs and Drug Addiction, based on information from a 2019 anonymous questionnaire conducted on almost 100,000 15–16-year-old students from 35 European countries, the amount of alcohol ingested by Portuguese young people is the 10th highest. This report also shows a preference of the Portuguese in this age group for distilled drinks (59%), a value much higher than the European average (38%). These results could be compared to the ones obtained in the ESPAD Report 2015 when the spirit drinks were option of 53% of young Portuguese people and 34% of the European average, showing a tendency for the choice of this kind of beverages.

Based on a Statista Global Consumer Survey (2022), made online to U.S. adults, with ages between 21 and 64 years old, conducted in July 2022, looking at the drink type which the largest share of respondents of each age group said they consume, differences can be observed. It was from the respondents between 21 and 39 years old most commonly cited cocktails and long drinks as one of their choices. However, respondents up to 40, have cited beer and over-59s, wine also crept in, sharing the top spot with beer (Figure 4.6).

Figure 4.6 – How alcohol preference varies with age in the U.S. adults.



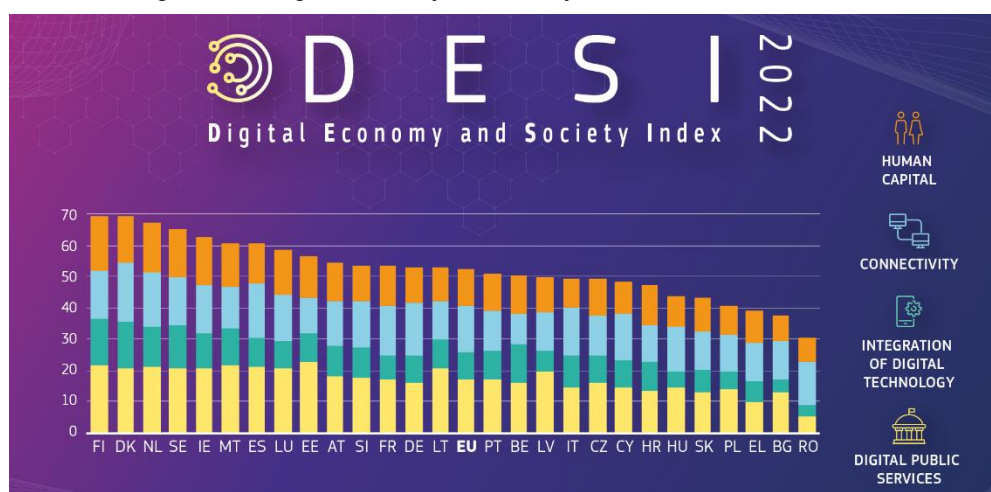
Source: Statista Global Consumer Survey (2022).

4.1.4. Technological Context

Robotics is a clear example of how digitalization and new technological tools are increasingly part of our lives. However, it is expected that technological equipment will have a greater acceptance (ease of sale) where the use of technology and the digitalization of society are more developed.

Worldwide, according to IMD World Digital Competitiveness Ranking for 2022, Portugal ranks 38th out of 63 countries analysed. Also, data is available through the Digital Economy and Society Index (DESI) which is one of the main ways to compare the levels of digital transition and competitiveness of the EU countries since 2014. The DESI 2022 reports, based mainly on 2021 data, shows that Portugal (PT) is ranked 16th, among the 27 Member States, being just below the EU average (Figure 4.7).

Figure 4.7 – Digital Economy and Society Index 2022 of EU countries.



Source: EC (2022).

Technavio (2022) has a robotic bartender market research report, categorized as part of the industrial machinery market, that analyse and forecast the market for the period 2022-2026, at global and regional level, providing valuable insights on the post COVID-19 impact.

The robotic bartender market share is expected to increase by USD 678.8 million from 2021 to 2026, and the market's growth momentum should accelerate at a compound annual growth rate (CAGR) of 24.27% and a year-over-year (YoY) growth rate of 23.05%. The major contribution should come from the North America region with 34.69% and the key consumer countries with the highest revenue share should be the US, China, Japan, Germany, and UK.

Presently, the robotic bartender market has a fragmented structure with several players occupying the market share, which could change due to industry consolidation or if some vendors exit the market.

According to this report, the key factors driving the growth of robotic bartending market are the notably leverage in the use of technology by bars/nightclubs (which increased significantly over the past decade), as well as the use of crowdfunding as a platform to raise funds.

On the other hand, the forecast also anticipates that the disruption threat is high, the regulatory control should have medium impact in this sector and factors such as the extremely high cost of robotic arm bartenders will be one of the key restraints to the market growth during the forecast period, leading many potential customers to prefer not to make the investment in robotic solutions due to the uncertain perception of profitability.

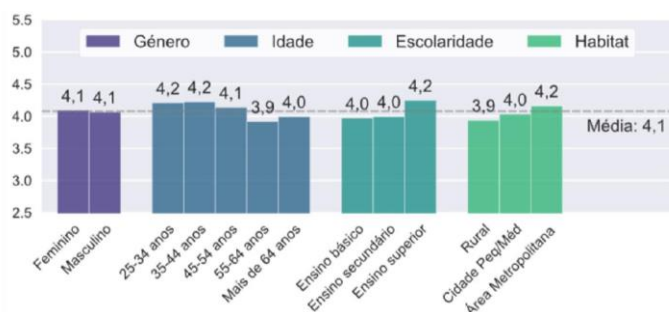
Finally, the robotic bartender market will not only grow significantly during the forecast period by the commercial segment, as it also anticipates that robotic bartenders will gain a foothold in the residential sector as end-users seek more lavish drinking styles at social gatherings and homes.

4.1.5. Environmental Context

More and more, companies recognize the link between their values, their actions, and their profits. In this context, despite the still existing gap between the growing global concern with the environment and consumer behaviour, companies tend to associate their image with a more sustainable future, reducing their environmental footprint by adopting best practices, whether in terms of product development, use of green technologies, or incorporating more eco-friendly business models and procedures.

According to Truninger et al. (2019), in *Segundo Grande Inquérito sobre Sustentabilidade*, based on the NEP (New Environmental Paradigm) scale from 1 to 5, ecocentric values predominate among the Portuguese (4.07 on average) over anthropocentric values (2.91 on average), reaffirming and becoming stronger compared to the previous 2016 survey. This dynamic, which is general for all respondents, has, however, different profiles, assuming the direction of ecological values for the younger, more educated and residents in areas that are more urban (Figure 4.8).

Figure 4.8 – Ecological propensity by social characterization.



Source: Truninger et al. (2019).

4.1.6. Legal Context

From the legal factors' perspective, emphasis is placed on the import rules and on the commercial relations law, the former due to their particularity in the type of business, and the latter due to recent changes that may impact the business.

Incoterms, short for International Commercial Terms, are globally recognized rules, used in contracts for the delivery of goods that have been developed and maintained by experts and practitioners brought together by the International Chamber of Commerce (ICC) and become the standard in international business. Reflecting the changes to the global trade environment, the latest version published by ICC are the Incoterms 2020, that have come into effect from the 1st of January 2020 and is composed by 11 rules that clearly state which tasks, costs and risks are linked to the seller/exporter and the buyer/importer (Figure 4.9).

Figure 4.9 – Incoterms 2020 rules responsibility quick reference guide.

Groups	Freight Collect Terms						Freight Prepaid Terms				
	Any Mode or Modes of Transport		Sea and Inland Waterway Transport				Any Mode or Modes of Transport				
Incoterm®	EXW Ex Works (Place)	FCA Free Carrier (Place)	FAS Free Alongside Ship (Port)	FOB Free On Board (Port)	CFR Cost and Freight (Port)	CIF Cost Insurance & Freight (Port)	CPT Carriage Paid To (Place)	CIP Carriage & Insurance Paid to (Place)	DAP Delivered at Place (Place)	DPU Delivered at Place Unloaded (Place)	DDP Delivered Duty Paid (Place)
Transfer of Risk	At Buyer's Disposal	On Buyer's Transport	Alongside Ship	On Board Vessel	On Board Vessel	On Board Vessel	At Carrier	At Carrier	At Named Place	At Named Place Unloaded	At Named Place
Obligations & Charges:											
Export Packaging	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller
Loading Charges	Buyer	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller
Delivery to Port/Place	Buyer	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller
Export Duty, Taxes & Customs Clearance	Buyer	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller
Origin Terminal Charges	Buyer	Buyer	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller
Loading on Carriage	Buyer	Buyer	Buyer	Seller	Seller	Seller	Seller	Seller	Seller	Seller	Seller
Carriage Charges	Buyer	Buyer	Buyer	Buyer	Seller	Seller	Seller	Seller	Seller	Seller	Seller
Insurance	Negotiable	Negotiable	Negotiable	Negotiable	Negotiable	*Seller	Negotiable	**Seller	Negotiable	Negotiable	Negotiable
Destination Terminal Charges	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Seller	Seller	Seller	Seller	Seller
Delivery to Destination	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Seller	Seller	Seller
Unloading at Destination	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Seller	Buyer
Import Duty, Taxes & Customs Clearance	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Buyer	Seller

Source: IncoDocs (2020).

Still with regard to import rules, an international nomenclature developed by the World Customs Organization (arranged in 6-digit codes), allows all participating countries to classify traded goods on a common basis named Harmonized System (HS) which is in its seventh amendment.

In this context, appears the Combined Nomenclature (CN), a EU's 8-digit coding system which comprise the HS Nomenclature with further EU-specific subdivisions, followed by a description and a duty rate. Annex I to the basic CN Regulation (No 2658/87) is updated every year and published as a stand-alone Regulation in the EU's Official Journal. The latest available version was the Regulation (EU) 2022/1998, which applies from January 1, 2023. The CN serves the EU's Common Customs Tariff (CCT) and provides statistics about the trade within the EU and between the EU and the rest of the world.

Beyond the 8-digit level, EU countries are free to introduce national distinctions. It is based on this tariff classification of goods, consisting of a numerical code, that it is possible to calculate the customs duties levied on a given product upon its arrival in the national territory, through the *Autoridade Tributária e Aduaneira* website.

In terms of commercial laws, reference should be made to the changes made by *Decreto-Lei n.º 84/2021*, of October 18, whose rules come into effect as of January 1, 2022. This law regulates and represents an important strengthening of consumer rights in the purchase and sale of goods, content and digital services, transposing Directives (EU) 2019/771 and (EU) 2019/770. Among other rules, the diploma establishes:

- The extension of the warranty period for movable goods from 2 to 3 years, whereby in the first two years the legal presumption in favour of the consumer is maintained (the consumer will not have to prove that the defect existed at the time of delivering the good);
- The "right to reject" that allows the consumer to choose freely between replacing the good and cancelling the contract when the non-conformity becomes apparent within the first 30 days of delivery;
- An additional six-month warranty period if the consumer opts to repair the good (up to a maximum of 4 repairs), promoting sustainable consumption;
- The obligation to make spare parts available for a period of 10 years.

4.2. Porter's 5-Force Analysis

This analysis helps in the definition of business strategy taking into account company's competition, potential new market entrants, suppliers, customers, and substitute products, aspects that can influence company's profitability.

4.2.1. Competition in the industry

The first of the Five Forces refers to the number of competitors and their ability to undercut a company, since the more there are, and the respective products and services they offer, the less power a company has.

Although the cocktail robot subject of this Business Plan was the first robot of its kind to be launched in the world, other direct competitors have since been created, and there are currently around 25 companies in the robotic bartender market, which are spread across various categories.

A vendor with dominant presence has significant control in the market and can influence in various ways including product/service launches, lobbying for regulations or geographical expansion. On the other hand, weak players generally have very low market share or presence in very few geographical markets and play with the rules set by the leaders.

Table 4.4 presents the main cocktail robots, its strengths, and weaknesses.

Table 4.4 – Other cocktail/mocktail preparation robots.

Competitors	Strengths	Weaknesses
Bartesian https://bartesian.com	- Domestic use; - Interesting solution using capsules; - Low selling price (€386).	- No bartending model; - Content of each bottle needs to be placed in the machine's own container; - Only 4 ingredients at once; - No built-in refrigeration; - No representation in Portugal.
Barbot https://thebarbot.com/	- Domestic use; - Mobile App; - No power connection required (rechargeable battery); - Pre-order for only \$20; - Low selling price (\$400).	- No bartending model; - Content of each bottle needs to be placed in the machine's own container; - Only 4 ingredients at once; - No built-in refrigeration; - No representation in Portugal.
Somabar https://www.kickstarter.com/projects/somabar/somabar-automated-craft-cocktail-appliance	- Domestic use; - Mobile App; - Good branding.	- Content of each bottle needs to be placed in the machine's own container; - Only 7 ingredients at once; - No built-in refrigeration; - No representation in Portugal.
Barsys https://thebarsys.com/	- Domestic use; - Mobile App; - Good branding.	- No bartending model; - Only holds 5 bottles at once; - No built-in refrigeration; - No representation in Portugal.
Party Robotics https://partyrobotics.com/	- Domestic model with 7 bottles and Business model with 15 bottles.	- Very poor design and branding; - No built-in refrigeration; - No representation in Portugal.
SirMixABot https://www.sirmixabot.com/	- Domestic model with 6 bottles and rotating concept.	- Bartending model only holds 10 bottles at once; - Very poor design and branding; - No built-in refrigeration; - No representation in Portugal.

Competitors	Strengths	Weaknesses
Mixartista https://www.mixartista.it/en	- Nice rotating concept.	- Only holds 12 bottles at once; - Slow, since it serves one ingredient at a time; - Lack of branding; - No built-in refrigeration; - No representation in Portugal.
theQube http://theqube.de/en/machine.htm	- Nice rotating concept; - RGB LED lighting; - Cooling down to 10°C.	- Only holds 12 bottles at once; - Slow, since it serves one ingredient at a time; - No representation in Portugal.
Rotender https://rotender.com/	- Vending cocktail machine (self-service); - Eliminates the need for a bartender; - Mobile App to choose, customize and pay; - Holds 16 bottles at once.	- No pre-set recipes of cocktails; - No instant cocktails (too many clicks); - No possible decor of drinks; - No built-in refrigeration; - No representation in Portugal.
Foxtender http://www.foxtender.com/	- Vending cocktail machine (self-service); - Eliminates the need for a bartender; - Mobile App to choose, customize and pay; - ID recognition system; - Possible age verification with card;	- Content of each bottle needs to be placed in the machine's own container; - Only 9 ingredients at once; - No possible decor of drinks; - Lack of branding; - No representation in Portugal.
TendedBar https://tendedbar.com/	- Vending cocktail machine (self-service); - Eliminates the need for a bartender; - Age verification; - Face/wristband recognition; - Holds 20 bottles at once.	- No instant cocktails (too many clicks); - No possible decor of drinks; - No built-in refrigeration; - Lack of branding; - No representation in Portugal.
Cecilia.ai (GKI Group) https://cecilia.ai/	- Interactive bartender (voice recognition & conversational AI); - Eliminates the need for a human bartender.	- Only holds 8 bottles at once; - Slow introduction; - No possible decor of drinks; - No built-in refrigeration; - No representation in Portugal.
Cocktailmachine/TenderOne https://www.cocktailsmachine.com/	- 1st cocktail robot with representation in Portugal; - Different models with 8 up to 30 ingredients at once; - Interesting built-in bar counter concept with wheels; - Point-of-sale.	- Content of each bottle needs to be placed in the machine's own container; - Requires more space in the establishment; - No built-in refrigeration.
SmartbarUSA https://www.smartbarusa.com/	- Different models with 8 up to 50 bottles at once; - Interesting built-in bar counter concept; - Server unlock via card swipe or pinpad; - Point-of-Sale.	- No preset recipes of cocktails; - Requires more space in the establishment and has no wheels; - No built-in refrigeration; - No representation in Portugal.
Wahlbar https://wahlbar.com/en/	- Domestic and Business use (self-service vending machine and built-in bar counter concept with wheels); - Vending machine eliminates the need for a bartender; - Nice branding; - 150 pre-set recipes; - Domestic unit with 12 bottles; - Self-service and built-in bar counter units with only 15 ingredients.	- Content of each bottle needs to be placed in the containers of self-service and built-in bar counter units; - Vending machine doesn't permit decor of drinks; - Built-in bar counter requires more space in the establishment; - No built-in refrigeration; - No representation in Portugal.
Yanu https://yanu.ai/	- Interesting built-in bar counter concept with modern and futuristic design; - Intuitive mobile App; - 45 bottles at once.	- Slow, since it serves one ingredient at a time; - Requires more space in the establishment and has no wheels; - No built-in refrigeration; - No representation in Portugal.

Competitors	Strengths	Weaknesses
MakrShakr https://www.makrshakr.com/	- Nice branding and client-base; - Interesting built-in bar counter concept with modern and futuristic design; - Intuitive mobile App; - Over 100 bottles at once.	- Most expensive; - Just one type of glass; - Slow, since it serves one ingredient at a time; - Requires more space in the establishment and has no wheels; - No built-in refrigeration; - No representation in Portugal.

The analysis of the table above allows us to verify the existence of four brands of robots exclusively for home use (Bartesian, Barbot, Somabar and Barsys) and two more with home use models (Party Robotics and SirMixABot). These are small machines which can hold a maximum of 7 ingredients at the same time. The Waehlbar brand also has a domestic model for built-in use (for example in the kitchen) with a capacity for 12 bottles.

Outside the domestic use, there are self-service models through vending machines (Rotender, Foxtender, TendedBar and a Waehlbar model), which have the main advantage of eliminating the need for a bartender and the disadvantage of not allowing the decoration of drinks.

For solutions that require bartending there are robots that are placed on top of existing counters and robots that have a built-in counter.

Regarding the former, which are directly compared to the robot that is the subject of this Business Plan, there are only competitors with rotating concept (Mixartista and theQube), which slows down the preparation of cocktails, since it serves one ingredient at a time in the glass. Both these robots can only hold 12 bottles at once.

The models with built-in bar counter, with wheels (Cocktailmachine/TenderOne and one model of Waehlbar) or without wheels (SmartbarUSA) have the disadvantage of being too big (a valid option for establishments without space problems or which are designed from scratch to accommodate this type of solution).

As slightly different/futuristic solutions, there is Cecilia.ai, Yanu and MakrShakr. The first is a kind of vending machine but with an Interactive bartender (voice recognition & conversational AI). Its disadvantages are, besides not allowing decor of drinks, it only holds 8 bottles at once and has a slow introduction. The other ones are models with built-in bar counter but without bartender, because the orders are made in an app, and it is a robot arm that prepares the cocktails. These robots can hold many bottles at once, but they are slower since they serve one ingredient at a time, and they are the most expensive ones.

Note also that only one of the competing brands has built-in refrigeration (theQube) and only one of the brands has representation in Portugal (Cocktailmachine/TenderOne).

4.2.2. Potential of new entrants into the industry

In this industry there are no strong barriers to the entry of new competitors in the market. However, given the type of product concerned, it is considered that, after the investment made by a potential customer, it is unlikely that a new purchase will be made in a short period of time, just because a similar product offers one or two additional functionalities. So, the secret for this product is being the first to sell.

When a company already has a cocktail preparation robot, only very innovative products could attract a company to buy another one.

4.2.3. Power of suppliers

The contract signed with Mixologiq company which developed the idea, guarantees to the company's Portuguese representation an exclusivity period for the sale of the robot in the Portuguese territory for 3 years, corresponding to June 2023 to June 2026. In return, the company's Portuguese representation commits to buy 30 robots in the first year, 60 robots in the second year and 100 robots in the third year.

Also, according to the contractual terms, the purchase cost per robot will vary depending on the number of products per order, but the purchase prices are guaranteed until the end of the contract, which means no price increases are contemplated.

The order and prepayment are made to this supplier, who then transmits the order to the robot manufacturer, located in an Asian country. The delivery is agreed between the manufacturer and the company's Portuguese representation and made directly to Portugal. Furthermore, the signed contract only presents an estimated time delivery of 40 calendar days, not considering any supplier penalty or compensations for the company's Portuguese representation, for eventual delays.

As such, there is a high degree of dependency on this supplier, increased by a contract which could safeguard more the Portuguese company interests. Nevertheless, there are no power of the supplier to increase the price of products, even if the price of raw materials, intermediate products, or labour increases, in this context of rising inflation.

Reference also to the firm, already contracted in Portugal to provide the maintenance services of the sold robots, composed by two technicians who were trained by a representative expert of Mixologiq for 3 days in Lisbon. So, although these technicians are by no means irreplaceable, this supplier has some power since an eventual need for replacement may imply the coming back of the Mixologiq expert to give training with all his expenses paid.

4.2.4. Power of customers

It is considered that, in this business, the power of customers to lower the sales price will be very limited. This hypothesis could only arise, if that is the policy of the company, in the case of customers who own several establishments and may want to buy in quantity.

4.2.5. Threat of substitute products

The last of the Five Forces focuses on the threat of substitute products and services. As direct substitute competitors there are mixologists (bartenders with significant knowledge of cocktail preparation), who provide a service broadly equivalent to that of the robot. As indirect substitute competitors we have the other drinks on sale in the establishments where cocktails are commercialized.

4.3. Analysis of Potential Markets

In the *Classificação Portuguesa de Atividades Económicas, Revisão 3 (CAE-Rev 3)*, the subclass of economic activity "Bars" has the CAE 56302 and the set of establishments with beverages service commonly known as nightclubs, cabarets, discos and dancings, is identified has "Beverages establishments with dance floor" with the CAE 56305. For simplicity, this sector will be referred as "Nightclubs" in the present Business Plan.

Also, the events organization companies, such as marriages, dance parties, corporate events, and others, are identified in the *CAE-Rev 3* has "Organisation of trade shows, conventions and similar event" with the CAE 82300 and, for simplicity, it will be referred as "Events Firms" in the Business Plan.

Table 4.5 presents the number of bars, nightclubs, and events organization firms in Portugal, distributed by geographic localization.

In *CAE-Rev 3*, the restaurants are categorized in different subclasses, with the CAE 56101 to 56107, and its number is presented in

Table 4.6 by geographic location in Portugal's territory.

Table 4.5 – No. of bars, nightclubs, and events firms in Portugal by geographic location.

Geographic location (NUTS - 2013)	BARS	NIGHTCLUBS	EVENTS FIRMS
North	834	170	532
Center	737	109	223
Metropolitan Area of Lisbon	750	147	939
Alentejo	361	26	64
Algarve	567	46	74
Autonomous Region of Azores	165	17	25
Autonomous Region of Madeira	713	10	23
Total	4 127	525	1 880

Source: INE (n.d.). Enterprises (No.) by Geographic localization (NUTS - 2013) and Economic activity (Subclass - CAE Rev. 3); Annual. Data last updated: March 29, 2022; Accessed on: December 9, 2022.

Table 4.6 – No. of restaurants in Portugal by category and geographic location.

Geographic location (NUTS - 2013)	RESTAURANTS						
	Traditional	Snack-bars	Self-service	Typical	With Dance Floor	Take away	NEC (include mobile food activities)
North	5 158	690	135	370	75	670	1 316
Center	3 450	494	127	206	39	572	945
Metrop. Area of Lisbon	5 842	862	231	344	80	785	1 912
Alentejo	1 248	175	47	101	14	237	347
Algarve	2 244	813	53	156	29	292	496
Auton. Region of Azores	264	105	7	29	8	28	152
Auton. Region of Madeira	554	210	8	28	11	28	178
Total	18 760	3 349	608	1 234	256	2 612	5 346

Source: INE (n.d.). Enterprises (No.) by Geographic localization (NUTS - 2013) and Economic activity (Subclass - CAE Rev. 3); Annual. Data last updated: March 29, 2022; Accessed on: December 9, 2022.

Collective tourist accommodations are divided into hotelier establishments (which include the hotels), tourist accommodation establishments and local accommodation establishments (where hostels are included).

Table 4.7 presents the number of hotels, by category distributed by geographic location in Portugal's territory.

Table 4.7 – No. of hotels in Portugal by category and geographic location.

Geographic location (NUTS - 2013)	HOTELS				
	5*	4*	3*	2*	1*
North	27	129	112	110	22
Center	10	105	118	84	15
Metropolitan Area of Lisbon	43	106	72	38	11
Alentejo	6	28	35	25	3
Algarve	33	60	48	18	2
Autonomous Region of Azores	5	30	15	15	2
Autonomous Region of Madeira	15	41	15	8	1
Total	139	499	415	298	56

Sources: INE (n.d.). Tourist accommodation establishments (No.) by Geographic localization (NUTS - 2013) and Type (tourist accommodation establishment); Annual. Data last updated: July 19, 2022; Accessed on: December 9, 2022.

The Hostelworld website was consulted, and it was found that there were 287 hostels in Portugal, since the *Instituto Nacional de Estatística* website only provides generic results for the category of local accommodation establishments.

According to *Estatísticas do Turismo 2021* report, from *Instituto Nacional de Estatística*, hotels contributed with 1.5 billion euros of total income and the hostels, which received 511.1 thousand guests to 1.2 million overnight stays in 2021, had total revenue of 35.8 million euros.

The “Casinos” belongs to the CAE 92000, which is more comprehensive. Table 4.8 presents the number of casinos in Portugal, distributed by geographic location. The information was obtained in the SRIJ - *Serviço de Regulação e Inspeção de Jogos* website, organism belonging to the *Turismo de Portugal*.

Table 4.8 – No. of casinos in Portugal by geographic location.

Geographic location (NUTS - 2013)	CASINOS
North	3
Center	1
Metropolitan Area of Lisbon	2
Alentejo	1
Algarve	3
Autonomous Region of Azores	1
Autonomous Region of Madeira	1
Total	12

Source: SRIJ (n.d.). Accessed on: December 9, 2022.

Another possibility that could eventually be explored in the future are also the cruise ship companies.

5. Interview Analysis to Potential Customers

5.1. Approach and Data Collection

A total of six interviews were conducted (three face-to-face and other three made online), between 17th December 2022 and 15th January 2023, among different types of potential customers, namely:

- ✓ Interview 1 (online) – A co-owner of a guesthouse-restaurant in Lisbon and a café-restaurant in Algés;
- ✓ Interview 2 (online) – A general manager of nine hotel units with 1 to 4 stars, in Lisbon, Ericeira and Oporto;
- ✓ Interview 3 (face-to-face) – A co-owner of a nightclub in Doca de Santo Amaro, in Lisbon;
- ✓ Interview 4 (face-to-face) – A senior bartender that works in a beach restaurant-bar with night dancing events in Costa da Caparica;
- ✓ Interview 5 (online) – A co-owner of a corporate and night event agency and owner of a cocktail stand in Albufeira;
- ✓ Interview 6 (face-to-face) – A owner of a recently open hostel in Barreiro.

The advantages of these online or face-to-face interviews are that it is easier to get the interviewee to answer the questions and to get more in-depth information from their answers. On the other hand, the disadvantages are mainly the possibility of the interviewee being somewhat influenced by the interviewer and not answering more sensitive questions honestly.

The propose of these interviews, was to find out if the people in charge of these companies, or at least has some power to influence a purchase, knew about the existence of cocktail preparation robots, if they already had one, how often they make this type of drinks, if they consider that it would be an added value for their establishments or events and to what extent, for how much they think this product will be available for sale, to what extent they would look favourably on the possibility of renting their robot in order to make it profitable in periods of lower affluence in their establishments and, generically, absorb their experience in the lines of business in which they work.

5.2. Data Analysis

The feedback of the interviewees was very interesting and useful information was collected. Only Interviewee 5 was already aware of the existence of this type of robot. Interviewees 1, 2, 3 4 and 6 had never heard of cocktail preparation robots, although interviewees 1, 3 and 4 does sell cocktails in their establishments.

Regarding the characteristics to which they would give more importance, not having staff with "know how" about cocktails or technical sheets was mentioned by all the interviewees except the interviewee 4 (the senior bartender). Interviewees 1, 3 and 5 emphasized the dosage (and stock) control. For interviewees 1, 3 and 4, speed of execution, ease of cleaning and ease of customization are aspects that will also make a difference in a possible purchase. Interviewee 2 also emphasized the size of the robot, a concern also shared by the interviewee 4.

In terms of the value at which they consider that this product will be on sale, interviewee 4 predicted a very low price from €5,000 to 6,000, the interviewees 1, 3, 5 and 6 mentioned prices between €6,000 and 8,500 and only interviewee 2 pointed to a price around €9,000 to 10,000 (values with VAT), closer to the value for which the robot will be for sale but still below.

However, Interviewee 2 mentioned that would like another type of business model that would involve renting, i.e., a cost for placing the robot and training for its use, and then a monthly rental for the provision of the robot and respective technical assistance. Under these circumstances, he thought of an initial cost around €2,000 to 2,500 (VAT incl.) and a monthly rental of €300 to 350 (VAT incl.).

When a significant number of robots have already been sold in the Portuguese market, it was idea of company's owner to create a platform that would allow their buying clients to rent their own robots. This option would enable the company object of this business plan to charge a small fee to manage the demand for rental services without spending time, taking big risks and without using its own robots for rental. However, when faced with this possibility, none of the six respondents would look favourably on renting their own robot in off-peak periods of their business, which allows this hypothesis to be discarded.

As additional notes to retain:

Interviewee 1 sees a great potential for the sale of this product in bars that bring up to 40-50 people standing. This aspect is somewhat contradicted by Interviewee 5, who associates the consumption of cocktails with a relaxed, seated, and leisurely environment ("for example, on a beach spread or in a trendy bar with some friends").

According to interviewee 5 this type of product also makes sense for event companies, not only in terms of rental but also sales.

This interviewee also points out that to enter the mass market of bars and nightclubs, the best way would be to associate/sell the robots to one of the four major drinks' importers in Portugal, because many bars and, especially, nightclubs are very sustained on their sponsorships, aspect also slightly approached by interviewee 3.

Interviewee 4 sees that there may be some resistance from professionals in his area to the introduction of these type of products, but at the same time he now sees that they can be good allies for bartenders who have very busy nights.

Interviewee 2 considers this product more suitable for 4-star rated hotels, as they target a slightly higher segment. However, the hostel owner (interviewee 6), also sees viability on a possible purchase, since his accommodation establishment has a very young target, open to experiences, which want to spend some time meeting new people and drinking something.

6. Opportunities and Threats

From the strategic management point of view, it is important to list the external factors that are favourable (opportunities) and that are unfavourable (threats) for the implementation and development of the business, which are summarised below.

➤ Opportunities

- Growth of the digital economy and execution of automated tasks with robotization;
- Fragmented market structure in the bartender robot market, whose main advantage is the lack of a clear leader, meaning that new entrants can find a quick path to profitability;
- Support measures applied to micro-companies present in the OE 2023;
- Relatively low unemployment projections which could create difficulties in recruiting qualified bartenders;
- Broad potential market.

➤ Threats

- Predictable shrinking consumer market and higher aversion to risk and investment in the next years, due to high inflation and rising interest rates;
- Bartender robot market, already with several players which increases competition for the market share;
- Prolongation of the conflict in Ukraine which will affect the global economy for longer;
- Technological equipment becomes obsolete at an increasing and exponential speed;
- Difference in mandatory warranty periods between the supplier's country and Portugal.

7. Benchmarking

The short benchmarking carried out was mainly related to the search for business methods and prices applied by some of the distributors that have had the exclusivity of selling of this cocktail robot for a long time, in other countries in and outside Europe.

In some countries the business model adopted is only the sale of the robot (as is the case of the company in Spain). In other countries the model is for the sale and rental (as for example in England and Belgium).

As part of their commercial strategy, most of these distributors resort to a partnership with the same credit institution, in order to enable the purchase of the robot in soft monthly payments, while allowing distributors to receive the full amount shortly after the moment of purchase without assuming risk.

Although there has not been a formal agreement in regard to sale prices, there is, however, a recommended price set by the supplier to practice among distributors. Most of distributors follow this recommendation but some practice above or below the price. For example, the English distributor has a sale price of £8,000 + VAT (about €9,300 + VAT, with exchange rate on December 10, 2022) and, on the other hand, the Australia distributor, practices \$23,500 Australian dollars (which equates to approximately €15,100 + VAT, with exchange rate as of December 10, 2022).

Currently, there is no information regarding to rental prices.

8. Implementation Strategy

8.1. Mission, Vision, Values and Objectives

MISSION: Transform industries with smart automation solutions.

VISION: Being leader on service robots for professional use in Portugal.

VALUES: Innovation, Efficiency, Leadership, Diversity, and Inclusion.

8.2. Targets Definition and Characterization

Bearing in mind a better matching of customer needs with targeted communications, a three target profiles were defined based on geographic, demographic, psychographically and behavioural criteria.

- Profile BUSINESS OWNER: This profile corresponds to someone typically male, with an age from late 30s to 65s. He is a mid to higher income earner, not necessarily holding a degree, but started a business early in hospitality by himself or in a family business, potentially running an hotel, restaurant, nightclub, or the like. He values status, reputation, and the sense of fulfilment, it is often busy, attends events regularly and behaves with confidence. Although not very brand aware/brand conscious, he watches the news, he is a more conservative buyer but profit-oriented, uses the mobile phone a lot, and, when consumes cocktails, is the classics.
- Profile START-UP: This is a profile of someone typically born and raised in the city, mainly young male, from late 20s to mid-30s. Holds a bachelor's degree or is a college dropout and has many ideas of projects that he/she wants to implement like opening a bar or organizing events. He is well-travelled, adventurer and is often spontaneous, project- or gig-oriented, tech-savvy, with a startup and entrepreneurial spirit and with forward-thinking. He has an active social life, uses social media, he is party animal, enjoys nightlife, consumes mostly beer and occasionally cocktails.

On the other hand, for indicative purposes only, two target groups, can be, generically, defined and characterized at the end-consumer level.

- Group 1: Mainly urban young people, between 18 and 35 years old, with a financial level who, although may not have high financial resources, value socializing, and enjoy new experiences in a relaxed environment, many of them with an interest in technology and curiosity for innovation.

- Group 2: Urban middle-aged to much older consumers, men, and women, with a medium-high to high financial levels, who see the cocktail as an exquisite drink, differentiating and associated with a relaxing environment.

8.3. Critical Success Factors

In the investment project in question, two critical success factors are identified, namely:

- Robots sales price;
- Investment horizon (equivalent to the speed with which all robots will be sold).

Given the importance of these variables, they will be specifically evaluated in Chapter 10, namely through a sensitivity analysis to the variation in the sale price of the robots, as well as considering two scenarios, one optimistic and the other pessimistic, with a variation in the investment horizon in relation to that of the baseline scenario.

9. Implementation Policies

9.1. Product

The product object of this business plan is a cocktail and mocktail preparation robot for professional use, with a front x deep of 49 x 65 cm for a total height of 93 cm and 55 kg weight.

It can take 20 ingredients corresponding of ten bottles at the top (usually sprit alcoholic drinks) and ten other bottles inside the refrigerated compartment (usually soft drinks and syrups) (Figure 9.1). The cocktails/mocktails, take between 10 and 30 seconds to be prepared, depending on ingredients and size of the drink.

A menu, designed by professional bartenders, is included, with 100 pre-loaded cocktail/mocktail receipts (Figure 9.2) that can be selected in a frontal touch screen with only two clicks. All the necessary information such as the type of glass, garnishes, ice, etc., is also displayed on the touch screen, requiring no specific “know how” about cocktails and mocktails preparation or technical sheets.

In the screen it is also possible to order the automated cleaning program for the tubes of the upper or the inner bottles (which takes only 5 minutes) and make the wi-fi connection that allows obtaining a dashboard with detailed usage statistics information that can be consulted online on from any device, on a specific website where the user enters with its login and password. It is also in this webpage, where the user can customize unlimited new cocktails and mocktails that will directly appear in the robot’ screen.

Figure 9.1 – Mixologiq robot for cocktails and mocktails preparation.



Source: Autobev (2022), Mixologiq's representative in New Zealand.

Finally, it also has an empty bottle detection, which means, when a cocktail/mocktail is in preparation and one of the ingredients runs out, the robot stops, warns the user, and, after the user replace the empty bottle, the robot finishes the drink with the correct dosages.

Figure 9.2 – Some examples of pre-loaded popular cocktails.



Source: Autobev (2022), Mixologiq's representative in New Zealand.

The company will use one cocktail/mocktail robot for demonstrations to potential customers which will be available for rental to event companies too. However, at least initially, renting will not be a priority as there are contractual commitments to purchase robots from the supplier and this will require greater financial returns, which can only be obtained through sales.

The other robots will be sold with or without a maintenance contract.

9.2. Price

The sale price of the cocktail/mocktail robots will follow the supplier's recommended price of €11,000 (incl. VAT). In addition, there is a facultative maintenance contract of €35/month (incl. VAT) which will comprise:

- VIP night-line 7PM-2AM all year (phone priority queue);
- 1:1 dedicated assistance on configuration and operation;
- Diagnosis of the failing product and/or parts;
- Repair and/or replacement of the defective Product and/or Parts within 72 hours;
- Free monthly check-up and report.

The rent price is estimated in €1,400 (incl. VAT) per day, which encompasses:

- Rental of the robot and tools;
- Bartender with operating knowledge of the robot;
- Transport of the robot and tools to the venue;
- Insurance for the robot.

9.3. Place

The company has a rented coworking space in Lisbon, where has not only a workplace, but also a space used for the cocktail/mocktail robot demonstrations (showroom) and a very limited space for robots stored in their boxes. The rental of the space also includes the availability of the meeting room, upon appointment, at no additional cost.

It is expected that the product will be commercialized mainly through direct sales. However, the possibility of using intermediaries, such as one of the four major drinks' importers in Portugal, should not be ruled out, as suggested by interviewee 3, to enter the mass market of bars and nightclubs more easily.

9.4. People

In the first year of operation, the only employee in the company will be the owner, who will accumulate strategic management, commercial, marketing, and distribution functions. After the first year it is envisaged that a sales assistant will be hired. Other services, such as accounting, website updating, technical assistance and bartending in the robot rental services, will be outsourced.

The technical assistance, associated to the contractual maintenance services or to address problems that may occur in the sold robots, will be provided by a sub-contracted company. The owner and one technician were trained by a representative expert of Mixologiq. An eventual need for this company's replacement probably implies the coming back of the expert to give training with all his expenses paid again, although in less time.

9.5. Promotion

The brand should stand out for offering the desired benefits and the price should be based on perceptions of value, since "Products are made in the factory, but brands are created in the mind" (Walter Landor).

The positioning strategy will focus, mainly, on the product attributes and benefits, which means associate the product to distinguishing features the product possesses and with certain beneficial value the product offers, namely:

- Refrigerated compartment: Prepare drinks always fresh;
- 20 Ingredients: Place up to 20 bottles (10 on top + 10 inside);
- Interactive touchscreen: Choose any recipe in only 2 clicks and have the drink in 30 s;
- Recipes: Select from 100 pre-set recipes + new unlimited custom recipes;
- Empty Bottle Detection: Know when it runs out of an ingredient;

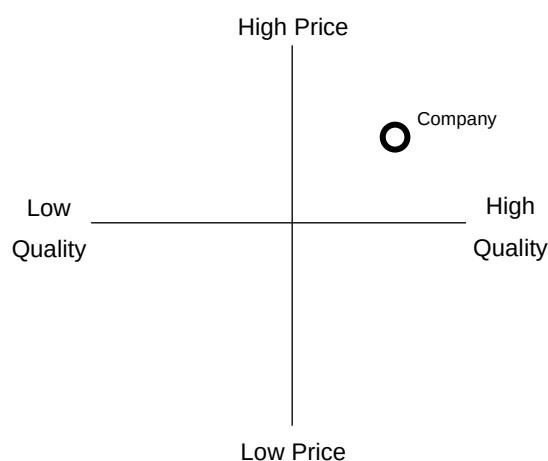
- Auto-Cleaning: Relax while robot auto-cleans in only 5 min;
- Wi-Fi: Connect remotely to robot from any device;
- Online Dashboard: Know exactly how much you sold, what and when sells most;
- etc.

Real value propositions will allude to a reduce effort in customer experience, saving time and reducing costs (“Same taste, but faster, easier, and cheaper” or “Time to focus on what is more important: more options, more creativity, more freedom”) and to the experience itself to the final consumer (“Same same, but different”).

The communication will try to divert attention away from the total price of the robot, focusing on the reasonable monthly cost for which the advantages of this robot can be accessed. For example: “For only 300-400€ per month, anyone can start or improve their bartending business with a fully equipped cocktail and mocktail robot which runs 24/7 and prepares perfect drinks in 30 seconds and only 2 clicks, from a wide range of 100 pre-set recipes and unlimited new custom ones”.

The market positioning map of the company, and for this product in particular, is presented on Figure 9.3.

Figure 9.3 – Market positioning map of the Portuguese company.



The company is in the first step of Keller Model, called Brand Identity, where the objective is developing a deep and broad awareness of the brand, being able to generate brand recognition and brand recall.

Each outbound communication instrument has different levels of effectiveness depending on the stage of the buyer readiness and “advertising and publicity” is the most important one to generate awareness. Furthermore, if we have a new product, technologically superior to any in the market, the last thing it should be done to generate awareness is use sales promotion because devalues the product in people’s minds.

The marketing and advertising it is foreseen that will be carried out through the following means:

- Showroom;
- Events (1 product launch and 1 brand awareness);
- Website;
- Brochure (on the website, communicated via e-mail and distributed by hand);
- E-mail marketing campaigns (5 per year);
- Social media contents (50 per year – image and videos posts);
- Press release + media kit (2 per year);
- Ambassadors program (2 to 3 recognized bartenders);
- Affiliate program;
- Agents program.

Later, in conviction stage of buyer readiness, personal selling is the most effective method to foster the orders and sales promotion, could be used when the product is already in a higher stage of buyer readiness, when there are already other real competitive products.

So, in order to build brand resonance and increase brand equity, a strong product promotion should be adapted to the brand stage and combined with a quality product, a quality experience, and time and consistency.

9.6. Partnerships

The only partnership foreseen is with a financial company in order to make it possible for potential buyers to buy the robot in smooth monthly instalments with very low interest.

10. Economic and Financial Viability Analysis

In the present chapter the business viability analysis will be performed at current prices. For this purpose, it is necessary to define some general assumptions, namely:

- Start of activity in July 2023;
- Investment horizon of 4.5 years, i.e., until the end of 2027;
- Hiring of a sales assistant to start in July 2024, i.e., 1 year after the company's start activity;
- Inflation rates of 5.5% in 2023, 2.5% in 2024, and 2% thereafter.

10.1. Expenses Data

➤ Business start-up expenses

The company has some business start-up expenses, occurred in the investment phase and that are accounted in the first year of operation (2nd half of 2023), namely:

- Company constitution: €400
- Technical training (provided by Mixologiq in Lisbon): €1,000 (incl. VAT)
- Website: €2,500 (incl. VAT)

The technical training, provided by Mixologiq in Lisbon, includes the expenses with flights, accommodation, and meals.

➤ Robot purchase expenses

The purchase cost per robot will vary depending on the number of products per order, according to the following ranges (without VAT):

- 1 – 5 robots → €5,400/robot
- 6 – 15 robots → €4,700/robot
- 16 – 30 robots → €4,500/robot
- 31 – 50 robots → €4,300/robot

As mentioned before, these purchase prices are guaranteed until the end of the 3 years contract, which means no price increases are contemplated, but the company need to meet the number of robots to be purchased per year to the supplier.

According to the company, at this time, it is planned to only place orders for 6 units at a time and, so, it is what will be considered in the economic and financial analysis. There is only one exception, regarding the last order in 2026, which will be for 10 units, so as not to have to place two orders of 6+4 units and thus pay a higher amount per robot. Table 10.1 presents the forecast of robots purchase in each year.

Table 10.1 – Robots purchase assumptions.

Year	Half 2023	2024	2025	2026	2027
No. of robots purchased per year	18	42	72	58	0
Accumulated No. of robots purchased	18	60	132	190	190
No. of orders placed per year	3	7	12	9	0

➤ Import expenses

An important variable to consider when planning the importation of goods from the Asian country where the robots are manufactured, is the type of international transport. For this variable the type of product, price and time were taken into consideration, having been evaluated the possibilities of rail, sea, and air transport. As the goods in question are not perishable, the best option to consider is maritime transport. In this case the goods can be carried out in full containers (Full Container Load - FCL) or in groupage containers (Less Container Load - LCL), depending on if its quantity is sufficient or not to fill a container. In the present case, given the size of the expected orders, it will always be applied the LCL, requiring deconsolidation (separation of the goods brought in the container) and consideration of the respective costs.

The rail transport requires the articulation with other means of transport from the place where the regular rail connection between Asia and Europe ends, and the air transport, although much quicker, is also more expensive, which makes it a justified possibility only in some eventual situation that requires the urgent transport of the goods.

After some contacts with companies in the sector, to analyse several possible combinations and evaluate which would be the most appropriate Incoterm for the situation at hand, it was found that is the EXW (Ex Works). This is an Incoterm that can be applied to any mode or modes of transport, where the seller's delivery takes place (and also the risk transfer) when the goods are placed at the disposal of the buyer at the manufacturer's premises or another named place (factory, warehouse, etc.).

The logistical processes associated with importing from an Asian country can be complex and time-consuming, so it is important to rely on the support of a logistic operator with experience and proven know-how in the market, in order to free the company from some bureaucratic procedures and get the goods to their destination, safely and with cost optimization.

So, a logistical operator, with the dual function of freight forwarder (*“transitário”*) and customs broker (*“despachante”*), should be contracted to make the loading and transport of the goods to the port in the Asian country, international transport by boat, unloading of the goods in the national territory, deconsolidation (necessary to LCL containers), the customs clearance services and the transport of goods from customs to company' storage. This service

also includes an insurance and the payment of customs fees charged to pay for the emoluments, storage and handling charges of the goods, certificate costs, among others.

For the import of 6 robots, the expense with a logistic operator is estimated at €1,300.

The import of goods from countries outside the EU is also subject to the payment of customs duties, that is, the tax levied by the EU on imported goods, since the completion of the internal market, where goods can circulate freely between Member States. In practical terms, it consists of customs control aimed at ensuring compliance with the necessary formalities so that imported goods can be consumed or transacted within the EU, as well as preventing the entry of illegal or prohibited goods into the EU.

Customs duties, result from the product between the duty rate associated to the type of goods (and where they come from) to the so-called "customs value" (sum of the value of the contents of the shipment declared on the commercial invoice, international transport costs and insurance until customs clearance).

As already referred, customs/import duty rates or *Taxas dos direitos aplicáveis a Países Terceiros* (TPT), for each type of good, are fixed annually by EU legislation. The robot concerned has the tariff code 841850 90 00 - *Outros móveis frigoríficos*, to which corresponds a customs duty rate of 2.2%. "Customs value" is estimated in €29,200. So, Customs duties results in about €640.

The value added tax (VAT) is calculated in accordance with Article 17th of the *Código do IVA (CIVA)*, corresponding to the application of the VAT rate to the sum of the "customs value", customs duties, and fees. The VAT rate is the same as the one applicable in the domestic market. It can also be consulted at *Autoridade Tributária e Aduaneira* website, and corresponds to 23%, as the import is into mainland Portugal (the Portuguese archipelagos have other VAT rates). The VAT costs related to the import expenses of 6 robots, are estimated in €6,720.

Note: It was considered an increase of 5,5% to 2024, 2,5% to 2025 and 2% to 2026 and 2027, for all the import expenses.

➤ **Wages and salaries**

The wages and salaries must be considered are:

- Manager: ~€1,560/month of costs to the company (equivalent to a net wage of ~€1,000/month including meal allowance) [until mid 2024] and €2,675/month of costs to the company (equivalent to a net wage of ~€1,500/month including meal allowance) [after mid 2024]
- Sales Assistant: ~€1,600/month of costs to the company (equivalent to a net wage of ~€850/month including meal allowance and €400 of sales commissions) [after mid 2024]

- Accountant: €150/month [until end 2024] and €250/month [from 2025]
- Bartender (with operating knowledge of the robot): €200/day
- Maintenance technician: €150/service

Note: It was considered an increase of 5,5% to 2024, 2,5% to 2025 and 2% to 2026 and 2027, for all wages and salaries (except to the “Manager”).

Table 10.2 shows the forecast of rental days (requiring payment for bartender service) and maintenance services for the robotic machines that will be provided each year.

Table 10.2 – Bartender and maintenance services provided.

Year	Half 2023	2024	2025	2026	2027
No. of robots rented per year	2	8	14	20	26
No. of maintenance services provided per year	3	14	31	47	62

➤ Operational expenses

The necessary operational expenses (incl. VAT) to consider are:

- Permanent commercial registry certificate: €25/year
- Corporate liability insurance: €200/year
- Demo/rental robot insurance: €35/month
- Phone: €15/month/phone
- Email: €10/month/account
- Ms Office and anti-virus license: €500/account
- Computer servers: €50/month
- Bank: €15/month
- Office/showroom/storage: €250€/month
- Small warehouse or similar: €400/month [after mid-2024, since the stocks will increase to meet its contractual commitments with Mixologiq, as it can be seen in the third line of Table 10.4, the company will require to rent an additional small warehouse or similar, with more storage space]
- Travels: 3% of the revenue
- Marketing and advertising (including the website update): 1% of the revenue (by now, the communication budgeting method adopted by the company to estimate the amount which will spend with marketing and advertising will be a percentage of revenue).

Note: It was considered an increase of 5,5% to 2024, 2,5% to 2025 and 2% to 2026 and 2027, for all operational expenses (except “Travels” and “Marketing and Advertising”).

➤ Depreciations and Amortizations

It was considered a lifetime period of 10 years for the demo/rental robot, a cost of €800 and 8 years lifetime for the laptop computers and €300 and 6 years life time for the smartphones (values without VAT). The annual and accumulated depreciations in the investment horizon are shown in Table 10.3.

The European trademark registration is an intangible asset valid for 10 years and may be renewed indefinitely. Its amortization is also shown in Table 10.3.

Table 10.3 – CAPEX depreciations and amortizations.

Depreciations and Amortizations	Price (€)	Depreciation rate	Depreciation period (years)	Annual depreciation (€)	Accumulated depreciation (€)	Net book value (€)
CAPEX						
Demo/rental robot	5 023	10.0%	10	502	2 261	2 763
Laptop computer (manager)	800	12.5%	8	100	450	350
Smartphone (manager)	300	16.7%	6	50	225	75
Laptop computer (sales assistant)	800	12.5%	8	100	350	450
Smartphone (sales assistant)	300	16.7%	6	50	175	125
European trademark registration	1 200	10.0%	10	120	420	780
Total	8 423			922	3 881	4 543

Note 1: The price of the demo/rental robot includes the purchase price of the product and the equivalent amount of the import costs.

Note 2: It is considered one year less use for the sales assistant equipment, resulting in a lower accumulated depreciation and a higher net book value, in relation to those assigned to the manager.

10.2. Revenue Data

Revenue will come from the robot sales, rents and maintenance contracts forecasted in Table 10.4.

Table 10.4 – Robot sales, rents, and maintenance contracts.

Year	Half 2023	2024	2025	2026	2027
No. of robots sold per year	10	34	52	48	45
Accumulated No. of robots sold	10	44	96	144	189
No. of robots in stock in the end of the year	7	15	35	45	0
No. of robots rented per year	2	8	14	20	26
No. of new maintenance contracts per year	7	23	35	32	30
Accumulated No. of maintenance contracts	7	30	65	97	127

10.3. Income Statement, Working Capital and Cash Flow

➤ Income Statement

Table 10.5 presents the Income Statement of the business for the defined investment horizon.

Table 10.5 – Income Statement.

Income Statement	Half 2023	2024	2025	2026	2027
Robot sale revenue	89 431	304 065	465 041	429 268	402 439
Robot rent revenue	2 276	9 106	15 935	22 764	29 593
Maintenance contract revenue	598	7 512	21 341	38 756	54 805
Total Revenue	92 305	320 683	502 317	490 789	486 837
Business start-up expenses	3 246	0	0	0	0
Company constitution	400	0	0	0	0
Technical training (provided by Mixologiq in Lisbon)	813	0	0	0	0
Website	2 033	0	0	0	0
Cost of goods sold	55 257	171 540	263 108	243 052	226 050
Robot purchase expenses	84 600	197 400	338 400	272 600	0
Import expenses	5 820	14 327	25 174	20 685	0
Logistic operator	3 900	9 601	16 869	13 861	0
Customs duties	1 920	4 726	8 305	6 824	0
Initial inventory	0	35 163	75 350	175 817	226 050
Final inventory	-35 163	-75 350	-175 817	-226 050	0
Wages and salaries	12 670	46 444	70 860	74 979	78 959
Manager	10 920	29 645	37 450	37 450	37 450
Sales assistant	0	11 200	22 960	23 419	23 888
Accountant	900	1 899	3 000	3 060	3 121
Maintenance technician	450	2 100	4 650	7 050	9 300
Bartender (with operating knowledge of the robot)	400	1 600	2 800	4 000	5 200
Operational expenses	5 848	19 644	29 431	29 157	29 189
Permanent commercial registry certificate	25	26	27	28	28
Corporate liability insurance	81	172	176	179	183
Demo/rental robot insurance	171	360	369	377	384
Phones	73	232	317	323	329
Emails	49	154	211	215	220
Ms Office and anti-virus license	203	643	879	897	915
Computer servers	244	515	528	538	549
Bank	90	190	195	199	203
Office/showroom/storage	1 220	2 573	2 638	2 690	2 744
Small warehouse or similar	0	1 951	4 000	4 080	4 162
Travels	2 769	9 620	15 070	14 724	14 605
Marketing and advertising (including website update)	923	3 207	5 023	4 908	4 868
Total Expenses	77 020	237 628	363 399	347 188	334 198
EBITDA	15 285	83 055	138 918	143 601	152 639
Annual depreciation and amortization	461	922	922	922	922
EBIT	14 824	82 133	137 996	142 679	151 717
Corporate Income Tax (T)	2 520	15 248	26 979	27 963	29 861
EBIT(1-T)	12 304	66 885	111 017	114 716	121 856
Operating Cash Flow = EBIT (1-T) + Depreciations	12 765	67 807	111 939	115 639	122 779

Note: values in euros.

As contemplated in the OE 2023, a reduced corporate income tax rate of 17% was applied on taxable profits up to €50,000 and the standard rate of 21% to the amounts above.

➤ Working Capital

The average time to receive from robot sales, rents and maintenance contracts are presented in Table 10.6, as well as the average time to pay from robot purchases, import expenses, *IRS* and Social Security, VAT, and other expenses.

Special note for the need of payment for the purchased robots at the time of the order. Has said before, the estimated time delivery is of 40 calendar days, which is equivalent to about 1.5 months in advance of the expected delivery.

The import expenses (including robots VAT) are paid in the act of reception the products.

Table 10.6 – Payables and receivables average time.

RECEIVABLES	
Average time to receive from robot sales	2 months
Average time to receive from robot rents	1 month
Average time to receive from maintenance contracts	0 months
PAYABLES	
Average time to pay from robot purchases	-1.5 months
Time to pay for import expenses	0 months
Time to pay <i>IRS</i> and Social Security	1 months
Time to pay VAT	2 months
Average time to pay other expenses	1 month

Based on the periods of the accounts payable and receivable, Table 10.7 shows the need of strengthen the working capital by 2025.

Table 10.7 – Working capital.

Working Capital	Half 2023	2024	2025	2026	2027
1. Operating financial needs					
Accounts receivable from robot sales	36 667	62 333	95 333	88 000	82 500
Accounts receivable from robot rents	467	933	1 633	2 333	3 033
Accounts receivable from maintenance contracts	0	0	0	0	0
VAT receivable	1 754	0	0	0	0
Inventories	35 163	75 350	175 817	226 050	0
Total Accounts receivable	74 051	138 617	272 783	316 383	85 533
2. Operating financial resources					
Accounts payable for robot purchase expenses	-21 150	-24 675	-42 300	-34 075	0
Accounts payable for import expenses	0	0	0	0	0
<i>IRS</i> and Social Security	728	1 362	2 014	2 029	2 045
Accounts payable for other expenses	1 864	2 013	3 017	2 989	2 992
VAT payable	0	2 746	2 892	4 445	15 675
Total Accounts payable	-18 558	-18 554	-34 378	-24 613	20 712
Working Capital (1.-2.)	92 609	157 171	307 161	340 996	64 822
Investment in WC	92 609	64 562	149 991	33 834	-276 174

Note: values in euros.

➤ Cash Flow

Table 10.8, presents the investment's Cash Flow.

Table 10.8 – Cash flow.

Cash Flow	0	Half 2023	2024	2025	2026	2027
1. Inflows						
Operating Cash Flow		12 765	67 807	111 939	115 639	122 779
WC Divestures and Terminal Value		0	0	0	0	276 174
CAPEX Terminal value						4 543
Total (1)		12 765	67 807	111 939	115 639	403 496
2. Outflows						
CAPEX	8 423					
Investment in WC		92 609	64 562	149 991	33 834	0
Total (2)	8 423	92 609	64 562	149 991	33 834	0
Cash Flow (1-2)	-8 423	-79 844	3 245	-38 052	81 804	403 496
Accumulated Cash Flow	-8 423	-88 267	-85 022	-123 074	-41 270	362 226

Note: values in euros.

10.4. Economic Viability Analysis

For a security to be risk-free, there must be no default risk, which generally implies that the security has to be issued by a government with a triple A rating, from the three major rating agencies, which means an extremely low credit risk or, in other words, an extremely strong ability and willingness to keep its financial commitments.

In this context, the Risk-free rate (R_f) or the 10-year risk-free government bond yield used, as reference, was the Germany 10 Year Government Bond Yield from 10th March 2023 (Source: <http://www.tradingeconomics.com/bonds>).

The Market risk premium ($R_m - R_f$), or equity risk premium, corresponds to a long-term historical average of the deviation between the return of risk-free bonds and the return of the stock market. The Market risk premium for Portugal was obtained through Damodaran (2023).

Beta measures the sensitivity of a stock's returns to the markets returns. An unlevered beta (β_u) was selected, based on Damodaran (2023) data, by industry, for the Western European. The industry selected was "machinery" since it was the closest to the product among the options.

Table 10.9 shows the data used to calculate the Cost of Equity for unlevered firms (R_u), through the following expression:

$$R_u = R_f + \beta_u(R_m - R_f)$$

Table 10.9 – Data to calculate the Unlevered Cost of Equity.

Risk-free rate (R_f)	2.496%
Market risk premium for Portugal ($R_m - R_f$) _{Portugal}	9.23%
β Unlevered (β_u)	1.18
Unlevered Cost of Equity (R_u)	13.39%

Three investment decision criteria were used to assess the economic viability of the business, namely, the Net Present Value (NPV), the Internal Rate of Return (IRR) and the Payback-period. The results are presented in presented in Table 10.10.

Table 10.10 – Investment decision criteria.

NPV (R_u)	173 430 €
IRR	49.61 %
Payback	3.74 years

All the decision criteria are consistent (as expected), and the decision is to invest, since $NPV \geq 0$, $IRR \geq R_u$ and the Payback $\leq$ Investment horizon. The payback occurs after 3 years and 9 months i.e., in the first trimester of 2027. So, the investment is economically viable which means that there was no need for external funding in order to make this investment viable (the investment is viable even with 100% equity).

10.5. Financial Viability Analysis

Given the business profile, it is considered that the initial investment of relatively low amount is made with own resources, and the financing needs will be met through a so-called credit to support the company's treasury or working capital, to meet the company's current needs (Table 10.11). The interest payment was calculated assuming a loan interest rate (R_d) of 5%. The tax benefit was computed using a weighted Corporate Income Tax rate (since it was used two different income tax rates of 17 and 21%).

Table 10.11 – Debt service schedule.

Debt service schedule	Half 2023	2024	2025	2026	2027
1. Loan principal beginning of the period	79 844	76 599	114 650	32 846	0
2. Principal payment	0	3 245	-38 052	81 804	32 846
3. Interest payment	3 992	3 992	3 830	5 733	1 642
4. Weighted Corporate Income Tax rate	17.00%	18.56%	19.55%	19.60%	19.68%
5. Tax benefit (3x4)	679	741	749	1 123	323
Out-Flow (2+3-5)	3 314	6 496	-34 971	86 413	34 165

Note: values in euros.

Once the financing needs occur throughout the operation period in a non-uniform way, it is more appropriate to calculate the Adjusted Present Value (APV) that corresponds to the present value of the unlevered investment plus the present value of the financing effects (Table 10.12).

Table 10.12 – Adjusted Present Value.

NPV (Ru)	173 430 €
PV Tax Benefit	3 221 €
APV	176 650 €

10.6. Sensitivity Analysis

A sensitivity analysis was done, using a single variable change, namely for the “Robot sale price (incl. VAT)” (Table 10.13) and a two variables change using the “Average time to receive from robot sales” and the “Average time to pay from robot purchases” (Table 10.14).

Table 10.13 – Sensitivity Analysis - Robot sale price (incl. VAT).

APV	
Robot sale price (incl. VAT)	176 650 €
9 000 €	24 963 €
9 500 €	63 291 €
10 000 €	101 275 €
10 500 €	138 980 €
11 000 €	176 650 €
11 500 €	214 366 €
12 000 €	252 326 €
12 500 €	290 213 €

Table 10.14 – Sensitivity Analysis - Average time to receive from robot sales and to pay from robot purchases.

		Average time to pay from robot purchases (months)						
APV	176 650 €	-1.0	-1.5	-2.0	-2.5	-3.0	-3.5	-4.0
Average time to receive from robot sales (months)	0.5	232 250 €	228 891 €	225 532 €	222 173 €	218 821 €	215 552 €	212 283 €
	1.0	214 750 €	211 391 €	208 034 €	204 764 €	201 495 €	198 226 €	194 957 €
	1.5	197 250 €	193 976 €	190 707 €	87 438 €	184 169 €	180 900 €	177 630 €
	2.0	179 919 €	176 650 €	173 381 €	170 112 €	166 842 €	163 573 €	160 304 €
	2.5	162 593 €	159 324 €	156 055 €	152 785 €	149 516 €	146 247 €	142 978 €
	3.0	145 267 €	141 998 €	138 728 €	135 459 €	132 190 €	128 921 €	125 651 €
	3.5	127 941 €	124 671 €	121 402 €	118 133 €	114 864 €	111 594 €	108 325 €

The analysis shows that, maintaining all the other variables, the investment is still viable selling the robots for €9,000 (incl. VAT). On the other hand, it is visible the greater influence of the average time to receive from robot sales.

10.7. Optimistic and Pessimistic Scenarios

Two additional scenarios, one optimistic and one pessimistic, were also performed, assuming an investment horizon of 3.5 and 5.5 years, respectively, i.e., a faster or slower sale of the robots compared to the predicted 4.5-year scenario. In the optimistic scenario, there's no need of renting a small warehouse or similar, since there will be very low stocks.

The decision criteria result for both scenarios are shown in Table 10.15 and Table 10.16.

Table 10.15 – Optimistic scenario - Investment decision criteria.

NPV (RU)	197 691 €
IRR	105.94 %
Payback	1.79 years
APV	198 912 €

Table 10.16 – Pessimistic scenario - Investment decision criteria.

NPV (RU)	135 350 €
IRR	32.10 %
Payback	4.40 years
APV	141 116 €

Of course, in the optimistic scenario considerable better results are obtained than in the predicted scenario, being able, for example, to recover the investment in 1 year and 10 months.

In the pessimistic scenario, although the payback period is extended to 4 years and 5 months, the investment is still viable. However, doing a sensitivity analysis with the variation of the robots' sale price, a sale at €9,000 (incl. VAT) already returns a negative APV (Table 10.17).

Table 10.17 – Pessimistic scenario - Sensitivity Analysis for Robot sale price (incl. VAT).

APV	
Robot sale price (incl. VAT)	141 116 €
9 000 €	- 8 222 €
9 500 €	29 492 €
10 000 €	66 924 €
10 500 €	104 239 €
11 000 €	141 116 €
11 500 €	177 718 €
12 000 €	214 294 €
12 500 €	250 852 €

11. Conclusions

This applied project in management aimed to develop the business plan for commercialisation of a service robot for professional use in the preparation of cocktails and mocktails.

The contract signed with the supplier guarantees an exclusive 3-year period for the commercialisation of the robot on the Portuguese market but, in return, the need to purchase a total of 190 robots during this same period.

The business plan approach methodology begins with an external analysis, through a Pestel Analysis, a Porter's 5-Force Analysis and an Analysis of Potential Markets, where the main potential types of segments, namely, hotel establishments, nightclubs, bars, restaurants, casinos, and event organization companies, are presented and quantified.

Some interviews with owners of these types of businesses, or employees who have some power of influence in a potential purchase, were also performed and the main findings presented.

To summarise the external analysis, the opportunities and threats to the implementation and development of the business are listed and was done also a brief benchmarking based on the experience of some of the supplier robot's exclusive resellers in other countries.

Strategy implementation and implementation policies were then addressed and finally the economic and financial viability analysis. An NPV of €173,430 (with an unlevered cost of equity of 13.39%), an IRR of 49.61% and a payback-period of 3.74 years were obtained, meaning that the investment is economically viable. The introduction of the financing effects resulted in an APV of €176,650.

Although the sales of the concerned product may marginally reach other targets, such as, for example, the larger event organization companies themselves, considering exclusively the universe of 4 and 5 star hotels, hostels, nightclubs, bars, snack-bars, restaurants with dance floors and casinos existing in Portugal, this potential market corresponds to about 9,200 establishments. Taking into account the expected sale of 189 cocktail/mocktail preparation robots (since one of the robots will be used for demonstrations to potential customers and will be available for rental to event companies), the referred potential market will represent, therefore, only about 2%, so, in this aspect, it is considered that the target defined in terms of number of sales is far from being overly optimistic.

Now, regarding the stipulated sales price of €11,000 (incl. VAT), although it is above the values indicated by all the interviewees, there is the expectation that the indicated value would be higher in case they had the opportunity to see the robot in operation. On the other hand, the fact that the VAT amounts paid by the buying companies are later recovered and, above all, the sales strategy focusing on the monthly fee and not on the total price, are considered to

have a high influence. In any case, the sensitive analysis revealed that, maintaining all the other variables, there would still be room to lower the proposed sales price, should the need arise, in €2,000 to €9,000 (incl. VAT).

Given that technological equipment becomes obsolete at an increasing and exponential speed, shortening the life cycles of innovation and/or the competitive advantages of products, an attempt was made to consider a short investment horizon, but at the same time one that would realistically allow the startup's insertion in the market. So, an investment horizon of 4.5 years was considered. Optimistic and pessimistic scenarios were also performed, assuming an investment horizon of 3.5 and 5.5 years, respectively. The optimistic scenario allowed to reach a NPV of €197,691, an IRR of 105.94%, a payback-period of 1.79 years and an APV of €198,912. The pessimistic scenario, resulted in a NPV of €135,350, an IRR of 32.10%, a payback-period of 4.40 years and an APV of €141,116.

In the pessimistic scenario, although the investment remains viable, a sensitivity analysis with the variation of the robots' sale price, shows that a sale at €9,000 (incl. VAT) already returns a negative APV.

Anyway, the contractual obligation to purchase such a significant number of robots in a short period of time, brings difficulties, namely in terms of liquidity and stock management, making the task quite challenging for the company and some risks cannot be forgotten or overlooked.

There's a significant economic slowdown forecasted for the coming years and the international political conjuncture makes these economic forecasts particularly difficult and uncertain. An increased risk, not included in this Business Plan, is related to the warranty period for robots. In fact, the French supplier has a legal obligation to provide a warranty for only 2 years, whereas the Portuguese market requires a 3-year warranty for the sale of movable goods. It also should be noted that the difference in warranty periods will be higher than just 1 year due to the stocking of products.

At a more micro level, it can be mentioned the company's high dependence on the supplier and the manufacturer, as well as the existence of a competitor already represented in the Portuguese market whose insertion is difficult to find out and confirm in this stage, but which could take away sales potential.

However, the growth of automated tasks with robotization, the lack of a clear leader in the bartender robot market, the large potential market, and the competitive advantages of the robot object of this work compared to the competition and with the non-use of this equipment, are good indicators for success.

In contrast to most competitors, there will be a direct sales presence in Portugal, the robot has a built-in mini-fridge, which keeps 10 of the 20 total bottle ingredients refrigerated and includes 100 pre-set recipes plus unlimited customisation possibilities.

Establishments can dispense specialized labour in cocktail preparation, and it can operate on 24/7 cycle. Usually, bartenders put the beverages by eye, so there's a gain in precision and cocktails are standardized with the perfect dosage of the various ingredients. In this case, it can promote more savings since eliminates overpouring of alcoholic drinks (the ones that are most expensive) in the preparation of the cocktails. It's not so common but for the bartenders that put the drinks one by one after using a quantity gauge, then the gain is in time, since the robot makes even the most complicated cocktail, in just 30 seconds. In this situation, it gives more time for creativity and decoration of the cocktails. Finally, the robot has automatic statistics of beverage usage, which allows a better stock management.

As the end of the investment horizon approaches, the company should look for new innovative products, but may still assess whether it is justified to continue commercialising Mixologiq's cocktail/mocktail preparation robots based on demand and negotiation of the conditions with that supplier.

Bibliography

- About IFR (n.d.). International Federation of Robotics, Accessed on: February 20, 2023, at: <https://ifr.org/association>.
- Aires, A. (n.d.). *Simulador Salário Líquido 2023*. Accessed on: February 27, 2023, on Doutor Finanças website at: <https://www.doutorfinancas.pt/simulador-salario-liquido-2023/>.
- Autobev (2022). *Mixology Two Brochure*. Accessed on: March 3, 2023, at: https://www.mixologiq.nz/files/NZBrochure2022.pdf?_ga=2.180543591.158951647.1678198532-1392927415.1678198532.
- Autoridade Tributária e Aduaneira (n.d.). *Importação*. Accessed on: March 3, 2023, at: <https://pauta.portaldasfinancas.gov.pt/pt/nomenclaturas/Pages/importacao.aspx>.
- Banco de Portugal (2022). *Boletim Económico Dezembro 2022*. Lisboa.
- Barbot (n.d.). Accessed on: December 3, 2022, at: <https://thebarbot.com/>.
- Barsys (n.d.). Accessed on: December 3, 2022, at: <https://thebarsys.com/>.
- Bartesian (n.d.). Accessed on: December 3, 2022, at: <https://bartesian.com>.
- Carlin, J. (2012). *Cocktails: A Global History*. London, UK: Reaktion Books.
- Cecilia.ai (GKI Group) (n.d.). Accessed on: December 3, 2022, at: <https://cecilia.ai/>.
- Cocktailmachine/TenderOne (n.d.). Accessed on: December 3, 2022, at: <https://www.cocktailmachine.com/>.
- Commission Implementing Regulation (EU) 2022/1998 of 20 September. *Official Journal of the European Union L 282*. European Union, Luxembourg.
- Conselho das Finanças Públicas (2022). *Perspetivas Económicas e Orçamentais 2022-2026 (atualização)*. Relatório n.º 08/2022.
- Conselho das Finanças Públicas (2023). *Resumo de Projeções Macroeconómicas para a Economia Portuguesa*. Última atualização: 13/02/2023.
- Damodaran, A. (2023). *Beta, Unlevered beta and other risk measures: Western Europe*. Date updated: January 5, 2023. Downloaded on: March 10, 2023, at: <https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fpages.stern.nyu.edu%2F~adamodar%2Fpc%2Fdatasets%2FbetaEurope.xls&wdOrigin=BROWSELINK>.
- Damodaran, A. (2023). *Country Default Spreads and Risk Premiums*. Date updated: January 5, 2023. Accessed on: March 10, 2023, at: https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/ctryprem.html.
- Decreto-Lei n.º 84/2021 de 18 de outubro. *Diário da República N.º 202 - 1.ª série*. Presidência do Conselho de Ministros. Lisboa.
- Euribor rates (n.d.). *Chart with the historical Euribor rates*. Accessed on: December 4, 2022, at: <https://www.euribor-rates.eu/en/euribor-charts/>.
- European Commission (2022). *Digital Economy and Society Index (DESI) 2022*.

- European Commission (2023). *Winter 2023 Economic Forecast: EU Economy set to avoid recession, but headwinds persist*. Accessed on: March 8, 2023, at: https://economy-finance.ec.europa.eu/economic-forecast-and-surveys/economic-forecasts/winter-2023-economic-forecast-eu-economy-set-avoid-recession-headwinds-persist_en.
- European Commission (n.d.). *Combined Nomenclature*. Accessed on: March 3, 2023, at: <https://trade.ec.europa.eu/access-to-markets/en/content/combined-nomenclature-0>.
- European Monitoring Centre for Drugs and Drug Addiction. Publications Office of the European Union (2020). *ESPAD Report 2019: Results from the European School Survey Project on Alcohol and Other Drugs*. Luxembourg. doi: 10.2810/970957
- European Monitoring Centre for Drugs and Drug Addiction. Publications Office of the European Union (2016). *ESPAD Report 2015: Results from the European School Survey Project on Alcohol and Other Drugs*. Luxembourg. doi: 10.2810/289970
- Finite Helical Dynamics (n.d.). *Robotics*. Accessed on: February 24, 2023, at: <https://www.finitehelicaldynamics.ca/robotics/>.
- Foxtender (n.d.). Accessed on: December 3, 2022, at: <http://www.foxtender.com/>.
- Garcia-Haro, J.M., Oña, E.D., Hernandez-Vicen, J., Martinez, S., & Balaguer, C. (2020). Service Robots in Catering Applications: A Review and Future Challenges. *Electronics* 2021, 10, 47. doi: 10.3390/electronics10010047
- Gasparetto, A., & Scalera, L. (2019). A Brief History of Industrial Robotics in the 20th Century. *Advances in Historical Studies*, 8: 24-35. doi: 10.4236/ahs.2019.81002
- Hilton, D. (2012). *Through a glass: how the language of cocktails shapes English*. Accessed on: February 24, 2023, on OED Oxford English Dictionary website at: <https://public.oed.com/blog/through-a-glass-how-the-language-of-cocktails-shapes-english/>.
- IFR (2018). *The Impact of Robots on Productivity, Employment and Jobs. Positioning Paper*. Frankfurt, Germany.
- IFR Statistical Department (2022). *World Robotics 2022 – Service Robots. Statistics, Market Analysis and Case Studies*. Frankfurt, Germany.
- IMD World Competitiveness Center (2022). *IMD World Digital Competitiveness Ranking 2022*. Lausanne.
- IncoDocs (2020). *Global Trade Guide: Learn key information around the Import / Export process*.
- Instituto Nacional de Estatística (2007). *Classificação Portuguesa das Actividades Económicas Rev. 3*. Lisboa.
- Instituto Nacional de Estatística (2022). *Estatísticas do Turismo - 2021*. Lisboa.
- Instituto Nacional de Estatística (n.d.). *Database*. Accessed on: December 9, 2022, at: https://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine_base_dados.

International Chamber of Commerce (n.d.). *Incoterms rules*. Accessed on: March 3, 2023, at: <https://iccwbo.org/resources-for-business/incoterms-rules/>.

International Monetary Fund (2022). *World Economic Outlook: Countering the Cost-of-Living Crisis. October 2022*. Washington, DC.

International Monetary Fund (n.d.). *IMF Reports and Publications by Country: Portugal*. Accessed on: March 8, 2022, at: <https://www.imf.org/en/Countries/PRT>.

International Standard ISO 8373:2012. *Robots and robotic devices – Vocabulary*. Second edition 2012:03. International Organization for Standardization. Geneva, Switzerland.

International Standard ISO 8373:2021. *Robotics – Vocabulary*. Third edition 2021:11. International Organization for Standardization. Geneva, Switzerland.

Ivanov, S., & Webster, C. (2022). Restaurants and robots: public preferences for robot food and beverage services. *Journal of Tourism Futures*, pp. 1-11, ISSN 2055-5911. doi: 10.1108/JTF-12-2021-0264

Jain, N.R.K., Liu-Lastres, B., & Wen, H. (2021). Does Robotic Service Improve Restaurant Consumer Experiences? An Application of the Value-co-creation Framework. *Journal of Foodservice Business Research*, Volume 26, 2023 - Issue 1: 78-96. doi: 10.1080/15378020.2021.1991682

MakrShakr (n.d.). Accessed on: December 3, 2022, at: <https://www.makrshakr.com/>.

Matin, L. (2022). *Who Invented Alcohol? A Brief History*. Accessed on: February 24, 2023, on Liquor Laboratory website at: <https://liquorlaboratory.com/who-invented-alcohol/>.

Mixartista (n.d.). Accessed on: December 3, 2022, at: <https://www.mixartista.it/en>.

Mixologiq (n.d.). Accessed on: March 6, 2023, at: <https://www.mixologiq.com/en/>.

OED Oxford English Dictionary (n.d.). *cocktail, adj. and n.*. Accessed on: February 9, 2023, at: <https://www.oed.com/viewdictionaryentry/Entry/35499>.

OED Oxford English Dictionary (n.d.). *mocktail, n.*. Accessed on: February 9, 2023, at: <https://www.oed.com/viewdictionaryentry/Entry/245969>.

Organization for Economic Cooperation and Development (2022). *OECD Economic Outlook, Volume 2022 Issue 2. Preliminary Version. Portugal projection note November 2022*. 194-196.

Party Robotics (n.d.). Accessed on: December 3, 2022, at: <https://partyrobotics.com/>.

República Portuguesa. XXIII Governo Constitucional (2022). *Relatório da Proposta de Orçamento do Estado para 2023 (OE 2023)*. Lisboa.

Rotender (n.d.). Accessed on: December 3, 2022, at: <https://rotender.com/>.

Serviço de Regulação e Inspeção de Jogos (n.d.). *Concessionários de Casinos*, Accessed on: December 9, 2022, at: <https://www.srij.turismodeportugal.pt/pt/casinos-e-bingos/concessionarios-de-casinos/>.

SirMixABot (n.d.). Accessed on: December 3, 2022, at: <https://www.sirmixabot.com/>.

SmartbarUSA (n.d.). Accessed on: December 3, 2022, at: <https://www.smartbarusa.com/>.

Somabar (n.d.). Accessed on: December 3, 2022, at: <https://www.kickstarter.com/projects/somabar/somabar-automated-craft-cocktail-appliance>.

Statista Global Consumer Survey (2022). *How Alcohol Preference Varies With Age*. Accessed on: November 10, 2022, at: <https://www.statista.com/chart/27977/how-alcohol-preference-varies-with-age/>.

Sun, Y., & Wang, R. (2021). The Research Framework and Evolution of Service Robots. *Journal of Computer Information Systems, Volume 62, 2022 - Issue 3*: 598-608. doi: 10.1080/08874417.2020.1870904

Sutcliffe, T (n.d.). *A brief history of cocktails*. Accessed on: February 24, 2023, on Difford's Guide website at: <https://www.diffordsguide.com/encyclopedia/2294/cocktails/a-brief-history-of-cocktails>.

Technavio.com (2022). *Robotic Bartender Market by End-user and Geography – Forecast and Analysis 2022-2026*.

TendedBar (n.d.). Accessed on: December 3, 2022, at: <https://tendedbar.com/>.

The Cocktail Society (2021). *The History of Cocktails*. Accessed on: February 24, 2023, at: <https://thecocktailsociety.uk/the-history-of-cocktails/>.

theQube (n.d.). Accessed on: December 3, 2022, at: <http://theqube.de/en/machine.htm>.

Trading Economics (n.d.). *Indicators*. Accessed on: March 7, 2023, at: <https://tradingeconomics.com/analytics/indicators.aspx?country=portugal>.

Trading Economics (n.d.). *Markets: Bonds*. Accessed on: March 10, 2023, at: <https://tradingeconomics.com/bonds>.

Truninger, M., Schmidt, L. (coord), Fonseca, S., Graça, J., Junqueira, L., Prista, P. (2019). *Segundo Grande Inquérito sobre Sustentabilidade – Relatório Síntese*. Observa / ICS-ULisboa.

Wahlbar (n.d.). Accessed on: December 3, 2022, at: <https://wahlbar.com/en/>.

Wang, W., & Siau, K. (2019). Artificial Intelligence, Machine Learning, Automation, Robotics, Future of Work and Future of Humanity: A Review and Research Agenda. *Journal of Database Management, Volume 30, Issue 1, January-March 2019*: 61-74. doi: 10.4018/JDM.2019010104

Werthner, H., Prem, E., Lee, E.A., & Ghezzi, C. (2022). *Perspectives on Digital Humanism*. Springer. Cham, Switzerland. doi: 10.1007/978-3-030-86144-5

Yanu (n.d.). Accessed on: December 3, 2022, at: <https://yanu.ai/>.