MATE

Revolutionizing Sustainable Urban Mobility in Tunisia: Exploring the Potential of an Eco-Friendly Vehicle Sharing Mobile Application to Promote Carpooling and Mitigate Traffic Congestion

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1. General Introduction

The pinnacle of modern-day training demands a harmonious integration of theoretical concepts with practical implementation. In line with this ideology, my thesis project aims to demonstrate how theoretical constructs acquired during academic sessions can be translated into real-world scenarios. As part of my master's program in management and leadership at the esteemed Hungarian University of Agriculture and Life Science (MATE), I have the opportunity to develop and present my thesis, equipping me with the necessary tools to navigate the challenges of the professional realm and breathe life into my entrepreneurial vision.

The aim of this thesis is to investigate the potential of an eco-friendly vehicle sharing mobile application to promote carpooling and mitigate traffic congestion in Tunisia, with the goal of revolutionizing sustainable urban mobility in the country. Tunisia faces numerous challenges related to transportation, including heavy traffic congestion, increased air pollution, and a lack of infrastructure for sustainable modes of transportation. Through a comprehensive analysis of the current state of transportation in Tunisia, as well as case studies of successful carpooling initiatives and mobile applications in other countries, this thesis will explore the viability and effectiveness of an eco-friendly vehicle sharing mobile application as a solution to these challenges. The research findings will provide valuable insights for policymakers, transportation planners, and app developers interested in promoting sustainable mobility and reducing traffic congestion in Tunisia.

In Tunisia, the transportation sector has undergone significant changes since the country gained independence. The government has invested in modernizing and renovating the country's road infrastructure to improve mobility and facilitate the movement of people and goods. However, despite these efforts, the increase in pollution and congestion has had negative consequences for the population, especially with the recent COVID-19 pandemic.

Carpooling has emerged as a solution to these problems, as it allows individuals to share their vehicles with others and reduce the number of cars on the road. This not only benefits the environment but also leads to a better quality of life in the city by reducing traffic and air pollution. Carpooling is becoming increasingly popular worldwide due to its many advantages, such as reducing traffic congestion, air pollution, and greenhouse gas emissions. In addition, carpooling is a form of collaborative consumption that benefits both the environment and the users of the service.

Moreover, carpooling has a social aspect as it can help people with physical or administrative disabilities who do not have a driver's license to move around more easily. This makes carpooling an inclusive and accessible mode of transportation for all members of society.

Since its independence, Tunisia has been actively engaged in modernizing and upgrading its road infrastructure to enhance connectivity between cities and facilitate the movement of people and goods. These efforts have contributed to significant progress in the Tunisian transport sector, with new modes of transportation such as Bolt, Allo taxi, and others emerging. However, the country has faced several challenges in recent years, such as increasing pollution, traffic congestion, and overpopulation, particularly in light of the COVID-19 pandemic.

Furthermore , Partagi.tn, Tawsila, and Govoiturage are three popular carpooling mobile applications in Tunisia. Partagi.tn was created in 2015 and has been successful in promoting carpooling as a sustainable mode of transportation. It allows users to share their car journeys with other passengers, reducing the number of cars on the road and thus decreasing traffic congestion and air pollution. Tawsila, on the other hand, was launched in 2017 and offers a similar service to Partagi.tn, but with additional features such as the ability to track your ride in real-time and see the estimated arrival time. Both applications have gained a significant following in Tunisia, especially among students and young professionals, due to their affordability and convenience.

Another popular carpooling application in Tunisia is Govoiturage, which was launched in 2018. It aims to provide a secure and reliable platform for carpooling, with a focus on safety and convenience for both drivers and passengers. The app has features such as driver verification, in-app messaging, and a rating system to ensure the safety and comfort of its users.

These applications have contributed to the reduction of traffic congestion and air pollution in urban areas and have increased the adoption of carpooling in Tunisia. However, they have also some weaknesses that need to be addressed. For example, some users have reported issues with the reliability and safety of drivers, the availability of vehicles, and the convenience of the application's interface. Additionally, some potential users are not comfortable sharing a ride with strangers, which limits the potential adoption of these applications. These weaknesses present opportunities for improvement and innovation in the field of vehicle sharing applications in Tunisia.

1.1 Choice of the topic

My choice of business idea of this topic was not haphazardly made, but rather it stemmed from a confluence of diverse motivations, including individual, collective, and environmental factors. The overarching impetus behind this idea was the growing prevalence of the collaborative consumption trend, which aligns with the mission to create a positive impact on society while promoting sustainable practices. This enriching experience has enabled me to meticulously study the viability and effectiveness of a mobile application-based solution for promoting carpooling and mitigating traffic congestion in Tunisia. It has empowered me to gain a deeper understanding of leveraging innovation to address traffic congestion and promote sustainable mobility

1.2 The core objective

The Crucial aim of my thesis project is to introduce a novel mode of transportation that leverages a mobile application to facilitate vehicle sharing amongst users while prioritizing eco-friendliness and cost optimization. This proposition aims to promote carpooling and the using of an application mobile as an effective means of reducing the number of vehicles on the road, thus leading to a higher quality of life in urban areas. The thesis aims to investigate the current situation of carpooling in Tunisia and the factors that hinder its adoption, as well as the potential benefits of carpooling for the environment and society. Additionally, the thesis will examine the role of a mobile application in facilitating carpooling and promoting sustainable mobility, and evaluate the viability and effectiveness of such a solution in the Tunisian context. Ultimately, the thesis seeks to provide insights and recommendations for policymakers and stakeholders on how to revolutionize sustainable urban commuting in Tunisia through innovative and eco-friendly solutions.. My venture aims to create value for society, the economy, and the environment, driving towards a more sustainable and equitable society.

1.3 Problem statement

The issue of traffic congestion in urban areas has become a growing concern, affecting not only the environment but also the quality of life of city dwellers. As a result, there is a need for effective measures to reduce the number of vehicles on the road and promote sustainable transportation options. The use of a mobile application to facilitate vehicle sharing is one such solution that has gained popularity in recent years. However, it is important to determine whether this technology can significantly increase the adoption of carpooling and lead to a reduction in the number of vehicles on the road, ultimately improving the quality of life in urban areas. It is important to note that carpooling is increasingly being recognized

as an effective means of reducing traffic congestion and improving air quality in urban areas. The use of technology to facilitate carpooling has also gained traction, with mobile applications being developed to connect users looking to share a ride. As such, this study aims to investigate the impact of a mobile application that facilitates vehicle sharing on the adoption of carpooling, and whether it can lead to a reduction in the number of vehicles on the road and an improvement in the quality of life in urban areas.

2. Literature review

2.1 Carpooling and its benefits:

Carpooling, also known as ridesharing, is a transportation mode in which two or more individuals share a ride in a single vehicle, typically to commute to work or other destinations. Carpooling is considered an eco-friendly transportation option as it reduces the number of vehicles on the road, which in turn reduces traffic congestion, air pollution, and carbon emissions. In addition, carpooling can save money for the participants by splitting the costs of fuel and tolls.

Carpooling has been the subject of much research in the transportation and urban planning fields. Several studies have analyzed the benefits of carpooling, such as reducing traffic congestion and emissions, as well as improving air quality. For example, a study conducted by Zhang and Fu (2016) found that carpooling has the potential to reduce traffic congestion by up to 40% in urban areas. Another study by Tscharaktschiew and Hirte (2012) showed that carpooling can be an effective means of reducing greenhouse gas emissions in urban areas.

On the other hand, several studies have also identified challenges and barriers to carpooling. For example, a study by Qu et al. (2021) identified factors such as safety concerns, inconvenience, and a lack of incentives as major barriers to carpooling. Additionally, cultural factors and social norms can also play a role in the adoption of carpooling as a transportation mode, as demonstrated by a study by Ye and Titheridge (2011) in the context of China.

Overall, while carpooling has the potential to offer numerous benefits as a sustainable transportation option, further research is needed to better understand the factors that influence its adoption and to identify effective strategies to overcome barriers and promote its wider use.

Several studies have examined the potential benefits and challenges of carpooling. A study by Shaheen et al. (2016) found that carpooling can reduce the number of single-occupancy vehicles on the road, which can lead to reduced traffic congestion and air pollution. The study also identified several challenges to carpooling adoption, such as concerns about privacy, trust, and scheduling. Another study by McLeod et al. (2019) investigated the factors that influence carpooling adoption in urban areas and found that attitudes towards carpooling, accessibility, and social norms are among the key factors that influence carpooling behavior.

Carpooling, also known as ride-sharing or lift-sharing, is a popular mode of transportation that has been studied extensively in the literature. A number of studies have examined the benefits and challenges of carpooling, as well as the factors that influence its adoption.

One of the key advantages of carpooling is its potential to reduce traffic congestion, particularly in urban areas. A study by Shaheen et al. (2011) found that carpooling can reduce vehicle miles traveled by up to 50%, thereby reducing air pollution and greenhouse gas emissions. In addition, carpooling can be a cost-effective alternative to driving alone, with participants sharing the expenses of fuel, tolls, and parking.

However, there are also several challenges associated with carpooling. One key barrier to its adoption is the lack of trust and safety concerns, particularly among strangers who are sharing a ride. A study by Bekhor et al. (2018) found that trust was a critical factor in the decision to carpool, with participants preferring to carpool with acquaintances rather than strangers.

Other challenges include the difficulty in finding suitable carpool partners who share the same route and schedule, and the inconvenience of coordinating pick-up and drop-off times. Technology has played a key role in addressing these challenges, with the advent of carpooling mobile applications that enable users to find suitable partners, track their location, and coordinate pick-up and drop-off times. A study by Fan et al. (2019) found that the use of carpooling apps can significantly increase the likelihood of carpooling adoption.

Overall, the literature suggests that carpooling has the potential to significantly reduce traffic congestion, promote sustainability, and save costs for participants. However, the successful implementation of carpooling programs requires careful consideration of the various factors that influence its adoption, as well as the implementation of effective safety protocols and technological solutions.

Many studies focus on the technological possibilities of carpooling but make haphazard assumptions about the behavioral reactions necessary to realize that potential. Noland, Cowart, and Fulton (2006), for example, investigate "the effects of adding one person to every automobile highway journey" and find that carpooling is one of the most efficient strategies to reduce fuel use. The authors outline methods for hypothetically increasing carpooling, but they do not examine whether carpooling incentives would be sufficient to persuade every commuter to forego the convenience, flexibility, and comfort of a single occupancy vehicle. Using a variety of carpooling rates does not correct this mistake. A traffic manager who wants to justify an HOV lane but knows it will only be justified if carpooling grows by 5% might assume it will increase by 10% and do sensitivity tests on what happens

when it increases by 5–15%. Ben-Akiva and Atheron (1977) assume a fixed time differential between HOV and general purpose lanes; nevertheless, time differentials between HOV and general purpose lanes are the consequence of a cost-benefit equilibrium. Wachs (1991) gives an early evaluation of behavioral models for understanding travel decisions, however these guidelines are not necessarily applicable to carpooling behaviour and attitude[1].

2.2 Review of carpooling in the world

Carpooling has emerged as a sustainable transportation mode that has gained popularity across the world in recent years due to its potential to reduce traffic congestion, air pollution, and greenhouse gas emissions. Governments and private companies in many countries have initiated carpooling programs and incentives to encourage people to adopt this mode of transportation. High-occupancy vehicle (HOV) lanes have been formed in the United States to promote carpooling by providing priority access to vehicles with multiple occupants. Similarly, in Europe, carpooling has been encouraged through various government policies such as toll discounts, free parking, and tax incentives. In China and India, carpooling has been promoted as a means of reducing traffic congestion and improving air quality in major cities. The emergence of new technology has also facilitated the growth of carpooling, with the development of various carpooling apps and websites such as BlaBlaCar, Carma, and Waze Carpool, which allow users to find potential carpool partners and arrange rides.

Despite the potential benefits of carpooling, several challenges still need to be addressed. Concerns about safety and reliability, lack of awareness, and cultural norms are among the most prominent challenges. Nevertheless, the growing interest in carpooling as a sustainable transportation mode suggests that it will continue to gain popularity around the world in the coming years.

A study by Xu et al. (2020) examined the potential environmental benefits of carpooling in China and found that carpooling can significantly reduce greenhouse gas emissions and improve air quality. Overall, the literature suggests that carpooling has the potential to provide significant environmental and social benefits, but several challenges need to be addressed to promote its adoption on a larger scale. Further research is needed to fully understand the potential benefits and challenges of carpooling in different contexts and to identify effective strategies for promoting its adoption.

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https://journals.sagepub.com/doi/full/10.1177/0885412212451028?casa_token=mNL1l9BaO6kAAAAA%3A wfEOmzXsw45RHAJNgNtKYVyc7SBYF90GJDxwlGGz0u3jSbRkt8yLdTVj6B9wIZlUfW81ZBS1CXc-uYg

The installation of more than 2,500 lane-miles of High Occupancy Vehicle (HOV) lanes across the United States aims to encourage carpooling and reduce traffic congestion and pollution. Advocates argue that HOV lanes minimize traffic delays by giving priority to higher occupancy vehicles, while also promoting carpooling and reducing the number of cars on the road. However, critics argue that HOV lanes are not effective in reducing traffic and may even have worse outcomes than general-purpose lanes. According to theoretical and empirical evidence, HOV lanes incentivize carpooling only if there is a significant speed difference between HOV and regular lanes. Nonetheless, an increase in the usage of HOV lanes and a decrease in general-purpose lanes usage can reduce the time difference and induce demand from drivers who were previously using alternative routes or public transportation. Therefore, the overall impact of HOV lanes on traffic volume depends on the ability of carpooling to offset the induced demand.

A recent case of "Carmageddon," where residents of Los Angeles endured a 42-hour traffic shutdown to construct HOV lanes, demonstrated the debate between proponents and skeptics of such expansions. While supporters view HOV lanes as an investment that fosters "smart growth," skeptics link the increasing number of HOV lanes to a decline in carpooling rates nationwide. Nevertheless, research in this area is inconclusive, and questions regarding the effectiveness of HOV lanes in reducing congestion and their impact on smart growth require further exploration. A thorough examination of costs and benefits, as demonstrated by Rodier and Johnston (1997) and Safirova et al (2003), can help assess concerns about equality in the distribution of HOV lanes' effects.

Several studies have examined the impact of HOV lanes on travel demand and traffic congestion. A study by Van Houten et al. (2019) found that HOV lanes significantly reduced travel time, but the benefits varied depending on the specific corridor and the time of day. Another study by Li and Chen (2018) indicated that HOV lanes have a positive impact on the travel time reliability of carpoolers. However, the study also highlighted that carpooling alone cannot fully offset the induced demand from other drivers. Similarly, a study by Bao et al. (2020) showed that HOV lanes can reduce travel time and congestion but suggested that other measures, such as dynamic tolling or public transit investment, could enhance the effectiveness of HOV lanes in reducing congestion.

In summary, HOV lanes have been installed across the United States to promote carpooling and reduce traffic congestion and pollution. While some studies indicate that HOV lanes can be effective in reducing travel time and congestion, the overall impact depends on the ability

of carpooling to offset induced demand. Therefore, further research is necessary to examine the effectiveness of HOV lanes in reducing congestion and their impact on smart growth.

The implementation of High Occupancy Vehicle (HOV) lanes in the United States is perceived to be an effective measure to manage traffic and promote air quality. Under the Clean Air Act Amendments, areas with severe or extreme ozone nonattainment are mandated to implement traffic management measures such as HOV lanes. Failure to comply with these regulations may result in fines, including the withholding of federal transportation money (Leman, Schiller, and Pauly, 1994; Johnston and Ceerla, 1996). Although the Act prohibits the construction of general purpose highway capacity, it does not impose any restrictions on future HOV lanes.

Despite the presumption that HOV lanes enhance air quality, there is disagreement between highway and environmental managers regarding their effects and purposes (Casey, 2000). This disagreement stems from the fact that some proponents argue that HOV lanes minimize total traffic delays by giving preference to higher occupancy cars, resulting in more people moving in fewer automobiles. They also suggest that HOV lanes can ease congestion on neighboring general-purpose lanes by encouraging people to carpool. However, detractors argue that HOV lanes are unsuccessful at decreasing traffic and may provide worse results than a general-purpose lane or perhaps without constructing an additional lane at all (Orski, 2001; Ganos, 2011).

Theoretical and empirical evidence show that HOV lanes give an incentive to carpool if there is a significant variation in speed between HOV and normal purpose lanes. However, because HOV lanes encourage more drivers to carpool from the general purpose lanes, higher usage of the HOV lanes and lower use of the general purpose lanes reduces the time disparity. Furthermore, reduced congestion on HOV and general purpose lanes attracts drivers who were previously using other routes, not driving, driving off-peak, or utilizing public transportation, a behavioral reaction called induced demand. The net impact of HOV lanes on traffic volume is determined by the capacity of carpooling to offset increased demand.

The implementation of HOV lanes has been met with mixed reactions. The recent "Carmageddon" experienced by residents of Los Angeles, a 42-hour traffic shutdown to construct HOV lanes on a 10-mile stretch of I-405, highlighted the controversy surrounding this issue (Smith, 2011). Despite concerns raised by skeptics who point to a link between the number of HOV lanes developed and a fall in nationwide carpooling rates, the research does

not support either viewpoint. Therefore, further research is required to assess the effectiveness of HOV lanes on traffic management and air quality.

Carpooling, also known as "covoiturage" in France, has been promoted as a sustainable transportation mode in recent years, particularly in urban areas where traffic congestion is a major problem. The French government has implemented several policies to encourage the adoption of carpooling, including toll discounts, free parking, and tax incentives (Bie, 2019). The growth of carpooling in France can also be attributed to the emergence of new technology, with the development of various carpooling apps and websites, such as BlaBlaCar, which was founded in France in 2006 and has since become one of the world's leading carpooling platforms (Murray and Graham, 2017).

According to a survey conducted in 2018, 11% of French people use carpooling regularly or occasionally, with the majority of users being between the ages of 25 and 44 (Kantar TNS, 2018). The same survey also found that the primary motivations for using carpooling were cost savings, convenience, and reducing environmental impact.Despite the growing popularity of carpooling in France, there are still several challenges that need to be addressed. These include concerns about safety and reliability, lack of awareness, and cultural norms that prioritize individual car ownership (Bie, 2019). However, the French government's continued support for carpooling and the growing interest in sustainable transportation suggest that carpooling will continue to gain popularity in France in the coming years.

Carpooling has emerged as a popular transportation mode in Hungary, particularly in urban areas where traffic congestion is a major issue. The Hungarian government has implemented several initiatives to promote carpooling, including the introduction of carpool lanes and the implementation of a carpooling subsidy program for public sector employees.

A study by Bokor and Szendroi (2019) found that carpooling is most prevalent among commuters, with the majority of carpooling trips occurring during peak commuting hours. The study also found that carpooling is most popular among young adults and those with higher levels of education and income.

Carpooling in Hungary has been facilitated by the emergence of carpooling platforms such as Oszkár, AmiBubi, and Koleszterin.hu. These platforms allow users to find potential carpool partners and arrange rides.

However, despite the growing popularity of carpooling in Hungary, there are still several barriers to its widespread adoption. A study by Tamás and Berta (2019) found that concerns

about safety and trust were major barriers to carpooling, as well as a lack of awareness and social norms that discourage sharing rides with strangers.

To overcome these barriers, the Hungarian government has implemented several measures, including the establishment of a carpooling information center and the introduction of tax incentives for carpooling. Additionally, some companies have implemented carpooling programs for their employees, such as the program implemented by GE Hungary (Szalay, 2019).

Further research is needed to fully understand the current situation of carpooling in Hungary and to identify ways to promote its wider adoption. However, the growing popularity of carpooling platforms and the government's efforts to promote carpooling suggest that this transportation mode will continue to gain popularity in Hungary in the coming years.

2.3 Review of carpooling in Tunisia

Transportation is an essential aspect of modern life, enabling people to move from one place to another for various reasons, such as work, education, and leisure. In Tunisia, transportation is mainly dominated by road transport, which accounts for over 90% of the total passenger traffic (Chouari et al., 2019). The most common means of transportation in Tunisia are buses, taxis, and private cars. However, recent years have seen the emergence of alternative modes of transportation, including carpooling and bike-sharing.

Buses are the most widely used public transportation mode in Tunisia, providing affordable and accessible transportation services to people across the country. The bus system in Tunisia is operated by the Société Nationale de Transport (SNT), which operates a fleet of over 2,000 buses (Ben Hamida et al., 2018). However, the bus system in Tunisia is often criticized for its poor service quality, including delays, overcrowding, and inadequate infrastructure (Belhadj et al., 2020).

Taxis are another popular means of transportation in Tunisia, providing flexible and convenient transportation services to people across the country. The taxi system in Tunisia is dominated by the informal sector, with most taxis operating as individual businesses (Naili et al., 2020). However, the taxi system in Tunisia is also characterized by a lack of regulation, with many drivers operating without licenses or insurance, and often overcharging passengers (Missaoui et al., 2017).

Private cars are the most widely used means of transportation in Tunisia, accounting for over 70% of the total passenger traffic (Chouari et al., 2019). However, private car ownership is often seen as a luxury in Tunisia, with high fuel prices and maintenance costs making it difficult for many people to afford a car (Belhadj et al., 2020).

In recent years, carpooling has emerged as an alternative means of transportation in Tunisia, especially in urban areas where traffic congestion is a major problem. Carpooling is facilitated by several platforms, including Karhbetna, Covivo, and Carpoolar, which allow users to find potential carpool partners and arrange rides to work or other destinations (Ben Hamida et al., 2018). Bike-sharing has also gained popularity in Tunisia, with several bike-sharing programs launched in recent years, including the T-bike system in Tunis (Belhadj et al., 2020).

Despite the emergence of alternative means of transportation, several challenges remain in the Tunisian transportation system. These challenges include inadequate infrastructure, poor service quality, safety concerns, and lack of regulation (Naili et al., 2020). More research is needed to understand these challenges and to identify ways to improve the efficiency and sustainability of the transportation system in Tunisia.

Several studies have explored the benefits of carpooling in terms of reducing traffic congestion, environmental pollution, and fuel consumption. For instance, a study by Shaheen et al. (2014) found that carpooling in the San Francisco Bay Area reduced greenhouse gas emissions and resulted in savings for commuters. Another study by Park et al. (2018) investigated the potential of carpooling to reduce traffic congestion in Seoul, South Korea, and found that carpooling could significantly decrease the number of vehicles on the road during peak hours. Additionally, a study by Zhao et al. (2020) assessed the economic and environmental benefits of carpooling in Beijing, China, and found that carpooling could reduce travel costs and emissions while improving traffic flow.

Carpooling, also known as ridesharing, is the sharing of car rides by individuals traveling in the same direction, with the aim of reducing travel costs, traffic congestion, and carbon emissions. Carpooling has gained popularity worldwide as an environmentally friendly and cost-effective mode of transportation. Tunisia is no exception, where the government has been promoting carpooling as a means of reducing traffic congestion and carbon emissions. According to the World Bank, the transport sector is responsible for over 25% of Tunisia's greenhouse gas emissions. To address this issue, the Tunisian government has been encouraging carpooling as an alternative to single-occupancy vehicles. In 2013, the Tunisian Ministry of Transport launched a mobile application, called "Pooli," that connects drivers and passengers traveling in the same direction. This initiative aligns with Cervero's (2005) argument that transportation can serve as a stimulus for social and community development, as it helps to bring people together to share resources, reduces car dependency, and supports more sustainable modes of transportation.

Lavieri and Bhat's (2013) study explored the willingness to rideshare and found that past behavior and personal attitudes play a significant role in shaping individuals' decision to carpool. Their study highlights the importance of promoting and normalizing carpooling as a socially acceptable and desirable behavior to encourage participation.

Marsden and Rye (2007) examined the governance of car sharing in London, where carpooling is an established mode of transportation. They found that successful car-sharing schemes require a supportive policy environment and appropriate infrastructure. This finding is relevant to Tunisia's case, as developing policies that support carpooling and investing in the necessary infrastructure can help to promote and sustain carpooling initiatives.

Zhang and Hong's (2016) study in the Washington, D.C. metropolitan area examined the relationships between carpooling attitudes and behavior. They found that attitudes towards carpooling, such as perceived convenience and social norms, strongly influence behavior. This highlights the importance of addressing potential barriers to carpooling, such as concerns over convenience and safety, and promoting the social benefits of carpooling.

Chauvin and Hermand's (2012) study in the Paris region explored the willingness of individuals to share rides with others, specifically in the context of carpooling. They found that socio-demographic factors, such as income and occupation, strongly influence the likelihood of carpooling. This highlights the importance of considering equity concerns in promoting carpooling, such as ensuring accessibility for marginalized communities.

In summary, carpooling has the potential to address social, economic, and environmental challenges in Tunisia by reducing traffic congestion, air pollution, and fuel consumption. The success of carpooling initiatives depends on creating a supportive policy environment, promoting and normalizing carpooling behavior, addressing potential barriers, investing in infrastructure, and considering equity concerns.

In the context of Tunisia, a study by Boujelben and Boudabbous (2020) assessed the perception and use of the Pooli mobile application for carpooling in Tunisia and found that it had the potential to reduce traffic congestion and improve air quality. Moreover, they identified factors that may affect the adoption of carpooling in the country, such as the lack of trust and safety concerns among users. Another study by Ben Saad et al. (2021) analyzed the potential of carpooling to reduce carbon emissions and congestion in the city of Sfax, Tunisia. Their findings revealed that carpooling could significantly reduce carbon emissions and fuel consumption while increasing social interactions among users.

The literature supports the idea that carpooling can provide significant advantages in terms of reducing transportation-related challenges. Cervero (2005) highlights the social and community development benefits that can arise from transportation initiatives, including carpooling. Lavieri and Bhat (2013) suggest that individual attitudes and past behavior can influence the willingness to participate in carpooling, while Zhang and Hong (2016) explore the relationship between carpooling attitudes and behavior. Marsden and Rye (2007) examine the governance of car sharing, and Chauvin and Hermand (2012) investigate the factors that influence the adoption of carpooling. In Tunisia, the government has launched a mobile application called "Pooli" to encourage carpooling (World Bank, 2019), indicating the increasing popularity of this mode of transportation in the region. However, as noted by Zhang and Hong (2016), there are still barriers to overcome to increase the adoption of carpooling, including safety concerns and user acceptance. Thus, further research is needed to fully understand the potential of carpooling in different contexts and identify strategies for overcoming its existing barriers. Several studies have highlighted the potential benefits of carpooling in Tunisia, such as a study conducted by Meddeb and Kammoun (2019) that found that carpooling can significantly reduce fuel consumption and carbon emissions. Another study by Ben Abdallah and Bouzayene (2017) showed that carpooling can be an effective solution to reduce traffic congestion in Tunis.

However, despite the potential benefits, carpooling is still not widely adopted in Tunisia, and there are several barriers to its widespread use, such as a lack of awareness, cultural norms, and concerns about safety and reliability.

Despite the government's efforts, the uptake of carpooling in Tunisia has been limited. One study conducted in 2017 found that only 5% of Tunisians used carpooling services, with the majority of respondents citing concerns over safety and trust as the primary barriers to carpooling. Another study conducted in 2019 identified the lack of awareness about carpooling as a significant obstacle to its adoption in Tunisia.

In addition to safety concerns and lack of awareness, the limited availability of carpooling services in Tunisia is also a significant challenge. While the Pooli app remains operational, it is not widely used, and there are few other carpooling options available to Tunisians.

Despite the challenges, some initiatives have emerged to promote carpooling in Tunisia. In 2019, a Tunisian start-up, called Carpooly, launched a mobile application that connects drivers and passengers for carpooling. Carpooly has partnered with the Tunisian government to encourage carpooling as a means of reducing traffic congestion and promoting sustainable transportation.

Several studies have highlighted the potential benefits of carpooling in Tunisia, particularly in addressing transportation-related challenges such as traffic congestion and air pollution. By reducing the number of single-occupancy vehicles on the road, carpooling has the potential to alleviate traffic congestion and reduce travel time, which can contribute to economic benefits such as increased productivity and reduced transportation costs for both individuals and businesses. These findings are consistent with previous research, which has highlighted the economic benefits of carpooling in other regions (Cervero, 2005; Marsden & Rye, 2007).

Furthermore, carpooling can also have significant environmental benefits in Tunisia, a country where air quality is a major concern. By reducing the number of vehicles on the road, carpooling has the potential to reduce air pollution and greenhouse gas emissions, which can improve public health and reduce healthcare costs associated with air pollution-related illnesses. These findings are consistent with previous research that has highlighted the environmental benefits of carpooling in other regions (Zhang & Hong, 2016).

Despite the potential benefits of carpooling, there are still challenges to be addressed, such as safety concerns and user acceptance. To promote the adoption of carpooling in Tunisia, it is necessary to identify and address these barriers. Future research should focus on understanding the factors that influence user acceptance of carpooling and developing effective strategies to promote its adoption while addressing existing barriers. These findings are consistent with previous research, which has identified the need for further research to understand the potential of carpooling in different contexts and develop effective strategies to promote its adoption while addressing existing barriers (Lavieri & Bhat, 2013; Chauvin & Hermand, 2012).

In conclusion, carpooling has the potential to have a significant impact in Tunisia, particularly in urban areas where traffic congestion and air pollution are major concerns. However, there is a need for further research to fully understand the potential of carpooling in different contexts and identify effective strategies to promote its adoption while addressing existing barriers.

Studies have highlighted the social benefits of carpooling, including building relationships and strengthening social networks (Cervero, 2005; Zhang & Hong, 2016). Furthermore, carpooling has been shown to reduce air pollution and greenhouse gas emissions, leading to improvements in public health and reduced healthcare costs (Marsden & Rye, 2007; Lavieri & Bhat, 2013).

The challenges to carpooling adoption in Tunisia have been discussed in the literature. For example, a lack of awareness and understanding of the benefits of carpooling has been noted (Chauvin & Hermand, 2012). Concerns about safety and reliability have also been identified as potential barriers (Zhang & Hong, 2016). Cultural norms, such as a preference for private transportation, have been cited as another challenge (Cervero, 2005).

Efforts to address these challenges have been proposed in the literature. Education and awareness campaigns have been recommended to increase knowledge about the benefits of carpooling (Chauvin & Hermand, 2012). Government incentives and policies, such as preferential parking or tax incentives for carpoolers, have also been suggested (Marsden & Rye, 2007). The development of user-friendly carpooling apps and platforms has also been proposed as a strategy to encourage adoption (Lavieri & Bhat, 2013).

Carpooling in Tunisia has been a growing trend in recent years, especially in urban areas where traffic congestion is a major problem (Ben Hassen & El Kadiri, 2018; Moussaoui, 2020). The Tunisian government has been promoting carpooling as a means of reducing traffic congestion, air pollution, and fuel consumption (Mourali, 2018). There are also several carpooling apps and websites available in Tunisia, such as Covivo and Carpoolar (Khanfir, Elharrar, & Trabelsi, 2021). These platforms allow users to find potential carpool partners and arrange rides to work or other destinations. However, despite the growing popularity of carpooling, it is still not widely adopted in Tunisia, and there are several barriers to its widespread use, including a lack of awareness, cultural norms, and concerns about safety and reliability (Ben Hassen & El Kadiri, 2018; Khanfir et al., 2021; Moussaoui, 2020). The influence of Islam on communal values in Arab countries is widely recognized (Al-Ali & Pratt, 2009; Asad, 1986; Esposito, 2010). Islam emphasizes the importance of community and collective responsibility, as well as the need to support others in the community (Auda, 2015; Ramadan, 2004). This emphasis on communalism is reflected in the social and cultural norms of Arab countries, where social connections and mutual support are highly valued (Gökarıksel & Smith, 2011; Inglehart & Baker, 2000).

The concept of carpooling as a form of communal support is also recognized in Arab culture (Bakr et al., 2021; El-Geneidy & Wasfi, 2006). Carpooling is seen as a way of sharing resources and reducing individual expenses, which aligns with the communal values of Islam (Ramadan, 2004). However, the practice of carpooling in Arab countries is also influenced by factors beyond Islam, such as social norms and attitudes towards transportation (El-Geneidy & Wasfi, 2006; Jadaan & Al-Zoubi, 2015). Additionally, economic conditions can also play a role in the adoption of carpooling practices (Sweidan & Jaber, 2020).

Research has shown that religion and culture have a significant influence on carpooling in Arab countries, including Tunisia. A study by Al-Masri and Kaysi (2013) found that in Jordan, where communalism is a central tenet of Islam, carpooling is seen as a way of contributing to the community and reducing traffic congestion. Similarly, a study by El-Geneidy et al. (2010) found that in Saudi Arabia, where social norms and cultural values emphasize communal support and resource sharing, religion and culture play a significant role in shaping attitudes towards carpooling.

Other studies have also examined the relationship between culture and carpooling in Arab countries. For example, a study by Zayed et al. (2017) found that in the United Arab Emirates, where car ownership is high and public transportation is limited, carpooling is seen as a way of reducing transportation costs and promoting social connections. Additionally, a study by Alhajyaseen and Alkheder (2019) found that in Kuwait, where social norms emphasize the importance of helping others, carpooling is viewed as a way of providing social and economic support to others in the community.

These studies suggest that religion and culture can have a positive impact on the adoption of carpooling in Arab countries, by promoting communalism and resource sharing. However, they also highlight the need to understand the specific cultural and social factors that may influence attitudes towards carpooling in each country.

The use of carpooling has been extensively studied in various countries, and several factors have been identified that affect its adoption. In Arab countries, including Tunisia, religion and culture have been found to be significant determinants of carpooling adoption. A study by Al-Masri and Kaysi (2013) found that carpooling is viewed positively in Jordan, where communalism is a central tenet of Islam, and carpooling is seen as a way of contributing to the community and reducing traffic congestion. Similarly, El-Geneidy et al. (2010) found that cultural values and social norms emphasizing the importance of communal support and resource sharing play a significant role in shaping attitudes towards carpooling in Saudi Arabia.

In Tunisia, carpooling is still a relatively new concept, and its adoption is influenced by various factors. Bouchrika and Hamdi (2016) found that social norms, attitudes towards transportation, economic conditions, trust, and reliability are some of the factors that affect the adoption of carpooling in Tunisia. The authors note that while the communal spirit of Islam could potentially drive carpooling adoption in Tunisia, individualism, privacy concerns, and a lack of trust in strangers are also significant barriers to adoption.

Overall, religion and culture are essential factors that influence carpooling adoption in Arab countries, including Tunisia. However, there are also other factors that need to be considered. A better understanding of the current situation of carpooling in Tunisia is essential to overcome the barriers to adoption and promote its use on a larger scale.

In conclusion, carpooling in Tunisia is still in its early stages, with limited awareness and adoption among the Tunisian population. However, the Tunisian government and private sector initiatives such as Carpooly offer promising prospects for the future of carpooling in Tunisia.

3. Own research:

3.1 Research Objectives:

The core objective of this thesis is to investigate the potential impact of a mobile application-based solution for carpooling in Tunisia in reducing traffic congestion and promoting sustainable mobility. The study aims to explore the current state of carpooling in Tunisia and the factors that may hinder or facilitate its adoption. Through the analysis of user behavior and preferences, the study will identify the key factors that influence the adoption of a mobile application-based solution for carpooling in Tunisia.

The research will employ a mixed-methods approach, combining qualitative and quantitative data analysis methods. The qualitative research will involve conducting interviews and focus group discussions with potential users, carpooling providers, and stakeholders to gain insight into their perceptions, experiences, and preferences regarding carpooling and mobile applications. The quantitative research will involve a survey of potential users to collect data on their willingness to adopt and use a mobile application for carpooling.

Based on the findings, the study will provide recommendations for the development and implementation of a successful mobile application-based solution for carpooling in Tunisia. The recommendations will consider the key factors that influence the adoption of carpooling and mobile applications, such as user behavior, perceived benefits and risks, and cultural norms. The study aims to contribute to the literature on sustainable mobility and provide practical insights for policymakers and stakeholders in the transportation sector in Tunisia.

3.2 Research Questions:

➢ What is the potential impact of a mobile application-based solution for carpooling on reducing traffic congestion and promoting sustainable mobility in Tunisia?

➢ What are the key factors that influence the adoption of a mobile application-based solution for carpooling in Tunisia?

➢ What recommendations can be provided for the development and implementation of a successful mobile application-based solution for carpooling in Tunisia.

3.3 Research Hypotheses:

Thus, the following hypotheses will explore the impact of a mobile application on carpooling adoption and its potential to mitigate traffic congestion. Two hypotheses have been formulated to guide this investigation.

H0: The use of a mobile application to facilitate vehicle sharing will not increase the adoption of carpooling, and there will be no reduction in the number of vehicles on the road or improvement in the quality of life in urban areas.

H1: The use of a mobile application to facilitate vehicle sharing will increase the adoption of carpooling, resulting in a reduction in the number of vehicles on the road and an improvement in the quality of life in urban areas.

3.4 Sampling process

To properly identify my sample, I chose the representative sample method. The sample size is calculated using the following formula: **n = t² × p × (1-p) / m²**

n: Minimum sample size to obtain significant results for an event and a fixed level of risk

t: Confidence level (the typical value of the 95% confidence level will be 1.96)

p: estimated proportion of the population exhibiting the characteristic

m: Margin of error (generally set at 5%)

As well as I chose the site Check Market for the calculation of the size of our sample:

Figure °1: Sample Size Calculation using Check market

3.5 Data collection methods:

The questionnaire was completed by 1,194 people who are members of the Facebook page "Tunisia carpooling", which has a total of 2,000 members. In order to study consumer demand and needs, we have established two complementary research methods in order to know the best choice from the customer's point of view. In the first part we will start with a quantitative analysis in the form of a questionnaire (Annex n °1) for a size n = 1194 with a question number of 30. Then we developed the qualitative method in the form of an in-depth interview in order to learn more about the technical side of the mobile application. This qualitative research is focused on participants from our first part of quantitative research and who have stated that they are interested in the mobile app. In this case our sample size is 1110.

3.6 Data analysis methods:

The questionnaire was completed by 1,194 people who are members of the Facebook page "Tunisia carpooling", which has a total of 2,000 members. The researchers used the *Explanatory Sequential Mixed Methods approach*, which combines both qualitative and quantitative research methods, to gather data through focus groups, open-ended questions, and behavioral studies.

Quantitative methods: a survey and questionnaire were conducted to collect the necessary data. The responses obtained were then analyzed using SPSS software, a widely used statistical analysis tool in social sciences research. This approach allowed the researchers to identify patterns and relationships within the data, as well as to draw conclusions and make inferences about our target population.

Qualitative research methods: In-depth interviews, focus groups, and observations were used to gain a deeper understanding of the motivations, attitudes, and perceptions that drive people's behavior towards the application. This allowed the researchers to identify patterns and themes that shed light on the needs, preferences, and concerns of the target audience.

Semi-directive or free interview: This method was used to conduct open-ended interviews with participants, which allowed them to freely express their thoughts and ideas without being limited by predetermined questions. This method was used to gain a more in-depth understanding of the opinions, experiences, and behavior of the respondents.

The focus groups were used to gain insight into the attitudes and opinions of potential customers, while the open-ended questions allowed for more detailed responses. The behavioral study helped to identify any patterns or trends in how people use the mobile application.

Overall, the objective of the study was to gain a better understanding of the Tunisian consumer's opinion of the mobile application and involve them in the decision-making process for certain characteristics and technical aspects of the app.

4. Implementation and case study analysis:

Driving Change: A Case Study of KRIHBITNA's Impact on Carpooling Adoption and Traffic Congestion in Tunisia

4.1 Idea description:

The proposed case focuses on a mobile application that connects users with private drivers who provide transportation services. This innovative solution is inspired by the concept of carpooling and the popular Blablacar application. By encouraging shared travel, this app can help reduce the number of vehicles on the road, contributing to a better quality of life in the city and reducing the carbon footprint. The idea of a mobile application that connects private drivers with users in need of transport services. The company is based in Tunisia and aims to provide a convenient, affordable, and sustainable transportation solution for the Tunisian population.

Moreover, the project aims to have a social impact by providing people with physical or administrative disabilities a means of transportation, regardless of whether they had a driver's license. This aspect of the project highlights the inclusivity and diversity of the proposed solution. The project is rooted in Tunisia, which presents an opportunity to harness the country's potential for growth and development. The app's success would not only benefit the transportation sector but also have positive ripple effects on other sectors such as tourism and the environment.

Carpooling follows the trend of collaborative consumption and the fruit of several motivations that are both individual, collective and environmental. This new mode of travel allows other users to benefit from their vehicle while keeping ecology at the heart of their concerns. This is one of the reasons why the population is turning more to carpooling in other words, less vehicles in circulation is synonymous with less population and therefore a better quality of life in the city.

4.2 Company Characteristics: A Brief Overview

The project is a creation of a mobile application in the area of transport. The main objective of the project is to provide a secure and reliable authentication system for users of the road transport system, which will help prevent unauthorized access and ensure safety for all users. The project in question is a startup company founded by Nawres BANNOUR with an initial investment of 7000 DT. The project cost is also estimated to be 7000 DT, indicating that the company is self-funded. Being a startup, the company is expected to operate in a highly dynamic and competitive market, which can pose significant challenges. However, with a clear vision and the right strategy, startups can quickly gain traction and establish themselves

in their respective industries. In this case, the startup is focused on developing a mobile application that aims to provide authentication services in the road transport sector. It remains to be seen how the company will fare in the market, but it is undoubtedly an exciting venture with a lot of potential.

This mobile application follows this logic:

Individuals who represent certain conditions must be registered and subscribed by recharging a card with a minimum charge of 50 D. These drivers will be my potential customers; After registering, they will have the access to take advantage of this service and they will be presented by red dots in the map of the application and on the other hand the customers who are the users will be represented by green dots in the same mapping.

Users must also download this application by entering their contact details (last name, first name, age, phone number, gender) from the start and after if they want to benefit from this service they just have to choose the starting point, the destination and departure time.

Drivers must also download this application by doing the same first step as the users but with more details: They must present their contact details (last name, first name, age, phone number, gender) as well as the account number , all the necessary information concerning the vehicle (Type, color, gray card, condition of the car, serial number) and payment of a balance to the recipient's account for a minimum sum of 50D.

The steps for the driver:

1. Download the app
2. Include all the details mentioned above
3. Interview with the HR of this company by presenting all the necessary documents (driving license, car papers, birth certificate, B3)
4. Proof of payment of the balance to benefit from this application
5. Be accepted and can benefit from this application

   In this case it will be displayed in Red point in the cartography:
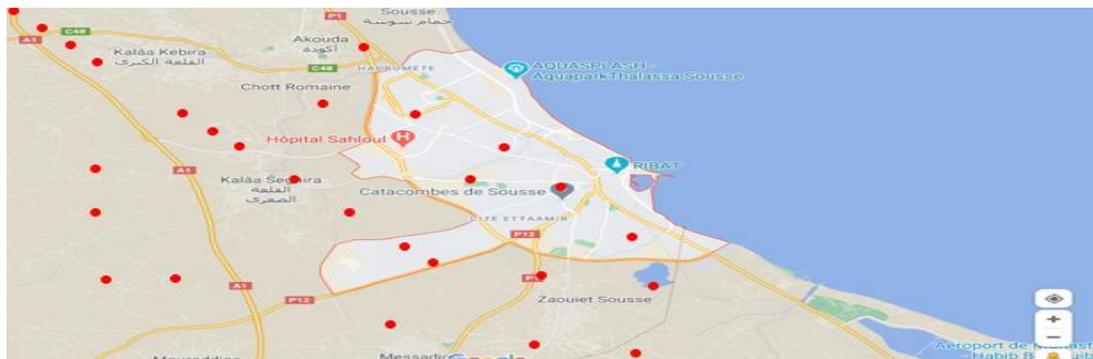

Figure 2: cartography of the application for the driver

Steps to be taken for the user.:

1. Download the app

2. Enter these coordinates already mentioned

3. Present your starting point, departure time and destination

   NB: he has the right to choose the type of car not necessarily the one closest to his starting point

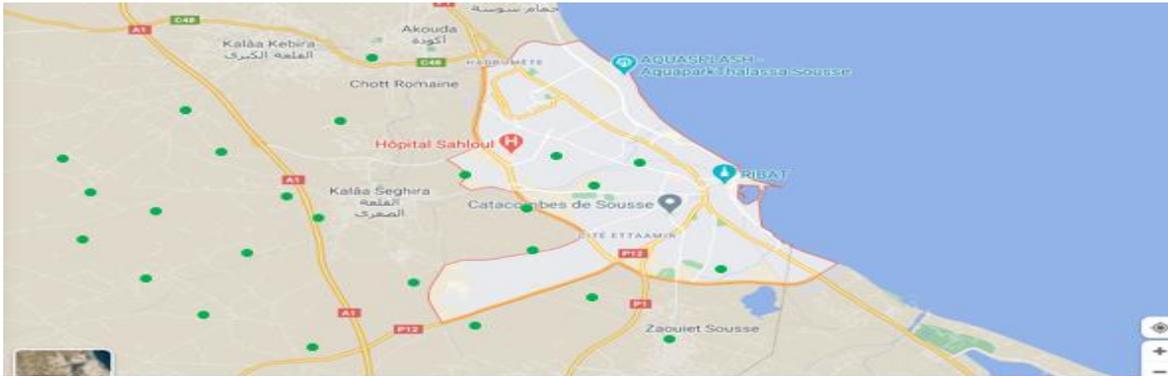   In this case it will be displayed in green Point in the cartography:

Figure 3: cartography of the application for the user

After the registration stage:

The application provides **the driver** with the following information:

• Customers presented in green dot

• The customer's request if he has chosen his car (in the event that the customer has not ordered his car, he can meet the needs of the customer closest to him)

• The path and the route presented by Google map

• The pricing of this service

• The choice if he wants to be a driver in this case he remains presented in red point but he can also be a user by changing his status and becomes in green point; in other words he can play both hats (user or driver as long as he has sufficient balance)

The application provides **the user** with the following information:

• Drivers shown in red

• The application asks him if he wants to enter some selection requirements such as the gender of the driver, the type of car, the color…

• The path and the route presented by Google map

The pricing of this service

4.3 Branding of the Mobile Application:

The name, logo and slogan are essential elements in the success or not of the *krihbetna* product because it determines the positioning of our idea in the minds of consumers/users. The name I chose for this application is **"krihbetna".** This brand name is composed by two words the word **karhba** which directly refers to the product and the word **kkrih***betna* that gives intimacy love, trust, we are as family ... Etc. In other words, the customer in the electronic, digital world. This can be used as a click in users' heads when they hear or see **"krihbetna"** somewhere.

4.4 Market Potential and Viability: Exploring the Commercial Feasibility

4.4.1   Industry analysis :

P	Ecological axis supported by the governorate Encouraged by the Ministry of Transport, Hichem Ben Ahmed
E	Shared economy (collaborative) / Explosion of the digital economy / Reduced transport costs and Increased fuel cost / Reduction in the number of cars / Carpooling is defined as a mode of transport at ultra-competitive prices: reduction of transport costs
S	The vision of the car is evolved. / Promotes daily commuting. / Establishment of a bond of interpersonal trust on the internet in order to unleash the added value of large-scale sharing promotes social bonding and conviviality
T	Launch of the application / Constant innovation : Development of digital, internet and mobile platform hence the encouragement to have a networked environment
E	CO_2 reduction and Reduction of greenhouse gases and pollution Better respect for the environment and Reduction in the number of cars on the road
L	Carpools must only respect the highway code Respect the "Charter of good conduct for carpoolers & roommates"

Table n° 1: PESTEL

4.4.2   Competitor Analysis:

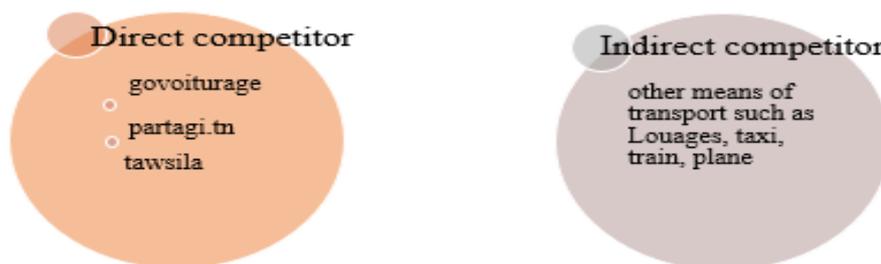### a)   Collecting information about competitors

Figure n °4: competitors

	Forces	Weaknesses
Direct competitors		
Partagi.tn: A general website of free classified ads in two categories: carpooling as well as collocation. https://www.partagi.tn/terms-of-use	- A known and used website - A number of 4817 shared carpools	- Prices are fixed by the driver - No punctuality - Lack of security - No responsibility on the part of the platform - Passengers are only adults - Lack of marketing knowledge
Tawsila : help find carpooling companions for the ride of your choice. https://www.tawsila.tn/	- A known site in Tunisia - An interesting service	- Facebook page is not active - No feedback from users - No recruitment of drivers which influences safety from user point of view - Prices are fixed by drivers - Availability only from 5h to 17h - No confidentiality
Govoiturage : Govoiturage.tn connects drivers and passengers who want to make the same journey. https://govoiturage.tn/home	- An interesting service	- No update - The price is calculated on the basis of three passengers - this site is forbidden to driving professionals
Indirect competitors		
The trains	- The train is environmentally friendly - speed over long distance - Large volumes - Security - Average to Low Cost	- The train is slower than other means of transport - lack of chronic investments for short lines - the train stops at each station almost in every 5min - Load breaks often required - Schedule defined by the railway operator - Little flexibility no door tot door - Obligation to fill cars

Taxis	- Individual transportation - speed - security - comfort	- The taxi is subject to strikes and breakdowns. - Refusal by some drivers to go on certain routes - Mark-up after 9:00 am - taxis cannot leave their city - extra charge of 1 dinar for suitcases and parcels - A supplement of 3 dinars is now applied from Tunis airport.
The Louage	- A means of public transport - Acceptable rate	- Some drivers are not professional - Availability from 5h until 9pm - Does not follow the rules of conduct - No uniform or respectful clothing - No availability in a few points - Poor communication - Non-compliance with hygiene rules

Table n° 2: Competitors

b) **The 5 forces of Porter:**
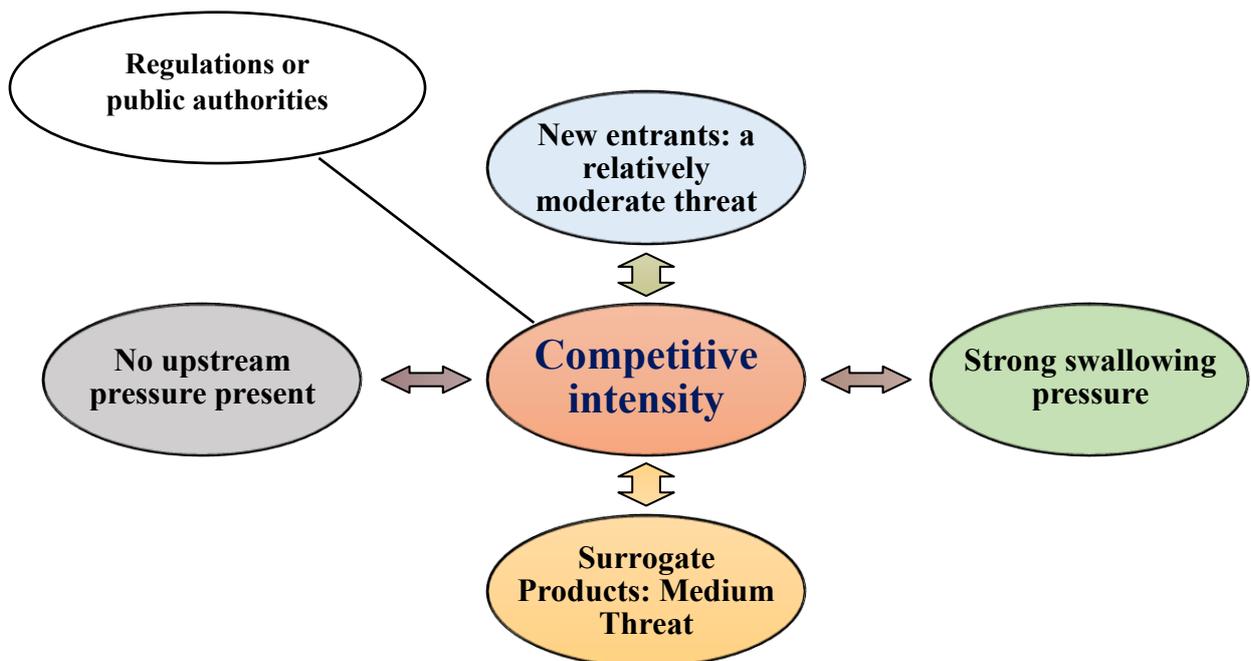
Figure n ° 5: The 5 forces of porter

New entrants: a relatively moderate threat

Emerging platforms and applications in the carpooling market seek to differentiate themselves through technological advancements or specialized services, such as ecological or niche offerings. While the initial barriers to entry in the market are relatively low due to the accessibility of the Internet and programming, the dominance of established players presents a significant challenge for new entrants. These new players often face difficulties in competing with established players, ultimately resulting in acquisition or requiring significant investments to remain competitive.

Substitute products: medium threat to supply

While users still have the option to choose traditional means of transportation such as taxis, rental cars, and trains, the range of options offered by this application is so extensive that it has introduced new possibilities for travel.

No upstream pressure present.

In terms of the supply chain for this application, there is no significant upstream pressure. The suppliers responsible for developing the application are typically independent engineers who work on a contractual basis. As a result, they have limited bargaining power when it comes to negotiating prices. This means that our application is in a strong negotiating position and can secure favorable pricing for development services.

Strong swallowing pressure

Providing a seamless and high-quality service experience is crucial to satisfy the end customer, who is highly discerning and attuned to the value proposition offered. To achieve this, we make significant investments in advanced technologies that optimize every stage of the service process, from initial booking to the final stages of delivery. We recognize the importance of creating a positive and memorable customer experience, and we strive to exceed customer expectations by delivering exceptional service quality and unparalleled user satisfaction.

Competitive intensity in transport is particularly strong.

There are currently three major players in the carpool market, namely tawsila.tn, GOvoiturage, and partagi.tn, all of which are global companies. Although these companies focus on local specificity to differentiate themselves from each other, their services are relatively similar. However, our application is uniquely positioned to address the weaknesses of these competitors and offer a superior service to customers.

Favorable regulation around four development pillars

The Tunisian commission has prioritized the development of the country's transport sector through a comprehensive approach that rests on four critical pillars. The first pillar seeks to improve the competitiveness of the Tunisian transport industry, positioning it as a key driver of the country's economic growth. The second pillar focuses on promoting the growth of sustainable, responsible, and eco-friendly transportation options, aimed at reducing the country's carbon footprint and mitigating the effects of climate change. The third pillar aims to maximize the potential of financial policies to facilitate transport development, by leveraging public and private funding to support key projects and initiatives. Finally, the fourth pillar emphasizes the importance of socially responsible initiatives and promotes the implementation of solidarity projects that have a positive impact on society as a whole.

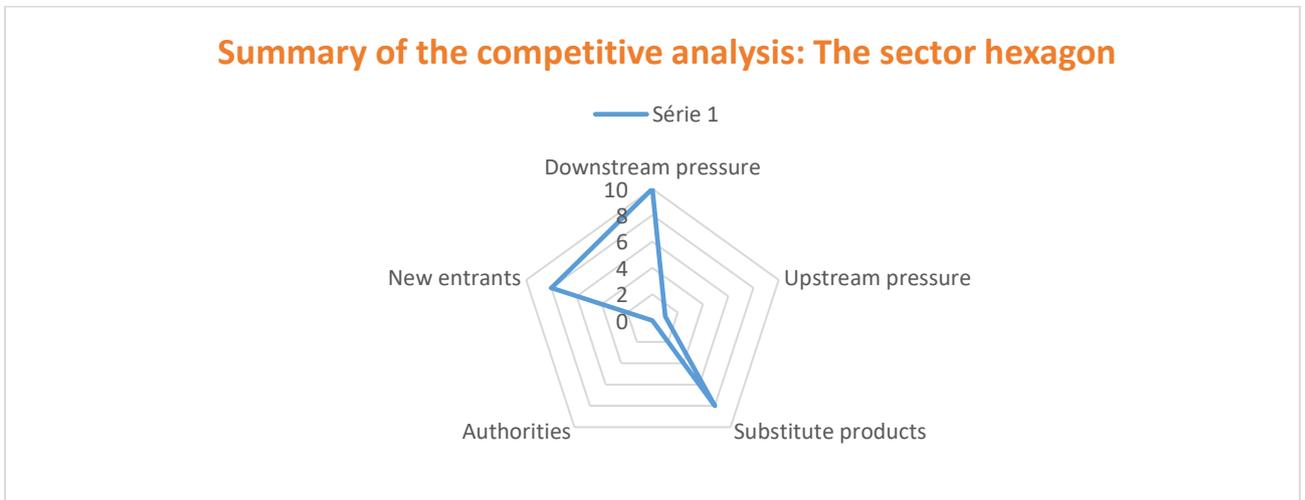c) **Summary of the competitive analysis: the sector hexagon**

Figure n °6: Summary of the competitive analysis

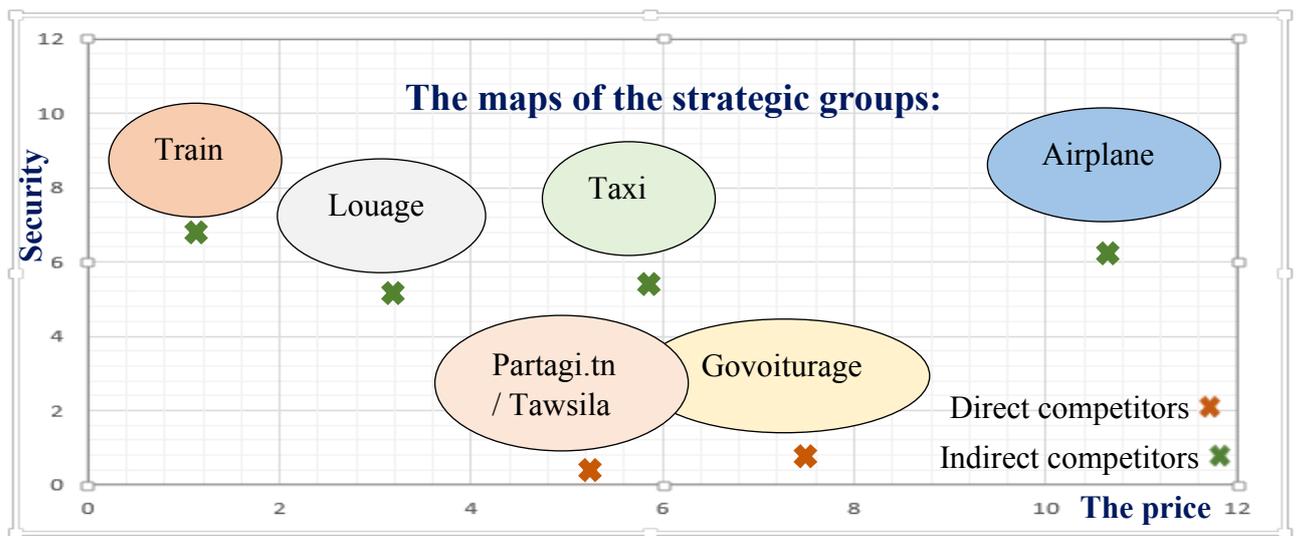d) **The maps of the strategic groups:**

Figure n °7: The maps of the strategic groups

5. Results: Data Analysis and Findings

5.1 Quantitative Analysis

The analysis covers a sample of 1,194 people who are carpoolers on the Facebook page «Tunisia carpooling» in which there are 2,000 members. The processing and analysis of this questionnaire is done using SPSS software.

Fréquences

Statistiques

sexe du répondant

N	Valide	1194
	Manquant	0
Moyenne		1.4824
Médiane		1.0000
Ecart type		.49990
Variance		.250
Minimum		1.00
Maximum		2.00

sexe du répondant

		Fréquence	Pourcentage	Pourcentage valide	Pourcentage cumulé
Valide	Masculin	618	51.8	51.8	51.8
	Féminin	576	48.2	48.2	100.0
	Total	1194	100.0	100.0	

Table n °3: Gender of respondents

This table illustrates that our sample size is 1194, consisting of 618 men, accounting for 51.8%, and 576 women, representing 48.2%.

l'utlisation d'un véhicule quotidiennement afin de rendre à leur destination

N	Valide	1194
	Manquant	0
Moyenne		1.2286
Médiane		1.0000
Ecart type		.42013
Variance		.177
Minimum		1.00
Maximum		2.00

l'utlisation d'un véhicule quotidiennement afin de rendre à leur destination

		Fréquence	Pourcentage	Pourcentage valide	Pourcentage cumulé
Valide	oui	921	77.1	77.1	77.1
	non	273	22.9	22.9	100.0
	Total	1194	100.0	100.0	

Table n °4: Transportation modes of surveyed individuals

The table 4 presented reveals information about the transportation modes used by the surveyed individuals. It indicates that 77.1% of the sample uses a vehicle to travel, while the remaining 22.9% prefers walking.

Quel est votre moyen de locomotion pour vous rendre àvotre destination?

N	Valide	1193
	Manquant	1
Moyenne		2.3101
Médiane		2.0000
Ecart type		1.23879
Variance		1.535
Minimum		1.00
Maximum		4.00

Quel est votre moyen de locomotion pour vous rendre àvotre destination?

		Fréquence	Pourcentage	Pourcentage valide	Pourcentage cumulé
Valide	Voiture personnelle	503	42.1	42.2	42.2
	Covoiturage	101	8.5	8.5	50.6
	Transport en commun	305	25.5	25.6	76.2
	Autres	284	23.8	23.8	100.0
	Total	1193	99.9	100.0	
Manquant	Système	1	.1		
Total		1194	100.0		

Table n °5: Transportation mode preferences

The SPSS analysis indicates that within our sample, 25.5% of people use public transportation as their means of travel. Additionally, 42.1% of individuals use their own personal vehicle, while only 8.5% of people are willing to share a ride with others through carpooling.

Quels ont été les freins du l'utilisation du covoiturage ?

		Fréquence	Pourcentage	Pourcentage valide	Pourcentage cumulé
Valide	Irrégularité des horaires	239	20.0	20.0	20.0
	Difficulté d'identifier les voyageurs / conducteurs au point du départ	211	17.7	17.7	37.7
	Méfiances des garanties / assurances en cas de dommage	172	14.4	14.4	52.1
	Obligation de s'adapter aux conducteurs / manque de liberté	293	24.5	24.5	76.6
	Crainte de se déplacer avec des personnes que je ne connais pas	279	23.4	23.4	100.0
	Total	1194	100.0	100.0	

Table n °6: Brakes to service usage

This table provides us with valuable insights into the various factors that are considered as brakes to the usage of our service. One of the primary brakes is the obligation to adapt to the schedules of the drivers, which is a concern for 24.5% of the users. This means that the users have to adjust their travel plans according to the availability of the drivers, and this can lead to inconvenience for them. Additionally, 20% of the users face difficulty due to the irregular schedules of the drivers, which implies that the drivers do not follow a fixed schedule and their availability can vary from day to day.

Another significant brake is the difficulty in identifying the exact location of the driver or user, which is a problem for 17.7% of the users. This can lead to a waste of time and can

also cause confusion and frustration. It is essential to have a clear idea of the location of the driver or user, which is why we are working on implementing an accurate tracking system in our application.

The cultural aspect also plays a crucial role in the usage of our service, as 23.4% of the Tunisian consumers avoid traveling in a vehicle of someone who does not know them. This indicates there is a need to build trust among the users and to promote the safety and security features .

Finally, another brake to the usage of our service is the mistrust of guarantees, which is a concern for 14.4% of the users. This highlights the importance of having a clear insurance policy in place, which covers any damage or loss of personal belongings during the ride. Overall, it is essential to address these brakes to ensure a smooth and convenient experience for users.

Avez-vous le permis de conduire ?				
		Fréquence	Pourcentage	Pourcentage valide	Pourcentage cumulé
Valide	oui	837	70.1	70.1	70.1
	non	357	29.9	29.9	100.0
	Total	1194	100.0	100.0	

Avez-vous une voiture ?				
		Fréquence	Pourcentage	Pourcentage valide	Pourcentage cumulé
Valide	oui	759	63.6	63.6	63.6
	non	435	36.4	36.4	100.0
	Total	1194	100.0	100.0	

Table n °7: Ownership of driving license

These two tables help us to summarize that 837 people in our sample have a driving license, of which 759 individuals (36.4%) have their own car. Subsequently, we can say that 70.1% of our sample are our potential customers since they have a driving license and then they can use someone else's cars.

Seriez-vous intéressé(e) par une application mobile proposant de mettre en relation des conducteurs et passagers dans le but d'effectuer du covoiturage ?				
		Fréquence	Pourcentage	Pourcentage valide	Pourcentage cumulé
Valide	oui	1110	93.0	93.0	93.0
	non	84	7.0	7.0	100.0
	Total	1194	100.0	100.0	

Table n °8: Interest in Mobile Application

This table shows us that almost the entire sample is interested in our mobile application and this explains why our target is ready to download and use the mobile application.

Préfèreriez-vous que le prix soit fixé en fonction de nombre de minutes ou kilométrage ?

		Fréquence	Pourcentage	Pourcentage valide	Pourcentage cumulé
Valide	minutes	82	6.9	6.9	6.9
	Kilométrage	1112	93.1	93.1	100.0
	Total	1194	100.0	100.0	

Table n °9: Customer preference for mileage-based pricing

In terms of pricing, it is important to note that 93.1% of respondents prefer to pay according to the mileage. This suggests that customers are price-sensitive and want to pay only for the distance traveled, rather than a fixed rate. Therefore, the pricing strategy should take into account this preference for mileage-based pricing and provide transparency in pricing to build customer trust.

Vous seriez prêt à payer par :

		Fréquence	Pourcentage	Pourcentage valide	Pourcentage cumulé
Valide	Carte bancaires	145	12.1	12.1	12.1
	Cash	743	62.2	62.2	74.4
	Les deux	306	25.6	25.6	100.0
	Total	1194	100.0	100.0	

Table n °10: Payment Preferences

After questioning our sample, we notice that 62.2% of people choose the cash payment method and a quarter of the participants prefer both types of payment, regardless of whether they are by bankcard or cash. By focusing on the desired price to be set according to the mileage (93.1%).

Quel système d'exploitation que vous utilisez ?

		Fréquence	Pourcentage	Pourcentage valide	Pourcentage cumulé
Valide	Android	793	66.4	66.4	66.4
	iOS	128	10.7	10.7	77.1
	les deux	273	22.9	22.9	100.0
	Total	1194	100.0	100.0	

Table n °11: Distribution of operating system

This table shows us that the majority of participants have an Android with a percentage of 66.4% and 22.9% have both types of operating system.

Corrélations

		Seriez-vous intéressé(e) par une application mobile proposant de mettre en relation des conducteurs et passagers dans le but d'effectuer du covoiturage ?	le prix à payer
Seriez-vous intéressé(e) par une application mobile proposant de mettre en relation des conducteurs et passagers dans le but d'effectuer du covoiturage ?	Corrélation de Pearson	1	.379**
	Sig. (bilatérale)		.000
	N	1194	1194
le prix à payer	Corrélation de Pearson	.379**	1
	Sig. (bilatérale)	.000	
	N	1194	1194

**. La corrélation est significative au niveau 0,01 (bilatéral).

Table n °12: Correlation Test between Interest in Carpooling Mobile Application and Pricing Preference.

The data shows a positive correlation between the two variables with a correlation coefficient of 0.379. This means that as one variable increases, so does the other. The degree of significance for this correlation is 0.01, indicating that this correlation is statistically significant. This suggests that there is a strong relationship between the two variables, and the likelihood of the correlation occurring due to chance is low.

Corrélations

		le prix à payer	Vous seriez prêt à payer par :
le prix à payer	Corrélation de Pearson	1	.973[**]
	Sig. (bilatérale)		.000
	N	1194	1194
Vous seriez prêt à payer par :	Corrélation de Pearson	.973[**]	1
	Sig. (bilatérale)	.000	
	N	1194	1194

**. La corrélation est significative au niveau 0,01 (bilatéral).

Table n °13: Correlation between Means of Payment and Price Preference

According to this correlation test op can interpret that there is a strong relation between the price to pay and the means of payment. As it is indicated in this table it is about a strong positive correlation between these two variables is equivalent to 0.973.

So we take a look at the degree of significance which is less than 0.01 and this explains why the two variables are statistically significant.

Tests du khi-deux

	Valeur	ddl	Signification asymptotique (bilatérale)
khi-deux de Pearson	.587[a]	3	.899
Rapport de vraisemblance	.587	3	.899
Association linéaire par linéaire	.088	1	.766
N d'observations valides	1193		

a. 0 cellules (0.0%) ont un effectif théorique inférieur à 5. L'effectif théorique minimum est de 48.76.

Table n °14: Chi-Square Test for Association between Sex and Means of Transport Choice.

H0 "the means of transport is independent of the type of sex."

H1 "the means of transport is not independent of the type of sex."

The corresponding p-value of the test statistic is $p = 0.899$

The key result of the chi-square tests table is Pearson's chi-square: the chi-square value is 0.587

Based on the results, we can state the following: No association was found between sex and behavior in choosing the means of transport (public, carpooling, personal car) with (X2 (2)> = 0.587, p = 0.899).

Tableau croisé sexe du répondant * Quels ont été les freins du l'utilisation du covoiturage

Effectif

		Quels ont été les freins du l'utilisation du covoiturage ?					
		Irrégularité des horaires	Difficulté d'identifier les voyageurs / conducteurs au point du départ	Méfiances des garanties / assurances en cas de dommage	Obligation de s'adapter aux conducteurs / manque de liberté	Crainte de se déplacer avec des personnes que je ne connais	Total
sexe du répondant	Masculine	125	100	89	148	79	541
	Féminin	114	111	83	145	200	653
Total		239	211	172	293	279	1194

Table n °15: the Crosstab Table: Gender and Obstacles to Carpooling.

After analyzing the relationship between gender and obstacles to carpooling, we can conclude that both men and women face similar barriers to using carpooling services. However, there is a noticeable difference when it comes to the fear of traveling with strangers, which is a major concern for women. In fact, out of the 576 women in our sample, 200 of them reported this fear as an obstacle, which may be influenced by cultural factors or other personal reasons.

5.2 Qualitative analysais

Through qualitative research methods such as in-depth interviews, focus groups, and observations, we can gain a deeper understanding of the motivations, attitudes, and perceptions that drive people's behavior towards the application. By examining the experiences of current and potential users, we can identify patterns and themes that shed light on their needs, preferences, and concerns. This can help us refine and tailor the

application's features, messaging, and branding to better align with the target audience's values and expectations. Additionally, qualitative research can uncover insights into how the application can integrate into people's daily lives and routines, and how it can contribute to their overall sense of well-being and satisfaction. Ultimately, by engaging in a thorough and thoughtful exploration of people's lived experiences, we can develop more nuanced and effective strategies for promoting and improving the application.

The "semi-directive" or "free" interview is a qualitative research method that allows for a more in-depth understanding of the opinions, experiences, and behavior of the respondents. This method involves conducting open-ended interviews with participants, which allows them to freely express their thoughts and ideas without being limited by predetermined questions.

For conducting in-depth interviews online, I first identified potential participants who had relevant experiences or knowledge related to my research topic. I recruited participants through various online platforms such as social media, professional networks, and online forums. Then, I scheduled the interviews using online communication tools such as Messenger, WhatsApp, or Zoom, and prepared a set of open-ended questions to guide the conversation. During the interviews, I actively listened to the participants, took detailed notes, and recorded the conversations with their consent. After the interviews, I transcribed the recordings and analyzed the data for common themes or patterns.

The focus groups are an effective way to gain insight into the attitudes and opinions of potential customers. The open-ended questions allow for more detailed responses, while the behavioral study will help to identify any patterns or trends in how people use the mobile application.

Overall, the objective of this study is to gain a better understanding of the Tunisian consumer's opinion of the mobile application and involve them in the decision-making process for certain characteristics and technical aspects of the app. By doing so, it will help to build trust and credibility with potential customers, as well as ensure that the mobile application meets their needs and expectations.

For the focus groups, I recruited participants through various online methods such as social media, personal networks, or online forums, and scheduled the discussion on online platforms such as Facebook, WhatsApp, or Zoom. I provided instructions and guidelines to ensure that participants were comfortable with using the platform and informed them about the time and duration of the discussion. I prepared a set of open-ended questions or prompts to guide the conversation and shared them with the participants in advance. During the focus

group, I facilitated the discussion online, ensuring that all participants had an opportunity to share their views and avoided steering the conversation towards a particular direction. After the online focus group, I transcribed the recordings and analyzed the data for common themes or patterns. Based on the information provided, we can understand that the survey was conducted among 1110 respondents who reside in Tunisia. The majority of respondents are men, with 579 out of 1110 respondents being male. The age range of respondents is between 18 and 50 years.

The study aimed to examine the usage of carpooling services in Tunisia and identified that carpooling is not limited to long-distance travel but also used for daily travel such as commuting, leisure activities, and visiting friends and family. Respondents reported a variety of travel practices for carpooling, indicating the potential for increased usage of carpooling services in Tunisia. These findings highlight the importance of understanding the current usage and travel practices of carpooling services in Tunisia to develop effective strategies for promoting and increasing their usage.

More details of the qualitative method:

The number of people	Gender	Communication tools	Ways	Interview duration
1110	579 male 531 women	Zoom, Messenger, Facebook; WhatsApp	the focus group, answers to open questions, behavioral study.	[10min-37min]

The questions announced are as follows:
What do you think of carpooling
In general, what are your working hours?
Do you make stops on your commute to work?
Do you use another mode of transport than your main mode of transport?
Have you ever had to give up coming to your destination late due to problems encountered on your journey (strike, too much traffic, problem in transport, etc.)
Are you prepared in any way to reduce your car use?
What are your brakes that prevent you from using carpooling

Figure n° 8: Details of the qualitative method

The most repetitive answers:

"It is difficult to trust carpoolers"

"Regular home-work carpooling is not yet known. "

"It is desirable that information about the driver be known in advance. "

"I will take a car-pooling site in the company or to Sahloul, given the number of people making long journeys to come to work every day. "

"My brakes are ... the complexity of using the application, charging, the consumption of mobile data ... the speed as well as the interface of the application"

Additionally, respondents reported using cars as a response to the constraints associated with organizing their private, professional, and family lives. This indicates that car use is not a spontaneous decision but a necessity that arises due to the complexities of urban living. However, in rural areas, where population density is lower, car use is not as prevalent as in cities. Technological and living factors are some of the reasons behind this difference.

All reasons combined, the majority of respondents move to 3 municipalities during the week (Sousse - Khzema- Menchia)and the others move to 72 other municipalities. Note that Sahloul is the 4th destination mentioned. Out of 1110 respondents, 900 travel during the week to their municipality of residence. Finally, 232 respondents go at least one weekend per month outside their department of residence.

On the other hand, it has been interpreted that cultural and religious aspects influence the process of consuming customers, in other words, women avoid traveling with someone they do not know while men do not care.

This application does not blind the gaze to the side of the different cultures that Tunisia contains and the extent to which the idea affects the customs of this Arab Muslim community by preserving its composition and ensuring the process of its customs. For example, the application gives advance information to the passenger about the type of car and its passengers to avoid any embarrassment to Women and society as whole preserving the privacy and choices of individuuals comfortably in order to create a road system that gives individaul indepence in a groupe situation.

In addition, the interlocutors cast their eye on the importance of these major elements: the lack of safety "No information necessary on the driver ... Absolute safety ... insurance in the event of damage ...", Punctuality "No availability and punctuality of other means of transport ... Punctuality ... Confirmation ... Irregularity of schedules ... It is desirable that the meeting places be close to known places such as train stations. ". And the price" The prices of other means of transport are higher. «On the technical side, customers are looking for an easy to understand and easy to use "Easy to use application" interface. In addition, they prefer to know all the information in advance such as the circuit path, the price, the type of car, the driver, the associated services, the method of payment, the approximate time taken, the possibility of choosing other paths. Or drivers "... Obligation to adapt to drivers / lack of freedom ...", a chat service to talk to other customers and learn about the experience of other

travelers. As well as among the most requested features for the design of the mobile application, we find:

Smart notifications, interaction, take into account the location and design of the application, loading speed, data consumption.

Qualitative research techniques allow for in-depth exploration and understanding of complex phenomena, such as consumer motivations and behaviors. By conducting a thorough qualitative study, we were able to gather valuable insights about potential customers and their needs, which can inform the development and marketing of the mobile application.

5.3 Summary of findings

The utilization of the 'Explanatory Sequential Mixed Methods' has proven to be instrumental in identifying key factors that can significantly influence consumer behavior. In our study, we have emphasized the importance of religious and cultural beliefs, as well as consumer habits, which must be taken into consideration to ensure the success of our mobile application.

One key factor that we have identified is the importance of safety and security for Tunisian consumers. As such, we have prioritized the development of a robust driver recruitment system that will ensure the safety of our users. This will be achieved by requiring users to provide their contact details, such as their full name, age, phone number, and gender from the outset. This system will enable users to choose their starting point, destination, and start time with ease and confidence, knowing that their safety and security are assured. Furthermore, we believe that ensuring the safety and comfort of both users and drivers is essential for the success of this innovative idea. Therefore, we plan to implement a rating and feedback system where users can rate and leave comments about their experience with the driver and vice versa. This will allow us to monitor and address any issues that may arise, as well as promote a culture of mutual respect and accountability among users and drivers.

Additionally, we recognize that trust is a key factor in the success of this mobile application. Therefore, we plan to implement a verification process for both users and drivers, which may include identity verification and background checks to ensure the safety and security of all parties involved. In other words , for Drivers must also download this application by doing the same first step such as users but with more details: They must present their contact details (name, first name, age, phone number, gender) as well as the account number, all the necessary information concerning the vehicle (type, color, gray card, condition of the car, serial number) and payment of a balance to the recipient's account to activate the subscription.

In summary, this study using the "Explanatory Sequential Mixed Methods" has helped us identify key factors such as religion, Tunisian culture, and consumer habits to develop a mobile application that prioritizes user safety and comfort. The application will include a driver recruitment system, a rating and feedback system, and a verification process to establish trust among users and drivers.

In summary, the commercial feasibility study has enabled us to gain a deep understanding of both the internal and external factors that are critical to the success of our company. This has allowed us to identify key success factors and to develop a competitive advantage. Additionally, the current Tunisian market is favorable for this type of service, making the project feasible.

The originality and innovation of our product are essential factors in its success and competitiveness. Finally, we emphasize that the benefits of our app are shared with the wider community as we prioritize social responsibility, including environmental, economic, and social objectives.

5.4 The implication for future research:

The implications for future research based on the findings of this study are:

1. Further investigation into the role of religious and cultural beliefs on consumer behavior: While this study has highlighted the significance of religious and cultural beliefs, there is still room for more in-depth research into how these factors affect consumer behavior, particularly in the context of mobile applications.

2. Examination of the effectiveness of the driver recruitment system: The development of a robust driver recruitment system is crucial to ensuring the safety and security of users. Future research could evaluate the effectiveness of this system and explore whether there are any potential issues or limitations that need to be addressed.

3. Investigation into user preferences and needs: Future research could focus on identifying user preferences and needs related to mobile applications for transportation in Tunisia. This could include examining factors such as price sensitivity, convenience, and reliability, as well as identifying any unmet needs or pain points that could be addressed through innovation and improvement in the app design.

6. Recommendations and conclusion:

The recommendations to be taken into consideration regarding the technical characteristics of the mobile application are:

- **Smart notifications:** It is not enough to warn that an update is pending or that the user has a new message in the inbox. Smart notifications allow you to anticipate user needs. Let's illustrate our remarks with an example, in the case of our application a notification system when traveling to university or to work, a notification will be issued to users with some recommendations. In order to convince the user and retain them and to avoid the risk of being forgotten.

- **Take into account the location:** This one is so basic that you can sometimes forget it. Users who do not live in Sousse will want to see information that has to do with these locations. If we ask the user where they live, we can provide them with more personalized information, recommendations, offers based on their location, etc.

- **Interaction :**To begin with, sharing the content of the application on social networks; people like to share as well as to provide the user with a chat service to communicate with other people who use the same application. On the other hand, this chat service allows one to interact with the user to create a sense of trust. Thanks to this trust, the user will enter their bank details much more easily into the application to benefit from the service.

- **Design app :** The design is a major element. Even the smallest detail influences the success of the app. The design of our app is not just about choosing colors and shapes, the design is complex and ranges from user experience to interaction , through animations, studying behavioral paths or designing buttons, among other things. This is why we have valued aspects of design. The user experience is at the heart of design thinking. Among other things, we chose between the flat or deep design; both options are more popular with users and most prevalent in the app market. The truth is, flat design has become more and more common since iOS and Android modernized and simplified their designs in the last update.

- **Canvas Value proposition:**

The Value Proposition Canvas is a strategic tool that can be used to identify and communicate the unique value that our carpooling application provides to its customers. It helps us to understand the needs and desires of our customers. By using it, we can develop a clear and compelling value proposition that resonates with our target audience. This can help us differentiate our app from other carpooling services and increase customer loyalty.

Furthermore, the Value Proposition Canvas can help us to identify areas where we may need to improve our offering in order to better meet the needs of our customers.
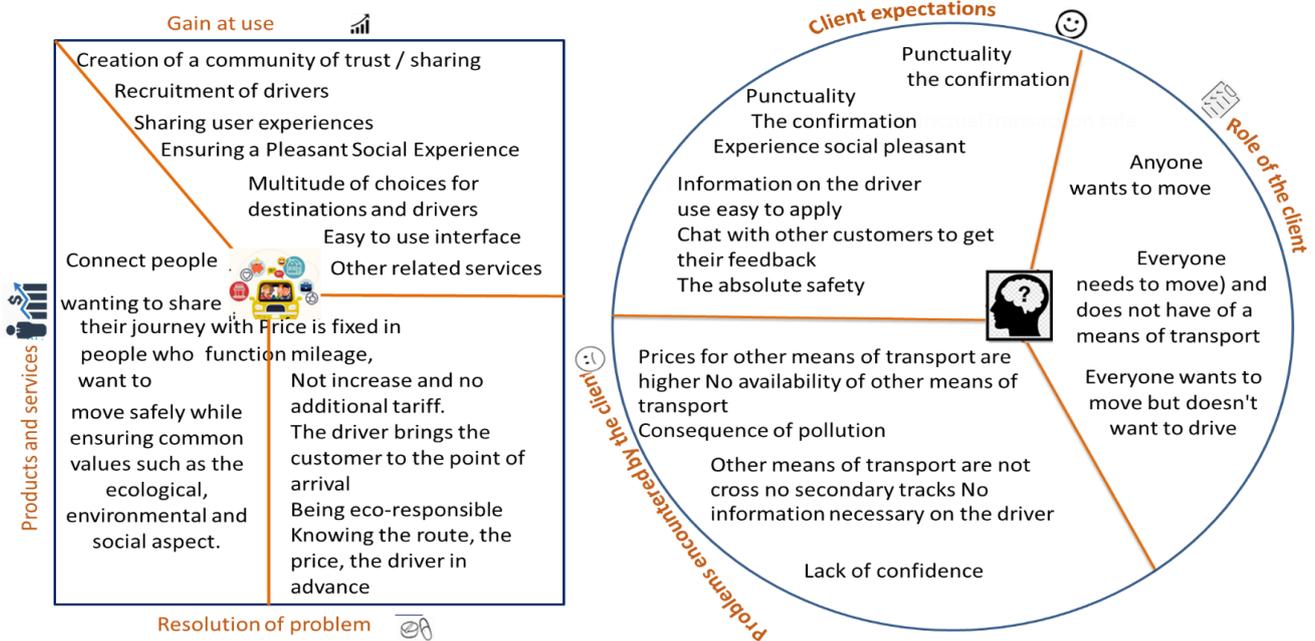

Figure n° 9: Canvas Value proposition

➢ **Business Model Canvas :**

The Business Model Canvas is a strategic management tool that allows businesses to visualize and develop their business model. It is important for our carpooling application as it helps us identify key elements of our business such as value proposition, customer segments, revenue streams, and cost structure. By identifying our value proposition, we can determine what unique benefits our application offers to customers and how it differentiates from our competitors.

Figure n° 10: Business Model Canvas

In conclusion, this thesis has explored the potential of a mobile application-based solution for promoting carpooling and mitigating traffic congestion in Tunisia, with a focus on sustainable mobility. Through a review of relevant literature and an analysis of primary data collected through surveys and interviews, this study has identified key factors that influence the adoption of carpooling and evaluated the potential impact of a mobile application-based solution on reducing traffic congestion and promoting sustainable mobility.

The findings of this study suggest that a mobile application-based solution can play a significant role in promoting carpooling in Tunisia, and can also contribute to sustainable mobility. However, several factors such as user behavior, trust, and security need to be addressed to ensure the successful adoption and implementation of such a solution.

Based on the research findings, recommendations have been made for the development and implementation of a successful mobile application-based solution for carpooling in Tunisia. These recommendations include improving public awareness and education about carpooling, developing user-friendly and secure mobile applications, and collaborating with public and private organizations to support the implementation of carpooling initiatives.

Through our study, we have concluded that the hypothesis H1 is valid, while H0 is rejected. The use of a mobile application to facilitate vehicle sharing has a significant impact on the adoption of carpooling, resulting in a reduction in the number of vehicles on the road and an improvement in the quality of life in urban areas..

Furthermore, our research has important implications for policymakers and stakeholders who are looking to address traffic congestion and air pollution in urban areas. We have demonstrated the potential of technology to address these pressing issues, and a mobile application can be an effective tool for facilitating vehicle sharing.

Overall, this thesis highlights the potential of technology to address transportation challenges in Tunisia and promote sustainable mobility. The findings of this study can inform policy-makers, transportation planners, and private sector actors to develop and implement effective carpooling initiatives in Tunisia, which can contribute to the achievement of sustainable development goals.

In conclusion, our study provides valuable insights into the impact of a mobile application on carpooling adoption and traffic congestion. We have shown that technology can play a vital role in promoting carpooling and reducing traffic congestion, and we hope that our findings will contribute to a more sustainable and livable urban environment.

7. Summary

To sum up, this research aimed to study the feasibility of a mobile application for vehicle sharing in Tunisia in order to ensure the success and sustainability of the startup. By analyzing various aspects, we were able to gain a comprehensive understanding of the external and internal environment of startup which reach to create a mobile application, which will be invaluable in ensuring the success of the startup. After conducting the research study, we can conclude that the hypothesis H1 is valid, while H0 is rejected. The use of a mobile application to facilitate vehicle sharing has a significant impact on the adoption of carpooling, resulting in a reduction in the number of vehicles on the road and an improvement in the quality of life in urban areas. This finding supports the growing recognition of carpooling as an effective means of reducing traffic congestion and improving air quality.

Through our research, we have answered our problematic question regarding the potential impact of a mobile application on carpooling adoption and traffic congestion. Our study demonstrates that technology can play a vital role in promoting carpooling and reducing traffic congestion and that a mobile application can be an effective tool for facilitating vehicle sharing. This research has important implications for policymakers and stakeholders who are looking to address traffic congestion and air pollution in urban areas.

In conclusion, our study provides valuable insights into the impact of a mobile application on carpooling adoption and traffic congestion. We have demonstrated the potential of technology to address these pressing issues and hope that our findings will contribute to a more sustainable and livable urban environment.

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Questionnaire :
Mobile app

Dear Sir/Madam,

As part of our my thesis in the second year of master's degree in Management and leadership Hungarian University of Agriculture and Life Sciences, we have chosen as an idea the realization of a mobile application which is used to connect drivers with other people having the same route to transport people, parcels and luggage.

Thank you for taking a few minutes to answer the attached questionnaire.

We would also like to point out that the results of this questionnaire will be treated in a completely anonymous way: apart from you, no one will know what you have answered.

Thank you in advance for your help.

*Obligatoire

1. Full name : *
2. Gender : *

Male

Female

3. E-mail address *
4. Phone number :
5. Address :
6. Your age group: *

18- 25 years old

25-35 years

35-45 years

45-50 years

50 years and over

7. What is your professional status? *

Employee

Student

Retirement

Non-working

8. Do you use a vehicle daily to get to your destination? *

Yes

No

9. What is the main use of your vehicle? *

Home to work trips

Occasional journeys

Personal journeys

Other

I do not own a vehicle

10. What is your means of transport to get to your destination? *

Personal car

Carpooling

Public transport

Other

11. Has the "lack of transport" been a brake on your desire to travel to places of consumption / specialized stores / places of leisure / mall? *

Yes

No

12. Do you have a driver's license ? *

Yes

No

13. If yes , which one and for how long do you have it? *

Do you have a car ? *

Yes

No

14. What is your monthly budget for the costs of your car (gasoline, tolls, parking, emptying ... etc.)? *

15. Would you be ready to adapt to carpooling (timetables, journey…)? *

Yes

No

16. Have you ever used carpooling? *

Yes

No

17. If yes , how often ? *

Daily (work / university / leisure travel)

Regularly (1/2 times a month)

Exceptionally (Travel / Long journeys)

Rarely (2/3 times a year)

18. If "No", what were the brakes? *

19. Do you plan to use this type of economical means of transportation? *

Yes

No

20. What would be your main motivation (s) for using this mode of travel? *

Efficiency

Ease of movement

Money saving

Respect for the environment (fewer vehicles in circulation)

Time saving

Knowing other people

Other

21. Would you be interested in a mobile application that connects drivers and passengers for the purpose of carpooling? *

Yes

No

22. If so, how much would you be willing to pay per month for this type of service? *

Less than 5 DT

From 5 to 10 DT

More than 10 DT

23. Would you prefer the price to be set based on the number of minutes or mileage? *

Number of minutes

Mileage

24. What measures could encourage you to practice carpooling? *

Save money by sharing costs (gasoline, tolls, parking, etc.)

Make a citizen gesture in favor of the environment (reduce pollution, noise, etc.)

Bring conviviality to your relationships

Reduce stress and fatigue on a daily basis and thus reduce the risk of accidents

Which carpooling system would you go to? *

Use of the vehicle of each of the carpoolers in turn

Use of a single vehicle and passenger participation in travel costs (gasoline, tolls, parking, etc.)

25. Would the free use of this carpooling concept for users be an incentive to use this means of transport? *

Verry much

I think yes

I do not know

Not at all

26. If you are a "driver" you would be ready to use this concept of carpooling *

Yes

No

27. You would be prepared to pay by *

Bank card

Cash

Both

28. Which of the following technological equipment do you have? *

Laptop

Desktop

Tablet

Mobile phone

Other

29. What operating system are you using? *

Android

ios

Both

Thank you very much

Lists of figures

List of tables

STUDENT DECLARATION

Signed below Nawres BANNOUR, student of the Hungarian University of Agricultural and Life Sciences, Gödöllő Campus, Management and leadership MSc Course <u>full time</u>/correspondence* declare that the presented Thesis is my own work, and I have used the cited and quoted literature in accordance with the relevant legal and ethical rules. I understand that the one-page-summary of my thesis will be uploaded on the website of the Campus/Institute/Course, and my thesis will be available at the Host Department/Institute and in the repository of the University in accordance with the relevant legal and ethical rules.

Confidential data are presented in the thesis: **<u>yes</u>** no

Date: 2023 year04 month 30day

Nawres bannour
_____
Student

SUPERVISOR'S DECLARATION

As primary supervisor of the author of this thesis, I hereby declare that review of the thesis was done thoroughly; the student was informed and guided on the method of citing literature sources in the dissertation, attention was drawn to the importance of using literature data in accordance with the relevant legal and ethical rules.

Confidential data are presented in the thesis: **<u>yes</u>** no

Approval of thesis for oral defense on Final Examination: **<u>approved</u>** not approved

Date: Gödöllő, 2023 year April month 30. day

_____
Internal Supervisor

Appendix 2

CONTENT SUMMARY OF THE THESIS

Thesis title Revolutionizing Sustainable Urban Mobility in Tunisia: Exploring the Potential of an Eco-Friendly Vehicle Sharing Mobile Application to Promote Carpooling and Mitigate Traffic Congestion

Author name Nawres BANNOUR

Management and Leadership MSc, full time course

Internal Supervisor: Dr. habil. Ildikó RUDNÁK Ph.D

In this study, we aimed to investigate the feasibility of a mobile application for vehicle sharing in Tunisia, with the goal of ensuring the success and sustainability of the startup. We employed Explanatory Sequential Mixed Methods, including a questionnaire and interviews with 1924 participants, to gain a comprehensive understanding of the external and internal environment of the startup. The results showed that H1 is valid, while H0 is rejected, indicating that a mobile application for vehicle sharing has a significant impact on the adoption of carpooling. This leads to a reduction in the number of vehicles on the road and an improvement in the quality of life in urban areas, supporting carpooling as an effective means of reducing traffic congestion and improving air quality.

Our study provides answers to our problematic question regarding the potential impact of a mobile application on carpooling adoption and traffic congestion. We found that technology can play a vital role in promoting carpooling and reducing traffic congestion, and a mobile application can be an effective tool for facilitating vehicle sharing. Our findings have important implications for policymakers and stakeholders seeking to address traffic congestion and air pollution in urban areas.

In conclusion, our study highlights the potential impact of a mobile application on carpooling adoption and traffic congestion and underscores the importance of technology in addressing these pressing issues. We hope that our findings will contribute to the creation of a more sustainable and livable urban environment.

Appendix 3 – Sample Abstract

ABSTRACT OF THESIS

Thesis title: Revolutionizing Sustainable Urban Mobility in Tunisia: Exploring the Potential of an Eco-Friendly Vehicle Sharing Mobile Application to Promote Carpooling and Mitigate Traffic Congestion

Author name Nawres BANNOUR

Course, level of education: Management and leadership
Host Department/Institute:

Primary thesis advisor: Dr. habil. Ildikó RUDNÁK

This study aims to examine the potential impact of a mobile application-based solution for carpooling on reducing traffic congestion and promoting sustainable mobility in Tunisia.

Using Explanatory Sequential Mixed Methods, including a questionnaire and interviews with 1924 participants, we identified the key factors that influence the adoption of a mobile application-based solution for carpooling in Tunisia.

Our findings indicate that the use of a mobile application-based solution for carpooling can significantly reduce traffic congestion and promote sustainable mobility in Tunisia. However, factors such as trust, convenience, and perceived usefulness play a crucial role in determining the adoption of the solution. We provide recommendations for the development and implementation of a successful mobile application-based solution for carpooling in Tunisia. Our study contributes to the emerging field of sustainable mobility in developing countries and can inform policy and decision-making processes to promote eco-friendly and efficient urban commuting.