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Analytic Hierarchy Process
for decision-making:
A case in the food sector

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Introduction

Frequently, in our everyday life, we are asked to make decisions of any kind. For instance, we could have trouble in choosing the new smartphone or the new car to buy, among a lot of different alternatives. Or imagine you work for a company, or even you are the boss, and you have to decide where to open a subsidiary or which new manager to hire among some candidates, or where to expand your market based on some criteria, previously well discussed with your team. There are several ways to decide what, why and how to do something. Instinctively, rationally, mathematically. Or, combining these approaches. The process presented in this paper is one of the most powerful and precise methods to make accurate decisions, in a variety of different contexts – the Analytic Hierarchy Process (*AHP*). From a very complex issue it allows us to come to a simple systematic scheme to reach a meaningful and precise conclusion. To put it in another way, as if we were cooking, this recipe needs some ingredients. We should have some alternatives to choose from, some criteria considered important by all decision-makers involved and the widest information as possible about the decision to be made.

If I say that many decisions in companies and in real life could be reached

through a *mathematical process*, maybe someone could think I am crazy. Anyway, throughout this work my objective is to demonstrate that I am not and that this is a very useful and substantial method. We have to thank the University of Pittsburgh Distinguished Professor *Thomas L. Saaty* (1926 - 2017) for his fundamental contribution to the mathematical world. He was the brilliant developer of AHP method. I worked hard to collect the right information from books, articles and websites, with the purpose to be able to present everything in the clearest way as possible.

In addition, this final work should also represent something the writer is interested to. Indeed, as I have been working as a waitress in restaurants for years and I love eating traditional Italian food – in particular Venetian food, I decided to take you into this fascinating world. After all, food has become the starting point for extraordinary development in every society. National cuisines embody food wisdom of populations and their respective cultures. You could think that this does not match with AHP, but I am going to present a plausible case study. The case will be about some young people who have the dream to open a small restaurant ("*Trattoria*"). They have proposed some alternatives – four European cities where they would like to operate, and some criteria – e.g. raw materials, rents and competition. Thus, we have all the ingredients we need to discover where they should start the business.

Our journey will start with Chapter 1, in which I will give you a deep explanation of what AHP is, how it works, where it can be used and why it is so reliable, focusing also on the importance of the decisional process that pre-

cedes the final calculations. After that, I will move into the Italian food world (Chapter 2). Firstly, I will talk about this topic in general, mentioning some *Istat (the Italian Institute of Statistics)* exports data and the world-renowned *Brand Italia*. Before entering the case environment, something general about Hospitality Management and Organizational theory of restaurants will be proposed. Subsequently, considering that the alternatives are Treviso, Lisbon, Berlin and Genève, I will analyse and explain all the variables concerning transport costs, standard of living, presence of subsidies, competition and Italian food perception in these areas. In fact, in Chapter 3, I will focus on the theory of the case studied, focusing on the possibility of opening a restaurant in those areas, defining and analysing the specific criteria that have been chosen, for each city. Finally, with the help of the statistic software R, the best option would be found – i.e. the city, among the alternatives, in which the young entrepreneurs should open their small Italian restaurant. You will see how the AHP could simplify an apparently much more complex issue, transforming words into numbers.

Chapter 1

AHP method

The Analytic Hierarchy Process was developed by Thomas L. Saaty in the '70s. It was a revolutionary improvement in the field of decision-making. Particularly, for *multi-criteria decision-making* problems. This decision tool is based on choosing the best alternative among several. This can be done by ranking them and obtaining a *priority vector*. As said before, criteria are needed, and the ranking must be done for each criterion. At the end, summing all the *priorities* obtained for each alternative with respect to each criterion, we can define the best decision to be made. The english Consulting Company *Transparent Choice Ltd* defines the AHP as “a structured and transparent way of making decisions. With AHP your decision becomes a step-by-step process, which simplifies decision-making, enables collaboration and improves the quality of decisions”. In my opinion, this definition captures the main features of this powerful process. The fact is that, as it uses numbers to express qualitative elements, everything appears clearer to everyone. *Collaboration* is a fundamental part of the process because the more

decision-makers are able to obtain the right information about the decision to be made, the more they understand the case, the more the decision's quality improves.

AHP is one of the most widely used comprehensive methods for decision-making, and it seems to work very well. In 2017, the *University of New South Wales* carried out a test on more than one hundred decision-making methods and the most usable to prioritize projects of various nature – e.g. technology selection, strategy development, stakeholder engagement, trade studies – was proved to be the Analytic Hierarchy Process. AHP is a well-proven process for collaborative multi-criteria decision-making. It is accessible to everyone, in fact it can be used also for everyday “trivial” individual decisions, such as choosing the new car to buy. Indeed, according to a “*Guide on AHP*” (*Transparent Choice Ltd*), the AHP is a great method to use any time your decision meets one or more of these conditions:

- It has multiple stakeholders;
- It is long-lasting;
- It has a significant impact on your organization;
- It involves large requirements of money or resources;
- You need to validate your final decision (numbers can help in this case).

AHP enables us to make effective decisions on complex issues by simplifying and expediting our natural decision-making processes. It allows to break down a complex, unstructured situation into its component parts, arrange them into a hierarchical order and set their importance to determine the best

decision. According to the developer of AHP method (*Saaty, 1990*), there are basically two approaches that individuals normally use to make decisions – *deductive* and *systems*. The former is a scientific approach that provides a synthetic explanation of the whole network, made by chains and cycles. The latter does not take care of the parts, it provides an exam from a general perspective. The peculiarity of Analytic Hierarchy Process is that it manages to combine the two approaches, resulting in a method to simplify complex decisions, without the risk of being influenced by personal preferences, persuasion or others external environmental factors. For what concerns the people who have to make decisions – decision-makers – Professor Saaty explains (*Saaty, 1990*) that as we know our brains are split in two parts. The right one is creative and takes decisions and the left one is logical and turns them into words. About this, the Professor defined four qualities that decision-makers should have:

1. *Truthfulness* by not oversimplifying complexity;
2. *Justice* by evaluating costs and benefits and assigning costs to those who get the benefits;
3. *Ability* to plan for the unknown by calculating changes, determining where they are likely to occur, and deciding which priorities should dictate action;
4. *Flexibility* in adapting to change by planning, implementing and, in response to new conditions, replanning and reimplementing. This is also known as *learning process*.

AHP encourages these four important qualities. Furthermore, it enables decision-makers to represent the simultaneous interaction of many factors in complex, unstructured situations. It helps to identify and set priorities based on their objectives, knowledge and experience of each problem. To make decisions, it is fundamental to understand the world around. As a matter of fact, in the external environment, usually problems exceed resources. That is why, we need a framework like this to think about complex problems in a simple way, but humans are *not* logical creatures. Another great advantage of this method is its perfect suitability for group decisions, in which all participants evaluate alternatives and the final result is determined as the mathematically optimum consensus. The results are accepted because they are objective and free of external influence (*Goepel, 2013*). For these reasons, AHP had and still has a great success: it combines feelings, intuition and logic in a structured approach.

1.1 Eigenvalues and eigenvectors

To better understand how the process actually works, we should before recall eigenvalues and eigenvectors of matrices. Suppose that we have a square matrix A - i.e. a matrix with the same number of rows and columns - and a non-zero vector v . v is an eigenvector of A if Av is a scalar multiple of v in other words,

$$Av = \lambda v$$

λ is the eigenvalue associated with the eigenvector v . And the determinant of $(A - \lambda I)$ is equal to 0, which means that the result is a square, singular, non-invertible matrix. I represents the *Identity matrix*, which has one on the left-right diagonal and zero elsewhere (Khan, 2009).

Fortunately, all these calculations are done by computer software. Nevertheless, this concept will be useful in AHP, since it works with matrices and vectors.

1.2 AHP in (some) depth

Broadly speaking, it is important to point out that AHP is used for *relative measurement*. It implies that we focus on the *proportions* between some alternatives, rather than on the exact quantities. This becomes particularly useful in problems of choosing the best alternative and most of all when measuring each alternative is complex. AHP is flexible and makes articulated cases solvable (Brunelli, 2015; Atanasova, Lapevski, Timovski, 2014).

According to Professor Saaty, AHP has three basic principles: first, we have to define the goal of the decision to be made, to structure the problem in a *hierarchy* and decide the categories and criteria. Group discussion is extremely important to do this. We need to structure *functional hierarchies*, which decompose complex systems into their consistent parts according to their essential relationships. After that, we make *pairwise comparisons matrices* of criteria in each category, in order to set the priorities and obtain a priority vector. This point is better explained later on. Finally, we have to

pay attention to the logical *consistency* of our judgements and summing the priorities obtained for each alternative, based on all the different criteria, we can assess the optimum option (*Saaty, 1990*).

After having defined the principles, we can explain how AHP works. To make it simpler, we consider it as a step-by-step process:

Step 1: Define alternatives. They represent the things or options from which to choose – e.g. candidates, places, technologies etc.

Step 2: Organize criteria. This step is very important because criteria are necessary to make the decision effectively. There could be also sub criteria and/or sub sub criteria, all collectively defined.

Step 3: Collect inputs and information. Give the opportunity to the team to say what they think about criteria, alternatives and the decision to be made. Surveys or simple meetings could be organized.

Step 4: Pairwise comparisons. Professor Saaty recommends to create *reciprocal matrices*, for each element's impact on each criterion. Then, other pairwise comparison matrices should be created for the criteria with respect to the final goal and also for the sub criteria with respect to the criteria they refer to. A matrix, to be reciprocal, must have one on the left-right diagonal and the numbers inside are reciprocals, i.e.:

$$A_{ij} = \frac{1}{A_{ji}}$$

Here is an example of a reciprocal matrix:

$$\begin{bmatrix} 1 & 2 & 3 \\ 1/2 & 1 & 4 \\ 1/3 & 1/4 & 1 \end{bmatrix}$$

The question to be asked to complete the matrices required is “How many times is alternative A (row) more important or preferred than alternative B (column)?”. To answer this question, a numeric reference scale is used (*Saaty, 1990*):

- 1 means equal importance,
- 3 means moderate importance,
- 5 means strong importance,
- 7 means very strong importance and
- 9 means extreme strong importance.

The intermediate values represent compromises.

This scale provided by Professor Saaty has been derived from pairwise comparison measurements, after the elements to be measured are known. Professor said that humans make pairwise comparisons in many situations of their lives, thus they are used to measure the world around by comparing things. For this reason, he set the reference scale to measure also qualitative elements numerically. This makes the judgement process much easier and immediate. Other scales have been proposed and studied in literature through time, with some success, but the original one is still the most used (*Brunelli, 2015*). Indeed, Saaty’s scale is useful because it helps decision-

makers to quantify the importance of an alternative with respect to another and it simplifies the construction of pairwise comparisons matrices, as it is composed only by positive integers. For instance, if alternative A is strongly more important or preferred than B, the place a_{12} in the matrix will be filled by a 5 and $1/5$ must be put in place a_{21} to respect the reciprocity of the matrix.

Once all the required judgements have been gathered, they have to be synthesized: after having obtained the relative priorities, they are normalized. This consists in dividing each element of the vector of priorities by the sum of all its components. The result is a ranking vector, based on pairwise comparisons between alternatives and/or (sub) criteria.

Step 5: Check consistency. This is a fundamental step of the process. Consistency tells decision-makers if the matrices have been randomly completed, or not. The software helps us to find the Perron-Frobenius eigenvalue, also called λ_{max} , that is needed to calculate the Consistency Index (CI). Perron-Frobenius theorem, proved by Oskar Perron and Georg Frobenius, asserts that "a real square matrix with positive entries has a unique largest real eigenvalue and that the corresponding eigenvector can be chosen to have strictly positive components. With a perfectly consistent matrix A the dominant eigenvalue is equal to the number of alternatives (n) and the dominant eigenvector is equal to the ranking (w)" (wikipedia.org).

Formally, the CI is calculated with this Formula:

$$\left(\frac{\lambda_{max} - n}{n - 1} \right)$$

The value obtained, must be compared with that of the random-like matrices scale created by Professor Saaty. He did some simulations, as if the decision-maker decided the matrices' entries totally randomly. Thus, in the worst scenario, these are the *CI* values obtained, according to the number of alternatives:

##	CI
## 1	-
## 2	-
## 3	0.58
## 4	0.9
## 5	1.12
## 6	1.24
## 7	1.32
## 8	1.41

The *CI* of the matrices completed should not exceed 10% of the appropriate value in the table above.

Example: if we have $\lambda_{max} = 3.065$ and three alternatives (we are dealing with a 3 by 3 square matrix), our *CI* is

$$\left(\frac{3.065 - 3}{3 - 1} \right) = 0.03$$

Now we calculate the 10% of 0.58 – i.e. the reference value having three alternatives ($n = 3$) – and we find 0.058. Since 0.03 is lower than 0.058, we can say that our decision is consistent. In other words, the *Consistency Ratio* between the Consistency Index (0.03) and Random Index (0.58) should not exceed 10%, to consider the matrix consistent. In this case, in fact:

$$\left(\frac{0.03}{0.58}\right) = 0.052 \sim 5\%$$

Whether we have inconsistency, it could be due to poor understanding of the issue, high uncertainty, team disagreement and other similar causes. In fact, several rounds of discussion among decision-makers are recommended. This can improve the quality of criteria and can provide further documentation, to better prove the exactness of the final decision.

Step 6: Rank alternatives and weight criteria. Once the priority vectors have been obtained for each alternative and each criterion, also the criteria (and sub criteria) must be weighted, as previously said. Thus, a comparison matrix for criteria must be filled to understand how much one criterion is more, or less, important than another. Finally, by multiplying the criteria weights for the normalized local priorities of each alternative and by summing them, the best alternative can be defined.

There is a recommendation I would like to give. Sometimes, AHP could present the problem of *rank reversal* (Ishizaka, Siraj, 2019; Brunelli, 2015). It occurs whenever the relative ranking of two alternatives in the global ranking is reversed when a new similar or irrelevant alternative is added

(or removed). This could happen due to two independent causes - the normalization of the weights and local inconsistent pairwise comparisons. Anyway, this problem is not something that belongs to AHP. Rather, it could arise if the normalization of values is not correct. To avoid rank reversal problem, normalization by “dividing the score of each alternative only by the score of the best alternative under each criterion” has been suggested (Belton and Gear, 1983). Further more, rank reversal violates the *independence property* of AHP, which states that once it has been decided that an alternative is better than another one, this remains true independently from the number of other alternatives that will be considered. This because AHP is used for long lasting decisions that would not change when a similar alternative is added (Saaty, 1994). The normalization mode used in AHP is the linear one (see *Step 4* above) and the sum of the normalized priorities must be 1. To avoid the problem of rank reversal, the researchers pointed out that it is very important to use the right normalization technique and to check consistency of matrices throughout the process development. Besides this property, there are other four. *Reciprocity* (already mentioned) states that “if element *A* is *n* times more important than element *B*, then element *B* is $1/n$ times more important than element *A*”. *Homogeneity* tells us that “the comparison makes sense only if the elements are equally comparable. One element cannot be much better than the other”. The axiom of *Dependence*, “allows comparing the group of elements from one level with elements of the higher level. The comparison in the lower level is depended on the elements from the higher level”. Finally, *Expectation* axiom states that “any change in

the structure of the hierarchy requires a new calculation of the priorities in the new hierarchy". These properties have to be respected in order to be able to use correctly AHP to make decisions (*Atanasova, Lapevski, Timovski, 2014*).

1.3 Decisional process importance

The case presented in this paper represents a relatively simple group decision, which has been examined and focused through the AHP method. In this case, there are not many complex calculations, mainly because the initial problem (the objective of opening a Venetian "Trattoria") has been analysed through qualitative rather than quantitative elements. Anyway, as this powerful process is often used in much more articulated decisions such as Government procurements, the decisional process is considered fundamental to define the stakeholders and to add value to the coherence of the final decision (*Saaty, 1990*). In my opinion, decision-making is something rooted in our human being, we are decision-makers by nature. Every human action is followed by a more or less complex decision. The combination of rational and irrational perspectives is very important to better understand individual judgements and behaviours. Indeed, when decisions are more complex and a simple discussion is not enough, more opinions on a specific topic may be needed and the AHP could be supported by e.g. voting methods applied to stakeholders. For instance, they could be asked to vote for each previously selected criterion with a number from 1 (not important) to 5 (very important) and after having counted how many points has earned

each criterion, the criteria importance scale is constructed. The process that precedes the AHP calculations can be considered even more important than numbers themselves. Precisely, the final aim is to reach a group choice that makes each stakeholder satisfied and familiar with the problem and its different aspects. This can be done only by developing a strong and wide understanding of stakeholders' objectives, knowledge and opinions (*Dragincic, Vranesevic, 2014*). That is why, collaborative work is necessary among decision-makers: meetings are useful to let the group better understand the whole case theory and hierarchies may be constructed by independent and competent sub-committees (*Mu, Pereyra-Rojas, 2018*). As will be clear in the following chapters, the quantitative part is the last one, after a careful qualitative analysis to collect enough information about criteria and alternatives considered. To put it in another way, without the decisional process before the practical application of the AHP method, no decision would be made.

Generally speaking, making decisions requires knowledge of goals, attributes and alternatives. As goals and attributes are totally subjective and mostly uncertain, incomplete or imprecise, a very clear understanding of the whole decision system is of primary importance. Thus, ethics, human values that individuals bring to society and the different creative thoughts of decision-makers become an integral part of the decisional process. The aim is to reach convergence between all involved individuals' variety of values and activities. In this way, no one would be unsatisfied with the final decision.

The AHP, as previously said, helps to *structure* the subjective part into recip-

rocal and consistent matrices, in order to be able to make an exact decision, based on objective elements. An important issue is that decision-makers must be aware of the factors (goal, criteria, alternatives) that compose the structure of the problem and they have to collect information through group discussions, literature, personal experience in order to be able to find the best solution to the examined problem. Clearly, every single decisional process can never be equal to another because factors, people involved and external environment are continuously changing. In this regard, some lists of human capabilities, values and cause-effect lists were proposed to simplify the decisional process for decision-makers and to represent a sort of “guide” for them in this difficult task (*Begicevic, Saaty, 2010*).

Professor Saaty as well emphasizes the importance of the decision-making process that precedes the AHP calculations. The method includes both rating and comparison methods, along with personal preferences and social, political and/or environmental influences, transforming them into numbers. These numbers are the result of an accurate decisional process. Professor invites decision-makers to pay attention to two aspects of group decision-making: first, discussion and exchange are very important to reach consensus on the initial problem; second, in complex decisions, sub-groups of experts may be needed to determine how each area affects the main issue. Saaty also gives a list of characteristics that a decision-making approach should have:

- Be simple in construct
- Be adaptable to groups and individuals

- Be natural to our intuition and general thinking
- Encourage compromise and consensus building
- Easy to review
- Use multiple criteria to better explain the whole case in exam.

As previously said, he pointed out the need to have details about the problem itself, the people involved, their objectives, influences, ideas and experience. Indeed, after the discussion, the AHP breaks the problem down, it aggregates solutions and it organizes perceptions, feelings, judgements and memories in a single framework, in order to reach the best solution of the initial problem. Moreover, *analytic decision-making* induces people to express tacit knowledge, to organize and harmonize different feelings and understanding, to include both logical and intuitive or emotional judgements and to transform irrational opinions into rational structures (Saaty, 1994).

At this point, after a general view of the AHP method and the important decisional process before calculations, something must be said about the broad topic chosen for this work (and for which the AHP will be very useful)
- Italian food.

Chapter 2

Brand Italia

We are born in a Country where “people live to eat”. We are used to seat at the table at home or in a restaurant with our family or friends and enjoy the best meals of our territory, usually accompanied by a glass of good wine. This is part of our culture, since our ancestors discovered fire for cooking one million years ago. Indeed, food can be seen as a sort of community glue, as it promotes social interaction. Eating is no more a simple action or physical necessity - it becomes an experience, a cultural exchange, a self-presentation vehicle and a social need (*Barilla Center for food and nutrition*). Every food practice reflects a community’s social and cultural values and can reveal its cultural identity. In this regard, an accurate quote by the German philosopher Ludwig Feuerbach states: “*Der Mensch ist was er isst*”, “*L’uomo è ciò che mangia*”. For what concerns Italian food culture, it could be seen as strange by others but thanks to tourism and globalization of both ways of living and consumption, it has become known and loved all over the world: it represents part of our cultural heritage (*Dansero, Giorda, Pettenati,*

2015). Indeed, Italian cuisine is one of the oldest cuisines in Europe and it is characterized by a wide variety of *home-made* dishes from one Region to another, due to several civilizations that invaded Italy throughout its history and to different geographical characteristics (*Nevin Sert, 2017*). In foreign Countries, Italian products and restaurants are a *must-have*. We should be proud of this. Through restaurants, Italian food is spread and appreciated in many other countries (*Barilla Center for food and nutrition*). This chapter will give you an overview of the importance of Made in Italy food, but it must be reminded that *Brand Italia* is multi-sectorial. The words “*Made in Italy*” evoke in consumers’ minds attributes that positively characterize the image of Italy as a country. In particular, creativity, uniqueness, quality, and sophistication. Especially in the food and beverage sector, whose products have gained estimation through time. And its attitude all over the world is fortunately very positive (*Gregori, Palagna, Temperini, 2016*). Indeed, according to the *Top 30 most valuable Italian brands* ranking, published by the brand consulting companies WPP and Kantar Millward Brown in 2019, Made in Italy brand grows by 14% every year and its revenues are about 97 billion US dollars. The first most profitable sector was found to be fashion, with Gucci leading the ranking with an annual growth rate of 50%. The second most important sector for Made in Italy is food, with Kinder, Nutella and Ferrero Rocher in the Top 15. Thus, these sectors represent for Italy the salvation of our economy. According to the research, Made in Italy performs exceptionally well, in part due to the heritage, authenticity and associated lifestyle of many of the brands. Moreover, ambition, bravery, innovation and focus on

customer experience have made Italian products and brands known all over the world and continuously growing, most of all in emerging countries (E.g. BRICS).

As we know, millions of tourists from all over the world come to Italy to taste our food every year. A research conducted by the International Tourism Exchange of Milan found out that half of the tourism volume is from outside Italy and 75% of tourists come to Italy to taste our food and beverage. It is curious to discover that, after an Italian holiday, 59% of tourists will continue to buy Italian food and 54% Italian wine. It means that our products leave a mark and are loved all over the world (*ansa.it: Alagia, 2018*). Despite the fact that Italian food is one of the most imitated in the world (according to the OECD report "*Trade in counterfeit goods and the Italian economy*" of 2018, Italian food forgery represents 13% of the total volume of Italian counterfeited products), Italy's food and beverage exports are still growing year after year at about 4% rate and this sector represents around 40 billion Euro of income per year, almost the 9% of the total GDP. According to Istat data on food exports, during the period 2000 - 2019, Italian food exports have more than doubled. The Italian regions that export more are Lombardia, Emilia-Romagna and Veneto (*see later*). The productive value of the sector is 140 million Euro, it occupies 13% of all Italian workers in 25% of all Italian companies. The Chamber of Commerce of Milan elaborated some Istat data about this topic and found out that Germany, France and USA are the major export partners for Italy. Portugal is emerging above all for fish, spices and water. Switzerland for wine. According to the Deloitte

research “*Italian cuisine market monitor*”, the world catering market worths more than 2,5 billion Euro. Italian cuisine is the second most widespread, after the Asian one and the first for what concerns growth prospects abroad (*colturaecultura.it; www2.deloitte.com*).

What we should be aware of is that the Country image and the charm of the *Brand Italia* represent a real strategic asset, to differentiate the value proposition of Italian companies from the international competitors and to provide intangible characteristics that contribute to increase the perceived value of products and brands and to form positive purchase intentions and to influence perception, i.e. the “country of origin effect” (*De Nisco, Mainolfi, 2016*). I found interesting the result of a Blogmeter’s online survey - “*Italian Excellence: a research on Made in Italy abroad*” - which asked a sample of people from different countries, European and not, what would they associate Italy with. The 63% associated Italy with *food*. This means that a lot of people from abroad, think about Italy and food as a unique concept of quality (*ilsole24ore.com*).

2.1 Some data

In the previous paragraph, some Istat data on Italian food exports were mentioned. After a personal elaboration, they are here graphically represented, to make them clearer.

In the barplot below, the volume of Italian exports by area in 2018 and 2019 is represented. The total volume exceeds 470,000 million Euro in both years

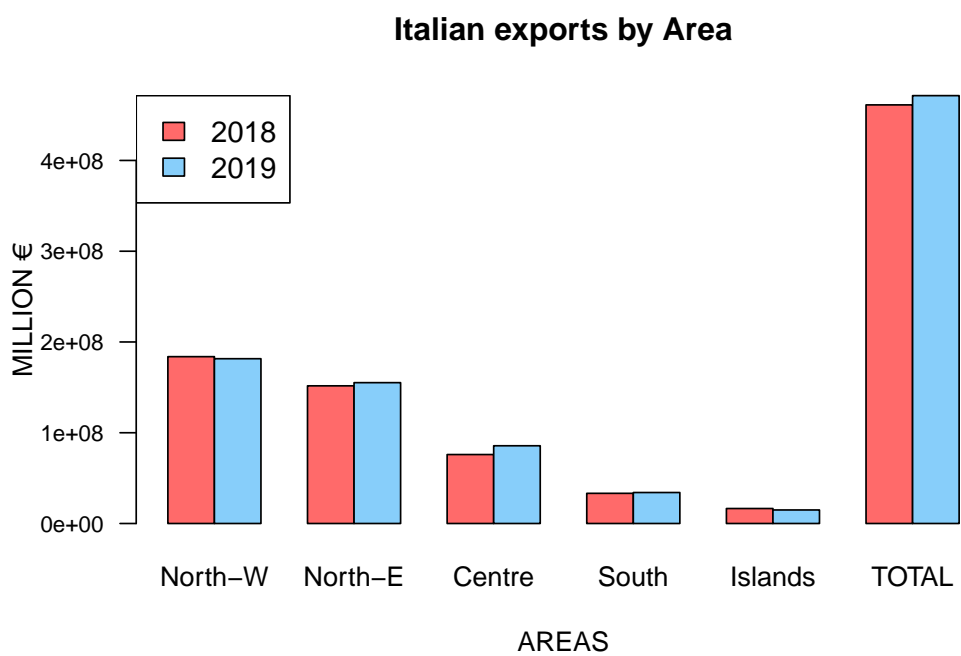


Figure 2.1: Italian Exports by area 2018-2019

and it slightly grew last year with respect to the previous one. Something remarkable is that North-West and North-East together export about 70% of the total. This means that the export activity is much more developed in Northern Italy. Following, another barplot represents the volume of exports by Region.

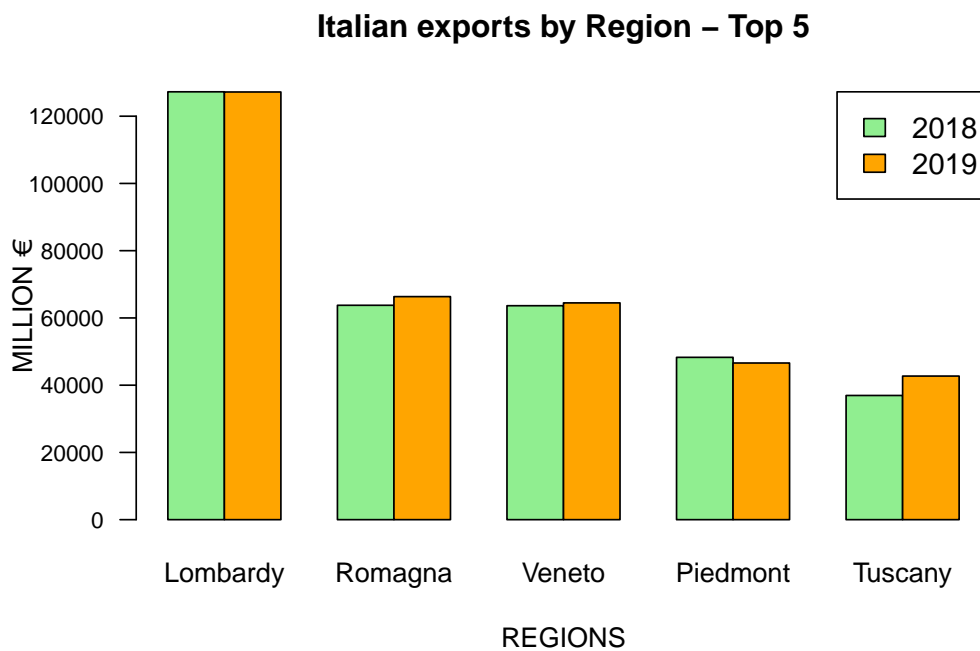


Figure 2.2: Italian Exports by Region 2018-2019

These are the five Italian regions that export more. Lombardy remains stable over 127,000 million Euro and each of the other four regions export around half of the volume of Lombardy. Tuscany, even if it closes the “Top 5”, had the highest growth between 2018 and 2019. For what concerns Food and Beverage exports, always according to the *Istat database*, Italian exports grew by 6.6% between 2018 and 2019. This means that last year has been a positive

year for the continuously growing Italian food and Beverage industry, which helps our brand to spread all over the world.

Chapter 3

Hospitality management and theory of the case

3.1 Organizational theory of restaurants

Before starting to describe the case environment, it is necessary to clarify some organizational theory as applied to restaurants. In other words, what should be taken into account to organize operations and services in the best way, to inspire trust, authenticity and transparency and to develop customers' attachment to the new restaurant.

When talking about organizational theory of restaurants, indeed we are in the field of hospitality management, which spans from hotels to cafeterias and restaurants. It is defined as the "application of management concepts and structured leadership in the areas of accommodation, dining and general guest services". Manufacturing and commercial businesses sell products, hospitality's goal is instead to sell services, experiences, enjoyment for guests and to satisfy their psychological needs (*oxfordhomestudy.com*). Eating ex-

periences can stimulate all the senses and arouse cognitive and affective reactions in customers (*Aulet, Meneguel, Mundet, 2018*). Apparently, there is not a commonly agreed theoretical framework for hospitality management in literature. Anyway, the main issue for restaurateurs regards the type of *service* they want to offer - low, medium or high quality restaurant, more or less focused on hiring prepared staff and on establishing deep human contact with customers. All aspects involved in hospitality management and strictly connected are: external environment (continuously changing), management information system, technical infrastructure and human resources. It goes without saying that the *interaction* between these political, cultural, social and economic factors represents the basis of hospitality management and allows to transform a customer's need into customer's satisfaction. This means providing physiological and psychological comfort and security to guests (*Nailon, 1982*).

Besides the service the restaurant aims to give, *maximising the customer's satisfaction* is a crucial point for a successful hospitality business. To reach this objective, the customer target must be selected first, and then all business operations must go around it - i.e. sought-after customer relationship, own unique value proposition, marketing strategies, allocation of resources. Unfortunately, it is easier to say it, than to do it. The restaurant sector is one of the most demanding and challenging businesses to operate, due to the complicated and competitive business environment in which it operates (*Chua, Han, Lee, 2020*). Thus, to generate customer's satisfaction, it is necessary to "strike at customers' heart". When people go out to have dinner in

a newly-opened restaurant, they seek for variety - i.e. something different from what they already visited before. If restaurateurs manage to achieve customer's satisfaction, they almost automatically reach also *new product or brand attachment*. In this way, customers are more likely to reuse the product or, in "restaurant terms", to come and eat again in the restaurant because they have in mind a positive image of a unique and pleasant place to dine. This important strategy can help to survive in today's restaurant industry, because it approaches the psychological side of customers, generating positive emotions during the consumption and leaving a positive impact after it. Consequently, the satisfied customers will use positive word-of-mouth with family and friends, who could become new customers for the restaurant (Chua, Han, Lee, 2020). Another relevant issue concerning customers' sustainable behaviours and purchase intention regards *Corporate Social Responsibility (CSR), transparency and trust*. At this stage, the primary marketing tool for a restaurant comes in - the Menu. It makes the first impression to customers, it makes them understanding the offerings' quality, value and price. Indeed, writing on the Menu information about food ingredients such as their origin, their producers or their nutritional characteristics enhances CSR, transparency and authenticity. A restaurant can be defined as "authentic" if it manages to create a subjective belief in customers that they are having an authentic dining experience (Kim, Song, Youn, 2019). Consequently, customer trust earning is fostered and this represents an important competitive advantage for a company. Indeed, trust can be seen as a driver for customers' willingness to select that specific restaurant (Shafieizadeh, Tao,

2020). Anyway, a recommendation to restaurateurs is always to be honest with their clients, because “Honesty is the best policy” (*Benjamin Franklin, 1706-1790, United States Founding Father*) and “Honesty and integrity are by far the most important assets of an entrepreneur” (*Zig Ziglar, 1926-2012, Writer and Motivator*).

Last, but not least, another fundamental point in hospitality management and specifically in restaurant opening is adopting the right *marketing strategy*. The “4P concept” (*Product, Price, Place, Promotion*) can help in developing it (*Felecia, Halim, 2019*). *Product* refers to the menu offerings according to food and beverage and to the desired idea that the product itself would transmit to customers. *Price* is clearly about the price of the products offered. *Place* has two sides: one is the physical location of the restaurant and the other is the competitive position of the business. As previously said, if a restaurateur manages to offer its clients something new for them, something unique that they had not tasted in other restaurants, this can be the secret to beat the competition. Finally, *Promotion* involves all the activities aimed at making the restaurant known to the highest number of potential customers as possible. These activities include, for instance, deals and promotions, Community marketing (i.e. word-of-mouth), billboard advertising, *SEO* (Search Engine Optimization) which comprises website and social media interaction, *PPC Ads* (Pay-Per-Click Ads) which make your website coming up when people digit certain words into the research engine. These aspects are crucial to start and run a successful business (*thedigitalrestaurant.com*). Anyway, it does not matter which marketing tools are chosen, the most important thing is

having something to say, a *message* to give. It should be authentic, relevant and distinctive. It represents 70% of marketing effectiveness, and the rest is about the choice of media (*Joonas Mäkilä, Head of marketing strategy and communications at Finnish restaurant group Royal Ravintolat*).

The mentioned aspects are important to create a winning business plan for a restaurant. Besides them, it is necessary to make an internal analysis, thinking about the most suitable legal structure for the company, the capitalization needs and how to get to the money, the team, the desired capacity, atmosphere and structure of the restaurant, the employees' tasks and restaurant operations schedule. Moreover, an external analysis is needed, to have an overview of possible local competitors, potential customers and suppliers. Putting everything together, the roadmap for the successful future of a business is set (*Erickson, restauranowner.com*).

3.2 Case theory

The case analysed in this paper is, as said in the *Introduction*, a decision that some young people have to make regarding where to open a small typical Venetian "*Trattoria*". The idea is having a small restaurant with about thirty seats, in which typical Venetian dishes are prepared with dedication and professionalism, trying to cultivate something in place if possible, or selecting suppliers carefully. The target could vary, from young people trying the Venetian "*Aperitivo*", to the couples and groups of friends or families going out for lunch or dinner in a value-for-money, young and

friendly Italian Restaurant. The *main objective* is to bring customers into a traditional but creative at the same time Italian way of cooking and to give them an unforgettable eating experience. Considering that customers, in recent years, are increasingly looking for *learning* experiences in gastronomy (Aulet, Meneguel, Mundet, 2018), the above-mentioned aim can be seen as consistent. Heavy importance would be given to build a relationship with clients and to leave them positive emotions after having tried the restaurant. Concerning promotion, initially it would be through flyers, social media and word-of-mouth. Once a good number of customers have been gained, also direct marketing could be effective and more innovative ideas could be implemented.

The *alternatives* proposed are four European very different cities: Treviso, Lisbon, Berlin and Genève. Following, there will be a general description of the cities. This means talking about the standard of living, the possibility to open and run a business successfully and the existence of subsidies and loans for young entrepreneurs. The description will be guided by the criteria and sub criteria chosen, after a discussion with the interested parties. The criteria are:

1. The availability and supplying of raw materials. This takes into account the distance between Italy and the three foreign cities, because transportation costs change accordingly.
2. The cost of rents. This criterion is then divided into two *sub criteria*: easiness of doing business in that specific country and the possibility

of having subsidies and/or loans.

3. The local competition. This takes into account the local population food target and perception of food *Made in Italy*.

Before describing the chosen cities, a brief digression on the *Cost of Living Index* is needed. It is the index that explains in numbers the standard of living in different regions. It compares the expenses a person can expect to face to acquire food, housing, transportation, energy, clothing, education, healthcare, childcare, and entertainment in a certain area (*investopedia.com*). The question to be asked to better understand this index is “*How many goods and services does a given sum of money purchase in a certain location?*”. The more are the goods that can be bought with a certain sum of money, the lower would be the index. Usually, the values obtained are compared to a base value of 100, associated to United States - New York City in this case. This means that if a city has the Cost of living Index of 120, life there is 20% more expensive than in New York. According the *Numbeo* online database rankings, the indexes for the cities in exam and they are visible in the graph below.

As we might have imagined, Genève is the city with the highest Cost of living Index and Lisbon has the lowest value. It is interesting to point out the similarity between Berlin and Treviso. The values for these cities are quite the same. After this clarification, the description of the cities chosen for the case can start.

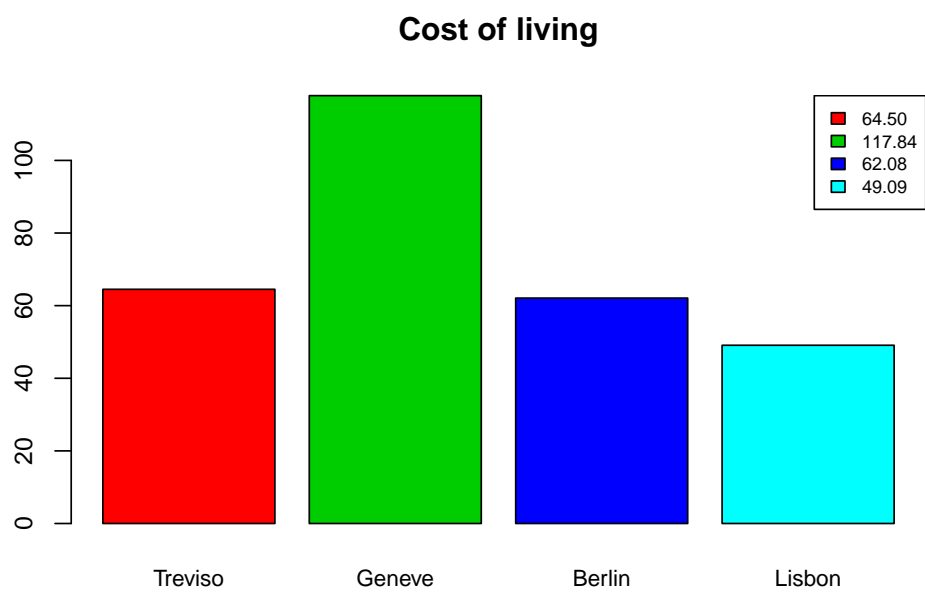


Figure 3.1: Cost of living indexes - base value 100 New York City

3.3 Treviso

Treviso is a medieval Venetian city, situated in North-Eastern Italy, with almost 85,000 inhabitants. There are some interesting monuments to visit and the typical bars and restaurants represent its main characteristic. Polenta, Radicchio and Tiramisù are just few of many dishes worth tasting in this area, famous all over the world (*wikipedia.org*). In 2019, according to the *survey on Quality of Life in Italy*, conducted by the Italian financial newspaper “*Il Sole 24 Ore*”, Treviso stood at the 8th place in Italy for the quality of life. Moreover, it has been defined as “Growth champion” as it moved from the 43rd position to the 8th during the last thirty years. This means that, even if it is quite small, the standard of living is high, above all in the city centre. The survey analyzed, for each Italian Province, six indicators - Wealth and Consumption, Environment and Services, Security and Justice, Business and Work, Demography and Society, Culture and Leisure. Treviso placed second in the final ranking for Security and Justice, which means that it is also a safe and low crime city (*lab24.ilsole24ore.com*).

For what concerns food exports, Istat found that for the Veneto region they grew of 4.4% in 2019. Finally, the informative editorial *LC Publishing Group* studied the Made in Italy food destinations and founded that in the European Union, the most ancient trade partner for Italy is Germany, with a value of more than 6 billion Euro and with about an 18% in market share (*foodcommunitynews.com*).

If the choice of where to open the restaurant would be Treviso, it would be

certainly easier for the reach of raw materials. Many varieties of Radicchio and a plenty of vegetables like asparagus are present, cereals like corn and good wine. All these raw materials could be cultivated in this Province. In this case, the fact that suppliers are local would be positive. They would be faster and cheaper. Anyway, in small towns like Treviso, it could be more difficult to have success in the field of restaurants. If you are not in a good central position, it could be difficult to have many clients. Moreover, frequently fiscal pressure and taxation are so high and heavy that restaurateurs are forced to give up and close their activity, because they cannot afford to pay everything. Rents in the Province of Treviso, also out of the city centre, start from 1,500 Euro per month, bills excluded. If the objective is to buy the restaurant, prices start from 120,000 Euro. These are approximative amounts, that depend on the size, on the position and on the date of construction of the building. It is also important to point out that the Province of Treviso, in 2019, had a flow of more than one million tourists with an average stay of three days (*statistica.regione.veneto.it*). These are good numbers, but the most difficult issue if you open a restaurant in Italy is satisfying *local people*, more than tourists. Italian cuisine is one of the most loved in the world, thus we are used to eat very well and we are demanding. *Brand Italia* for us is just normality. When eating out, we search for high quality food, even if we go out and eat a salad or a sandwich. As a consequence, competition is very intense in this area because there are plenty of typical restaurants that offer a wide variety of delicious Italian dishes. The main focus should be trying to be different from competitors, which is a key point towards

success. Anyway, it is more difficult here to stand out, because almost every restaurateur thinks in the same way and the Venetian cuisine is the dominant one. Perhaps, going outside Italy, could facilitate the differentiation with respect to all other different types of restaurants, from all over the world.

For what concerns capital needs, fortunately, there are concessions from the Veneto Region for who decides to open a bar or restaurant. By the *Decision of the Regional Government No. 82 of 27th January 2020*, a new type of concession for SME (Small and Medium Enterprise) founded by young people aged between 18 and 35, was introduced. Thus, young entrepreneurs could have a 30% refund on expenses for machinery, production plants, business use furniture, means of transport and hardware. Moreover, they could ask for capital contributions of 15% of the project cost or for a leasing or bank loan equal to the 85% of the project cost. To obtain this, they have to apply to a formal ban where they have to explain also their business plan. These loans and concessions have low interest rates, to facilitate the entrepreneurial activity. Unfortunately, bureaucracy is extremely heavy in this field and it is not easy. There is also the possibility to create a company, according to Italian law (*Art. 2463 bis c.c.*), with a share capital between 1 and 10,000 Euro. This model is known as *simplified Ltd company* and includes less costs and taxes than an ordinary Ltd. In any case, the Regional law establishes that to obtain the license to open a bar or restaurant in the Veneto Region, three conditions have to be respected: accessibility, competition and sustainability. They comprise professional and moral requirements. Some experience in the field and effective promotional activities close the cycle.

3.4 Lisbon

Lisbon is the capital of Portugal and it counts more than 500,000 inhabitants (excluding the urban area, with 3 million). It is the only European capital on the Atlantic coast. As it cares about the environmental protection and sustainable economy, it will receive in 2020 the *European Green Capital Award*. Lisbon is a global city, a financial but also historical and cultural centre. The strategic position on the coast allows flourishing fishing activities (*wikipedia.org*). In 2019, the World Economic Forum published the yearly *Global Competitiveness Report*. Portugal was at position 34 over the total of 141. Italy was at the 30th place. This report blends together micro- and macroeconomic ranks, for instance Health, Education, Labour and Financial markets. It evaluates the *capacity of a country to provide prosperity to its inhabitants*. The position in the global ranking indicates that Portugal is not so different from Italy. Anyway, despite lower salaries, Portugal maintains low the cost of food, drinks and rents, allowing to live decently with less money. Indeed, the online company *InterNations GmbH*, born to give advise and reliable information to expats (it is the largest expat network), conducted a research on a sample of 64 countries around the world in 2019. According to the report "*Expatriation Insider 2019 - The world through expat eyes*", Portugal ranks third, after Taiwan and Vietnam. It means that the country is the third most chosen place to move and live. Unfortunately, Italy cannot be so proud because it lies at the 63rd position. In addition, Portugal is defined as a highly recommended country in which to settle and start a successful business, because taxation

is low. Above all, in the food and beverage sector. In the report, the factors taken into consideration were: quality of life, ease of settling in, personal finance, working abroad and family life. Portugal had the best scores for what concerns quality of life (1st place) and ease of settling in (4th place), and locates in the Top 20 for family life and personal finance.

Moreover, Italian cuisine is highly regarded also there. Thus, it would be easy to have a lot of clients, both residents and tourists, which are almost 20 million every year. It could be a real and concrete opportunity for the ones who want to open a restaurant there, also thanks to the low fiscal pressure for non-residents. Italian restaurants are popular there, but they commonly serve pizza and pasta. A Venetian “Trattoria” would be something different (*thefork.com, tripadvisor.it*).

For what concerns prices, Lisbon offers a wide variety of buildings, most of them on sale. Rents for restaurants usually start from 2,000 Euro per month, not very high. There are nice places at a lower price than Treviso - less than 100,000 Euro - and there are others that cost much more. Usually, it depends on the size and on the position. Anyway, as previously explained, the objective of the entrepreneurs in this case is to open a *small* restaurant. Thus, they are not searching for a 200 square meters restaurant. Naturally, Lisbon is a capital city and even if there is the risk to pay a quite high price for the building itself, there are much more opportunities to be successful bringing Italian dishes in a country that loves Italian food. There are Italian restaurants in Lisbon, but the variety of cuisines are many, so it could be easier for Italians to stand out.

Another point is the possibility to cultivate something there and if not, how to be supplied from Italy. In Portugal the climate is wetter in the North and more drier in the South, so there are various products that can be obtained in this area. Corn and wheat, but also almonds, figs, citrus and olive trees are cultivated. Then, fishing is one of the most important activities for the local economy and Lisbon is in a strategic position. The other products, which must come from Italy like wine and some vegetables for instance, have to be imported from Italy. There are many companies which deliver Italian products to restaurants all over the world, with Certification of Quality to demonstrate the origin of what they export. Indeed, some examples are companies like *Bross*, *UnileverFoodSolutions*, *Bidcorp Group*, *Mavi Trade*, *AliBev Trade*, *Food Trading EU* and *Italian Food Trading*, a company based in Verona which delivers Italian food products throughout Europe at a relatively low cost. Naturally, when necessary, the vehicles used would be refrigerated.

Even though Portugal is similar to Italy for what concerns the heavy bureaucracy, it gains a good place in the ranking of the World Bank report "*Doing Business 2020*", which analyzes the easiness of opening a business, getting a location, accessing finance, dealing with day-to-day operations and operating in a secure business environment. Portugal is in 39th position, Italy in 58th. This means that despite some similarities between these two countries, Portugal appears to be a very good destination to run a business. It is important to point out that, considering the other alternatives of the case - Genève and Berlin - Germany is at 22nd position and Switzerland at 36th. From the report we also understand that many more countries are trying to

facilitate the procedures of doing business, both reducing rules and limits, and encouraging the use of technology and online payments. Speaking of concessions, both natural and legal persons can have them. The “*Non Habitual Residence Program*” allows non residents (*tax residents*) to benefit from many advantages. They are provided in detail by the English investment consulting company *Global Citizen Solutions*:

- Benefit from a special personal income tax treatment over a 10-year period
- Possibility of enjoying a tax exemption on almost all foreign source income
- 20% flat rate for certain Portuguese source incomes (from specific professions as well as income from self-employment), as opposed to normal Portuguese income tax rates of up to 48%
- No minimum stay requirement
- Become part of a white-listed tax environment within the EU
- A tax exemption for gifts or inheritance to direct family members
- No wealth tax
- Free remittance of funds to Portugal (*globalcitizensolutions.com*).

In general, Portugal is a country where people pay 50% less taxes than in Italy. It is interesting to point out that in Portugal exists a method to create a company in less than one hour, called “*Empresa na Hora*”. Everything can be done through the connected website. If the idea is to open a Ltd company, the minimum capital required is 5,000 Euro (*associazioneitalianialisbona.pt*;

companiesineurope.com). To conclude, as already said for Treviso, there are some European loans for new enterprises that can be accessed and they have very low or even zero interest rate. This possibility, along with the other tax benefits, make Portugal a very interesting destination to start a successful business.

3.5 Berlin

Berlin is the capital of Germany and the most populous European city, with almost 3.8 million inhabitants. It is known all over the world for its particular history and it is a city that offers a plenty of attractions to visit. Moreover, it is a good place for young people - both students and workers (*wikipedia.org*). According to the previously mentioned *Global Competitiveness Report*, Germany stays at the 7th place, just two positions after Switzerland. This means that the country manages to give prosperity to its residents. German economy is boosted also by tourists - in 2019, they were more than 30 million in Berlin. In recent years, the city almost reached the levels of centres like London, Rome and Paris.

As previously seen, Berlin has a Cost of Living Index which is even lower than Treviso. Naturally, we have to remember that it remains a Capital City. Thus, it could be less expensive in every-day expenses, but slightly more expensive than Treviso for rents, for instance. Indeed, rental fees for a restaurant are usually around 2,500 Euro per month. Again, it depends on the size and on the position of the place. The idea to open a typical

Venetian restaurant should be seen as very positive in Berlin. People there love Italian Regional cuisine - simple but delicious dishes at a medium price. According the Guide "*Top Italian restaurants in Berlin*" written by the gastronomic platform *Gambero Rosso*, during the last decade, Berlin has been the most growing city in terms of food. Since 2008, half a million people moved to Berlin, especially from Italy and Spain to live or work. This has turned into new higher quality food standards and there are indeed many Italian restaurants in the city. Most of them are Neapolitan Pizza restaurants and there are also some valuable restaurants and taverns from other Italian regions. Thus, it could be a good idea to bring also the Venetian cuisine into such a polyethnic city. It would represent a "new-in", something different (*gamberorosso.it*).

For what concerns the possibility to cultivate something there, Berlin has not the ideal landscape. Anyway, a start-up named *InFarm*, delivers greenhouses to supermarkets, restaurants and department stores, to allow them to cultivate vegetables also in a city. This has been a very clever and successful idea. In any case, as already said in the paragraph about Treviso, Germany is the first trade partner of Italy. This means that it would not be a problem to receive products from Italy to run the restaurant. The same companies I cited talking about Lisbon can be a reference point also for Berlin and Genève. Transportation costs would be quite high but still lower than for Lisbon, mainly because of the distance. Indeed, from Venice to Lisbon there are almost 2,500 km and from Venice to Berlin there are around 1,200 km. Genève is the nearest one, 578 km far from Venice (*google.it/maps*).

As said previously, from the World Bank report *“Doing Business 2020”* Germany is, among the alternatives, the country in which doing business is easier. Naturally, the simplification of the business is very important, as it is in all entrepreneurial sectors. Information about licenses and local law must be collected before starting. It is possible also in Berlin to start a business with just one Euro. This company is called *“Entrepreneurial Society”* and it provides limited responsibility to all members. There are some incentives for entrepreneurs, which are usually fixed rate loans repayable in five to ten years. The maximum value of the loan can be 100,000 Euro and if the company is founded by a team, each member can ask for the loan. Moreover, to allow the company to start in the best possible way, one or two years are without refund obligation. Depending on the dimension of the company and on the amount of the loan, up to 80% of the loan is guaranteed by the Government. This is a good opportunity for those companies which normally would not have access to bank credits. New entrepreneurs can also choose to subscribe a micro-loan of 25,000 Euro. This happens more often if they already have money to start the business (*ambberlino.esteri.it*). Another interesting point is that small businesses can receive from the national Government up to 30% reimbursement of initial costs - i.e. machinery, rents, staff costs (*“Guide to incentives for companies in Germany: the main public programmes” on confimprese.it*). As you can understand, Berlin as well is a city where it could be convenient and profitable to run a business.

3.6 Genève

Genève is the second most populous city of Switzerland, with more than 200,000 inhabitants. It is a centre for financial, commercial, industrial and intellectual activities. It is situated on the shore of Lemman Lake, on the banks of the Rhone and surrounded by mountains. The city is covered by buildings for more than half of its whole surface, some of them historical and attractive for tourists. It is also a diplomatic city, because it hosts the European seats of United Nations, World Trade Organization, World Health Organization, Red Cross and other international bodies. Genève focuses a lot on the development and quality improvement of culture and education (*wikipedia.org*). For what concerns tourism, the newspaper "Corriere del Ticino" reported that Switzerland in 2019 reached almost 40 million overnight stays and more than 3 million visited Genève (*cdt.ch*).

As mentioned before, among the alternatives, this one is the most competitive - i.e. it is able to give prosperity to its inhabitants more than all others. On the other hand, it is the one that has the highest cost of living Index, which is *widely higher* than the other cities. Moreover, we have to remember that Switzerland is not part of the European Union and its currency is the Swiss franc, which has a slightly higher value than Euro. For what concerns everyday expenses, Genève is generally more expensive than the other three cities. Going shopping is costly and rents are high but the medium salary in Switzerland is more than 3,000 Euro higher than in Italy - it is about 5,000 Euro. Everything is proportional to the higher cost of living. Rents for small

restaurants start from around 3,000/3,500 Euro but it always depends on the size and on the position of the building. Italian cuisine is very appreciated also in Genève and there are already some very nice Italian restaurants but Venetian cuisine could be something new in the city. The competition here, as in Lisbon, should not be too hard. The most competitive foreign city among alternatives, in the restaurant sector, could be Berlin because there is a large amount of Italian restaurants (*thefork.com, tripadvisor.it*). Anyway, there is still wide room for differentiation.

With regard to agriculture and farming, 35% of Genève surface is useful agricultural area. Most common cultures are cereals, vegetables and fruit. In the last few years the poultry farm has grown exponentially. Instead, dairy cows are still less diffused. Very popular industries are those which produce cheese and chocolate (*2017.agrarbericht.ch, Switzerland Agricultural Report 2017*). As you can understand, having the possibility to buy raw materials from locals is a good advantage for who wants to open a restaurant in this city. In this way, only the essential items would be bought from Italy resulting in less costs for the entrepreneurs. Moreover, it is very close to Italy and transport could be easier and faster. Indeed, recently Italy is becoming a more important partner for Switzerland in terms of food and beverage exports ("*Map of Italian Exports*", *milomb.camcom.it*).

As said for the other cities, before starting a business is necessary to collect information about what is needed. There are no particular limits to open a business in Switzerland, so anyone is welcomed. The secret is to start

something that misses or something different and innovative. According the article *“How to open a food activity in Switzerland”*, written by the online portal *Exportiamo*, dedicated to companies operating in foreign markets, company types in Switzerland are similar to italian ones because they comprise partnerships and capital companies. The most diffused are individual company, joint-stock company (similar to the italian S.p.A.), limited liability company (the italian s.r.l.) and limited partnership. For the limited liability company which is maybe the most convenient for young entrepreneurs, the minimum capital is 18,000 Euro. The expenses to effectively start the company, except for the social capital, are on average 10-12,000 Euro, depending on which type of company is chosen. In two to four weeks, the company is usually activated. The main advantage is that taxes are far lower than in Italy - for instance, the Value Added Tax is fixed at 8% and if the turnover is less than around 94,000 Euro (100,000 CHF), the VAT number is not compulsory. These reasons explain why Switzerland is very attractive for italian entrepreneurs. Finally, there is a state programme for entrepreneurs who need capital to run a business which supports SME and simplyfies the access to subsidised bank loans. There is also the opportunity to subscribe a guarantee with a guarantor that takes responsibility for the eventually unpaid debt. Every canton has some Economic Promotion Agencies that drive young entrepreneurs to the most suitable form of economic support. In this country the focus is on facilitating the access to loans for new entrepreneurs. Apparently, Switzerland is good at this with low interest rates, low taxation, low bureaucracy and velocity (*kmu.admin.ch, Swiss Confederation Portal for SMEs*).

Chapter 4

Case development

At this point, with all the information needed to develop the case and to search for the final choice on where to open the restaurant, the AHP method can be practically applied. First of all, after a discussion with the interested parties, the importance of each criterion with respect to another is clarified and the first matrix can be constructed. Subsequently, the matrices comparing the alternatives with respect to each criterion will be developed. Precisely, all the matrices were completed after a careful analysis of articles and websites to gain knowledge about the topic and the alternatives, which is reported in the previous chapters. Moreover, asking the young entrepreneurs who would like to open this “Trattoria” to complete the matrices on criteria and sub criteria. To do so, a team discussion has been held, in order to better understand the importance attributed to a criterion with respect to another, as well as the general idea and the resources needed.

As previously described, the criteria considered are the reach of raw materials, the cost of rents and the local competition. The matrix constructed is a 3

by 3 matrix, which compares criteria's importance with respect to the final goal of opening a "Trattoria".

$$\mathbf{C} = \begin{bmatrix} 1 & 2 & 5 \\ 1/2 & 1 & 4 \\ 1/5 & 1/4 & 1 \end{bmatrix}$$

Considering that the first row and first column represent the raw materials criterion, the second row and second column the rents criterion and the third row and third column the competition criterion, this matrix can be explained as follows: raw materials are considered slightly more important than rents (2) and strongly more important than competition (5). Finally, rents are considered moderately to strongly more important than competition (4). As required by the *reciprocity property* of matrices, the values under the left-right diagonal are the reciprocals (1/2, 1/5, 1/4).

At this point, the other pairwise comparisons matrices can be created. Firstly, alternatives (Treviso, Lisbon, Berlin and Genève) are compared with respect to the first criterion (Reach of raw materials). Thus, the question asked in order to fill the matrix is: "How much is alternative A preferred to alternative B concerning the reach of raw materials?".

$$\mathbf{R} = \begin{bmatrix} 1 & 6 & 4 & 3 \\ 1/6 & 1 & 1/2 & 1/4 \\ 1/4 & 2 & 1 & 1/3 \\ 1/3 & 4 & 3 & 1 \end{bmatrix}$$

As previously said in this chapter, for what concerns the reach of raw materials Treviso (first row and first column) is undoubtedly preferred, then Genève (fourth row and fourth column), followed by Berlin (third row and third column) and Lisbon (second row and second column), which are the farthest cities.

After this, alternatives are compared according to the second criterion - the cost of rents. By asking the question “*How much is alternative A preferred to alternative B concerning rents (for restaurants)?*”, the obtained matrix is shown below.

$$\mathbf{RE} = \begin{bmatrix} 1 & 2 & 4 & 6 \\ 1/2 & 1 & 3 & 5 \\ 1/4 & 1/3 & 1 & 3 \\ 1/6 & 1/5 & 1/3 & 1 \end{bmatrix}$$

This matrix shows that Treviso (first row and first column) is preferred also for rents, but in Lisbon (second row and second column) they are not much higher. Berlin (third row and third column) has slightly higher rents but the least preferred is Genève (fourth row and fourth column), due to its very high rents, as well as to its quality of life.

The following matrix represents the comparison between alternatives with respect to the third criterion, i.e. competition. The question to ask is the same: “How much is alternative A preferred to alternative B concerning competition?”. Clearly, an alternative is better than another in this case if competition is low, or at least much lower than it is in Treviso.

$$CO = \begin{bmatrix} 1 & 1/8 & 1/4 & 1/5 \\ 8 & 1 & 4 & 3 \\ 4 & 1/4 & 1 & 1/2 \\ 5 & 1/3 & 2 & 1 \end{bmatrix}$$

For what concerns competition, something changes. Treviso is considered the least preferred because there are “Trattorias” in every corner and it would be very difficult to stand out and be different from competitors. Instead, in the other cities there are Italian restaurants but a Venetian “Trattoria” would certainly be a new-in. Lisbona (second row and second column) is preferred to others, followed by Genève (fourth row and fourth column) and Berlin (third row and third column).

At this point, as we did for the three criteria (see above), the matrix that regards the two sub criteria under the Rents criterion must be filled, with respect to the overall objective. The sub criteria are the facility of doing business in that Country and the loans and concessions available for foreign young entrepreneurs.

$$\mathbf{S} = \begin{bmatrix} 1 & 1/5 \\ 5 & 1 \end{bmatrix}$$

The easiness of doing business (first row and first column) is deemed strongly less important than loans and subsidies (second row and second column), thus the matrix has been filled accordingly.

After having filled all the required matrices, the local priorities can be calculated for each matrix, using the software R. At this point, *eigenvalues and eigenvectors* become fundamental. For each matrix created, applying the R function *eigen(A)*, the software comes up with the eigenvalues and eigenvectors of the matrix *A*. The normalization of the priorities is obtained by dividing each element of the dominant eigenvector (the one with strictly positive components) by the sum of its components. Then, the sum of the normalized priorities must be - and it effectively is - one. Starting from the first matrix, *C*, the vectors of normalized priorities are:

$$c = (0.5695, 0.3331, 0.0974)$$

The same calculations are done for all the matrices. The resulting normalized priorities are the following:

$$r = (0.5468, 0.0701, 0.1183, 0.2648)$$

$$re = (0.4948, 0.3102, 0.1336, 0.0614)$$

$$co = (0.0505, 0.5596, 0.1499, 0.2399)$$

$$s = (0.1667, 0.8333)$$

The following step is to check the consistency of each matrix. If the matrices are not consistent, it means that something should be revised or there were misunderstandings before in the process. As previously said, the formula to calculate the *Consistency Index* is:

$$\left(\frac{\lambda_{max} - n}{n - 1} \right)$$

The value of λ_{max} is calculated by the software R with the function $eigen(A)$, which gives both the eigenvalues and eigenvectors of the matrix in exam. Clearly, the highest eigenvalue (*Perron Frobenius eigenvalue*) must be taken to calculate the *CI*. The index value must not exceed 10% of the *CI* for randomly completed matrices with the same number of alternatives (*Saaty,1990*). The table is again represented:

##	CI
## 1	-
## 2	-

3 0.58

4 0.9

5 1.12

6 1.24

7 1.32

8 1.41

Starting from the 3 by 3 matrix of criteria (C), the CI is:

$$CI(C) = \left(\frac{3.0246 - 3}{3 - 1} \right) = 0.0123$$

The value obtained should not be greater than the 10% of 0.58, i.e. 0.058. As $CI(C)$ is far lower than this value, this matrix can be defined *consistent*. The same must be done for all the previous matrices.

$$CI(R) = \left(\frac{4.0875 - 4}{4 - 1} \right) = 0.0292$$

In this case, the reference value on the table is 0.9, because the matrix has 4 alternatives. Thus, the CI should be, and it is, lower than 0.09 to consider it consistent.

$$CI(RE) = \left(\frac{4.0788 - 4}{4 - 1} \right) = 0.0263$$

The same reasoning as before is done for the matrix of Rents criterion and again it can be considered consistent.

$$CI(CO) = \left(\frac{4.0794 - 4}{4 - 1} \right) = 0.0265$$

The *CI* for the Competition matrix is as well lower than 0.09 and thus the matrix is consistent.

$$CI(S) = \left(\frac{2 - 2}{2 - 1} \right) = 0$$

By default, 2 by 2 matrices have *CI* equal to zero and they are considered *perfectly consistent*. Anyway, the calculations are shown to prove that.

The final step, which brings to the best alternative, consists in multiplying each component of the local priorities vectors by the weights of the different criteria and sub criteria. Then, the values concerning each alternative are summed up and the city that obtains the highest *global priority* is the best to open a Venetian “Trattoria”.

Starting from the Raw Materials criterion, which has a weight of 0.5695 (see above the priority vector *c*), this number must be multiplied by each component of the priority vector *r*.

$$T = 0.5695 * 0.5468 = 0.3114$$

$$L = 0.5695 * 0.0701 = 0.0399$$

$$B = 0.5695 * 0.1183 = 0.0674$$

$$G = 0.5695 * 0.2648 = 0.1508$$

These final numbers are the *global priorities* of the alternatives (in order, Treviso, Lisbon, Berlin and Genève), concerning the first criterion. The same calculations must be done for all criteria and sub criteria. Rents criterion has a weight of 0.3331. It must be multiplied by each component of the priority vector s and again by each component of the vector re (the calculation, indeed, is: criteria weight * sub criterion weight * alternative local priority with respect to the main criterion). This must be done for each sub criterion and the results must be summed together to obtain the global priorities concerning the Rents criterion for each alternative.

$$T = 0.3331 * 0.1667 * 0.4948 = 0.0275$$

$$L = 0.3331 * 0.1667 * 0.3102 = 0.0172$$

$$B = 0.3331 * 0.1667 * 0.1336 = 0.0074$$

$$G = 0.3331 * 0.1667 * 0.0614 = 0.0034$$

The same is done for the second sub criterion:

$$T = 0.3331 * 0.8333 * 0.4948 = 0.1373$$

$$L = 0.3331 * 0.8333 * 0.3102 = 0.0861$$

$$B = 0.3331 * 0.8333 * 0.1336 = 0.0371$$

$$G = 0.3331 * 0.8333 * 0.0614 = 0.0170$$

Competition criterion has a weight of 0.0974. It must be multiplied by each component of the priority vector co .

$$T = 0.0974 * 0.0505 = 0.0049$$

$$L = 0.0974 * 0.5596 = 0.0545$$

$$B = 0.0974 * 0.1499 = 0.0146$$

$$G = 0.0974 * 0.2399 = 0.0234$$

At this point, the final sum of the global priorities of each city can be done.

$$T = 0.3114 + 0.0275 + 0.1373 + 0.0049 = 0.4811$$

$$L = 0.0399 + 0.0172 + 0.0861 + 0.0545 = 0.1977$$

$$B = 0.0674 + 0.0074 + 0.0371 + 0.0146 = 0.1265$$

$$G = 0.1508 + 0.0034 + 0.0170 + 0.0234 = 0.1946$$

As for local priorities, also global priorities must sum to one, to be sure that calculations are correct. And it is so (previous rounding must be considered):

$$0.4811 + 0.1977 + 0.1265 + 0.1946 = 0.9999$$

To conclude, AHP told us that the alternative with the highest score has proven to be Treviso, mainly for the easiness of reaching raw materials

and also because there are some good subsidies for young entrepreneurs. Thus, it is the best city among the chosen alternatives in which to start a successful Venetian "Trattoria". This happens in this particular case, in which the availability and easiness of reaching raw materials are very important aspects for the interested parties. Clearly, different decision-makers with other ideas and opinions would come up with a different choice.

Conclusion

Throughout this paper, a case of application of the *Analytic Hierarchy Process* for decision-making was presented. The initial problem was the desire of some young entrepreneurs to open a Venetian “*Trattoria*” in one city among four alternatives - Treviso, Lisbon, Berlin and Genève.

Firstly, the AHP method has been explained in detail and a focus has been put on the importance of team discussion that characterizes the decisional process before calculations. This part is fundamental to deeply understand the whole case, in order to be able, at the end, to use numbers properly. After that, we dived into the world of Italian food and *Brand Italia*, which is considered a symbol of Italian culture all over the world. Indeed, many tourists come to Italy not only for the historical and natural attractions, but also to taste our food. Following, the last chapters were about the analysis and development of the specific case in exam. A general overview of Hospitality Management was presented to highlight the main issues that restaurateurs have to cope with in opening a business. Then, the cities chosen as alternatives were described on the basis of the criteria and sub criteria agreed after a group discussion and after having collected as much

information as possible from websites and literature. The final step included the calculations to get to the *final decision*. As explained in the first chapter, all the required pairwise comparisons matrices have been completed and their consistency checked. Local priorities and weighted global priorities were determined using R Software and the global priorities were summed up for each alternative separately. At the end, the highest one belonged to Treviso, so this could be the city in which to open a “*Trattoria*”.

This was just an example of how to apply the AHP in decision-making. This method is applicable in a plenty of different scenarios, much more complex than this one. The aspect that deserves attention is certainly the process of discussion and information gathering, without which the AHP could not be applied correctly. The *added value* of this mathematical method is that it manages to transform the previously gained knowledge into grasped numbers, to simplify even very complex multi-criteria decisions. It blends together rationality, instinct and mathematics.

“To make a decision, all you need is authority. To make a good decision, you also need knowledge, experience and insight.” (Denise Moreland, Management Culture Consultant)

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