

## COVID-19, CITIZEN'S PURCHASING BEHAVIOUR AND SMART CITY GOALS. EVIDENCE FROM BARCELONA.

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**KEYWORDS**— Smart city; citizen engagement; COVID-19; purchasing behavior; POST-COVID recovery

**ABSTRACT** – Even if we are unable to avoid the advent of harmful viruses from emerging, a Smart City (SC) can be seen as a means to lessen the effects of future pandemics on society. The COVID-19 outbreak has not only had economic consequences, but also social and environmental. This paper investigates how citizens purchasing behaviors have drastically changed because of the pandemic in the region of Barcelona. Amongst the results gathered from an online questionnaire distributed to Barcelona's citizens, it was interpreted and analyzed to reach the conclusion where COVID-19 is acting as an accelerator for the implementation of more smart city initiatives and therefore, achieve to a certain extent, smart city goals in Barcelona.

### 1. INTRODUCTION

The concept of a SC was developed to address the significant challenge of urban development faced by cities in the 21<sup>st</sup> century and fueled by globalization (Grimaldi, 2020). By the world becoming more interconnected, there's been "an increase in the number of residents and a concentration in urban areas" (Dirks, Gurdgiev & Keeling 2010, p.199). This has been reflected in the United Nations (2018) reports, which show how the population in cities is projected to increase from 55% to 68% by 2050. This current scenario calls for cities to find ways to manage new challenges; some have started to develop high quality and more efficient public transport (Grimaldi, 2020), smart lighting, waste management (Derqui & Grimaldi, 2020; Derqui, Grimaldi, & Fernandez, 2020), and even moving towards renewable energies (Grimaldi & Fernandez, 2015).

Regardless of these efforts, cities are still exposed and vulnerable to unforeseeable events, such as infectious disease outbreaks and pandemics (Costa & Peixoto 2020). To be able to prepare and overcome them, cities need to become more efficient and sustainable (Ramirez, Palominos, Camargo, & Grimaldi, 2021), that is, becoming "smarter" (IBM 2010, p. 1). Smart cities (SC from now) can be said to represent part of the solution. A SC nowadays is one that uses ICT and other means to improve quality of life and economic competitiveness while achieving sustainable development to meet the needs of present and future generations (International Telecommunication Union 2014).

This paper explores how citizens purchasing behaviors have drastically changed because of the pandemic, and if these have helped in the achievement of SC goals. Therefore, the research objectives are twofold:

- To explore how Covid-19 has evolved smart cities
- What changes have citizens experienced in their purchasing behavior as a result of Covid-19?

In this study, the SC concept is explored to respond to the following research question:

- Have changes in citizens purchasing behavior due to Covid-19 helped in the achievement of SC goals?

Case study research is considered fruitful for studying incipient phenomena. As an analytical tool, case studies are increasingly

common in business research. They have been used to analyze very complex phenomena (Liedtka & Liedtka, 2014; Yin & Yin, 2013). They are particularly appropriate in the early phases of theory development when key variables and their relationships are to be explored (Gibbert, Ruigrok, & Wicki, 2008). To examine our research question, we use the case study of Barcelona (Spain).

### 2. LITERATURE REVIEW

#### 2.1 Identifying smart city goals

Like any other public or private organization, the metrics for the assessment of a SC should consider social, economic, and environmental aspects (Oliveira, Oliver & Ramalhinho 2020). These three spheres are closely related to the theory of the Triple Bottom Line (TBL) (Elkington 1994), a well-known framework that all entities — including cities — should acknowledge before making decisions.

TBL Framework	Smart City Goals
Social	Improve the quality of life for both residents and visitors and enhance liveability
Economic	Create economic competitiveness by attracting industry and talent
Environmental	An environmentally conscious focus on sustainability

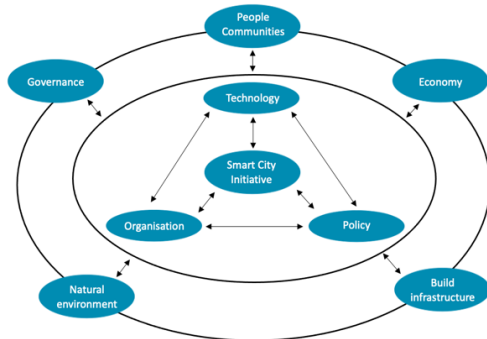
**Table 1.** Smart City goals from Elkington (1994).

Altogether, literature agrees on the fundamental objective of a SC: protect and ensure citizen's safety (Dameri 2017). Indeed, technology is a vital part of a SC, but citizens are necessary to embrace it in their daily lives. Eggers and Skowron (2018) agree with Dameri (2017) and highlight how the focus of any SC should be on its people. On the other hand, even if international literature states that the final aim of a SC is to improve the quality of life in a city (Dameri 2017). Oliveira, Oliver and Ramalhinho (2020) also comment on the challenges that arise when engaging citizens in social decisions. More research is needed in this area, as not many authors address this equally important subject.

#### 2.2 How has COVID-19 evolved the SC existing framework?

Chourabi et al, (2012, p. 2290) developed a framework to illustrate the relationship between eight factors in a SC (shown in Figure 1) and how they can be influenced by or influence other factors. The factors

in the inner circle (organization, technology, policy), are the only variables that can reach and affect SC initiatives. On the other hand, the outer circle factors (governance, people/communities, economy, build infrastructure, and natural environment), are highly likely to be altered more than the inner circle, as they are more exposed and vulnerable to outer conditions.



Source: Chourabi et al. (2012, p. 2294)

**Figure 1.** Variables of citizen's change in purchasing behavior.

Consequently, as the outer circle is more susceptible to the macro-environment, these factors could be seen, among other things, affected by the rapid and uncontrolled propagation of the Coronavirus disease (Covid-19). Covid-19 is an infectious disease—highly transmittable—which emerged in Wuhan, China, and rapidly spread around the world in 2020. Lockdowns and mandatory quarantines in cities—where 95% of the cases came from (UN Habitat 2020)—were some of the actions taken by governments to limit the movement of their citizens, which intended to control and minimize the devastating effects of the pandemic.

### 2.21 PEOPLE AND COMMUNITIES

By countries closing their borders, limiting citizens movement, and even making them stay at their home for months, governments are taking away an essential right from its citizens, that is, their freedom of movement (Donthu & Gustafsson 2020). Covid-19 has directly attacked an essential social factor in the SC framework, being people and communities, by putting at risk both their physical and mental health. They have been deprived of a good “quality of life” that a SC offers, as well as the opportunity to engage with the SC initiatives framework that stimulates “more informed, educated, and participatory citizens” (Chourabi et al. (2012, p. 2293).

### 2.22 ECONOMY

SC initiatives intend to create economic outcomes, such as job creation, business creation, and improvement in the productivity (Chourabi et al. 2012). However, the economic variable of the framework has been attacked by Covid-19. Businesses have been forced to shut down, likely causing bankruptcy for many local brands (Tucker 2020), leading to many people feeling pressured economically by losing their jobs and stability. For example, the travel industry has experienced 80% of hotel rooms being empty and airlines cutting their workforce by 90% (Asmelash & Cooper 2020).

### 2.23 NATURAL ENVIRONMENT

Before, cities consumed over two-thirds of the worlds energy and produce over 70% of carbon dioxide emissions. However, since Covid-19 emerged, there has been a noticeable drop in pollution and

greenhouse gases emissions worldwide. For instance, China's emissions of harmful gases have declined 25%, increasing 11.4% the quality of air, and saving up to 50,000 lives (Khan, Shah & Shah 2020). These have been the positive results of the industrial shutdowns—both in the manufacturing and economic sectors—experienced by just the country of China.

### 2.3 Key trends of citizen's purchasing behavior

With lockdowns, staying at home, and social distancing, Covid-19 has generated significant disruptions in purchasing behavior.

#### 2.31 E-COMMERCE

The online retail volume is expected to grow up to 15% until 2023 (Zierlein et al. 2020), as online channels have become a new trend from where to purchase goods and services, because of closed stores and contact bans. The biggest change has been in the purchase of online groceries and medicines, even if stores for this category were still open (Zierlein et al. 2020). Certainly, market preferences are now based on the most fundamental needs—food, health, and hygiene—while non-essential categories are falling. This rise in caution and cost-conscious purchase behavior is the economic result of Covid-19 on citizens (Wright & Blackburn 2020, p. 12). As many local businesses have been forced to shut down and people have been left without jobs, keeping financial stability is one of the main concerns people have.

#### 2.32 HOME CONSUMPTION

Our spending on out-of-home activities has ceased as a result of closed restaurants, bars, entertainment attractions, and recreational facilities. As a result, there has been a drastic usage of the internet and social media (Nowland, Necka & Cacioppo 2018), which not only keep human interactions but also maintain education and remote work (Donthu & Gustafsson 2020). This means citizen's behavior has changed to embrace digital technologies and spend more on internet-based tools to stay connected.

#### 2.33 TRANSPORTATION

The global shared mobility market experienced a boom before Covid-19 emerged, valued at USD 104.95 billion in 2017. Despite its advantages, Covid-19 has shift consumer's behavior to return to old habits: private ownership. To avoid infections in shared spaces and prioritizing their health above convenience, a large number of consumers are demanding fewer services from the sharing economy, even after the Covid-19 crisis (Zierlein et al. 2020). It seems that suddenly the acceleration of future mobility has come to a halt (Grimaldi & Fernandez, 2018).

### 2.4 Impact of the change in purchasing behavior on the SC framework

Proximity commerce is one area severely affected by Covid-19. If this new, safer, and more convenient trend of purchasing online continues, it could negatively impact SC in an economic, social, and environmental way.

#### 2.41 ECONOMIC IMPACT

The economic-financial crisis that took place worldwide in 2008, caused the closing of countless local shops and unemployment. Citizens suffered from financial instability; the same scenario experienced as a result of Covid-19. Jorda, Sing & Taylor (2020) state how following the patterns of other historical pandemics, there is a tendency to save our capital and discourage investments, deriving in a

decrease in economic growth. Similarly, if online buying from multinationals keeps being the preferred choice of citizens, we will find ourselves in the same economic situation, that is, experiencing “a desertification of the urban economic environment” (Grimaldi, Fernandez & Carrasco 2018, p. 250), making cities unattractive and without means to invest in SC initiatives (such as those shown in figure 1). All the mentioned factors could dangerously put at risk the economic goal of a SC being: “creating economic competitiveness by attracting industry and talent” (Eggers & Showron, 2018, p.3).

## 2.42 SOCIAL IMPACT

In parallel, this desertification does not only damage a city’s economy but also creates “a social problem of security and quality of urban life” (Grimaldi, Fernandez & Carrasco 2018, p. 249). Local shops in the city cover cultural, leisure, artistic, entertainment, sports, and gardening aspects, that bring together the citizens in the streets (SenStadt 2007). The closing of local retailing leaves large proportions of unoccupied space in the city, leading to people not walking by the streets, and therefore, decreasing its security (Grimaldi & Fernandez, 2017). According to Carley et al. (2000), derelict shopping areas build upon neighbors feeling of “dead frontage” and Grimaldi, Fernandez, and Carrasco (2018) believe that this adds to parents not allowing their children to go walking to school (due to their increased impression of the city’s dangerousness). Of course, this domino effect would be avoided if local shops open and citizens stop their purchase online, giving security to the streets. It is part of the SC goals to ensure citizens safety as well as economic stability.

## 2.43 ENVIRONMENTAL IMPACT

Finally, a decline in the local retailing can also cause severe environmental issues. As previously mentioned, the lack of people on the street due to the impression of insecurity, force people to take other forms of transportation to move around, increasing congestion and contamination (Grimaldi, Fernandez & Carrasco 2018). In addition, large online companies, such as Amazon, have been the major pollutants as people’s purchasing behavior shifted to online. In 2019, before the drastic increase in their sales because of Covid-19, Amazon’s carbon footprint rose 15% (Pisani 2020). Despite Barcelona’s effort to advertise against online consumption and before, “think twice”, more initiatives need to be taken to regulate this growing issue, which goes against environmental SC goals.

On the other hand, as new forms of transportation rise, such as micro-mobility, cities have acted accordingly to adapt to this new trend. Cities have started to redefine car lanes to create more spaces for bikes and e-scooters as people begin to avoid public transportation (Heineke et al. 2020). For instance, Barcelona’s mayor stated how “with paint we have recovered 30,000 square meters to be able to do bike lanes, walk with more space and have more space for bars and restaurants terraces for physical distance” (Smart City Expo World Congress, 2020). This has raised an opportunity to promote greener alternatives of transportation and contribute to the environmental goal of a SC being “an environmentally conscious focus on sustainability”.

## 3. METHODOLOGY

As an analytical tool, case studies are increasingly common in business research. They have been used to analyze very complex phenomena (Liedtka & Liedtka, 2014; Yin & Yin, 2013). They are particularly appropriate in the early phases of theory development when key variables and their relationships are to be explored (Gibbert et al., 2008). To examine our research question, we employ a two-step approach using the case study of Barcelona (Spain).

As a first step, before making the survey possible, a theoretical model is created (shown in the appendix I), to define the three main different constructs of the questionnaire, these were: COVID-19 impact on society, citizen’s change in purchasing behavior and impact on cities attractiveness. Then, variables for each construct were identified to help, later on, define the questions in the questionnaire. For example, to further interpret the construct of the impact COVID-19 has had on society, the number of deaths, number of people in the hospital, and the number of news are statistics that assist when describing the pandemics repercussion on society. The major challenge in the design of this theoretical model was the wide range of variables that could be taken into account when defining each construct. A significant discard had to be made to ensure the questionnaire didn’t end up with forty questions.

The second step was to build a survey based on an online questionnaire (shown in Appendix III), to explore and test the relationships between constructs. The survey is created using a cloud-based data management tool called Google Forms (Raju & Harinarayana 2016). The survey required a consistent structure for which we opted for the use of a Likert scale, as the first testing of the questionnaire exposed unclear results and confusion. In addition, to be able to distribute it among Barcelona’s citizens, social media platforms such as WhatsApp, LinkedIn, Instagram, and Facebook posts are used, enabling a rapid widespread of responses. Social media acted as an advantage to reach Barcelona’s citizens, but also, extended outside this region, which wasn’t our initial focus. It indeed raised the number of samples obtained, yet these results had to be discarded, leaving a lower sample sized than desired. Appendix IV illustrates a more detailed analysis of the methodology conducted, with a workflow chart.

Finally, along with the model and the survey, three hypotheses were developed (shown in the appendix II):

**Hypothesis H1.** The more COVID-19 impact, the less cities are attractive

**Hypothesis H2.** The more COVID-19 impact, the more citizens are changing the purchasing behaviors

**Hypothesis H3.** The more people change their purchasing habits, the less cities are attractive.

## 4. RESULTS

### 4.1 Demographic results

The online questionnaire gathered a total of 243 responses through various forms of digital distribution. While the main age group of respondents was 18 to 24 years old —34.7%— there was an equal number of responses across all 7 age groups, ranging from under 18 to over 65 years old. With respect to the employment status, 49.8% said to be currently employed. Other responses said to both studying and working, only studying or retired. Altogether, respondents were asked where they currently resided, to which the majority — 66.7%— answered inside the province of Barcelona. This was done to verify the target respondents, as this paper is a case study of the region of Barcelona only. The remaining percentage was discarded due to the scope of this study.

1	DEMOGRAPHICS
Age group	Under 18: 4.5% 18-24: 34.7% 25-34: 14.3% 35-44: 11.4% 45-54: 17.6% 55-64: 12.2% Over 65: 5.3%
Employment status	Working: 49.8% Studying: 25.7% Both: 17.6% Other: 6.9%
Residency in Barcelona	Yes: 66.5%

**Table 3.** Variables of citizen’s demographics.

#### 4.2 Impact on cities attractiveness results

To determine the economic impact on businesses as a result of COVID-19, people were asked whether their revenues had decrease compared to 2019. While the most popular response —29.2%— was not agreeing or disagreeing with this statement, an extremely high percent of 67.4 strongly agreed or agreed when they were asked if their expenses had decreased (also compared to 2019). 77% of the population whose revenues had not been affected by Covid-19 and their expenses had decreased, still consider themselves pessimistic regarding Barcelona’s economic future. On the other hand, those 50 respondents who confirmed to be optimistic, 78% affirmed to be currently working.

Likewise, the population was asked if after quarantine they had purchased more local products —as local shops started to open— and in this way, evaluate the current economic situation in Barcelona from citizens point of view. 49,8% agreed to purchase more locally than before Covid-19. The most prominent argument with an 86% was to support local shops. Despite the fact the majority of respondents now purchase locally, and a 20.6% still prefers the alternative of purchasing in large supermarkets. The dominant reasoning was due to its convenience (36.7%), along with their competitive price (24.5%), and finally, security issues in terms of Covid-19 exposure (24.5%).

Respondents were further inquired about their use of public or shared transport utilization to enable a comparison of usage before and after quarantine restrictions. 55.6% agreed that before Covid-19, their frequency of usage with respect to public or shared transportation was higher. Then, the following question was posed: “now, you have significantly reduced public or shared forms of transport”, to which over half —52.7%— of the population targeted strongly agreed or simply agreed.

Finally, to understand the social effect Covid-19 has had on purchasing behaviors, two variables were examined: the use of online services and the sense of security of Barcelona’s citizens. Since Covid-19 emerged, 66.2% of respondents admitted to using more online services, for example, social media. Similarly, to finalize the questionnaire, respondents were asked if they now feel less safe when leaving home. The leading answer for this was a full agreement, with 140 claims. A remarkable low percentage of 19.3% disagreed with not feeling safe. 37 out of 47 (79%) of these responses aforesaid to prefer going out and purchase locally instead of online, explaining their lack of fear towards Covid-19.

All these results gathered from the survey questions helped measuring the variables of the model regarding the impact on cities attractiveness and are presented in the following table (table 2).

	2	IMPACT ON THE CITY OF BARCELONA
BUSINESS	% spend on local products	Increase of 49.8% (after quarantine)
	Economic future growth	48.2% pessimistic 31.3% neither
ENVIRON.	Pollution levels	55.6% frequently used public/shared transportation
	Change in transportation method	52.7% decrease in public/shared transportation
SOCIAL	% usage of online services	66.2% increase
	Increase in criminality/fear	57.6% perceive their safety at risk

**Table 2.** Variables of COVID-19 impact on the city’s attractiveness.

#### 4.3 Citizen’s change in purchasing behavior results

The online questionnaire distinguished between purchasing habits before, during, and after Covid-19 quarantines. First, to gain an insight into the usual habits of citizens before Covid-19, they were asked if they had previously bought certain categories —essential and non-essential goods— online. Secondly, the numbers showed a positive claim towards the higher purchase online during Covid-19 with 52.3% strongly agreeing or agreeing. Nevertheless, considering there were heavy restrictions during Covid-19 quarantine, there is still a considerable high number of 56 respondents —23%— neither agreeing nor disagreeing with the displayed statement. Similarly, just over half of the of respondents (51.1%) confirm that even after Covid-19 restrictions have been eased, they remain purchasing online. The main argument extracted from the questionnaire was because they felt safer because of Covid-19 reasons (50%). Nonetheless, for the remaining percentages that didn’t fully agree (25.9%), results show how respondents keep their same purchasing habits as before Covid-19 emerged. In other words, they keep purchasing in person despite Covid-19 risks is to support local stores (58.1%) and because they confessed, they don’t like buying online (38.7%), leading to an 22.6% preferring the personal service from going to the stores.

All these results gathered from the survey questions helped measuring the variables of the model regarding the changes in purchasing habits and are presented in the following table (table 3).

3	CHANGE IN PURCHASING BEHAVIOUR
Sales online vs. offline	51.1% vs. 25.9%
Product category never purchased online	Essential goods: 50.2% Non-essential: 13.6%
% in spending	67.4% agreed their expenses decreased
% in savings	

**Table 4.** Variables of citizen’s change in purchasing behavior.

### 5. DISCUSSION & CONCLUSIONS

When exploring the impact COVID-19 has had on each construct shown in Appendix I, results indicate how the pandemic is acting as a moderator effect.

#### 5.1 Hypothesis H1

As illustrated in table 2, 84.8% of respondents agreed upon their actions –going to bars, restaurants, malls, and traveling— being restricted by the news they watched or read. To certain extent, this variable confirms the existing impact of COVID-19 on society. In consequence, as the pandemic increases, it is

influencing the economic, social, and environmental spheres of the TBL, impacting Barcelona's city's attractiveness.

### **Economic impact**

In agreement with Jorda, Sing and Taylor (2020), cities are becoming less attractive as we are following the patterns of the economic-financial crisis of 2008, where we save our capital and discourage investments, decreasing the economic growth of cities. Building upon this literature and with the survey conducted, Barcelona's citizens are also viewing the economic damage, as 48.2% consider themselves pessimistic in regard to the future economic growth of Barcelona. Altogether, there is a proven correlation between the effects of COVID-19 increase (e.g the closing of local shops and unemployment), which are essential factors for making a city attractive, as shown in table 1.

### **Social impact**

Simultaneously, the more COVID-19 impact, the more social problems raise and impact a cities attractiveness. For example, in table 3, it can be seen the results of the survey where 66.2% of respondents have increased the usage of online services (mainly social media), as a result of quarantines and lockdowns caused by the pandemic. Even though Donthu & Gustafsson (2020) state this has enabled us to keep human interactions and also maintain education and remote work, Nowland, Necka, and Cacioppo (2018) reminded in their article how social media can also bring out the worst in people through the sharing of fake news or trolling. It is part of the SC goals to ensure citizen's safety both physically and mentally, and along with the survey concluding 57.6% perceiving the health at risk when leaving home (shown in table 3), more COVID-19 is making Barcelona less safe and therefore, less attractive.

### **Environmental impact**

Concerns about health become a priority as COVID-19 cases increase. 52.7% of survey respondents confess to drastically decrease the use of public or shared transportation as a way to move around the region of Barcelona. People shift to other forms of transportation which increase congestion and contamination, more specifically, Barcelona is experiencing an increase in CO2 from car emissions. This has happened after lockdown measures have been eased. As venues and offices are opening, the people are moving more around the city as a consequence of being locked for months. Nevertheless, before this occurred, during the lockdown, it is true carbon emissions have been proven to have declined (Khan, Shah & Shah 2020), even if this has been experienced during a very short period.

However, it is no longer a matter of sharing a vehicle and the fear of getting infected, but as s Grimaldi, Fernandez, and Carrasco (2018) argue, the lack of people on the street due to the impression of insecurity as local shops are closed, force people to take other forms of transportation to move around. Once again, this damages the environment of the region, both by air and noise pollution, making the city of Barcelona less attractive.

Overall, it can be concluded that, in accordance with H1, the more the variables in table 2 increase, the higher the (negative) influence on a city's attractiveness. H1 is therefore confirmed.

## **5.2 Hypothesis H2**

E-commerce has been the major change in purchasing habits by citizens as a result of COVID-19. Temporary quarantines and lockdowns forced people to move from local shopping to online. Table 3 displays the results of the increase in online purchasing up to 51.1% of citizens making it their preferred option against the pandemic, even after government

restrictions were eased. The main argument extracted from the survey was due to "feeling safer" purchasing online, with no possibility of infection. Similarly, the biggest change in the purchase of online groceries was regarding essential products (food and medicines), the main market preference. Wright and Blackburn (2020, p.12) agree a rise in caution and cost-conscious buying as a result of COVID-19, even if 50.2% of respondents had never purchased this category online before (table 3). On the whole, it can be argued that COVID-19 is one cause for the rise in purchasing behavior online, especially for what is considered an essential good.

Furthermore, as more news come out in relation to COVID-19, the more citizens fear out-of-home activities and opt for home consumption. Table 3 reveals how 67.4% expressed to have reduced their spending during and after quarantine compared to 2019. Closed restaurants, bars, entertainment attractions, and recreational facilities have forced citizens to cut their spending, and unconsciously, encouraging savings. As previously mentioned, saving capital and the discouragement of investments, decreases the overall growth of cities, making them once again, unattractive. H2 is therefore, confirmed by at least two changes in citizens purchasing behavior as a result of more COVID-19.

## **5.3 Hypothesis H3**

Clearly, as changes in purchasing habits increase, this directly alters Barcelona's attractiveness in a social, economic, and environmental way. For example, as proven by the literature and the survey conducted, there has been an increment in online retailing. This new trend in citizen's purchasing behavior has disrupted local buying, as they experience a considerable decline in sales. This means local shops are enforced to close, leaving people unemployed and no movement of capital in the city. Multinationals such as Amazon, are the ones gaining clients due to their online services, meaning they are becoming the major pollutants trying to transport all goods worldwide, and in addition, the capital spend by citizens, leaving the country. This negatively affects a city's attractiveness both from an economic and environmental point of view. H3 is therefore confirmed too, but taking into account it is a domino effect, as a change in behavior impacts the city's attractiveness.

On the whole, it can be concluded that COVID-19 is a major cause for the alterations in the variables illustrated in Appendix I. The pandemic has had significant effects on citizens purchasing behaviors and consumption and has consequently affected the goals of a smart city. Nevertheless, it has been discussed how cities can lead the way towards economically, socially, and environmentally sustainable societies which guarantee an improvement of quality of life for their residents. As emphasized, despite the negative aftereffect of COVID-19, it has indeed accelerated the vision of a smart city in the region of Barcelona, enabling governments to adapt to the changing trends and implement smart city initiatives for those that might come.

Our research has however some limitations. First of all, the market research is naturally limited to the small population size to whom the survey was distributed to and was, unfortunately, not possible to obtain an overall picture of all citizens opinion in the region of Barcelona. In this way, future srsearch should extent the scope of the present study and our results should be confirmed by performing similar research in other cities to verify their scalability. The different cases could then support the validation of our hypotheses. Besides, future

researches could investigate the benefits of social media tools such as Twitter as an alternative solution to the common google-based survey as other studies have already demonstrated in other domains of application (Grimaldi, Diaz, & Arboleda, 2020)

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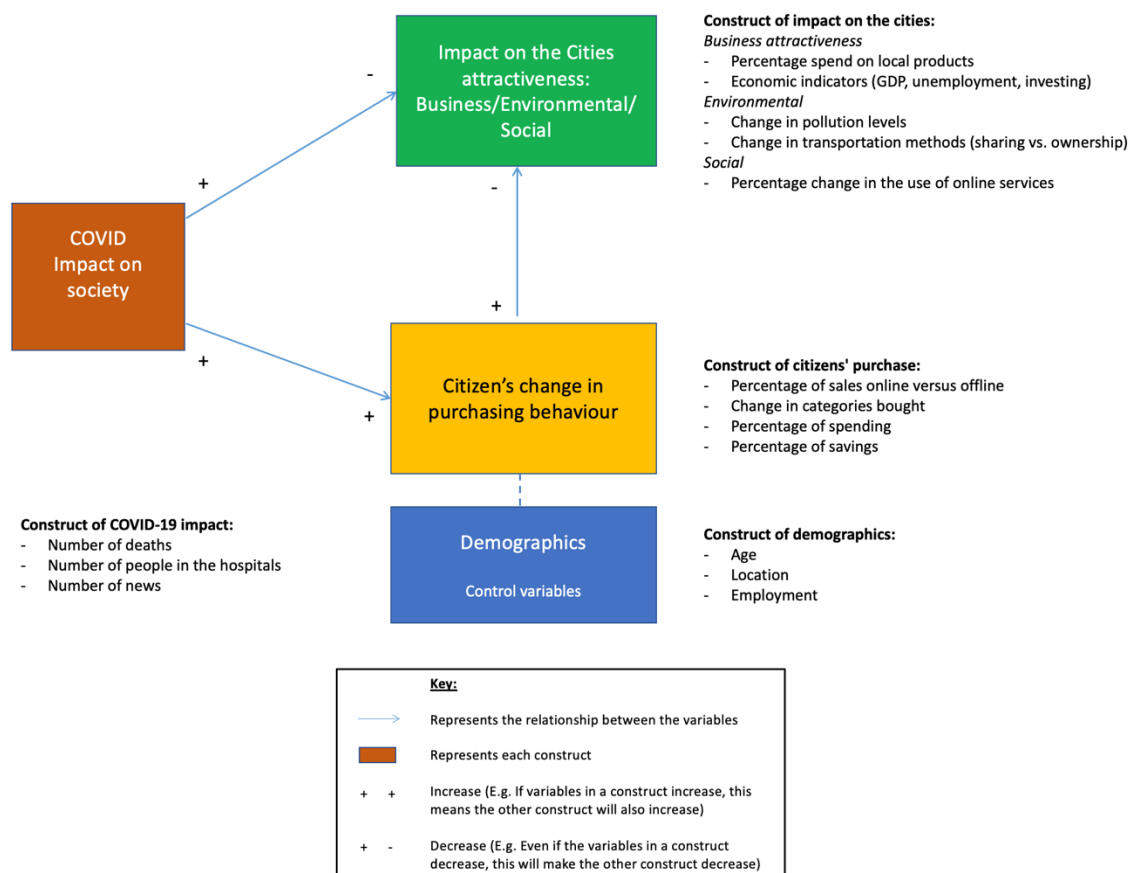
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## APPENDIX I- Design of the theoretical model.



## APPENDIX II- Research hypothesis

**Hypothesis H1:** The more COVID-19 impact, the less cities are attractive.  
**Hypothesis H2:** The more COVID-19 impact, the more citizens are changing the purchasing behaviors.  
**Hypothesis H3:** Combining H1 and H2, the more people change their purchasing habits, the less cities are attractive.

## APPENDIX III- Online survey URL

<https://forms.gle/czKukwtBKyK2f3kZ6>

## APPENDIX IV- Methodology workflow chart

