Libera Università Internazionale
degli Studi Sociali Guido Carli

PREMIO TESI D'ECCELLENZA

Effective Store Geo-Localization in Fast-Food Business Models: The Case of Donts Expansion in Rome

Francesco Lo Storto

2022-2023

LUISS

Libera Università Internazionale
degli Studi Sociali Guido Carli

Working Paper n. 2/2022-2023
Publication date: Dicember 2024
Effective Store Geo-Localization in Fast-Food Business Models: The Case of Donts Expansion in Rome

ISBN 979-12-5596-196-3

Luiss Academy is an imprint of
Luiss University Press – Pola Srl
Viale Pola 12, 00198 Roma
Tel. 06 85225485
E-mail lup@luiss.it
www.luissuniversitypress.it

Effective Store Geo-Localization in Fast-Food Business Models: The Case of Donts Expansion in Rome

By Francesco Lo Storto

ABSTRACT

Innovation in Business Model design could be acquired considering the introduction of data analytics in processes, following the wave of geolocation.

In fact, in order to capture the highest demand, the use of software in order to find the optimal positioning of retail fast-foods would have positive effects on customers, supply chain management and competitive analysis.

This work will focus on DONTS case study, a newborn fast-food company, which is considering a rapid expansion in Rome.

In order to understand the optimal positioning of new stores there will be used ArcGIS software, which analyzes spatial data solving the p-median problem.

Keywords: Business Model, Fast-food, Geolocation, Delivery, P-median problem

1. INTRODUCTION TO STORE LOCALIZATION IN RETAIL BUSINESS MODELING

The business model (BM) is a key concept in economics and management, and it is based on nine building blocks, which describes how a business creates, delivers, and monetizes value (Osterwalder et al. 2010.). These building blocks include customers, value proposition, channels, customer relationships, revenue sources, key resources, key activities, partners, and costs. In other words, it represents the strategy that a company adopts to generate revenue and profits and is a fundamental element for creating a sustainable business plan (Teece 2010). In this extent, the use of geolocation analysis has become a value added to every section of the BM.

The aim of this analysis will be to find the optimal new store location with respect to customers, competitors and point of interest distribution in the urban area of Rome, using ArcGIS software in order to find the maximized demand allocation for every store. The case study in which this research will focus, regards a new open fast-food named DONTS, and the implementation of the optimal location within the business model of this new brand.

2. LITERATURE REVIEW

2.1 Innovation in business model through geolocation

Business model innovation is becoming a differentiator for companies, and in this literature stream an interesting level of analysis is represented by innovative geolocation tools used to increase customer base. In fact, in today's competitive retail environment, the understanding of customers' needs, and potential is pivotal. Doing this considering the spatial distribution of demand point is for sure a value added, including fast foods' business models. This article aims to explore the significance of geolocation in the context of fast-food businesses and its impact on their overall performance.

In general it is possible to distinguish six main topics of innovation (Teece 2006): source, type, entry, protection, development and deployment. As for the type there are several fields of distinction, like product vs process innovation, radical vs incremental, architectural vs component innovation and competence enhancing or competence destroying innovation. Usage of geolocation analysis to capture demand has a huge impact on product and process innovation. In this extent, retail process innovation focuses more its attention on developing innovative processes within business models to enhance the potentiality of input and output innovations (Snihur and Markman 2023). The core idea is to implement data analytics with location data input about demand distribution, to have a more precise support in deciding with a scientific methodology where to open new locations in an urban area in order to recommend the right products to the right customer, have a more adequate supply chain management, and finally make a spatial competitive analysis.

The study in next paragraphs will take into considerations a deep understanding of the use of geolocation into retail BM, with a focus on p-median problem technique in defining the optimal locations.

2.2 Importance of data in geolocation

When considering the implementation of geolocation tools in a retail company business model, it is pivotal to deep dive in the centrality of data analysis, which opens a wide range of opportunities to every business, and therefore also to the fast-food ones. Nowadays the use of data has become an essential part of every kind of business because it guarantees a wider, deeper, and more accurate analysis of different issues to find the most efficient and effective solutions.

The European data market has had an exponential size increase in the last years, as represented on the one hand by the amount of people working with data, passed from six millions in 2016, to ten millions and a half in 2020, with an annual increasing rate of 14,1%, and on the other hand by the amount of companies developing their business models through data, passing from 255.000 companies in 2016, to more than 350.000 in 2020 (Il Sole 24 Ore 2017). This has led the total market value of

data from 300 billion in 2016, to 700 billion in 2020. It is interesting to highlight that in Italy only 26% companies use data in their business models, and those that do it have increased their profits by 22%, whereas in other countries the number of companies using data is higher, with a world average of one company over two being data-driven, as possible to notice in figure 1 (Il Sole 24 Ore 2021).

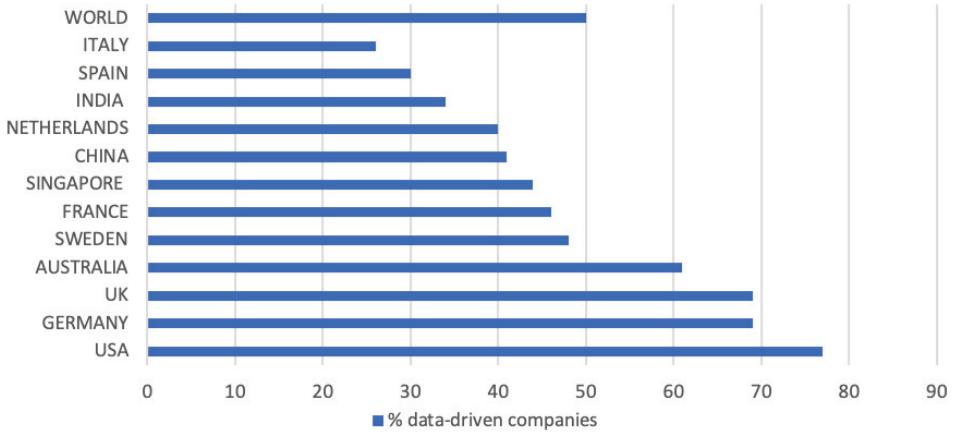

Figure 1: data driven companies
Source: Il Sole 24 Ore 2021

That information gives the possibility of understanding the power of data to improve value creation, and more specifically, about location data, it is pivotal to understand how many sources are available nowadays for retail companies. In fact it is estimated that there have been more than 25 billion "things" connected to internet in 2022, and this increase the possibility for companies to study customers movements and habits, in order to enhance customer acquisition and retention through optimal store location and detailed offering customization (Business Partner 2022).

The use of data in a business widens the possibilities of growth, considering for instance that organizations using data analysis have 5% higher productivity (Erik Brynjolfsson, Lorin M. Hitt n.d.). In this extent the highest the level of innovative business model both in products and processes, the highest the benefit from using data, because of the possibility to have a wider range of opportunities detection and a higher probability to acquire a sustainable competitive advantage (Roberts et al. 2016).

For sure, implementing in retails business models processes related to geolocation, in order to find the optimal positioning of new stores to be opened in a urban area, will generate benefits as regards customers, with a higher customization of the offering, as regards supply chain management, allowing efficient inventory management, reduced stockouts, and improved overall operational efficiency, and finally as regards competitor analysis, studying the geographical distribution of competitors in order to avoid serving saturated market areas, or to exploit the opportunity of zero competitors' locations.

2.4 Models for geolocation

Fast-food business models are widely recognized to be one of the most scalable and standardizable in the food industry, and its replicability implies the necessity to have a lot of locations to increase economies of scale, bargaining power with suppliers, and to break down marketing costs to increase brand awareness among all the stores revenues. The positioning of multiple stores, especially in big cities like Rome or Milan, before the birth of delivery apps had only to consider the presence of competitors nearby, or even the presence of other stores of the brand to avoid cannibalization of own clients. With the rising of delivery business models through platforms like Deliveroo, Glovo or Uber Eats, fast-food chains must consider a new driver to choose the positioning of stores, which is the limit of 3,5 km radius from the store that those apps give to well manage the delivery of the product.

In fact, those apps impose this special limit so that every store can deliver its products through those platforms only to customers closer than 3,5 km radius. To solve store site issue taking into account new variables like the delivery radius, scholars have analyzed different models, starting from the rising of a new marketing branch, geo-marketing, which has introduced the concept of having demand spatial distribution as a driver. Within this theme there are different theories used in order to solve the optimal allocation of retail stores, like Geographical Information Systems (GIS), game theory and finally p-median problem, which will be the one used for the case study under analysis.

2.4.1 The rise of geo-marketing

An innovative process BM can be developed considering all the variables influencing the decision of where to position new stores in a city, and a wide literature has been developed about it within the geo-marketing theory. Geo-marketing is recognized as a strategic tool that aims at addressing the four elements of marketing mix taking into account the territorial distribution of actual or potential customers, using data analyzed with cartography, statistics and computing. (ImagineFX and Page 2003)

The three main reasons because this new wave of data analysis has spread out are the development of new economic geography starting from Paul Krugman in 1992 and the centrality of geography in a lot of scientific fields; the increasing availability of a lot of socio-geographic aggregated and micro data; finally the development of analytical tools widely recognized as Geographic Information Systems, composed mainly by statistical and cartographic information, information processing and market studies.

Besides from the reasons why geo-marketing has become a determinant field of study, the most valuable solution offered by its techniques regards the ability to analyze

territorial potential not only from customer characteristics perspective, but also from their spatial distribution. In fact, thanks to a micro-territorial prism, most suitable places are found to set a territorial expansion plan of a brand and of its stores. The advantages of this approach consist of the ability to better target population also using the geographical variable, and to give a pivotal support tool to the financial department that has to choose where to invest for the development of new locations in a city.

Geo-marketing gives the possibility to identify the company's target analyzing the socio-demographic characteristics starting from the territorial microanalysis (Di and Roccazzella 2010). In fact they have developed a matrix, shown in figure 2, which takes into account the potential of a geographic area and the market share, thanks to which companies can understand where to increase the number of stores, if there is a high potential but a low market share, where to avoid cannibalization because of a low potential of that area and a low market share, where to make a partnership because of both high potential and market share, and finally in which area to keep the territorial strategy if there is a low potential and a high market share.

Potential	High	Development	Partnership
	Low	Selective management	Keeping
		HIGH	LOW
		Market share	

Figure 2: geo-marketing matrix
Source: (Di and Roccazzella 2010)

This analysis helps to consider two main components of territorial business strategies, which are the development and the management. In fact, if for what concerns the development, the choice of where to locate new stores depends on firm strategy, brand positioning and consumer direct supervision, the management choice depends directly on those previous characteristics, because if for instance the brand wants to target a niche, than the locations would be less capillary than a mass market offering. Overall, this type of BM innovation gives the possibility to make a socio-demographic analysis taking as driver variable the population micro-territorial distribution.

Among the new kind of KPIs used to understand the potential of a certain geographic area, companies are using percentage of customers compared to the target population, the size of the market, the percentage of turnover of loyal customers shared between points of sale, the average receipt, and the consumer lifestyle. Those KPIs are used both in development and management of store locations, considering that in

the former companies understand an area potential, and in the latter understand possible changes in the customers characteristics.

2.4.2 Main theories about localization issues

The development of store localization strategic tools can be divided into three main eras (Clarke 1998): the first can be dated until the early stages of 1980s, when companies were still relying on their experience and on analogic means like checklists (Davies 1977). Shifts in using GIS, has happened because previous methods were subjective and time-consuming. In this extent since 1980s' a set of store localization theories have been developed through the GIS, which is one instrument useful to support the analytical processes in decision making concerning this spatial issue. Finally, nowadays companies are experiencing the third phase with new digital tools at their disposal like optimization procedures with the so-called genetic algorithms. This branch of theory analyzes the localization problem introducing some constraints regarding competition and other variables directly linked with the business.

As seen, store site localization is strictly linked with GIS, because geography is central in this context, and this system guarantees a high level of data visualization (Church 2002).

One instrument used in a study, together with GIS, is the analytic hierarchy process (AHP) (Hernández and Bennison 2000): this divide a big problem into small tasks to be solved, and could be really useful in a context like store localization. This study used two layers of analysis in order to find optimal location for new supermarkets openings: the first regarded geo-demand, to understand demand level in every region; the second was about geo-competition, based on the openness of the market with respect to present level of offering of a certain service; finally, thanks to the Kernel Density application, scholars have been able to determine optimal spatial points for new supermarket openings (Roig-Tierno et al. 2013). Conclusions to this study have underlined the best locations also considering sales esteem, thanks to the introduction into the model of collected data on other supermarkets present in the areas.

In a study, besides from the different aim which was focused on optimal school localization in rural areas in China, rather than on the retail store localization, we can highlight the importance of analyzing this theme also under the cost-saving perspective. In fact an optimal localization of a service spot will have an enhancement on both service provider and customer cost-benefit ratio (Chen 2021).

Other theories focused more on the retail market, have been developed using as tool the game-theory model, after models that considered only horizontal differentiation (Science, Autumn, and Shugant 2012) and vertical differentiation (Ariana 2016) as sources of competitive advantage rather than store localization. Another piece of theory has been developed considering as main issue the commercialization of store brand from a retailer, and its positioning with respect to the strongest national brands (Sayman, Hoch, and Raju 2002). In this case results have shown that

the best solution is to position store brand next to national ones only if the convexity of the distance function is sufficiently high and if the cost advantage of not targeting is not too high.

Another stream of literature starts its reasoning from the concept of urban desertification with globalization and financial crises, that has led retailers to close their shops. One of the solutions to solve this issue is the use of optimal store localization, which is considered a pivotal strategic decision tool, considering that it influences frequency of store visiting. In this extent, it has been developed a model that finds optimal localization addressing business and social objectives of a company (Grimaldi, Fernandez, and Carrasco 2019). This model is based on an algorithm that considers the following steps:

- List of the opened shops with their localization in the neighborhood
- List of the vacant stores with their localization in the neighborhood
- List of shops part of the social project (SP) in the neighborhood

Then there is a pre-process and a process of this algorithm, as shown in figure 3

Pre-Process:

begin

Build a matrix calculating the shortest distance between the vacant stores and the shops which participates in the SP (M_{com})
Build an empty list with the partial solution where to add the selected vacant stores (LP_{sol})
Build an empty list with the final solution where to add the selected vacant stores (LF_{sol})

end

Process:

begin

while *the list of vacant stores (L_{vacant}) is not empty* **do**
Select the first shop (S_{vacant}) from the list of the vacant stores (L_{vacant})
Select the shop (S_{srp}) from the list of the shops which participate in the SP (L_{srp}) closest to (S_{vacant}) according to (M_{com})
if *the distance between both selected shops (S_{vacant}) and (S_{srp}) is between 0 and 50 meters* **then**
Add the selected vacant store (S_{vacant}) to the partial solution (LP_{sol})
end
Remove the selected vacant store from the list of vacant stores (L_{vacant})
end
Calculate the average betweenness (AB) of the network of the open shops (L_{open})
Calculate the betweenness (L_{betw}) of the previous selected vacant stores (LP_{sol})
Add every selected vacant stores (LP_{sol}) to the final solution (LF_{sol}) when its betweenness (L_{betw}) is greater than the average betweenness of the network of the open shops (AB)

end

Figure 3: Localization algorithm to optimize business and social objectives
Source: (Grimaldi, Fernandez, and Carrasco 2019)

Other theories have been developed to analyze how transnational firms manage the localization in large urban contexts like the city of Jiangsu in China, adapting their offering to the local culture (Zhang et al. 2014). The study has been conducted about Mc Donald's and KFC and their ability to locate new stores in the Chinese city creating good interactions with customers and becoming their everyday space. This study confirms that the localization is settled where cultural differences with other stores around the place is not too high.

Another study understanding fast-food localization has highlighted the importance of store proximity to public services (Widaningrum, Surjandari, and Sudiana 2020). Those scholars, starting by the high concentration of Indonesian population around cities, have found that the co-location of store brands around public services is influenced by five factors, namely leisure time/shopping, traveling, education, religious activities, health activities, work activities.

When talking about store site choice in accordance with a business model based mainly on delivery platforms channels, researchers divide two strategic approaches: small-scale survey-based methods and large-scale data driven methods. A piece of literature has been developed in the second approach, analyzing both supply and demand drivers. More specifically a study has been developed using data from a famous delivery platform in Shanghai, called Eleme, involving the understanding of couriers trajectory data on the supply side and customer order records on the demand one (Yan et al. 2022). The main outputs of this study have been the understanding that store site recommendation for business models involving presence on delivery platforms is completely different from brick-and-mortar ones: moreover store-region and customer-region is influenced by different factors, and finally various types of stores in different regions are sensitive to different periods.

2.4.3 P-median problem

Besides the already exposed theories, one of the most used one is the p-median problem. In fact, a location problem consists in identifying the position to be assigned to a set of structures, services, or facilities in a location space, according to the distribution of a real or potential demand relating to their use. The objective function to be optimized is based on a classification of localization models, divided between cost-oriented models and coverage-oriented ones: the first is divided between Simple Plant Location and p-median, whereas the latter in Set Covering and Maximal Covering, and in this thesis the focus will be on the p-median problem.

The objective function is generally represented by a cost function to be minimized or an evaluation of benefits to be maximized. In this extent the most frequently considered criteria are access costs, that represent a function of the distance of demand from available services, localization costs, which indicate the cost necessary for the opening and maintenance of services, and coverage, representing the total demand

covered by the services or the total demand that is within a certain distance from one of the services (Unina.it .2021).

The method used by this analysis will be based on the p-median problem (PMP), which is one of the most used methods in combinatorial optimization (Varnamkhasti 2012). "The objective of the p-median problem is to identify p source locations and map them to n destinations while minimizing the average distance between destinations and corresponding sources" (Gwalani, Tiwari, and Mikler 2021). This is based on the need of companies to maximize the utility considering customers' travel costs and opportunity costs when choosing where to buy. In fact, the objective function described below considers those two set of costs, cij, the costs of distance, and rj, the costs of localizing a service in certain spot. The two variables to be determined from this function are the decision variables xij, percentage of the demand in i covered by the service in j, and yj equal to 1 if and only if a service is activated in node j.

$$z = \sum_{i\in I, j\in J}\left(\frac{xi}{dij}\right) * yj + r\sum_{j\in J} yj = \sum_{i\in I, j\in J} cij + rp \text{ with } \sum_{j\in J} yj = p$$

I set of demand nodes $\boldsymbol{I = n}$
set of possible locations $\boldsymbol{J = m}$
1/dij cost of the application in i to the service in j
xi target population
rj localization cost of the service in node j; j
Decision variables:
xij percentage of the demand in i covered by the service in j
yj equal to 1 if and only if a service is activated in node j

A solution can be represented by a binary string characterized by p unitary values, which corresponds to the vector of the prefixed number of services to be activated, $\sum_{j\in J} yj=p$,

	1	2	..	..	n-1	n
y_j	0	1	0	1	1	0

The number of feasible solutions is therefore equal to the number of possible combinations of p elements on n positions which is equal to

$$\binom{n}{p} = \frac{n!}{(n-p)!\,p!}$$

The PMP can be more difficult to solve with a wide range of data, and because in store localization there is the necessity to use large amounts of datasets, there are different studies trying to build models that should solve this issue, which as in every optimization problem can be divided into exact models and heuristics (Mu and Tong 2018).

Among the exact methods there are the following:
- Direct enumeration, which finds 3 medians on a 10 node network, impractical when size grows (Hakimi 1975)
- Mixed integer programming tool with elimination of columns and rows of dataset when no demand-facility assignment occur (Rosing, ReVelle, and Rosing-Vogelaar 1979)

On the contrary heuristics are used in order obtain quick results even if more approximated, and it is possible to divide this method in three solutions:
- Greedy, introduces one site at time and selects the one maximizing objective function (Kuehn & Hamburger 1963)
- Alternate method, identifies a central site for every p facility, after assigning a demand to every p (Maranzana 1964)
- GRIA is the best as for optimal result in lower time than the others (Gwalani, Tiwari, and Mikler 2021)
- Myopic algorithm is suited for highly clustered distributions (Gwalani, Tiwari, and Mikler 2021)
- Vertex substitution algorithm, also called TB, is the most used one because works with all facilities simultaneously (Teitz &Bart)

The PMP is most of the times solved using the TB algorithm, which is based on an iterative comparison between the output of all the possible locations j, choosing at the end the ones highly minimizing the objective function z.

Some scholars have developed an enhancement of the TB method, called the spatial-knowledge enhanced TB (STB) (Mu and Tong 2018). It is based on a density method to choose the best facilities, and in fact tests from authors have highlighted a higher quality of the solution and a higher efficiency of acquiring this information.

2.5 Research gap: localization with both demand and offering variables constraints

As analyzed in the previous paragraph there has been a wide development of theories as concern store localization, even with limitations about the types of variables used for the analysis. In particular, in the geo-marketing works there has been an analysis only for what concerns territorial distribution of demand variables (Di and Roccazzella 2010). Other theories have considered both demand and competition, but in the supermarket field and without taking into account delivery constraints (Hernández and Bennison 2000), whereas studies analyzing store proximity to public points of interest have focused only on this issue without analyzing demand or competition variables (Widaningrum, Surjandari, and Sudiana 2020). Finally, the analysis in store localization using the PMP has been focused on understanding demand travel and opportunity costs when choosing where to buy, without considering other variables from competition or offering business model.

Business model innovation is pivotal in every industry to create a sustainable competitive advantage and to keep it throughout the time. In particular because of the

increasing growth, the high level of competition, and the high request for innovative input and output BMs, fast-food industry requires a deep analysis of the new value creation possibilities. In this extent process innovation will guide firms leading in this industry, and more accurately the use of data will be a decisive passage in defining those companies that will succeed versus those that will struggle.

The focus of this study will to analyze the business model of a new burger brand called DONTS, born in December 2022 in Trastevere, Rome, and make a methodological analysis about the implementation of localization techniques to better chose where to locate new stores in the city of Rome. There will be the use of socio-demographic and population distribution data to identify the target and define, thanks to the implementation of PMP model, using variables regarding competition, demand and offering characteristics, and delivery radius, which are the most profitable areas to open new locations avoiding cannibalization risks.

In fact, thanks to the use of ArcGIS algorithm, the new field of research that this study wants to settle, regards an analysis using PMP, considering in the same time delivery model constraints, competition, and demand distribution, variables always analyzed one by one in previous localization studies, and not considered in an integrated work. Moreover the industry under analysis will be the fast food one, which in terms of localization has been reviewed only with few articles in the literature, and always focusing on specific aspects of store localization, as for instance the understanding of cultural differences into transnational companies (Zhang et al. 2014), or as store proximity to public services (Widaningrum, Surjandari, and Sudiana 2020). Finally, the analysis will be conducted with micro territorial data as the census sections given by the more recent ISTAT dataset.

3. INDUSTRY OVERVIEW AND METODOLOGY

3.1 Fast Food industry

To better understand the applications of innovative business model, and in particular the implementation of data analysis for the localization of new stores, the best way is to deeply analyze it within a fast changing and growing industry. For this reason, the choice has been to understand the new waves of innovation and development of the fast-food industry, a sector that has seen an annually growth rate of customer expenditures since 1982 of 6,8%, compared to the 4,7% of non-fast-food- restaurants. The global market size is $907.0bn in 2023, and in the last five years market size has grown by 2,1%, with an expected growth rate of 5,1% until 2028, as for Grand View Research (Ibis world 2023).

In Italy, the country on which the localization analysis that will be conducted is focused, the industry is growing with a turnover of €6,8 billion in 2019, with respect to €6,1 billion in 2018, moreover with burgers that are the most requested fast-food meal with 44% of sales (FIPE 2021).

In United States (Fryar et al. 2018) the nation that has given the birth to most famous fast-foods, between 2013 and 2016 36,6% of adults have consumed those products in a given day, and the revenues generated in 2020 are $200 billion, with top players like McDonald's, Pizza Hut, Taco Bell and KFC. It is interesting to analyze that consumption decreases as age increases, as possible to see in figure 4.

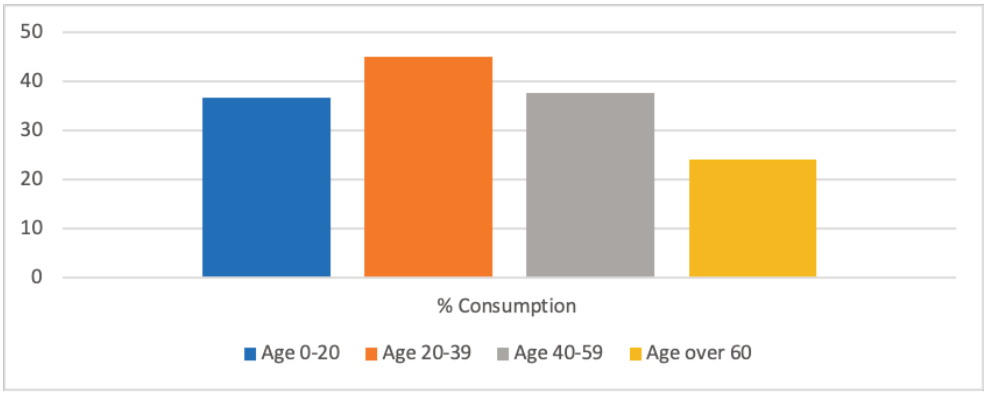

Figure 4: Fast-food consumption in U.S. per age
Source (Fryar et al. 2018)

On the opposite, consumption in U.S. shows that as income increases, consumption also increases, underlining that there is no bias from high income consumers to eat in a fast food, as noticeable in figure 5, with income measured as percentage of the Federal Poverty Level (FPL).

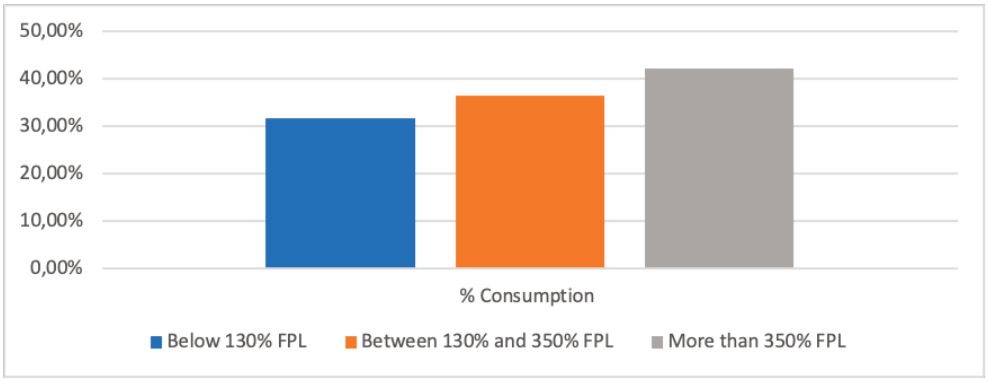

Figure 5: Fast-food consumption in U.S. per income
Source: (Fryar et al. 2018)

The growth in sales has different reasons, starting from the need to consume time-saving products, but also to buy money-saving products, considering that events like Covid-19 and Ukrainian crisis have decreased consumer purchase power, because of price and poverty level increase (Navigating the market headwinds – The State

of Grocery Retail' 2022, McKinsey & Eurocommerce). Another reason of growth is urbanization, considering that from World Bank data, the world population is passed from 34% in 1960 to 56% in 2021 living in urbanized areas, increasing the demand for fast consuming and money saving products. (The World Bank 2021)

Moreover, also globalization of food choices has driven to the spread of fast foods all around the world, because has given the possibility to standardized receipts and processes in all the countries where they are present, with slightly quality or flavors adaptation for the different countries. Technological development has given the chance to this industry to grow in terms of number of sales and upselling, thanks to the introduction of digital interfaces through which customers can interact and place orders. The most famous are kiosks and QR codes to place orders in store, and the development of delivery platforms like Deliveroo, Glovo and Uber Eats, to place orders from home. Overall, all innovative business models using technological interfaces are united by the large acquirement and use of data about consumers, utterly useful to create a more centered offering, and to support operational procedures like inventory management or territorial expansion of locations.

On the other side of the coin there are trends that could have detrimental effects for this industry. Specifically, there are arising concerns about healthiness and fit lifestyles against the consumption of fast-food meals that are traditionally full of sugars and fat. In fact some scholars have studied that there is a positive correlation between localization of fast foods, measured as the square miles per fast food and the state-level of obesity (Court-Brown et al. 2019). Moreover, the sustainability issue has touched this industry, requiring to all the companies acting in the value chain to take care of emissions and social responsibility (Shokri, Oglethorpe, and Nabhani 2014). Because of the innovation required by those threats it is pivotal to use data in fast foods business models, and in particular the study will focus on the importance of localization tools in this industry. The reason why geolocation is pivotal might be found in the importance of understanding and predicting sales, optimize supply to increase revenues and profitability.

In fact, there is a strict relationship between business location and economic growth of fast food chains (Glaeser et al. 1991). Moreover, a study about Mc Donald's and KFC and their ability to locate new stores in China, have underlined the importance of using geolocation tools in this industry in order to adapt the offering to cultural differences (Zhang et al. 2014). Store localization studies have also identified the importance in the fast food sector to choose store location understanding the point of interest present in the city under analysis (Widaningrum, Surjandari, and Sudiana 2020). Moreover, localization of new stores might be highly influenced by new trends in fast foods business models.

3.2 Trend innovating business models in fast food industry

As previously analyzed, the development of an innovative business model is the basis for obtaining and keeping a sustainable competitive advantage and high level of

performances. In the context of the fast-food industry, business model innovation is essential to remain relevant and successful in an increasingly dynamic and competitive market, considering that in this industry companies have traditionally relied on a standardized and efficient operational model to offer low-priced food items to customers.

Moreover this industry has historically been more focused on new receipts and new marketing strategies rather than on radical and process innovations (Sarkar and Costa 2008). Besides that, the most relevant innovations are the following: healthiness and alternative ingredients products, sustainability, digitalization, customization and personalization, partnerships and collaborations, and finally delivery. The understanding of those innovations will be pivotal in order to set the right variables as drivers of store localization, because they are drivers of competition, demand and offering.

3.2.1 Healthiness and alternative ingredients products

Today there is an increasing demand for alternative ingredients products like plant based or gluten free ones, and this has opened the opportunity for innovating fast-food BM in the input and more specifically in the ingredients used. It is estimated by VeganOk, a leading hallmark brand in Italy for vegan products, that in six months in 2021 vegan products demand has increased by 3,1%, whereas meat ones have had a decrease by 1,7% (Veganok 2020). According to the annual report of Grand View Research, the vegan food market size has reached a value of 12,69 billion in 2018, and will grow up with a CAGR 10,6% UNTIL 2030, reaching an expected value of $37,45 billions (Grand View Reasearch 2022).

As for Eurispes, the total amount of vegan and vegetarian people is 8,9% of the population and the main reasons told by consumers are healthiness 23,2% and animals respect 22,2%. Moreover plant-based diets have been recognized as one of the multiple ways in which humans can reduce their impact on the environment. In fact omnivorous diets are responsible for land use, water consumption and gas emissions, whereas vegan diets require a lower amount of resources, and as for the Journal Nature, this diet requires one third of the land use, one fifth of the water and create one seventh of gas emissions (Rosi et al. 2017). In fact for instance according to Water Footprint Network, producing one kilogram of meat needs 15,500 liters of water, whereas one kilogram of wheat only 1,300 liters. (Water footprint 2023)

As for gluten free products, the actual demand is around $20 billion in 2021 and will grow at a CAGR of 2,5% per year from 2023 to 2028. (Globe Newswire 2022) Moreover a large market like U.S. has reported from a study of NPD Group that about one-third of American adult has tried to cut off from their diet gluten either for intolerance necessity or for healthier lifestyle. In fact, it is widely studied that not only celiac people eat gluten free diet, but also people thinking it is an healthier option, considering that in U.S. 30% of gluten free people were doing it for health reasons different from

celiac disorders, whereas in U.K. the percentage amounted at 42% (Staudacher and Gibson 2015). It is possible to notice that fast-food is the less used restaurant by celiac, using in 10% of the cases only non-gluten ingredient products because of the risk in those kinds of restaurants of contamination.

In fact, contamination is a huge issue for people being affected by strong intolerances, and it has been conducted an analysis by the American Dietetic Association, which found out that in a sample non-gluten ingredients product, nine out of twenty-two had gluten levels higher than the one imposed by FDA (Thompson, Lee, and Grace 2010). But not only fast-foods have to increase their offering and attention on gluten free products, but all kinds of out-of-home earing spots, considering issues like number of alternatives, staff awareness and higher products cost (Wahnschaffe et al. 2001). In this extent, cost is a determinant variable in customers behavior, considering that in a study, it is underlined how gluten free products vary from 205% to 267% with respect to prices of their equivalent gluten products. (Missbach et al. 2015)

All those data show the importance for every player in the food industry to develop an adequate offering with alternative ingredients to satisfy those new customer needs, that are increasing in demand amount and variety of needs.

3.2.2 Sustainability

With increasing concerns over health and sustainability, fast food companies are exploring alternative ingredients, cooking methods, and packaging solutions to cater to the changing tastes and preferences of customers, and so innovating both in input and output. One of the most used frameworks within the implementation of a sustainable business model in the fast-food industry describes it into seven points (Svensson and Wagner 2011): driving forces, purchasing policies, value-adding processes, intermediaries and transport, retail practices, marketplace, and the natural environment. A useful case study to understand how this new wave of business models is based on the experience of Tim Hortons, one of the most famous fast-food chains in Canada (Hutchinson, Singh, and Walker 2012). The main driving forces of this sustainable turnover are strategy development and the assessment of risks and opportunities, stakeholder engagement, materiality assessment, development of commitments and goals. But above all, one of the main driving forces of this company has been the reduction of costs, specifically related to decrease of resource consumption.

As for purchasing policy, it regards the attention by Tim Hortons of having suppliers respecting certain standards as the use of water or the Animal Welfare Policy. Attention to sustainability is also put on product innovation, supply chain processes and new shops development or renovation. As for the marketplace and society, the company has developed a wide plan to be complaint with the Trans Fat Task Force, decreasing the percentage of detrimental ingredients for customers health. Finally, as for the natural environment, the company has developed a range of actions in

order to decrease its environmental impact during the resource acquisition and production phase, as for instance the goal set in 2010, to decrease by 2012 the packaging waste.

3.2.3 Digitalization

With the increasing use of smartphones and other digital devices, fast food companies are increasingly leveraging digital channels to reach out to customers, offer personalized recommendations, and facilitate online ordering and delivery, innovating therefore in the output of their BMs. Digitalization has given the possibility to introduce artificial intelligence (AI), thanks to the introduction of operative software and digital interfaces for customers like kiosks through which it is possible to collect and analyze customer purchase habits. The most common practices through which AI is exploited in the fast-food industry include the automation of ordering process, the personalization of recommendations, prediction of demand, and customer experience enrichment.

The automation of ordering processes is done thanks to introduction of chat-bot, kiosks or QR codes used to take in-store orders through smartphones. This gives the possibility to limit the interaction with humans and enhances the upselling potential, considering that an employee would fail into explaining to all the customers entering a store all the offerings or product addition possibilities, whereas a digital interface shows offers to every customer in the same way. Linked to the use of kiosks, QR codes and web apps, is the possibility to personalize recommendations thanks to the predictive capability that the collection and analysis of customer purchase preferences gives to fast-food companies. This would for sure enhance the customer experience, and a famous example is McDonald's, which has invested heavily in digital technologies, including self-order kiosks, mobile ordering, and delivery services, to improve customer satisfaction in the purchase journey.

Finally, AI has started to be used to automate processes in the kitchen, with the most extreme experience in this field represented by Creator Burger, an American fast-food chain that has started to open stores where all the burgers preparation process is automated thanks to the use of a robotized kitchen. (Medium 2022)

3.2.4 Customization

Fast food companies are increasingly offering customers the ability to customize their meals according to their preferences and dietary restrictions, fostering in this way output innovation. This trend has been boosted by the large fast-food chains which have introduced customizable menu, offering customers the possibility to choose the ingredients and composition of their meal, like hybrid forms of personalization as the development of McDonald's or Burger King to add or eliminate certain ingredients from their already created menu, or like Poke House or Chipotle, which allows

customers to choose from a range of toppings, proteins, and salsas to create their own unique meal from scratch.

Customers nowadays have increased by 22% in 2018 their necessity to eat specific food with the presence or the absence of ingredients, like the gluten free, lactose free or vegan meals, and this customer need is met by companies introducing business models where customization of the offering is at the core (Park and Kang 2022). The two scholars have noted that customers with a higher hedonistic involvement have also a higher appreciation of customizable offerings, because of the higher knowledge that they have about the company offering. In fact, what happens is that when customers have a more utilitarian relationship with a brand, a customizable offering could create a "choice overload", in other words a situation where customers feel they do not have enough time to choose or they do not have enough knowledge about the company offering, in order to create the best customized meal they want. Moreover, another potential drawback for companies could be the difficulty to have in the same time mass customization and standardization within a market and customer oriented perspective, which is a pivotal feature for fast-food models (Ogaard, Larsen, and Marnburg 2005).

3.2.5 Partnerships and collaborations

Collaborations and partnerships with other companies is an increasing trend in the fast-food industry, and in input and output BMs innovation. Those kinds of collaborations are intended to foster companies brand identity, to create positive brand image and brand knowledge in customer minds (K.L. Keller, V. Swaminathan Strategic Brand Management). Those partnerships could be both interindustry and intraindustry: some examples of intraindustry ones are often associated with the use of specific ingredients, like KFC has done with the partnership with Beyond Meat to introduce a plant-based chicken sandwich, or as Taco Bell which has partnered with Doritos to create the popular Doritos Locos Tacos. On the other hand, some examples of interindustry are partnerships with singers or with fashion brands, as happened between McDonald's and Travis Scott, the famous American trapper, which has conducted to the creation of a clothesline, or with the collab between Vicio, a burger chain in Spain, which has partnered with Nike to create a shoes model with the Spanish fast-food colors.

3.2.6 Delivery

Delivery and takeaway are taking the lead into fast-food output BMs innovation, because of different drivers that are guiding customers preferences and companies' reactivity. In fact, the necessity of timesaving products has increased, and fast-food through delivery of its meals takes a low amount of time for customers in the purchasing process. There are other reasons for the delivery model spread, like customer habits, technology, competition, and Covid-19 (Ma, Webb, and Schwartz 2021). Technology diffusion is represented also by the wide spread of smartphones,

considering that nowadays, from the data obtained with the annual We are social report (We are social 2023), it is possible to observe an exponential acceleration of the digital transformation, and in particular in this case of the presence on the Web of the world population, which is constantly growing, with an increase of 98 million people since January 2022 for the use of smartphones, an increase of 1.9%, of internet users, up 7.3% on the year just ended, and of 137 million active social media users, an increase of 3%.

If we go even deeper into the analysis of these data, it must be emphasized that the average daily time spent by each user using the Internet is no less than 6 hours and 37 minutes, that is one third of our day, while 92.3% of users accesses the Web via their smartphone, showing the overwhelming prevalence of this device, which has now become a real extension of our body, unfortunately degenerating more and more often into the phenomenon of nomophobia, or obsessive addiction to one's phone, as underlined by a study of the City University of Hong Kong. Covid-19 has also had an impact on decisions even of brick-and-mortar restaurants to implement delivery model, but it has potential detrimental effects because of the complexity for restaurants to understand possible capacity constraints, cannibalism between dine-in and delivery clients and market forces in a business which has some differences compared to the dine-in model.

In this extent to have a competitive value proposition, companies implementing delivery models might be aware of need to innovate in both product and service to have high customer satisfaction (Gavilan et al. 2021). As an example, restaurants might adapt their products to be more deliverable, like using ingredients and packaging that guarantee better product preservation.

Customer satisfaction is pivotal even in the delivery, and for the scholar it is measured with four indicators: quality, customer service, price, delivery and time (Ghosh 2020). On the other hand, there are other four distinct experiential factors to be considered for customer satisfaction, namely product issues, brand satisfaction, payment process, service handling more than time needed to deliver the product. (Teichert, Rezaei, and Correa 2020)

In conclusion the spread of delivery business model, also considering the special limits of 4km radius for the area coverage of a city through delivery, has added a new variable into the definition of a strategy of fast-foods locations development: in fact, thanks to the use of data and of spacial constraints, fast-food companies can now use socio-demographic and population distribution data in order to better study where to optimally place their stores in a city in order to better cover all the population demand through in-store and delivery orders.

3.3 DONTS: innovations in the business model

As seen the fast-food industry is a growing and fast changing environment, and our analysis about where to position optimally new stores will regard a newborn burger brand called DONTS. With its first shop opened in Trastevere, Rome on December 2022, DONTS is one of the first food brand riding the smash burger trend in Italy. Smash burger is a hamburger that is crushed, from the English to smash, on a high-temperature plate, favoring the creation of a crispy crust on the outside (Maillard reaction), leaving meat soft and juicy inside. The opportunities that DONTS will exploit recall most of the innovations in the food industry previously analyzed, and are the following:

- Ingredients freshness: Most of the fast-foods lack in the use of fresh meat and homemade products and receipts
- Healthiness: Among the competitors, there are only few options using only plant-based ingredients
- Customization: Developed in poke concepts but not for burgers in a standardized way
- Small shops with delivery: Low fixed costs and wider range of customers, 4km range with delivery apps
- Traversal brand with partnerships: Possible extension in streetwear sector also through collabs with already existing brands

The value proposition of DONTS wants to widely cover those opportunities and we can analyze it in six main points.

As for delivery, in the first months of activity, it is estimated that the percentage of delivery with respect to the total amount of orders is at 65%, representing a large share of revenues. The second point regards scalability, which can be guaranteed by standardization of processes and investments in small shops, the bases to develop a fast-food brand aiming at having a high number of shops in the way to have a capillary diffusion in Italy and abroad.

The third point regards customization, considering that this offering model gives a wide range of choices to customers and increase the adherence to their preferences. On the other hand, the development of the extra topping option, so adding or eliminating any ingredient from a product with €1/topping fee, allows the company to utterly foster its upselling, increasing the average bill which for DONTS is around 25€, compared to the mean of 6€ in US fast foods (Eatpallet 2022).

Healthiness is another pivotal point, considering that DONTS has developed from the beginning all the menu offering also in the plant-based version, giving the possibility also to vegan and vegetarian people to have access to its products, guaranteeing high quality and variety of this healthy option.

Moreover, the identity of the brand is designed to develop possible transversal partnerships with other industries like within the streetwear sector or in the music events one. Finally, DONTS BM is characterized by freshness of ingredients, considering that all the meat used in the smash burgers and in the fried chicken is not frozen and worked directly in the DONTS store.

To give the right boost to an innovative and scalable value proposition like this, there is the need to find optimal store locations, which will be the aim of this research. For this reason, as we will analyze, there are several variables to consider when localizing a store, and the delivery, with all its opportunities and constraints, is one of the most important.

3.3.1 Centrality of delivery in store location

Above all the innovative business model features, the delivery one is the most challenging and potentially rewarding for DONTS, and the one that more than the others posit a strict constrain for the decision about where to locate new stores.

It is fundamental to underline the large number of opportunities of innovation even in the way of implementing an advertisement campaign through delivery platforms. In this extent Deliveroo, Glovo and Uber Eats, the three apps used by the store, offer different ways in which brands can sponsor their products, paying for advertising or acquiring percentage of sales. One of those is the one implemented by Glovo, the so-called bubble, which costs in average 3,500€ for one week: it is a favoring positioning of the brand, which is placed as first and almost unique brand in the first layout when opening the app as seen in figure 6. DONTS has experienced this and the results have been incredible, with a huge increase in sales as shown in figure 7, with eleven thousand euros of sales and 465 order placed in the bubble week of 20 of February, and a high level of visibility granted to the brand in this week, noticeable also in the increase of sales even in the week after the Glovo bubble, which without this sponsorship has shown higher daily sales.

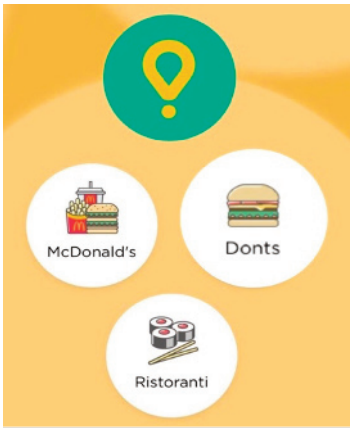

Figure 6: Glovo bubble
Source of both: DONTS data

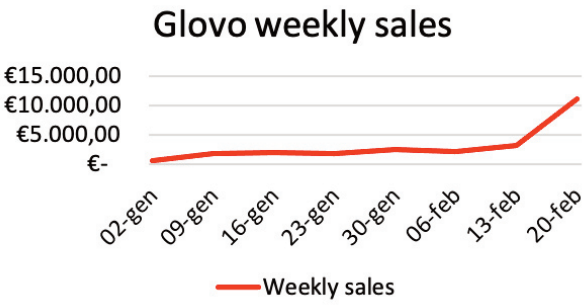

Figure 7: Glovo weekily sales

The other opportunity given by delivery platforms regards the possibility to develop a model with small stores, with a lower amount of dine-in spots. This model is based on the opening of small-sized stores (40-100 mq) with low rents (€1,500-€4,000), except for the opening of flag-ship stores with rents not exceeding

€10,000. This ensures a higher control of fixed costs like rent and power ones, and a higher flexibility with respect to a fast-changing environment.

3.4 Strategy design for optimal store location

The aim of this research will be finding the optimal store localizations for new DONTS opening in the urban area of Rome, so the research question will be the following.

RQ: which are the optimal locations to open the future DONTS stores in the urban area of Rome, using the p-median problem solved with Teitz and Bart heuristic algorithm?

3.4.1 Location allocation tool on ArcGIS: how data are analyzed

To conduct the optimal store location, the analysis uses a spatial optimization software called ArcGIS. In fact, every business benefits from location data, and ArcGIS works with them using ArcMap and ArcCatalog. ArcMap is a file that memorize all the elaborations, references and roadmaps of the layers used to do the work, and it is the app in which it is possible to visualize location data defining the zoning useful for the analysis, as shown in figure 8.

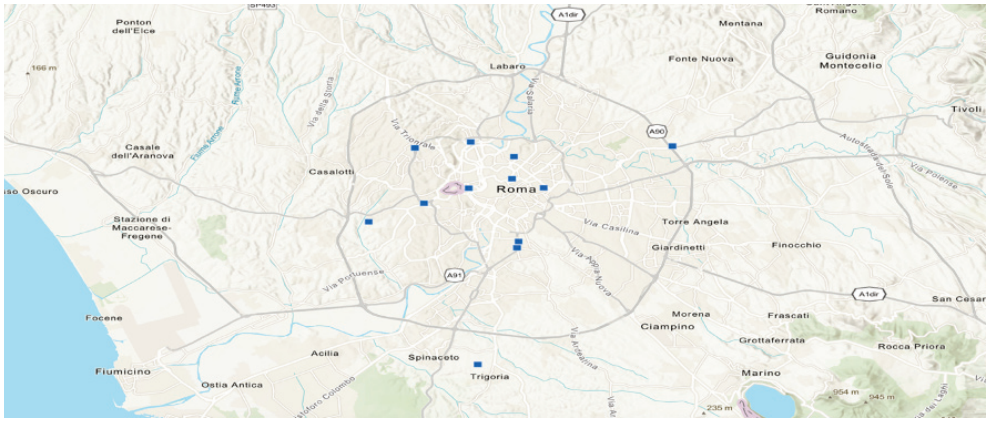

Figure 8: ArcMap on ArcGIS
Source: ArcGIS Online

The ArcCatalog is formed by the layers, which are all the location data frames presented as shape files, so CSV files containing latitudes and longitudes of all the point of interest regarding competition, demand and offering.

In our case the analysis is specifically designed to obtain optimal store localization, and it is obtained thanks to a specific tool of the ArcGIS software, which is the location-allocation problem, which uses Teitz and Bart heuristic and three geometric

tools, namely points, lines, and polygon barriers to elaborate the spatial data. This algorithm considering N candidate facilities and M demand points with a weight, choose a subset of the facilities, P, such that the sum of the weighted distances from each M to the closest P is minimized. This is defined as a combinatorial problem of the type N Choose P, and the solution space grows extremely large.

To solve the location-allocation issue, there is the need to have inputs and parameters settled, considering that the software sets a series of constraints to a certain objective function, and chooses the most efficient facility considering the variables given as input, which define the suitability of every facility. In fact, before the location allocation problem, a suitability analysis is conducted to identify the main variables influencing the location choice, which in DONTS case have been identified with, Demographics, Delivery radius, Competition, Store online reviews, and Point of interest.

Each facility under analysis has the following properties:

- ID
- Shape
- Name
- Type
- Weight
- Coverage capacity (Delivery)

Whereas every facility has inputs and outputs:

- Demand count
- DemandWeight
- Total_[Impedance]
- TotalWeighted_[Impedance]

This algorithm sets two problems to be solved, which are optimal localization of stores and maximization of demand allocation for that specific store. But it can identify different problems and solutions as the type of facility changes. More specifically there are seven problem types (ESRI 2023).

Minimize impedance, also denominated the p-median problem, aims at choosing the facilities to minimize the costs between the demand points and the facilities solutions. If the problems consider an impedance cutoff, so a value of demand under which it is not worthy to locate the shop, it is widely used to locate warehouses, considering as driver the transportation costs to the different outlets. Moreover, all the demand inside the cutoff of more the one warehouse, is allocated to the closest one. In the other case, when there is no cutoff, the problems regard more the allocation of public facilities like supermarkets, libraries, or hospitals.

Maximize coverage is widely used in the location of emergency centers like fire stations or first aid centers. The reason is because the aim of this problem is to locate points to cover at a maximum all the demand present. It is quite the opposite of impedance minimization with cutoffs, because in this case every location point can share demand if needed.

Maximize capacitated coverage is like the maximize coverage, with the difference here that the demand is allocated to a certain store without overcoming the store capacity. It is widely used to locate hospitals with a limited number of beds, or warehouses with a limited inventory. It does not require an impedance cutoff, and it can happen that a demand point is not allocated to the closest service point if it has reached the capacity constraint.

Minimize facilities uses the impedance cutoff and has the aim to minimize the number of facilities useful to cover demand. It is like the maximize coverage, except for the number of stores minimization, in fact it is used when the cost of building new stores is considered to be too high. Also, in this case any demand point outside the cutoff is not allocated and the nearest facility takes the demand inside the cutoff.

Maximize attendance is focused on the issue happening when demand weight decreases at the increase of distance between store point and demand. This means that when distance increases, customers are less probably going to that store. It is widely used by stores that cannot rely on data about competitors' sales and market shares. Also, in this case the demand in the impedance cutoff is allocated only to the nearest store.

Maximize market share is the opposite case of Maximize attendance, in fact here market shares are known, and the aim of this issue is to maximize market share with optimal store locations. It requires large amount of data about competitors and is widely used when locating large new discount stores. The weight of a demand point in the impedance cutoff is allocated in proportion to facility attractiveness.

Target market share is widely used to understand the minimum amount of stores needed to reach a specific market share. This is the problem which requires the largest amount of data, considering the need-to-know relative weights of both competitors and their own stores. It is used when companies want to know which the expansion is needed to reach a specific market share with budget not being a concern. In the case in which budget is a concern companies use the maximize market share problem. A demand weight inside the impedance cutoff always chooses store allocation proportionally.

This study will focus the attention on three problems above the one described now: more specifically the algorithm will have to solve the minimize facility, the maximize coverage, and the maximize attendance problems. The first one is more focused on finding the optimal number of stores, whereas the second and the third identify the optimal positioning starting from the pre-specified optimal number, in order on the one hand to maximize demand coverage, and on the other to maximize attendance to the stores. The final optimal new stores localization will consider the present positioning of the already existing DONTS stores, and all the variables already mentioned before.

3.4.2 P-median problem in ArcGIS

It is interesting to deep dive a little into the functioning of the software used by ArcGIS to solve the optimal localization in Rome of new DONTS stores. It consists in

searching for the position of a prefixed number p of facilities to be activated with the aim of minimizing the total costs, reference costs + location costs. The entire demand of each node pertains to active services, and it is assumed that localization costs are the same for each facility. In this extent it is a punctual and discrete location problem, single decision maker, oriented towards cost minimization. The data needed are the following:

- number of services to locate known in advance and equal to p
- equal localization costs for each service equal to r

This last point allows us to neglect the location costs in the objective function since they are constant. Furthermore, the constraint on the prefixed number of services to be activated must be added to the objective function, which is described as follows. Considering the objective function

$$z = \sum_{i\in I, j\in J} \left(\frac{xi}{dij}\right) * yj + r\sum_{j\in J} yj = \sum_{i\in I, j\in J} cij + rp \text{ with } \sum_{j\in J} yj = p$$

in this analysis the cij are the distances between all the census sections in Rome.

3.4.3 Constraints in the store localization process: how data are collected

To obtain the optimal store localization in the city of Rome, our analysis will consider some variables that are considered as constraints of a specific objective function which is to maximize demand allocation to the store. To do that the problem will consider on the one hand variables influencing DONTS and competitors offering characteristics, like healthiness, customization, and delivery, and on the other hand will consider variables influencing the demand, like demographics and point of interest. Using those data, thanks to geo-marketing it is possible to consider different variables to find optimal spots where to position new stores in an urban area. In this case the urban area under analysis is Rome, and besides from delivery constraints already analyzed, there will be other variables influencing the location choice.

The variables considered will be the following:

- Demographics
- Delivery radius
- Competition
- Point of interest
- Demographics

Thanks to ISTAT census, the most recent one is on 2011 population, about population distribution in the city of Rome, we have a dataset which comprehend the following spatial categories of analysis, from the widest to the most narrowed:

- Region
- Province
- Municipality
- Sub-municipal areas
- Census section

Then population data, analyzed in every geographic area, consider residential population, per age, per civic status, per gender, per level of degree. In our case data will

be classified using age as a driver to select the target. More specifically considering the age group, 44.9% of the people from the age group of 20 years to 39 years have recorded the highest percentage of fast-food consumers (Enterprise Apps Today 2023). For this reason, those group of people will be the target of the localization analysis, and it will be fundamental to consider the narrowest spatial boundary, so the census section, which are more than 12.000 in Rome municipality. In this extent the demand distribution will be considered as concentration in each census section of the target population, distributed as shown in figure 9, with the darkest sections indicating the more concentrated ones, and the red and black square indicating the already opened DONTS store.

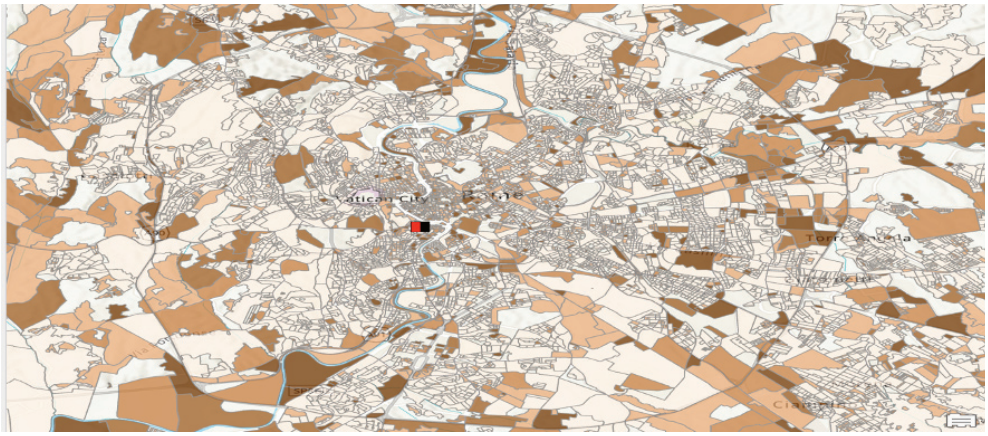

Figure 9: population distribution in census section
Source: ArcGIS Pro

3.4.3.1 Delivery radius

Of course, the main constraints imposed by this model are the spatial ones, because delivery radius cannot exceed the one imposed by apps, so 3,5km radius from the store, and therefore the decision about where to position stores in an urban context has to consider this variable. Moreover, another issue to be taken into account when implementing a model like this, is the fee requested to be present on their apps, which is about 25% of the shop sales. Data about delivery radius are collected thanks to the direct experience in DONTS.

3.4.3.2 Competition

More specifically competitors are chosen considering both direct and indirect ones, using as drivers the similarity in the business model characteristics, considering the main industry trends analyzed before. Among the direct ones there are Burgez, Smash Tag and Mc Donald's whereas the indirect ones are Poke House and Alice Pizza. All the brands are united by their presence on the delivery platforms, which represents

an essential sale channel for fast-foods, and as seen will be a driver for the store localization analysis.

As for direct competitors, the more similar in terms of offering are Burgez and Smash Tag, because their main product is the smash burger as DONTS. The former has been Founded in 2015 and is present with 19 locations in Italy, 8 only in Milan and two in Rome. Its turnover has been around €11.150 ml in 2021 and its offering comprises many healthy options: there are plant-based burgers and the "protein style menu", which offers a burger with iceberg instead of bread. As for Smash Tag, it is a newly brand born in Rome in April 2021 and is present with two stores in the city. Also, this brand has healthy options like iceberg burgers. The last direct competitor is Mc Donald's, which is the burger fast food by definition, and must be considered. It is the biggest fast-food in the world, with 68 million people served every day in 119 countries with 37,000 stores and a turnover of €23.21 bn in 2021. It has 21 stores in Rome.

For what concerns the indirect ones, we consider them because of their similarity in the value proposition, like plant-based options, customization, rapidity of preparation and presence on delivery platforms. Competition is localized using data from Google Maps, mapping all the stores that each brand has in the urban area of Rome, as is possible to notice from the map in figure 10.

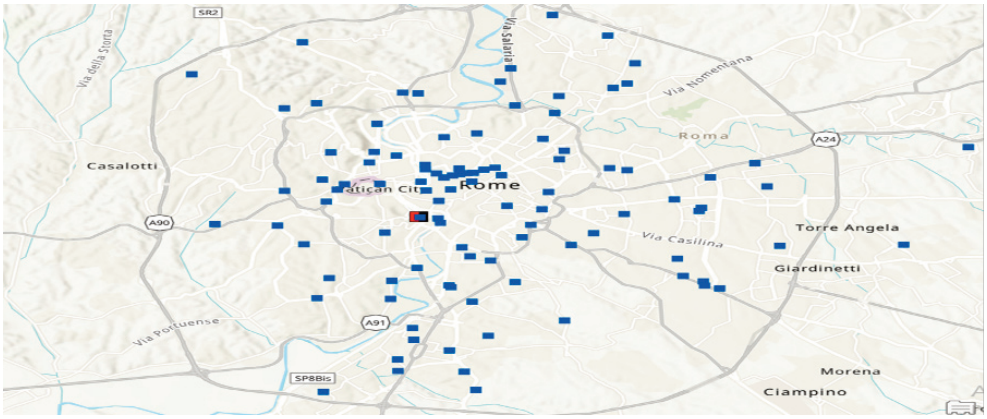

Figure 10: Competitors localization
Source: ArcGIS Pro

In the analysis there will be considered store reviews on Google Maps, and this level of understanding will be useful to identify the relative competitive weight of every competitor store, which would be a proxy for demand attraction and so higher competitive pressure. In fact, this weight will be used in the descriptive analysis underling all the characteristics of the chosen localization points.

3.4.3.3 Point of interest

To consider also the in-store and take away demand, the analysis will consider which are the most people attractive points of interest in the city of Rome, under different layers:

- Monuments: data acquired through Roma Capitale database
- Commercial centers: data acquired thanks to Google Maps
- Universities: data acquired thanks to Google Maps
- Train Stations: data acquired through Roma Capitale database

It is possible to notice from figure 11 the distribution of those point of interest, mostly concentrated in the city center, making this area more attractive.

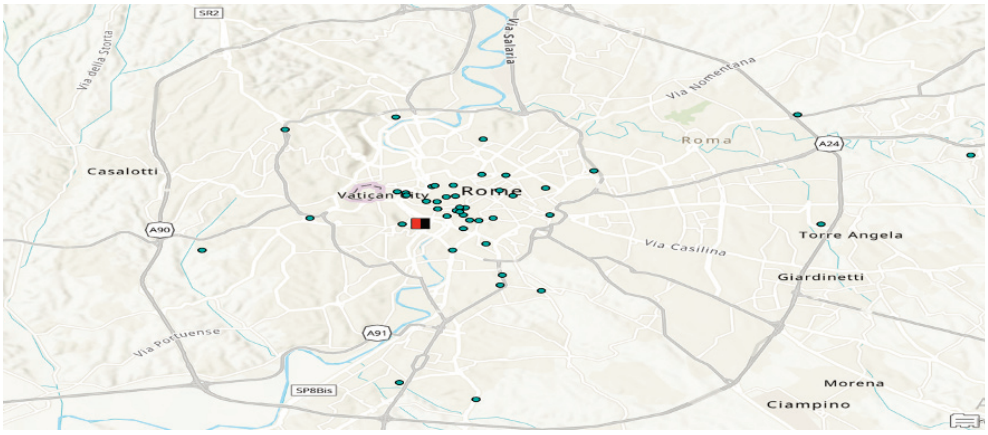

Figure 11: Point of interest distribution
Source: ArcGIS Pro

3.4.3.4 Monuments

Monuments are a strong demand attracter, especially in a city like Rome. In fact, in 2021 there have been 6,8 million of visitators in Roman museums and monuments, with the first ten monuments represented in figure 12.

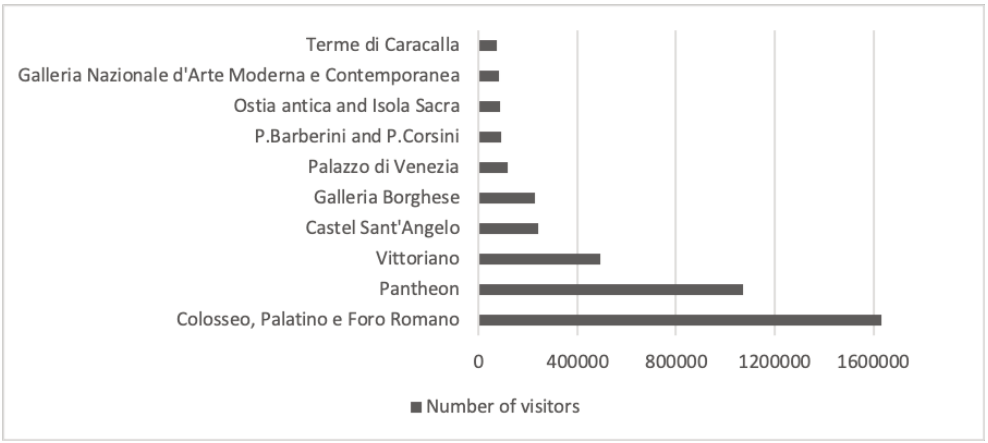

Figure 12: Number of visitors
Source: Roma capitale, Annuario statistico, 2022

3.4.3.5 Commercial centers

In Rome there are several commercial centers where everyday thousands of people make their shopping. Those could be considered high demand attracters not only because of customers making shopping, but also because all the employees working there, eat their meals in the food stores present in the centers.

The following are the biggest for m2 in Rome:

- Porta di Roma 130.000 m2
- Roma Est 98.000 m2
- Maximo 60.500 m2
- Euroma 2 51.375 m2
- Gran Roma 32.300 m2

3.4.3.6 Universities

Universities are a strong point of interest for fast food brand, because students, from 18 years old onward are in the DONTS target and have an availability to pay which is in line with the price offering.

3.4.3.7 Train station

Finally train stations are an accelerator of demand, because they convey a wide range of people in the same point. It is estimated that everyday there are almost 480.000 passengers arriving to, and departing from Roma Termini and 150.000 to and from Roma Tiburtina, for a total of almost 226 million people per year (Grandi Stazioni 2023).

4. FINDINGS

4.1 Results setting

To obtain the best results possible, there have been four main steps done to prepare data. First, the census sections with potential have been set as demand points, then the already existing shop has been set as required in the software, the red and black one in figure 13, and the candidates' shops have been set as the census section centroids, shown in figure 13 as yellow dots with different dimensions according to the amount of target population.

Finally, the p-median problem requires to prefix the number of facilities to be chosen by the algorithm, and this is an issue solved considering the amount of resource that DONTS business plan has estimated to have in the future two years and considering the average cost of opening each new shop. It is estimated that the setup costs of one shop amount at 324€ on average: 150K for store goodness in locations not too peripherical in roman urban area, 4K for the first month lease fee, 60K for store renovation, 50K for the kitchen, 10K for raw materials, 50K for the initial marketing. With the financial resources aimed by the business plan, it is estimated the opening of 6 stores in Rome in the medium term. Moreover, this is the optimal amount also considering the delivery radius constraint of 3,5 Km, which with 6 stores would completely cover all the city area with a limited overlapping.

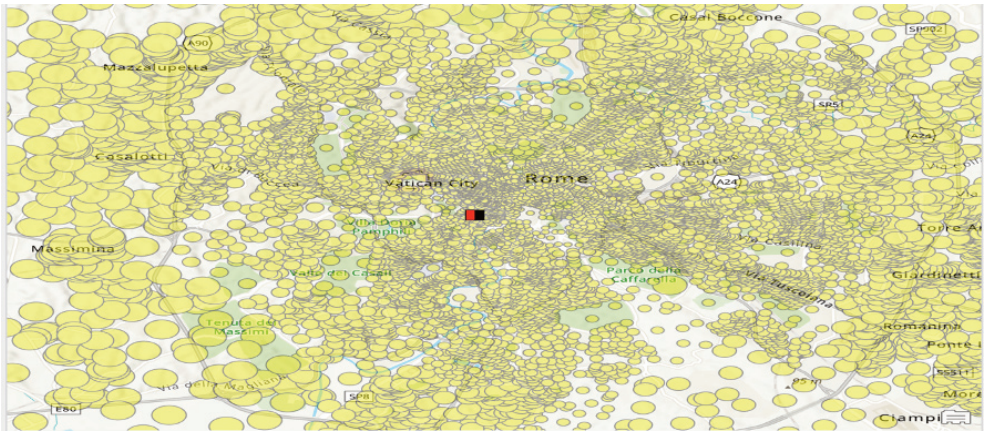

Figure 13: Census sections centroids
Source: ArcGIS Pro

The optimal results have been obtained with a repeated running of the location-allocation layer on ArcGIS Pro software, modifying every time some parameters. In this extent the first parameter has been distance between the shops, considering delivery radius constraint: in this case it has been taken as referral the delivery radius of 3,5 Km and modified by excess or by default to find the optimal allocation considering not only target population distribution but also competitors and point of interest. Then,

there has been an iterated number of attempts in order to identify the optimal solution, changing every time the type of location-allocation problem used, among the minimize facility, the maximize coverage, and the maximize attendance.

Moreover, there have been tests with both linear and power function, dealing with the importance given to the distance costs. In fact, with a linear function cost increased in a linear way with distance, whereas with the power function costs increased more at the increase of distance. Finally, area of demand points considered has been the last parameter: the software has been run before with all the demand points in the municipal area of Rome, but after noticing that in this way point of interest variable and competition was undervalued in the positioning, having as location chosen areas too peripherical or even out of the G.R.A., the software has been run delimiting the possible solutions to the areas with highest concentration of point of interest and target population, as shown in figure 14.

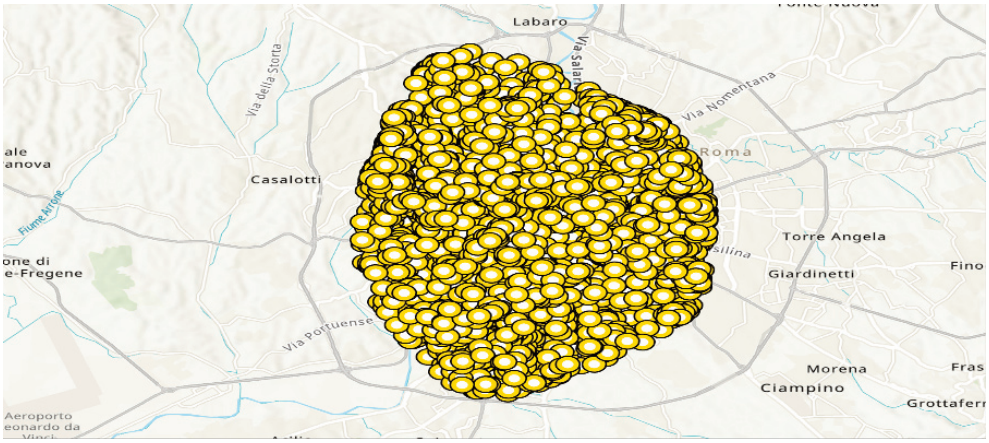

Figure 14: area of demand points considered
Source: ArcGIS Pro

4.2 Results analysis

To analyze the results obtained as optimal locations to open the future six DONTS stores in Rome, the amount of target population covered with the chosen stores, and a descriptive analysis of competition and points of interest have been used as driver to understand the potential of every location. In this extent the model has set as spatial limits of the store coverage a 3,5 km buffer, printed with the blue circle in figure 15, measuring the proximity to competitors, and a 5 walking minutes of catchup area, printed with the green area in figure 15, to understand the census section, and as a consequence the target population covered.

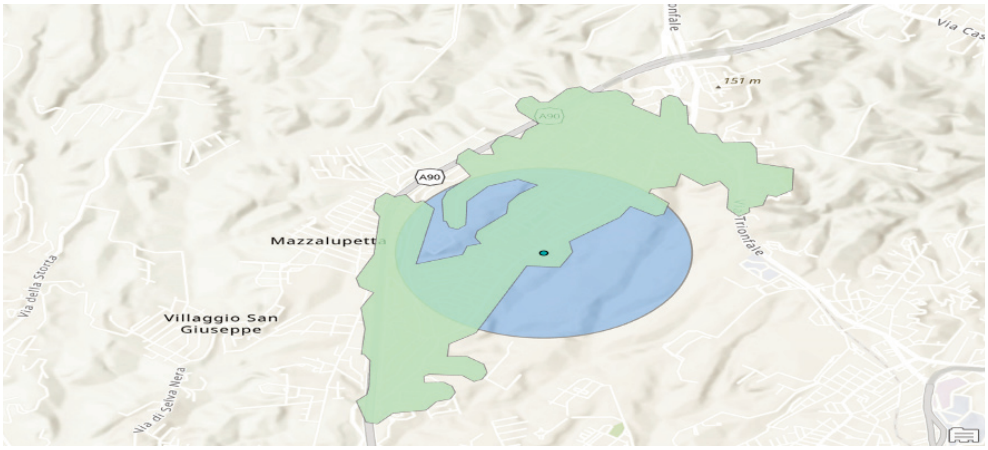

Figure 15: Buffer and catchup area
Source: ArcGIS Pro

Moreover, to compute the target population covered, it has been considered the amount of people in each census section, and if one of those was covered also by another DONTS store, or by a competitor, the number has been equally split between the amount of facilities covering that section, using the intersection function on ArcGIS.

Without considering the optimal location of DONTS Trastevere, the six solutions obtained by the software are represented in figure 16, and are distributed in the following areas: Monteverde/Ostiense, Cornelia, Piazza Bologna, Piazza del Popolo, San Lorenzo and EUR, and as represented in table 1 in the Appendix, the potential of the first four new DONTS stores is higher than the one of the actual store in Trastevere, so the order of opening suggested is the one represented by the order given by the target coverage.

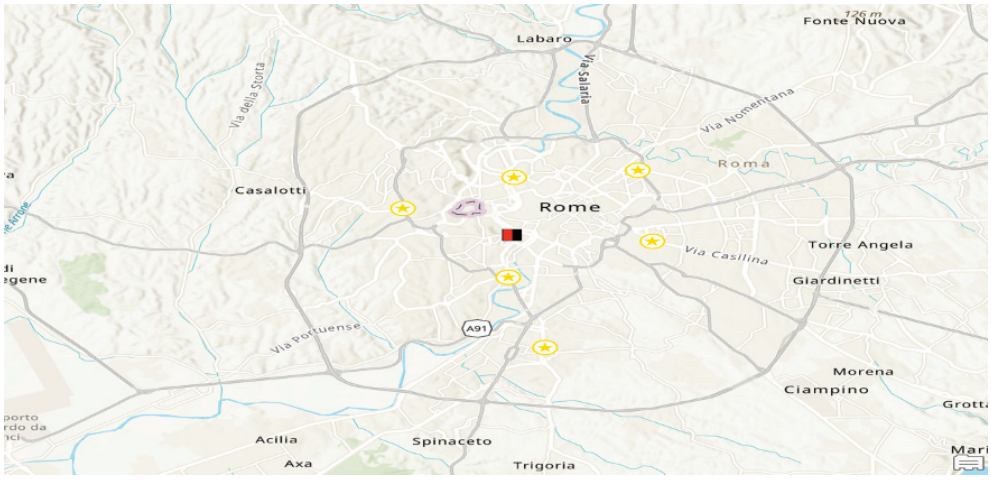

Figure 16: Store chosen
Source: ArcGIS Pro

In the following paragraphs it will be conducted an analysis to understand the characteristics of each of the following locations in comparison to the already existing store in Trastevere and to competition, suggesting the opening of the first four in order of estimated coverage Monteverde/Ostiense, Cornelia, Piazza Bologna, Piazza del Popolo, and the last two San Lorenzo and EUR just to complete the coverage of the roman urban area.

Before analyzing the potential of new stores, it is pivotal to understand the relation between the ex-ante potential of Trastevere store, and the ex-post results in relation to its optimality suggested by ArcGIS.

4.2.1 Already existing store: Trastevere

This location is the already opened DONTS store, and it has been ranked as 32nd as for target coverage, considering both new optimal DONTS stores and all competitors. Moreover, as for target coverage, DONTS Trastevere covers 6375 people, a lower level with respect to optimal new stores, like Moneteverde/Ostiense (23833 people), Cornelia (10060 people), Piazza Bologna (9509 people), and Piazza del Popolo (7764 people), as possible to notice from table 1 in the appendix. Trastevere store ex ante revenues esteems have been computed only considering residential people, and as a consequence only the delivery sales, which account for almost 60% of the total, because delivery channel is for sure used by people living in the area considered by the software, within the 3,5 Km buffer.

Then the reasoning to estimate future delivery revenues has considered that only 10% of residential people, in this case 6375, will buy in a day, with an average bill of 25€, arriving at values of average daily sales with delivery of €1500.

Ex post data have shown that total everyday revenue has arrived at €2450, with a progression represented in figure 17. Considering only delivery sales, which accounted for 60% of the total, DONTS Trastevere store has reached a value of 1470€, really close to the ex-ante esteem, confirming that the hypothesis can be replicated to make esteems of future shops, and confirming that Trastevere area suggested as optimal by the software, has shown its profitability potential.

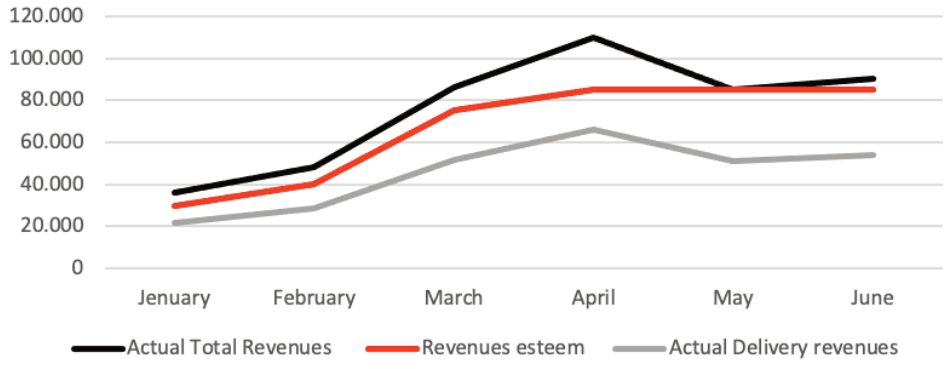

Figure 17: DONTS Trastevere revenues
Source: DONTS

Those data, with a peak of €110.000 total revenues in April, show that the four future DONTS shops with higher coverage selected by ArcGIS, namely Monteteverde/Ostiense, Cornelia, Piazza Bologna, and Piazza del Popolo, would have even higher revenues than the one in Trastevere.

4.2.2 First store: Monteverde/Ostiense

This location has been ranked as fourth for demand allocation among all competitors, 23.833 people, ahead all the other DONTS stores, and for this reason should be the first option for an expansion in Rome. The main competitors in its area are Alice pizza in Via Grimaldi, and McDonald in Via degli Stradivari, with a coverage of 15.479, so much lower than the DONTS store in Monteverde/Ostiense. The first has a ranking of 4,3/5 with 580 reviews whereas McDonald's has 3,8/5 with 2543 reviews (Google Maps). As for the customer experience with the direct competitor, we use the world cloud in figure 18.

Figure 18: McDonald's Via degli Stradivari world cloud
Source: Worldclouds.com

From this image it is possible to notice that there is a high frequency of positive words, meaning a potential threat for DONTS, which could be contrasted by the higher target coverage with respect to competition. Finally, the biggest point of interest is Piramide, which is also an important metro station and could guarantee a profitable passage of people.

4.2.3 Second store: Cornelia

In this geographical area the store would have a high coverage, 10.060 people, considering that it would be the 17th among all competitors and the second among the optimal solutions obtained with the location-allocation algorithm. As for competition, this area would have an Alice pizza in Via di Boccea, and a direct competitor as McDonald's in Piazza San Giovanni Battista, with a coverage of 7.956, so slightly low than the DONTS one in Cornelia. The former has a rating of 4,4/5 with 810 reviews, whereas the latter has a rating of 3,5/5 with 2.362 reviews (Google Maps). This direct competitor potential threat for DONTS regarding the customer perception is represented by the following world cloud in figure 19.

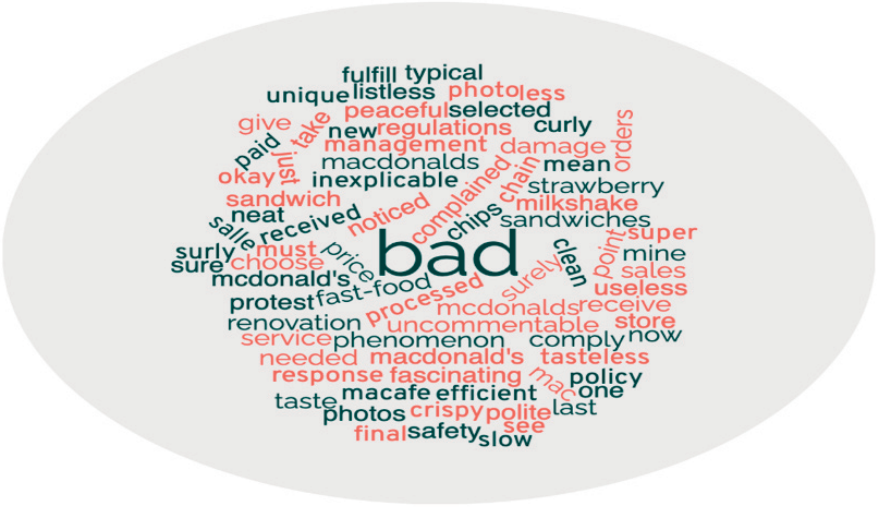

Figure 19: McDonald's Piazza San Giovanni Battista world cloud
Source: Worldclouds.com

This image shows that the highest frequency is reprresented by negative words like bad, comply, uncommentable, and this for sure leaves space for a competitive entrance by a DONTS store in this area, confirmed also by a higher target coverage with respect to competition. The most attractive point of interest in this area is represented by the Link Campus university, which has more than 1.000 people between students, professors, and other employees, which represent a potential opportunity also for partnerships and discount, which can increase first try purchase and as a consequence customer base increase (MIUR.it).

4.2.4 Third store: Piazza Bologna

This location is the third for coverage among the new DONTS one proposed by ArcGIS, 9.509 people, whereas is 19th considering all competitors. In this area there is a high level of direct competition, with Smash Tag in Via Michele di Lando, with

a coverage of 6.915 and Burgez in Via Catania, with a coverage of 8.826, both lower than the DONTS store in Piazza Bologna. Moreover, those two are not only direct but also the ones with the most similar product offering, mainly smash burgers, and with the most similar business model, based on small shops with 60% of sales done through delivery platforms. Smash Tag has a rating of 4,4/5 with 583 reviews, whereas Burgez has a rating of 2,8/5 with 44 reviews (Google Maps). For this reason, the highest competitive threat should be represented by Smash Tag, and in figure 19 it is possible to notice the world cloud of its reviews.

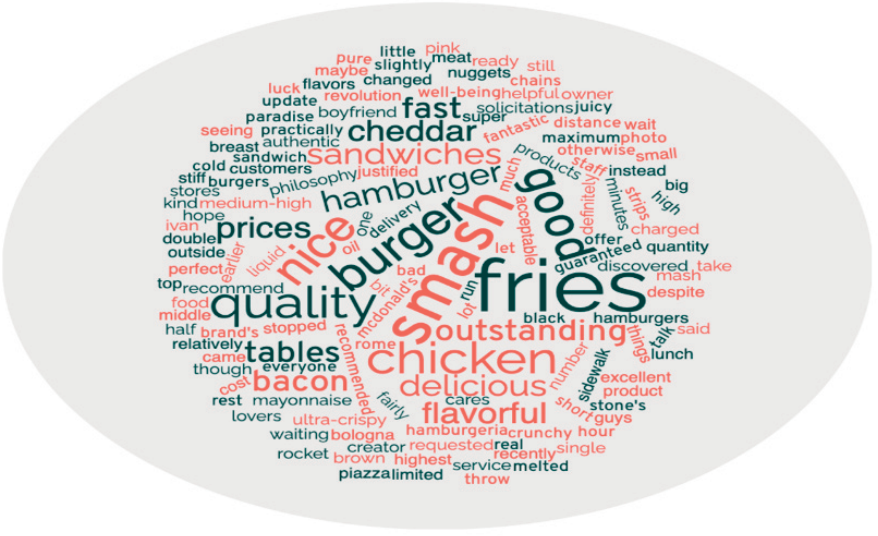

Figure 20: Smash Tag Via Michele di Lando world cloud
Source: Worldclouds.com

This image shows the utterly positive perception that customers have about this brand but considering that it is birth only two years ago (Romatoday.it), it should be less difficult to penetrate this area for DONTS, also knowing the higher amount of target covered in relation to competition. For sure the most attractive point of interest in this area is Stazione Tiburtina, the second station for daily catchment area, with more than 150.000 passengers every day (Grandi stazioni 2023).

4.2.5 Other stores

Piazza del Popolo, San Lorenzo and EUR are other three interesting areas, but with lower potential than the first three.

Piazza del Popolo is 25th considering all the direct competitors as for target coverage, 7.764 people, so a store in this area would utterly increase DONTS sales and awareness among customers. In its catchup area the direct competitor present is only one McDonald's in Piazza delle Cinque Lune, with a rating of 3,5 with 4.008 reviews

(Google Maps). As for the point of interest, for sure this location has Piazza del Popolo and Villa Borghese as places which attract a large amount of customers, whereas among other POI we need to underline the presence of Sapienza University, which accounts for more than 100.000 students, and other 10.000 among professors and employees (MIUR.it), even if the closest seat of this university is the Architecture one, which accounts for students.

San Lorenzo is 34th for coverage, 6.068 people, meaning that it does not represent a priority in the new stores opening, but could represent an optimal solution to consolidate the presence of the brand in the territory after the opening of the first four stores. Competition in this area is represented by McDonald's in Via Casilina, with a coverage of 17.811, much higher than the DONTS store in San Lorenzo, and with a rating of 3,8/5 with 1.864 reviews (Google Maps). Finally, the biggest point of interest is Porta Maggiore, which does not have a high degree of attractiveness considering that it has had a huge decrease of visitors per day from 2020 to 2021 (Roma Capitale – Annuario statistic, 2022).

The last store for target coverage is the one in EUR area, 2.923 people, and its competition is characterized by a McDonald's in Via Delle Tre Fontane, with a coverage of 10.940, much higher than DONTS store in EUR. The former has a rating of 4,1/5 with 234 reviews, and the direct competitor of 4,1 with 1.932 reviews (Google Maps).

5. DISCUSSIONS AND CONCLUSIONS

5.1 Implications

The use of data for geolocation through software like ArcGIS have a high potential for retail business models. In fact, as analyzed in chapter one, there are three main implications that it is possible to highlight, namely customers, supply chain and finally competitors' analysis.

In this extent, as for customers it is possible to notice how geolocation can increase demand acquisition and enhance customer experience through a more detailed targetization and the minimization of the distance cost to reach the store. In fact, the use of ArcGIS is relevant for managers for what concerns the choice of store locations considering target coverage, as seen in table 1 in the appendix where all the new DONTS stores and competitors ones have been classified considering their coverage. In this way the rank in table 1 in appendix could be a hint for the industrial plan and the new openings timeline, and customers would benefit because more concentrated areas would be covered more rapidly. Moreover, location tools can be important also to understand customers' demographics and behaviors in a certain area, and then make customized communication and offering.

For what concerns the supply chain, knowing in advance the most profitable areas where to open new stores would be a strong advantage because can anticipate an analysis about inventory management, like for instance deciding where to settle the

warehouse in order to optimize transportation costs and distance with respect to all new potential stores. For example, geolocation analysis can help in identifying optimal locations for distribution center in order to minimize delivery distances and ensuring timely and fresh ingredient availability across store locations.

Finally, managers have to be widely aware of the high potential of this tool in order to make a deep competitors' analysis. In this extent as shown from the previous chapter, all the optimal locations for new DONTS stores have also been analyzed considering competitors in that are, from two perspectives, target coverage and customer perception. This last point has been analyzed in order to understand the potential threat or opportunity given relative weights of competitors using online reviews.

Of course, the answer to the research question, "which are the optimal locations to open the future DONTS stores in the urban area of Rome, using the p-median problem solved with Teitz and Bart heuristic algorithm", has found its maximized result into those six locations. In this extent it is pivotal to underline that the PMP finds its solution using the vertex substitution algorithm, also called TB, which is the most used one because works with all facilities simultaneously (Teitz &Bart) and is also used by ArcGIS to solve the localization problem. The output found are 100% sure given the parameters and constraints imposed, and for this reason it impossible to have alternative and more efficient solutions. What can change is the choice of parameters and constraints, like the delivery radius, the type of problem, the type of function or the prefixed number of localizations to be chosen.

5.2 Limitations

The analysis conducted can be implemented and developed in a deeper extent in different layers.

First of all, it has only been considered the coverage of residential target, without taking into account people commuting from other census sections out of the 3,5 Km buffer to reach the stores, and this could be an interesting implementation because will give the chance to analyze all the possible demand, but for sure would need a specific analysis about people movement in a metropolis like Rome. In fact, considering only target demand among the residential people, the analysis has been conducted considering only sales coming from people living in the area considered, which is a limitation considering that sales sources come also from tourists or from customers coming from other census sections.

Another interesting aspect is adding the used descriptive variables, like competition level with weighted level of competitivity using reviews, or like point of interest, within the computation of ArcGIS algorithm. Moreover, the objective function used in the P-median problem has considered location costs r as constant, whereas the possible future improvement can take into consideration the different costs of lease fees in the urban areas considered. In this extent, the software gives a specific positioning, and this could not be chosen if in that location there are no available stores for

a new opening. In fact, a realistic analysis must consider stores availability, therefore, a sight valuation might be useful after the identification of the optimal area.

Moreover, the optimal store location has been analyzed under two of the three benefits exposed by the literature review. In fact, among customers, supply chain management and competition, future works can deep dive in the supply chain management section when considering optimal store locations. Indeed, if in this work customers have been analyzed considering their residential census section using a demographic segmentation, whereas competition have been selected with store proximity to the optimal locations and analyzed through the use of online reviews and target coverage, supply chain management has not been studied.

For what concerns the revenues esteems made ex-ante for DONTS Trastevere, there are two limitations: first considering only delivery for residential people would be a simplification if we consider that those people can buy also in store. Secondly, it is possible that people not resident in the area would use delivery channels, or because live there but have not the residence in that specific census section, or because are tourist ordering from a hotel, which in central areas is more possible.

Finally, there is the need to update ISTAT data, because most recent ones are from 2011, and there might have been changes in population distribution in the census sections, but this update has still not been delivered by the institution at the moment of analysis.

5.3 Conclusions

Those results are in line with the expectations regarding four main drivers of analysis as importance of customer targetization, relevance of target covered, adherence of location with target distribution, and finally the level of competition.

In fact the locations found confirm that the highest is the level of spatial targetization, the highest is their acquisition, and more fundamental their retention. In fact the relevance of the target covered type is confirmed by the experience of the already existing DONTS store, where spatiasl targetization has given optimal results in terms of sales.

In this extent not only spatial targetization increases customers first sales, but also fosters their perception of the brand, as seen by the 4,8/5 review score for DONTS Trastevere, which as a consequence increases also, as expected, the level of customer retention.

Finally we expected that locations with a lower level of competition, both in terms of number of competitors present and their perception, would increase sales level and profitability of the location. This is exactly what is possible to notice from DONTS Trastevere experience, reflected by the first three potential new locations, all chosen by the algorithm with an optimization of the distance from direct and indirect competitors.

The locations found are completely in line with those four drivers, so would be extremely interesting for DONTS to open in the next future new stores to measure the ex post results.

REFERENCES

Links

https://www.ibisworld.com/global/market-size/global-fast-foodrestaurants/#:~:text=The%20market%20size%2C%20measured%20by,Food%20Restaurants%20industry%20in%202023%3F
https://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS?end=2021&start=1960
https://medium.com/future-today/can-robotic-restaurants-become-a-thing-1f0618669fd9
https://wearesocial.com/it/blog/2023/01/digital-2023/
https://www.nestle.com/about/research-development/open-innovation
https://www.coca-colacompany.com/content/dam/journey/us/en/reports/coca-cola-business-environmental-social-governance-report-2021.pdf
https://www.unilever.com/brands/innovation/innovate-with-us/
https://www.danonecommunities.com/
https://www.fipe.it/wp-content/uploads/2021/12/Rapporto_PE_Sito_2019-2.pdf
https://www.veganok.com/aumenta-la-richiesta-di-prodotti-vegetali-cresce-il-numero-di-referenze-veganok/
https://www.globenewswire.com/en/news-release/2022/10/05/2528525/0/en/Global-Gluten-Free-Product-Market-Size-to-grow-USD-6-2-Billion-by-2030-CAGR-of-7-7.html#:~:text=The%20global%20gluten%20free%20product%20industry%20is%20projected,above%206.2%20billion%20by%202030
https://www.grandviewresearch.com/press-release/global-vegan-food-market
https://www.infodata.ilsole24ore.com/2017/05/04/quanto-vale-mercato-europeo-dei-dati/
https://www.ilsole24ore.com/art/big-data-noi-siamo-quello-che-compriamo-e-supermercato-sa-meglio-noi-ADCsoRJB?refresh_ce=1
https://waterfootprint.org/en/
https://eatpallet.com/fast-food-statistics/
https://desktop.arcgis.com/en/arcmap/latest/extensions/network-analyst/algorithms-used-by-network-analyst.htm#ESRI_SECTION1_6FFC9C48F24746E182082F5DEBDBAA92
https://desktop.arcgis.com/en/arcmap/latest/extensions/network-analyst/location-allocation.htm
https://www.grandistazioni.it/content/grandiStazioni/it/le-nostre-stazioni/roma-termini.html
https://www.enterpriseappstoday.com/stats/fast-food-industry-statistics.html
http://ustat.miur.it/dati/didattica/italia/atenei-non-statali/roma-link-campus
http://ustat.miur.it/dati/didattica/italia/atenei-statali/sapienza
https://www.romatoday.it/eventi/de-magna-e-beve/smash-tag-burger-prati.html
https://www.comune.roma.it/web-resources/cms/documents/07_Cultura_Annuario_2022.pdf
https://businesspartnermagazine.com/why-location-data-important-business/
https://www.docenti.unina.it/webdocenti-be/allegati/materiale-didattico/34272914

Books

Alexander Osterwalder & Yves Pigneur, Business model generation
Timmers, Business Models for Electronic Markets
Keller, K.L. (2003), Strategic Brand Management: International Edition, Building, Measuring, and Branding Brand Equity, Pearson Education Ltd, Harlow.
Shoshana Zuboff, The age of surveillance capitalism, 2018

Papers

Ariana, Riska. 2016. "済無No Title No Title No Title", 22(3): 1–23.
Chen, Yulong. 2021. "Optimizing Locations of Primary Schools in Rural Areas of China", *Complexity* 2021.
Clarke, Graham. 1998. "Changing Methods of Location Planning for Retail Companies", *GeoJournal* 45(4): 289–98.
Court-Brown, C.M., A.D. Duckworth, S. Ralston, and M. M. McQueen. 2019. "The Relationship between Obesity and Fractures", *Injury* 50(8): 1423–28.
Davies, R. L. 1977. "Store Location and Store Assessment Research: The Integration of Some New and Traditional Techniques", *Transactions of the Institute of British Geographers* 2(2): 141.
Di, Marco, and Dio Roccazzella. 2010. "Lo Sfruttamento Del Potenziale Di Mercato Attraverso Approcci Di Geomarketing e Micromarketing".
Ekhlassi, Amir. 2012. "Determining the Integrated Marketing CommunicationTools for Different Stages of Customer Relationship InDigital Era", International *Journal of Information and Electronics Engineering* 2(5): 761–65.
Erik Brynjolfsson, Lorin M. Hitt, Heekyung Hellen Kim. "Strength in Numbers : How Does Data-Driven Decisionmaking Affect Firm Performance ?"
Farjam, Sanaz, and Xu Hongyi. 2015. "Reviewing the Concept of Brand Equity and Evaluating Consumer-Based Brand Equity (CBBE) Models", *The International Journal of Management Science and Business Administration* 1(8): 14–29.
Fryar, Cheryl D., Jeffery P. Hughes, Kirsten A. Herrick, and Namanjeet Ahluwalia. 2018. "Fast Food Consumption Among Adults in the United States, 2013-2016", *NCHS data brief* (322): 1–8.
Gavilan, Diana, Adela Balderas-Cejudo, Susana Fernández-Lores, and Gema Martinez-Navarro. 2021. "Innovation in Online Food Delivery: Learnings from COVID-19", *International Journal of Gastronomy and Food Science* 24(September 2020).
Ghosh, Deepayan. 2020. "Customer Satisfaction Towards Fast Food Through Online Food Delivery (OFD) Services: An Exploratory Study", *International Journal of Management* (IJM) 11(10): 645–58. http://www.iaeme.com/IJM/index.asp645; http://www.iaeme.com/IJM/issues.asp?JType=IJM&VType=11&IType=10; http://www.iaeme.com/IJM/issues.asp?JType=IJM&VType=11&IType=10; http://www.iaeme.com/IJM/index.asp646.
Glaeser, E., H. D. Kallal, J. A. Scheinkman, and A. Shleifer. 1991. "Growth in Cities (No. W3787)", *National Bureau of Economic Research*: 2–28. http://www.nber.org/papers/w3787.

Grimaldi, Didier, Vicenc Fernandez, and Carlos Carrasco. 2019. "Heuristic for the Localization of New Shops Based on Business and Social Criteria", *Technological Forecasting and Social Change* 142(April 2018): 249–57. https://doi.org/10.1016/j.techfore.2018.07.034.

Gwalani, Harsha, Chetan Tiwari, and Armin R. Mikler. 2021. "Evaluation of Heuristics for the P-Median Problem: Scale and Spatial Demand Distribution", *Computers, Environment and Urban Systems* 88: 1–23.

Hernández, Tony, and David Bennison. 2000. "The Art and Science of Retail Location Decisions", *International Journal of Retail & Distribution Management* 28(8): 357–67.

Hutchinson, David, Jang Singh, and Kent Walker. 2012. "An Assessment of the Early Stages of a Sustainable Business Model in the Canadian Fast Food Industry", *European Business Review* 24(6): 519–31.

ImagineFX, and P M Page. 2003. "WORLD Of", Eric: 9. https://eric.ed.gov/?id=ED560751.

Jaradat, Ahmad, Azian Mohamad, Ahmad Asadullah, and Seyed Ebrahim. 2015. "Issues in Location Based Marketing: A Review of Literature", *International Journal of Scientific and Research Publications* 5(1). www.ijsrp.org.

Kim, Su Yeon, Tae Soo Jung, Eui Ho Suh, and Hyun Seok Hwang. 2006. "Customer Segmentation and Strategy Development Based on Customer Lifetime Value: A Case Study", E*xpert Systems with Applications* 31(1): 101–7.

Liu, Lon-mu, Siddhartha Bhattacharyya, Stanley L Sclove, and Rong Chen. 2001. "Data Mining on Time Series: An Illustration Using Fast-Food Restaurant Franchise Data", 37: 455–76.

Ma, Jing, Timothy Webb, and Zvi Schwartz. 2021. "A Blended Model of Restaurant Deliveries, Dine-in Demand and Capacity Constraints", *International Journal of Hospitality Management* 96(May): 102981. https://doi.org/10.1016/j.ijhm.2021.102981.

Missbach, Benjamin et al. 2015. "Gluten-Free Food Database: The Nutritional Quality and Cost of Packaged Gluten-Free Foods", *PeerJ* 2015(10).

Moeller, Klaus, and Georg August. 2010. "Partner Selection , Partner Behavior , and Business Network Performance An Empirical Study on German Business Networks", 6(1): 27–51.

Monograph, *International Thematic*. 2019. 4 Modern Management Tools and Economy of Tourism Sector in Present Era Modern Management Tools and Economy of Tourism Sector in Present Era.

Mu, Wangshu, and Daoqin Tong. 2018. "A Spatial-Knowledge-Enhanced Heuristic for Solving the p-Median Problem", *Transactions in GIS* 22(2): 477–93.

Ogaard, Torvald, Svein Larsen, and Einar Marnburg. 2005. "Organizational Culture and Performance - Evidence from the Fast Food Restaurant Industry", *Food Service Technology* 5(1): 23–34.

Osterwalder, Alexander, Yves Pigneur, Alan Smith, and The Movement. You're Holding a Handbook for Visionaries, Game Changers, and Challengers Striving to Defy Outmoded Business Models and Design Tomorrow's Enterprises. It's a Book for the… Written By.

Park, Soona, and Jiyun Kang. 2022. "More Is Not Always Better: Determinants of Choice Overload and Satisfaction with Customization in Fast Casual Restaurants", *Journal of Hospitality Marketing and Management* 31(2): 205–25. https://doi.org/10.1080/19368623.2021.1946879.

Payne, Adrian, Pennie Frow, and Andreas Eggert. 2017. "The Customer Value Proposition: Evolution, Development, and Application in Marketing", *Journal of the Academy of Marketing Science* 45(4): 467–89.

Pollák, František, Ľudovít Nastišin, and Lukáš Kakalejčík. 2015. "Analytical View on the Use of Mobile Platforms in Purchasing Process", *European Journal of Science and Theology* 11(6): 137–46.

Reformat, Beata. 2019. "The Increased Importance of Geolocation in Retail Trade in Poland – Selected Aspects of Activities", *Annales Universitatis Mariae Curie-Skłodowska, sectio H – Oeconomia* 53(2): 67.

Roberts, Nicholas et al. 2016. "Using Information Systems to Sense Opportunities for Innovation : Integrating Postadoptive Use Behaviors with the Dynamic Managerial Capability Perspective Using Information Systems to Sense Opportunities for Innovation: Integrating Postadoptive Use Beha", *Journal of Management Information Systems* 33(1): 45–69. http://dx.doi.org/10.1080/07421222.2016.1172452.

Roig-Tierno, Norat, Amparo Baviera-Puig, Juan Buitrago-Vera, and Francisco Mas-Verdu. 2013. "The Retail Site Location Decision Process Using GIS and the Analytical Hierarchy Process", *Applied Geography* 40: 191–98. http://dx.doi.org/10.1016/j.apgeog.2013.03.005.

Rosi, Alice et al. 2017. "Environmental Impact of Omnivorous, Ovo-Lacto-Vegetarian, and Vegan Diet", *Scientific Reports* 7(1): 1–9. http://dx.doi.org/10.1038/s41598-017-06466-8.

Sarkar, Soumodip, and Ana I.A. Costa. 2008. "Dynamics of Open Innovation in the Food Industry", *Trends in Food Science and Technology* 19(11): 574–80. http://dx.doi.org/10.1016/j.tifs.2008.09.006.

Sayman, Serdar, Stephen J. Hoch, and Jagmohan S. Raju. 2002. "Positioning of Store Brands", *Marketing Science* 21(4): 378–97.

Science, Source Marketing, No Autumn, and Steven M Shugant. 2012. "Defensive Marketing Strategies Author (s): John R . Hauser and Steven M . Shugan DEFENSIVE MARKETING STRATEGIES *", 2(4): 319–60.

Shokri, Alireza, David Oglethorpe, and Farhad Nabhani. 2014. "Evaluating Sustainability in the UK Fast Food Supply Chain: Review of Dimensions, Awareness and Practice", *Journal of Manufacturing Technology Management* 25(8): 1224–44.

Snihur, Yuliya, and Gideon Markman. 2023. "Business Model Research: Past, Present, and Future", *Journal of Management Studies*: 1–14.

Staudacher, Heidi M., and Peter R. Gibson. 2015. "How Healthy Is a Gluten-Free Diet?" *British Journal of Nutrition* 114(10): 1539–41.

Svensson, Göran, and Beverly Wagner. 2011. "Transformative Business Sustainability: Multi-Layer Model and Network of e-Footprint Sources", *European Business Review* 23(4): 334–52.

Teece, David J. 2006. "Reflections on 'Profiting from Innovation.'" *Research Policy* 35(8 SPEC. ISS.): 1131–46.

———. 2010. "Business Models, Business Strategy and Innovation", *Long Range Planning* 43(2–3): 172–94. http://dx.doi.org/10.1016/j.lrp.2009.07.003.

Teichert, Thorsten, Sajad Rezaei, and Juan C. Correa. 2020. "Customers' Experiences of Fast Food Delivery Services: Uncovering the Semantic Core Benefits, Actual and Augmented Product by Text Mining", *British Food Journal* 122(11): 3513–28.

Thompson, Tricia, Anne Roland Lee, and Thomas Grace. 2010. "Gluten Contamination of Grains, Seeds, and Flours in the United States: A Pilot Study", *Journal of the American Dietetic Association* 110(6): 937–40. http://dx.doi.org/10.1016/j.jada.2010.03.014.

Varnamkhasti, Mj. 2012. "Overview of the Algorithms for Solving the P-Median Facility Location Problems", *Advanced Studies in Biology* 4(2): 49–55. http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:Overview+of+the+Algorithms+for+Solving+the+P-Median+Facility+Location+Problems#0.

Wahnschaffe, Ulrich, R. Ullrich, E. O. Riecken, and J. D. Schulzke. 2001. "Celiac Disease-like Abnormalities in a Subgroup of Patients with Irritable Bowel Syndrome", *Gastroenterology* 121(6): 1329–38.

Widaningrum, Dyah Lestari, Isti Surjandari, and Dodi Sudiana. 2020. "Discovering Spatial Patterns of Fast-Food Restaurants in Jakarta, Indonesia", *Journal of Industrial and Production Engineering* 37(8): 403–21. https://doi.org/10.1080/21681015.2020.1823495.

Yan, Hua et al. 2022. "O2-SiteRec: Store Site Recommendation under the O2O Model via Multi-Graph Attention Networks", *Proceedings - International Conference on Data Engineering* 2022-May(i): 525–38.

Zhang, Min et al. 2014. "Transnational Practices in Urban China: Spatiality and Localization of Western Fast Food Chains", *Habitat International* 43: 22–31. http://dx.doi.org/10.1016/j.habitatint.2014.01.003.

APPENDIX

1	Mc Donald's Piazza dei Mirti	30197
2	Mc Donald's Via dei Prati Fiscali,	28364
3	Mc Donald's Via Casilina	25962
4	DONTS Monteverde/Ostiense	23833
5	Mc Donald's Via di Tor Tre Teste	20172
6	Mc Donald's Via Casilina	17811
7	Mc Donald's Via Appia Nuova	17141
8	Mc Donald's Largo dei Colli Albani	16482
9	Mc Donald's Via degli Stradivari	15479
10	Mc Donald's Viale Palmiro Togliatti	13092
11	Mc Donald's Via Tuscolana	12675
12	Mc Donald's Via Castellina Marittima	12443
13	Mc Donald's Via Tiburtina	11107
14	Mc Donald's Via delle Tre Fontane	10940
15	Mc Donald's Via Ostiense	10448
16	Mc Donald's P.za Annibaliano	10178
17	DONTS Cornelia	10060
18	Mc Donald's Corso di Francia	10048
19	DONTS Piazza Bologna	9509
20	Burgez Via Catania	8827
21	Burgez Via Candia	8274
22	Mc Donald's Via Nomentana	8252
23	Mc Donald's Via di Casal del Marmo	8182
24	Mc Donald's Piazza S. Giovanni Battista de La Salle	7956
25	DONTS Piazza del Popolo	7764
26	Mc Donald's Via Torre di Mezzavia	7737
27	Mc Donald's Piazza delle Cinque Lune	7664
29	Mc Donald's Piazza Pio XI	7108
30	Mc Donald's Piazza Regina Margherita	7069
31	Smash Tag Via Michele di Lando	6915
32	DONTS Trastevere	6376
33	Mc Donald's Via Bernardino Alimena	6329
34	DONTS San Lorenzo	6068
35	Mc Donald's C.C. ""PORTA DI ROMA, Via Alberto Lionello	6016
36	Mc Donald's Viale di Valle Aurelia	5787
37	Mc Donald's Viale Giulio Cesare	4574
38	Mc Donald's Via Giovanni Giolitti	4460
39	Mc Donald's Via delle Muratte	4356
40	Mc Donald's Via delle Muratte	4356
41	Mc Donald's Via del Mascherino, 8, Borgo Pio	4265
42	Mc Donald's Via Nazionale	3536
43	Mc Donald's Via del Tritone	3496
44	Smash Tag Via Vittoria Colonna	3476
45	Mc Donald's Via Marsala	3468
46	Mc Donald's Piazza di Spagna	3228
47	DONTS EUR	2923
48	Mc Donald's Via Laurentina	2888
49	Mc Donald's Viale dell'Oceano Pacifico	2622
50	Mc Donald's Grande Raccordo Anulare, km 49+400	972

Table 1: Stores' target population coverage
Source: ArcGIS Pro