A TALE OF TWO CITIES

Examining Processes & Technology Application in Local Governments from Diverse Perspectives

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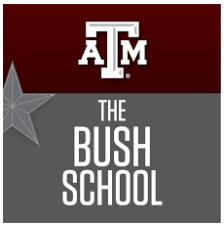

Research in Partnership with the City of Navasota, Texas (USA) and the City of Kragujevac (Serbia)

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Executive Summary

This Capstone began with the idea of exploring the relationship between local governments and the communities they serve. From utilizing emerging technology to provide superior and more efficient services to evaluating the quality and impact of capital improvement projects, the Capstone Team sought to achieve a feat never once attempted by a Bush School capstone project: providing comprehensive deliverables for two different clients. The Team worked diligently to offer a substantive final report that addressed the needs of both the City of Navasota and the Public Utility Company, Sumadjia.

The following Final Report notes best practices of local governments, highlights key goals and findings from both teams, and offers a series of reflections on the overall Capstone experience. Additionally, how our group structured internal processes of designing a capstone structure with the ability to address the needs of two clients is also noted. This Capstone project was facilitated during the COVID-19 pandemic, thus resulting in inherent challenges that come with operating exclusively over a virtual space. Using a variety of innovative software applications to keep the Team's collaborative environment productive, we were able to efficiently implement the project's overarching mission and vision.

Overall, the Bush School of Government and Public Service's *Processes and Technology Capstone* overcame obstacles caused by the COVID-19 pandemic to deliver a final product in which every member of the Team, Capstone Clients, and the Bush School can take pride. This Capstone project explored complex issues and made innovative recommendations based on survey analysis, data-driven research, and case studies. The Team believes the following report contributes to existing literature in the fields of capital improvement project evaluation and the technology-government symbiosis.

Team Narrative

The Capstone project has provided many opportunities for the team to learn from each other, and from the challenges that we overcame. Serving as a representation of the complexities of intra-organizational relations in a workforce environment, the Capstone project necessitated flexibility and hard work from each member of the team. A significant amount of time was spent being intentional in discussing our different backgrounds, experiences, and personalities and leadership styles. As future public servants, this style of developing relationships and mutual understandings is essential to the success of our future careers and communities. Lessons of how team diversity can build strength and produce better outcomes were demonstrated as the team met weekly for nearly a year. Together, we exceeded expectations and ultimately delivered phenomenal results to each of our Clients.

Originally, this Capstone was designed to be a continuation of a previous project working with the City of Bryan on technology issues facing local governments. However, due to financial constraints and the uncertainty around COVID-19, the original Client was unable to continue with the project as is. This sudden change left our very eager Capstone team with an opportunity to do something ambitious and unique. So, over the summer of 2020, most of the team met on a weekly basis to discuss the future outlook of the project, objectives, clients, etc. At this time, many in the academic world and professional world of local government began to adapt to COVID-19 by working collaboratively over video technology software like Zoom. Working together in this virtual environment without physical proximity to one another was a significant change to which members of the team were not accustomed. This new challenge required more intentional communication, compassion, and inclusion. We developed and used strategies of open dialogue to ensure full team engagement with the project.

Our first objective was to find a new client to work with out of existing relationships maintained by the Bush School or fellow students. During the first month of summer meetings, the team brainstormed and asked students to contact potential organizations interested in partnering to be a Client. Students were asked to reach out to any previous contacts or professional experience(s) they had in order to find a client willing to work with us. Multiple students developed ideas for Capstone Clients and how projects would be potentially conducted. Ultimately, by utilizing the professional relationships the Bush School has developed with nearby communities and the professional experience(s) of the Capstone members, the team chose the City of Navasota, Texas and City of Kragujevac, Serbia as Clients. Having two clients for a single project was something that had not yet been accomplished within a single Bush School Capstone project. Our team was at the forefront of innovation in this way.

Secondly, we had to develop an organizational model from scratch, while managing communication and getting documentation from the two Clients. Three team members presented possible solutions for the aforementioned client selection, which were deliberated, resulting in a unanimous selection by the leadership team. Each member of the project who had a connection to the Client was the designated Team Manager for that team and the final member whose Client was not chosen was designated as the Capstone Group Manager providing oversight to both projects. Each member of either team reported to their respective Team Manager each Team Manager reported to the Group Manager; and the Group Manager coordinated directly with the Professor. All of these positions were elected, with each member of the Capstone team acknowledging that there may need to be organizational leadership changes at some point in the project. Forming the hierarchy from nothing and eventually evolving the structure gave each

member insight into lessons of the importance of administrative behavior and leadership. An organization chart is provided in *Appendix C* to illustrate this initial Capstone structure.

As the first semester of the project began, different internal challenges arose from the nature of team conflict and miscommunications. Team conflict, derived from natural disagreements on how to handle parts of the Capstone, became a problem in the middle to end of the first semester. Thankfully, the whole of the team had previously agreed upon potential changes in leadership if such a situation were to happen. Intentionality, team consensus, and open dialogue were among the main components of conflict resolution used to fix the hierarchy problems. Eventually, we decided there were too many levels of hierarchy between the top and the bottom of the organization. It was also decided that the Team Managers should be the only level of leadership between the Professor and each member of the Capstone. Also, Co-Managers were introduced for both projects, so organizational problems could be handled with more involvement. A secondary organizational chart is attached in *Appendix C* to highlight the aforementioned changes.

Externally, the Capstone-Client relationships developed well with only a few obstacles. Communication and data reliance were some of the minor elements that caused delay in first semester deliverables. At the beginning of accepting new clients, each team met with their leadership to outline expectations regarding professionalism, communication, openness for sending documentation, etc. These ideals were mostly lived up to and there were no major problems for any one of the areas. In regards to communication however, some of the Client staff on either project would be somewhat delayed in providing documentation or correspondence to the Capstone teams. These problems were eventually resolved through adapting to more routine Client meeting check ins. Due to the nature of the Serbia project, there were also many

documents that needed to be translated. Through perseverance and hard work by each member of the team, the appropriate documents and presentations were translated well and on time. Another challenge for the team was too much reliance on data without a proper follow-up from the Client. The time difference between Kragujevac and College Station is seven hours. This made it difficult for both client and the team to organize their schedules in a way that allowed them to meet frequently. Due to this challenge,we decided to focus on the available data and primarily base our research around it. During the second semester, a more flexible approach was taken towards scheduling the meetings and problems from the first semester were mitigated.

Best Practices of Local Government Organizations

Navasota Best Practices

The City of Navasota, Texas served as a very interesting Client to work with and learn best local government practices from. In interactions with the City, the Navasota subteam experienced the importance of quality communication, relationship building, leadership, and public management. These are crucial aspects of effective city management in the United States. Some of the best practices the Capstone learned from the Navasota project include: gauging and incorporating public feedback, building relationships with nearby institutional leaders, and pursuing external funding in a fiscally ambitious manner.

The Navasota city staff demonstrated that they do an excellent job of caring about and handling citizen feedback. In both citizen interviews conducted by the Navasota team, the citizens indicated that Brad Stafford, the City Manager, and his staff have an open door policy and always listen to residents' concerns.[1] Beyond this, all city council members praised the City

[1] Appendix A (Navasota Report), 2021.

leadership for their commitment to improving the City and being open to feedback.[2] As highlighted in literature and case studies, it is important to align goals between staff, public feedback, and elected officials interests.[3] The methods and processes for public input Navasota follows are inclusive and focus on hearing people out, no matter whether the feedback is positive or negative. The acceptance of working with the Capstone project in and of itself is showing a commitment to citizen involvement. At the outset of the project, Brad Stafford outlined that he wanted a survey and some capacity to understand many diverse citizen perspectives on capital improvements in the City.[4] These small, yet impactful decisions are intentional and part of what makes Navasota an exemplary case study of how governments can effectively integrate public feedback into future projects.

Building relationships with other key community stakeholders is equally as important of a lesson as public involvement. Without collaborative and cooperative relationships between institutions like school districts, county governments, economic development organizations, and chambers of commerce, Navasota would have a significantly decreased ability to provide quality municipal services to the community. Luckily, the Navasota team identified the importance of these relationships in the literature and case studies.[5] The team even followed up with the leaders in each of the aforementioned institutions within Navasota. Each of them identified a positive working relationship with the Navasota city staff and elected officials.[6] Navasota helps organizations like Navasota ISD funnel information regarding bond elections and important community meetings to the public.[7] They also assist and enable entities like the Chamber of Commerce and Economic Development Corporation to finance and implement important

[2] Appendix A (Navasota Report), 2021.
[3] Ibid.
[4] Ibid.
[5] Ibid.
[6] Ibid.
[7] Ibid.

projects crucial to city infrastructure.[8] Maintaining these positive, mutual relationships between the city and various stakeholders is important to cooperative, functioning governance. Navasota exemplifies these core values well, as we have seen from our research.

Effective local government management also requires quality financial stewardship and the ability to ambitiously pursue external funding. Since governments operate from taxpayer money, it is important to use it wisely and maximize its effectiveness. Local governments often do not have enough money to meet the demands of their communities. So, they are expected to pursue external grants from places like Council of Governments (COGs), and state and federal agencies. In the council member interviews, most indicated that staff does their best to pursue this external funding for city projects. One council member even indicated being elected to dramatically increase the pursuit of grant funding, but eventually understanding that the staff already excels in this area.[9] However, even though the Navasota staff already do a fantastic job on finding external funding for projects, they recently stepped up their dedication to it by hiring a grant management position.[10] Evidently, the staff is outstanding in pursuit of this external funding and should be seen as a positive case study for not only pursuing grants, but also maintaining positive relationships with community stakeholders and incorporating public feedback into future plans.

Kragujevac Best Practices

In 2018, the Kragujevac city government started an initiative to centralize the activities of seven public communal companies under the same institution. In 2019, the initiative was accepted, and public utility activities were institutionalized under the Public Utility Company

[8] Appendix A (Navasota), 2021.
[9] Ibid
[10] Email correspondence, Brad Stafford, Feb 11, 2021.

Sumadija (herein PUCS).[11] This decision was part of a strategic plan that encompassed an idea of a smarter city that will follow the technological trends aiming to improve the services offered by public communal companies.

Before forming PUCS, the Sector for Public Transport piloted several projects that aimed to incorporate cutting-edge technologies to improve the existing public transport system. These projects resulted in mapping Kragujevac as a city with one of the best organized public transport systems, not only in Serbia but in Eastern Europe. Encouraged by this success, the other sectors started considering the same practice. The moment of centralization and willingness to explore different technological solutions for service improvement made the city of Kragujevac a perfect Client that matched the needs of the research topic of our Capstone project. In addition to analyzing and recommending technological solutions for the waste and parking management sectors, the Kragujevac team also had a chance to work with a public company that is undertaking massive institutional changes that made this Capstone experience even more valuable.

There are many takeaways that the Kragujevac team gained from work with the Client. The most important ones came from two good practice examples that the team recognized as a most valuable learning experience. The first one is transparency. Since the very beginning of our Capstone, the Client highlighted the importance of open communication. The Client considers this an essential factor that will enable both parties to come with the best possible ideas for implementing technological solutions that will be compatible with the existing system and infrastructure of the PUCS. The importance of open communication was demonstrated through full access to all data and information that the Client had about parking and waste management.

[11] JKPS Istorijat, n.d.

Their relationship with us was a continuation of their efforts to increase the transparency of their work, not just among their partners but also among the public. One of the requests that the team had to take into consideration while researching different technologies was that they have to include a system that would allow PUCS to easily communicate the data within their organization and its service users. Their open communication and need for systems that encourage open data systems serve as examples of how public institutions show their effort towards more transparency in their work.

The second important takeaway is a system-thinking approach. One of the reasons why PUCS was formed was the better connection and greater cooperation between different public utility sectors. In June 2020, right before our Capstone started, the PUCS installed the first reverse vending machine in Serbia. The goal was to promote recycling activities among citizens and encourage responsible waste disposal practices.[12] The interesting fact about this project is that it directly connected the service of two different sectors for the first time. The PUCS asked the vendor of the reverse vending machine to create a paying system that will allow reimbursement through an eKG credit card. The eKG is a personalized paying card that citizens and visitors of Kragujevac use to pay for public transport services. The money earned from recycling is directly deposited to their eKG cards, allowing its users to cover public transport costs. Currently, the city is in the process of installing seven additional reverse vending machines. Also, one of the vendors is interested in opening an assembly line in Kragujevac. The case of the reverse vending machines is a good example of how system thinking theory can be applied in the work of local governments when considering the implementation of new

[12] Mladenovic, 2020.

technologies. The final goal of PUCS is to have an interdependent system that will encourage cooperation between different PUCS sectors in the future.

Goals & Findings

City of Navasota

The main goal of the project as a whole was to take a holistic view of the last 15 years and decide whether or not the City of Navasota's projects increased the value of the city as a whole. Our findings suggest that the City of Navasota's work on capital projects has garnered a strong return on investment, has increased the overall livability of the city, as well as increasing the value of the city as a whole.

Out of the findings of the research conducted by the team over the last year, the most significant findings found that:

- The City of Navasota has spent approximately $7 million on various road repairs, utility upgrades, and technology upgrades over the last decade; and has received over $12 million in grant funding from the state of Texas and the federal government.
- The City of Navasota saw a 26% growth in sales tax revenue from February 2020 to February 2021, compared to the statewide average of 1.69%.
- Property in Navasota has appreciated 143.84% since the year 2000, at a rate of 4.39% per year. Much of this growth can be attributed to the financial investments the City has made to improve quality of life.
- 54% of citizens who took the Team's survey did know how the City spends on projects.
- Citizens did not know about 4/6 of the projects covered in this report prior to taking the survey.

- ➢ Citizens were satisfied with downtown beautification and City Council's work as a whole, but would like to see more road repairs and business expansion. They highly prioritize road repair and flood control infrastructure projects.
- ➢ In order to communicate this information to the public, the team generated marketing materials for publication titled "Navasota Works!" This included the creation of a brochure and magazine for the City to use for future advertising and distribution.

Each of these findings will be discussed in greater detail in *Appendix A* of the report. The team found that the work that has been conducted by the City of Navasota has increased the overall livability and quality of the city as a whole.

City of Kragujevac

Team and Project Goals

The overarching goal for the City of Kragujevac was to find more efficient ways to improve the city's waste management system and parking service system. To achieve this goal, the Kragujevac team took ideas from the 2019-2020 Capstone project and the original topic of discovering the relationship between technology and government. Here, the team explored emerging technologies, case studies from cities around the world who encountered similar issues, and analyzed vendors who could provide possible solutions. A combination of these three aspects bolstered our understanding for how governments can utilize technology to better serve their communities.

The first goal the Kragujevac team was tasked with was creating an accurate assessment of the current conditions of both waste management and parking service systems. This assessment was the basis for the first phase of our project. A data-driven approach was the

team's guiding strategy to meet the goals and expectations of our Client. To achieve the thorough analysis of current conditions for PUCS, the team analyzed data provided by the Client and used a series of case studies to act as benchmarks.

Case study research, the team's second goal, proved to be an efficient tool to compare waste management and parking systems from around the world. Indeed, this allowed the team to generate a list of best practices or industry-standards within the waste management and parking services space. The last major goal the team worked towards was creating a methodology to research, assess, and critique vendors. Vendors were identified during the project's first phase as an option to provide solutions to both waste management and parking services. This goal culminated in the creation of a vendor profile to determine a vendor's overall viability for providing solutions to the Client's needs. Exploring the practical application of these findings was the goal of the project's second phase.

Overall Project Findings

Over the course of this project, the Kragujevac team was able to come to important conclusions and report useful findings that directly address the Client's needs. Ultimately, the findings resulted in designing the *Application Form* which is a series of logic models, practical application assessments, and sustainability metrics to help determine the overall feasibility of proposed solutions. The Application Form allows for:

- ➢ Vendor Analysis
- ➢ Impact and Evaluation Strategy
- ➢ Project Sustainability Assessment

The overall goal of the Application Form was to design a method that took the practical application of the findings from the project's first phase. The Application Form was also designed to apply to future, emerging technologies in the waste management and parking services space. The idea of sustainability was a common theme in our findings. With this, the Kragujevac team wanted to assure the Client that chosen technologies would improve overall sustainability measures. Therefore, it was pivotal for possible solutions to have long-term viability and practical application.

Another major finding concerned challenges with vendors. To this effect, two distinct challenges were found as the project unfolded: logistical challenges and organizational complications. Regarding logistical challenges involving vendors involved issues with banking networks and payment systems between Serbia and third-party host countries. Essentially, the team found that some vendors that could provide sustainable solutions could not be considered because they could not offer payment options for parking services from inside Serbia and only within E.U. member countries. Organizational complications associated with challenges related to how third-party vendors operate and discuss sales. The team worked diligently to research how services offered by vendors could solve the Client's needs, however, we found that, without working in an official capacity with the City of Kragujevac, getting cost estimates and even making initial contact with vendor representatives was difficult.

The last major finding identified by the team was an understanding of the limitations on the Client's ability to influence policy. Legislation and policies outside of PUCS' sphere of influence was impacting the efficiency of both waste management and parking services systems. This is certainly an area that needs future research. The intersection of policy and implementation strategy was an area the team did not have ample resources to fully explore.

Inherent policy and political challenges were determined to be potential issues during the project's first phase, however, the scope of work for the Kragujevac team was limited to exploring the relationship between technology and government. Additional areas of future research should, then, explore how policy and legislation can support this working relationship.

Integration of Academic Studies into Leadership

Throughout the Capstone project, the team met weekly to discuss academic concepts from Herbert Simon's *Administrative Behavior: A Study of Decision-Making Processes in Administrative Organizations*. This book details crucial foundations of organizational behavior and had lessons applicable to the work the Capstone was doing. Each member of the team was assigned to read a chapter each semester, take notes, and provide either discussion questions or topics for the week. Throughout these discussions, team members were encouraged to bring in their own ideas or lessons learned from their backgrounds and work experiences. Three overarching themes stood out from *Administrative Behavior* as the most important and applicable to the Capstone experience: fact and value decision making opportunities; psychology and team dynamics; and the role of authority. These fundamental ideas of organizational structure and how the Capstone experienced them are outlined in this section.

Fact and Value Decision Making

The first influential academic concepts the team learned were the barriers to decision making and how to distinguish between facts and values. Oftentimes, there are constraints to the work individuals can do within an organization, such as time, limited information, or work exhaustion.[13] This often leads to managers of organizations making decisions that do not seem

[13] Simon, Herbert A. *Administrative Behavior: A Study of Decision-Making Processes in Administrative Organizations*. 4th ed. New York, NY: Free Press, 1997.

correct in the long-term. Continued use of limited and incomplete information can lead to a concept called *satisficing*, where low-quality information can lead to mediocre or poor outcomes.[14] As Dr. Bullock discussed in class conversation on this topic, it's important to note that "the flow of information is the blood and oxygen to the organization."[15] Being able to quickly and effectively make decisions is imperative in public management and fostering an environment of quality information flow can strongly influence a government organization's public service delivery.

Coupled with barriers to effective decision making, the distinction between facts and values is quite important. Simon describes facts as being a part of the "observable world"[16] and values as being "ethical propositions" that are neither true nor false.[17] However, both are foundational in evaluating alternatives, especially in context of governmental organizations. Determining policy and administrative structures often reflects the priorities of that government, whose values are supposed to follow the citizens'. This concept is evident in the Capstone's selection of both Clients. Even after the original Client had disengaged, the team remained determined to continue with working with local government entities knowing that they had a significant effect on many people's lives, especially when compared to higher levels of government. Value determinations were also exemplified when the team chose to work with one domestic and one international client. This decision was made intentionally due to the fact that many members had different interests and experiences that would be beneficial to different clients. By taking an inclusive, multi-client approach, these values were set as precedent for respecting each other as a team and establishing cooperative subteams that worked well together.

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[14] Ibid.
[15] Personal communication, Justin Bullock, March 3, 2021
[16] Simon, Herbert A. *Administrative Behavior: A Study of Decision-Making Processes in Administrative Organizations*. 4th ed. New York, NY: Free Press, 1997. (p. 55)
[17] Ibid, Page 56.

From the separate teams, decisions were made within bounded rationality quite often. For the Kragujevac team, the language barrier served as a bit of an obstacle for translating documents. Cross-cultural communication and time zone differences were also opportunities from which the Kragujevac team could learn, grow, and make decisions that produced quality outcomes. Navasota had some communication lag between requests for documentation and receiving them. The two teams overcame these obstacles by evaluating the circumstances and facts of the work and applying values of public service, hard work, and determination. Intentionality and integrity were at the forefront of these decisions. However, there were some lessons learned along the way dealing with individual and organizational psychology and team dynamics, too.

Psychology and Team Dynamics

At the individual level and organizational level, understanding psychology and group behavior is key to predicting and understanding outcomes and behaviors. At the individual level, it is important for members to be actively involved and hold stake in projects. Then, motivating others becomes much easier and team cohesion and cooperation typically increases. From the organizational level, influence is necessary to ensure solid group dynamics. Simon outlines five *mechanisms* of organizational influence that are helpful in coordinating teams:

- ➢ Division of labor
- ➢ Establishing standards of practice
- ➢ Formal and informal roles of authority
- ➢ Formal and informal methods of communication
- ➢ The internalization/indoctrination into the practices of the organization[18]

[18] Simon, Herbert A. *Administrative Behavior: A Study of Decision-Making Processes in Administrative Organizations*. 4th ed. New York, NY: Free Press, 1997. (p. 112)

Managers can use each of these mechanisms to encourage positive group behavior and coordination. Clear communication and planning are integral to remain effective organizationally; however, information only relevant to a team member should be communicated and administrators should coerce a willingness to participate from each team member.

Within the whole Capstone team, the overarching mechanism to encourage active engagement and work was the final grade each semester. However, most team members individually felt the desire to go above and beyond expectations to help the Clients, the Capstone, and help the Bush School maintain its reputation. So, the intrinsic motivation existed. The week to week deadlines and continued stumbling blocks in each semester demotivated members of each team. However, the leadership ensured group contribution through positive reinforcement and setting clear expectations. As a whole, team compliance to get things done by reasonable deadlines was very high. This is due to realistic group dynamics and leadership being compassionate and understanding, yet holding high expectations for providing quality deliverables.

The Role of Authority

There is a vast amount of literature that analyzes the importance of authority and its role in organizational formation. Simon's pragmatic approach defines it as the ability to make decisions that will influence the actions of others.[19] In his book, Simon analyzes the instrumental nature of authority by focusing on concepts such as the use of authority, its impact on the unity of command, its limits, and sanctions. Further analysis of these concepts will help us understand some of the team's challenges during our work in the Capstone.

[19] Simon, Herbert A. *Administrative Behavior: A Study of Decision-Making Processes in Administrative Organizations*. 4th ed. New York, NY: Free Press, 1997.

Authority is a concept that is an essential building block of any organization. The normative function of the authority helps organizations with formalizing the behaviors between individuals working together. The use of authority can be defined through the three most important factors. First, if functioning in a hierarchically organized system, authority imposes the responsibility of team members to those who hold it. Second, authority secures expertise in the decision-making process. Third, authority permits coordination of activity.[20] When analyzing the structure and relationships inside the Capstone team, we can see that all of the three factors were represented but at the same time hindered by certain sanctions over the authority. This sanction will be analyzed in the following paragraph.

An organization is composed of a group of people who are working towards the same goal. This implies that the organization will adopt and reflect some of the values accepted and manifested by its members. When applied externally, the same logic can be used to describe how certain societal norms and values influence the way an organization behaves. These normative factors, carried by individuals and society together, serve as a latent function which Simon describes as a *social sanction*.[21] This social sanction, in a certain way, confines the role of authority within the organization. All of the team members in our Capstone project were students, expressing the same level of authority previously defined by the educational institution we are attending, Texas A&M. Our relationships can be described as acquaintances and friendships which never demanded a statement of authority. When put in a surrounding where a certain level of authority needs to be exerted, the previous relationships of friendship will have an impact on it. This is why our team was struggling to accept the leadership role of certain

[20] Ibid.
[21] Simon, Herbert A. *Administrative Behavior: A Study of Decision-Making Processes in Administrative Organizations*. 4th ed. New York, NY: Free Press, 1997.

members. The friendly nature of our relationships before the Capstone was not prepared for the new environment in which some of the team members are supposed to have more authority. The social sanction also influenced the other two factors of authority. The second factor states that authority secures expertise in decision-making. Even though we considered a level of expertise as an important factor when building our leadership structure, it was once again hindered by the previously defined social sanction. Also, our ability to coordinate certain activities was limited too. This is why the relationship between leadership defined one of our team's major challenges during the first semester.

The concept of authority, which focuses on the unity of command, explains how we successfully overcame the previously mentioned leadership challenge. When writing about the unity of command, Simon offers a set of recommendations on how to structure the role of authority to minimize the chance for conflict. To avoid the conflict, Simon suggests that:

- Each individual receives orders from only one superior;
- Individual may receive orders from many superiors, but in the case of conflict, he/she only obeys one of them;
- Each unit in the organization has exclusive authority for a specific thing;
- An individual is subject to the authority of all other individuals of a certain rank that is higher than his/her own.[22]

After the first semester, our leadership was restructured. Instead of having three different layers of leadership, we decide to have two. The result was less tension in communication about

[22] Simon, Herbert A. *Administrative Behavior: A Study of Decision-Making Processes in Administrative Organizations*. 4th ed. New York, NY: Free Press, 1997. (p. 192)

certain activities and evaluation of our work. The same structure was kept till the end of the project, and all of the team felt that this change had positive effects on our effectiveness.

Conclusion

When the team met for the first time in July 2019, all team members had a similar view of the capstone experience. The Capstone project was perceived as a learning opportunity that will introduce the team to certain practical skills needed for building a professional attitude towards learning and applying good practices within the local governments and public administration. The Capstone project enabled the team to learn about the value of well-established professional relationships, leadership skills developed through overcoming internal and external challenges, and recognizing and connecting these trends with the academic perspective of one of the capital works about governance and administration by Herbert A. Simon.

At the beginning of the Capstone project, the team was given a chance to find a new Client on our own. This was perceived as a challenge and opportunity at the same time. The concern was related to the relevancy of the Client's work for the capstone topic. The opportunity was the ability of the team to shape its own learning experience. The clear learning objectives that were determined initially enabled the team to effectively communicate possible cooperation and the outcomes of the Capstone project. The open dialog was an important value for the whole process of finding and eventually choosing two different clients. Aware of its benefits, both teams decided that it is worthy of being potentiated in cooperation with the Clients. The open dialog was considered a first leeson that led to a more professionalized relationship within the team and with the Client. Over time, this has built the trust between the teams and their clients,

resulting in open communication that values transparency and dedication towards the same goals.

Throughout the academic year, both teams were faced with numerous internal and external challenges. External challenges were related to communication with the client, availability and reliance on data, and time difference in the case of the Kragujevac team. Internal challenges were related to the team's hierarchical structure, and the role of authority different team members had. By embracing a positive mindset, the team saw these challenges as learning opportunities and eventually overcame them. The internal challenges were solved by experimenting with different leadership structures, roles, and responsibilities. External challenges demanded flexibility and patience from both the team and clients in order to adjust to different working schedules and communicational styles. The benefits of fostering a professional relationship and attitude towards the communicational changes were the ones that helped in overcoming the external challenges.

The practical experience was complemented by an academic approach to some of the most important topics in public governance and administration. The solutions for some of the challenges such as authority, team dynamics, and decision-making were found in the Simon book. The academic approach to organizational systems formalized practical knowledge and helped the team members frame their experience into implementable patterns.

The Capstone project was a comprehensive learning experience that allowed both teams to familiarize themselves with the work of two different local governments. It was an experience that demanded an organized and planned approach to managing the team dynamic of a diverse group of people and two well-established institutions dealing with different sets of organizational opportunities and challenges. By applying theoretical knowledge and practical skills, the team

managed to reach the objective set at the beginning and obtain knowledge about good organizational practices within the local governments and contribute to their further development.

APPENDIX A. Navasota Report

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The City of NAVASOTA, TEXAS

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Executive Summary

The Team has worked diligently over the past year with the City of Navasota to evaluate the quality of Capital Improvement Projects (herein CIPs), determine sources of funding, and gauge public opinion on these projects. Ultimately, having a multifaceted approach to evaluate the CIPs was helpful to understand the impact they have on the community. This report is to inform the community of their government's efforts and show how Navasota is innovative.

During the course of this project, the Team conducted interviews with elected officials, organizational stakeholders, and active citizens. The Team also created, distributed, and analyzed a community survey that allowed citizens to share how they felt about the CIPs. Consistent and quality communication was kept with the City staff to review various funding sources, the implementation strategies, and impact of each improvement project. Relevant case studies and academic literature were also reviewed and incorporated to compare to Navasota. Best practices are highlighted and discussed in this report. Finally, the Team created two major deliverables for the City to provide to citizens, including an informative tri-fold brochure and detailed magazine.

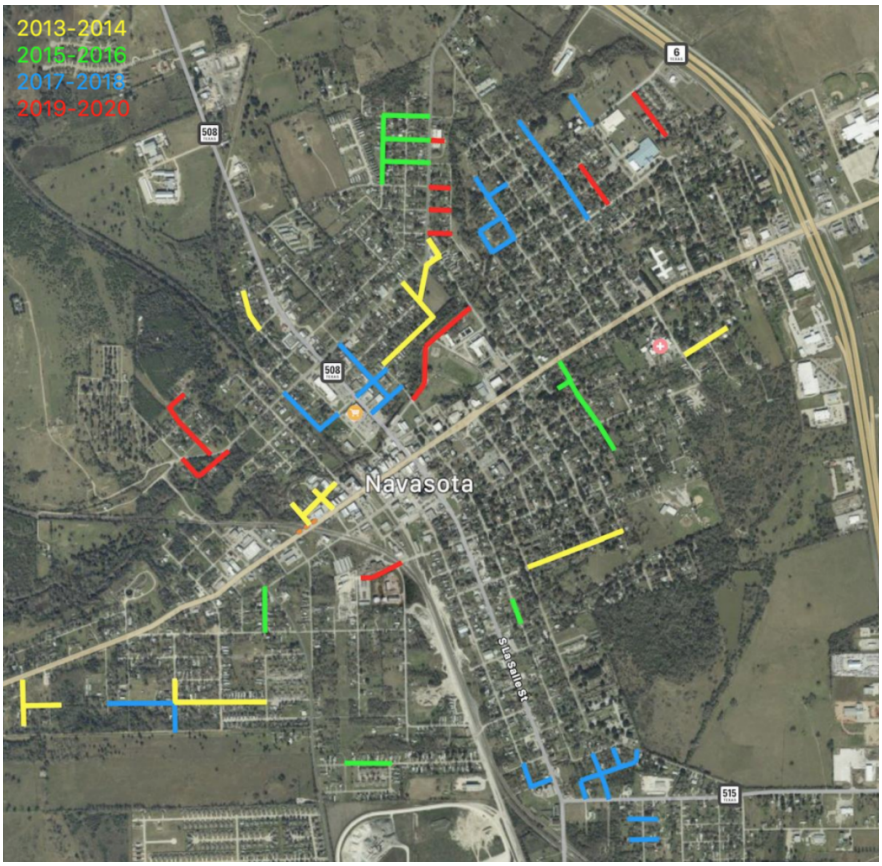
As we go in further detail throughout the report, it is important to highlight the significance of impact City staff's work on CIPs. By evaluating the infrastructure projects real impact, sales tax revenue, and property values in the City, it is evident that the CIPs had a tangible effect on Navasota quality of life. It is also clear that Navasota prioritizes important elements from case studies and literature, including city council relations, citizen feedback, and downtown revitalization. The survey also indicates that citizens are generally informed on these projects, but there is some room for improvement and consistency in CIP education/information. It is the Team's hope that the following report is helpful to residents in Navasota and community stakeholders in understanding the quality job the City of Navasota has done regarding CIPs.

Financial Analysis

Bid Analysis and Grant Funding

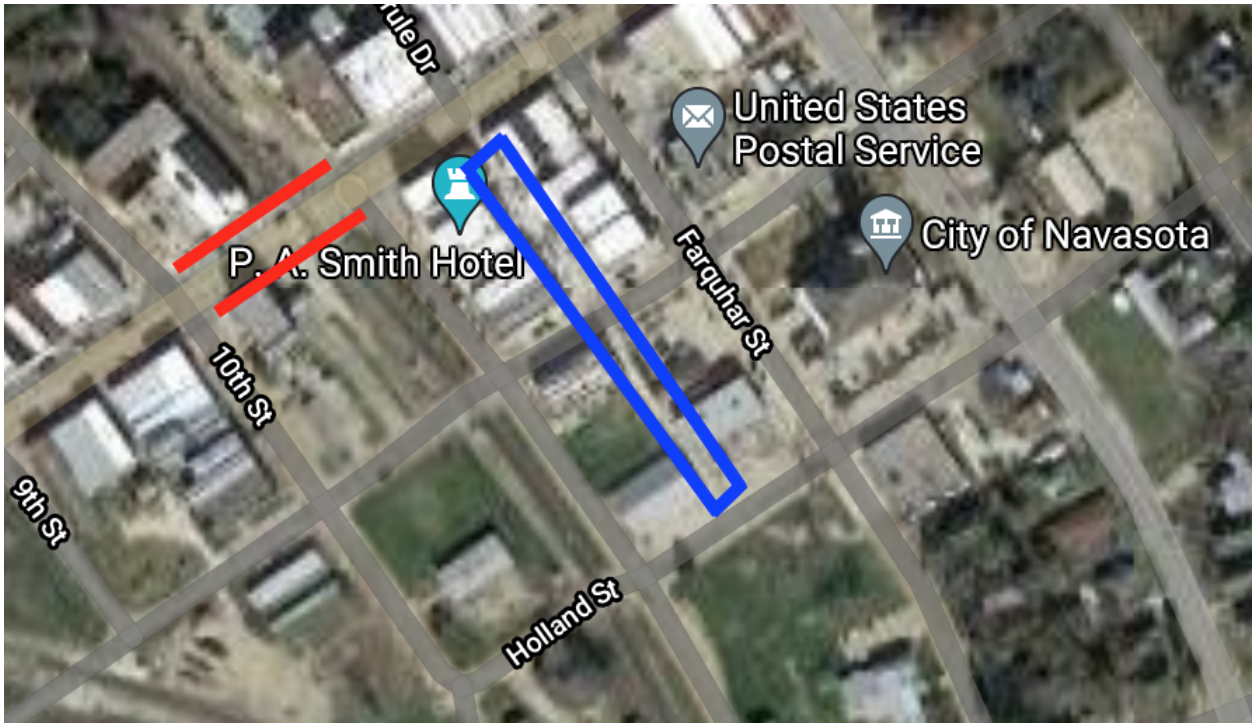
Prior to the start of a project, bids are assembled by interested parties such as engineers and contractors to outline the anticipated cost and plan of action for each project. These bids were analyzed to locate the sites of repairs, as well as identify the cost for each project. The main types of projects assessed include road repairs, revitalization of the Historic Downtown district, and utility improvements and expansions. The City has also been granted significant funding in the form of grants for these projects in order to offset the cost of completion.

Between 2013 and 2020, the City of Navasota conducted repairs to roadways that totaled close to $1.3 million. During this time, the City repaired 118,313 square yards of road, at an average cost of $10.95 per square yard.



Road repairs, by year

The three projects outlined for revitalization include sidewalk repairs, gas and waterline improvements, as well as an upgrade of the City's SCADA system. Approximately 170 square yards of sidewalk between 10th Street and Railroad Street on West Washington Ave were repaired with a base bid of $318,000 (shown in blue). The alley between Farquhar Street and Railroad Street, approximately 400 square yards, had a revitalization of the aging gas and waterline (shown in red). This project was completed at a cost of $155,015.

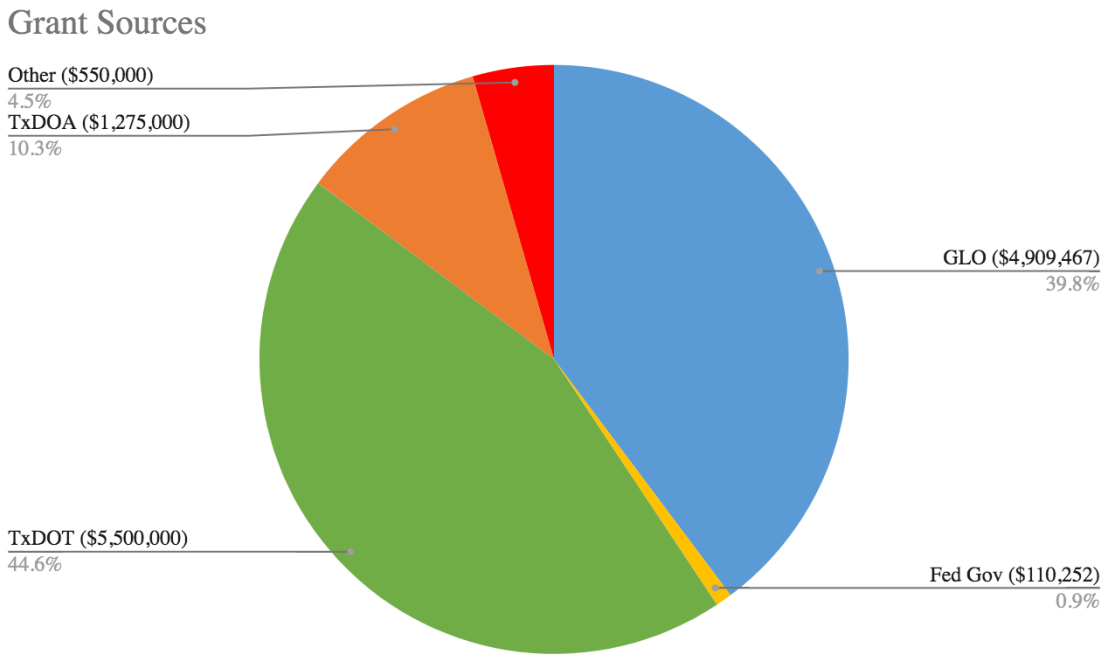


In addition to the sidewalk and alley improvements, several public works locations throughout the City benefited from SCADA system upgrades. These upgrades were made at a cost of $280,000 in order to continue effective monitoring of utility systems across the City.

In 2013, water service infrastructure was improved spanning 3,163 feet at a cost of $335,724. The following year, 6,515 feet of existing infrastructure and new construction connecting the airport to the various systems was completed at a cost of $365,511. A sewage rehabilitation project was completed in 2017 replacing 3,884 feet of existing lines for a total of $494,496, with an additional $444,130 for optional upgrades to the original base project. Extensive drainage improvements were made in conjunction with the downtown parking lot renovation for $515,142 in 2019. Also in 2019, Foster Street drainage was improved spanning

600 feet at a cost of approximately $638,351. In 2020, both phases of the Railroad Street drainage project began covering 1,340 feet at a cost of $965,302 and $960,242, respectively.

In order to require the least amount of money through tax increases, the City of Navasota is diligent about utilizing capital improvement funding through grant funding. Since 2000, the City has been awarded over $12 million in grants from agencies such as the General Land Office (GLO), the Texas Department of Agriculture (TxDOA), Texas Department of Transportation (TxDOT), the Department of Energy, and Department of Justice to name a few. This funding greatly diffuses the costs associated with making improvements to the City, as well as alleviating some of the financial burden from the taxpayers.

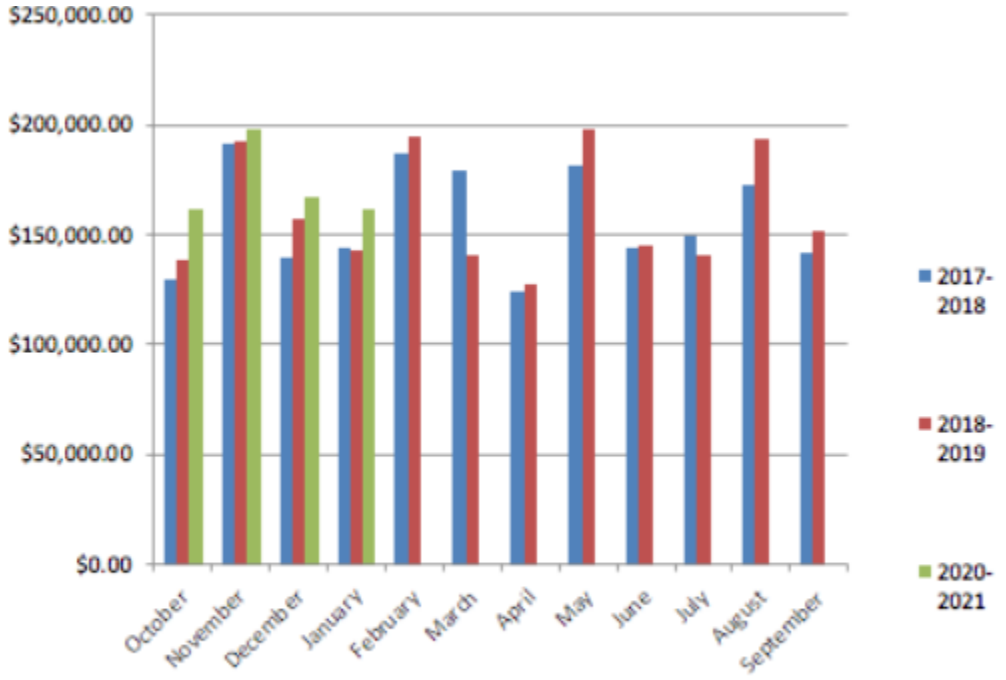


Sales Tax Revenue

In the wake of the COVID-19 pandemic, cities and local businesses were hurt financially nationwide. However, the City of Navasota was able to maintain and grow sales tax revenue steadily over the last year. As of this time, the most recent information available extends to February 2021. Navasota ranks 202nd out of 1165 cities for growth in sales tax revenue within the state of Texas. Relatively, 362 cities in the state saw a decrease in sales tax collection. The

average percentage change in collected revenue from February 2020 to February 2021 statewide was 1.69%, where Navasota saw a growth of 26.01%.[23]

Sales Tax Revenue, by Month and Year



The increase in sales tax revenue can be attributed to population growth, downtown revitalization, and a push for shopping local. The Shop Local Navasota campaign, launched by the City in March of 2020, was created to encourage residents to patronize their local stores, restaurants, and services, rather than traveling to surrounding cities during the trying times of the COVID-19 pandemic. The website and Instagram accounts were created to show what businesses were open and what services were offered during the stay-at-home orders of the beginning of the COVID-19 pandemic. The website also offered online marketing tips for local businesses, along with financial resources for business owners to utilize, such as the Navasota Small Business COVID-19 Relief Grant. The grant distributed a total of $52,750 to 59 local businesses as a means to sustain the economic strength and diversity seen in Navasota.[24]

[23] City Sales and Use Tax Comparison Summary, April 2021. https://comptroller.texas.gov/transparency/local/allocations/sales-tax/cities.php.
[24] Brooks, Madison. "Shop Local Navasota." Texas Town & City. Texas Municipal League, March 21, 2021. https://www.tml.org/DocumentCenter/View/2540/032021_TTC. Page 14.

The campaign was selected as a finalist for the Texas Downtown Association's 2020 President's Awards Program for the *Best Promotion - Digital Campaign* category,[25] as well as highlighted in the "Small Cities' Corner" of the Texas Municipal League's monthly publication, *Texas Town & City*.[26] The Shop Local Navasota campaign is an example of the City of Navasota working to help small businesses and increase revenue locally. It is clear that the money spent on the downtown revitalization of Navasota is resulting in a strong return on investment in terms of sales tax revenue, due to the fact that a significant portion of stores and businesses are located in the Historic Downtown region of the City of Navasota.

Property Values, 2000-2020

Property in Navasota has appreciated at a rate of 4.39% per year, with a total increase of 143.84% since 2000.[27] Compared to the rest of the state, real estate pricing is increasingly competitive within the City of Navasota. According to the state comptroller, the median home price in the state of Texas is $218,000, as of 2017.[28] Within the City of Navasota, however, the median home price is valued at $236,761.[29] This comparison shows that the money invested in the improvement and revitalization of the City reflects favorably on resident and business property values.

Since 2005, the property assessed within the City has increased in value from roughly $80 million to $190 million. Adjusting for inflation in 2021 dollars, the City has still seen a significant increase over the last 15 years.

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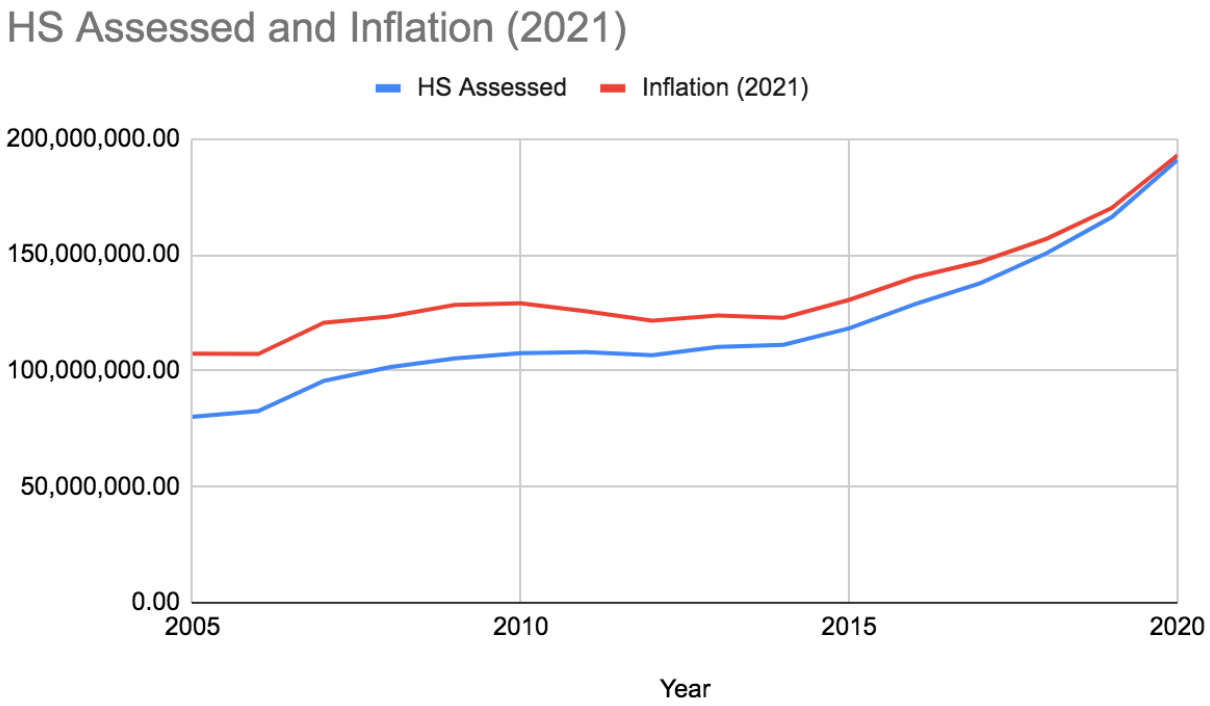
[25] Email correspondence, September 3rd, 2020.
[26] Brooks, Madison. "Shop Local Navasota." Texas Town & City. Texas Municipal League, March 21, 2021. https://www.tml.org/DocumentCenter/View/2540/032021_TTC.
[27] "Navasota Texas Real Estate Appreciation & Housing Market Trends." NeighborhoodScout. Accessed February 2021. https://www.neighborhoodscout.com/tx/navasota/real-estate.
[28] Texas Housing Prices on the Rise. Accessed February 2021. https://comptroller.texas.gov/economy/fiscal-notes/2018/march/housing.php.
[29] "Navasota Texas Real Estate Appreciation & Housing Market Trends." NeighborhoodScout. Accessed February 2021. https://www.neighborhoodscout.com/tx/navasota/real-estate.



These figures show that real estate within the City of Navasota is a virtuous investment. Future residents and business owners are unlikely to lose money buying property within the City, given the consistent upward trend of the last 20 years.

Best Practices for Capital Improvement Projects

Revisiting Phase I: Literature and Case Studies

The Phase I report aimed to provide Navasota with an overview of the best practice used to develop and carry out CIPs. This task included the review of literature related to budgeting and planning practices that could improve the management of current and future CIP in Navasota. The assessment of best practices was also configured into the 'Case Study' section of the Phase I report which explored how cities similar to Navasota managed CIPs. These case studies were constructed using interviews with officials in Brenham, Bryan, and Tomball, Texas.

Now that our Team has conducted more research related to the best practices for CIP management, we introduce a new set of best practices that best align with the CIP goals of Navasota. To effectively convey how CIP best practices are useful to Navasota, the following sections integrate the findings of previous case studies with literature on CIP management. The

next subsection of this report clarifies how case studies and literature were combined into 'themes' for the benefit of this research.

Case Study Themes

As mentioned above, the construction of case study data was done using interviews in which city managers, engineers, and other government officials shared practices for successfully implementing and managing CIPs in their respective areas of Texas. The selection of 'themes' from each case study was done using principles from Charmaz's Grounded Theory.[30] This involved dividing practices into categories, voting on which themes would most benefit the City of Navasota, and finally using these categories to select literature relevant to these themes and CIP in Navasota. The three themes became: City Council Relations, Citizen Feedback, and Downtown Revitalization.

Best Practices

(1) City Council Relations: Brenham, Bryan, and Tomball, Texas each contributed practical information regarding city council relations and CIP development. These best practices along with literature on collaboration within local government are reviewed below:

The interviews conducted to gauge best practices for CIP discussed a number of topics, however, city council relations became a focal point for much of the advice given by Brenham, and Bryan, Texas. Zeeming describes this topic as an "important feature of contemporary local government management."[31] In the study of interlocal cooperation elected officials and appointed officials are seen as actors with different methods of approaching similar goals. These separate methods may sometimes clash or stand opposed to one another in the delivery of services of contracting.[32] In some cases, these dynamics can produce conflicts between different local government actos which Leroux & Carr characterize as rooted in misalignments in priorities within CIP planning networks.[33] This conflict, along with typical local government power

[30] Charmaz, Kathy. *Constructing grounded theory*. sage, 2014.
[31] Zeemering, Eric S. "Governing interlocal cooperation: City council interests and the implications for public management." Public Administration Review 68, no. 4 (2008): 731-741.
[32] Ibid.
[33] LeRoux, Kelly, and Jered B. Carr. "Explaining local government cooperation on public works: Evidence from Michigan." Public Works Management & Policy 12, no. 1 (2007): 344-358.

structures can significantly affect how local governments fund or proceed with CIP. Yet, conflict can be avoided through practices suggested by Brenham and Bryan. Appointed officials in Brenham conveyed that consistent communication with city council members regarding CIPs has built trust between the two groups. Trust has become integral to their CIP development over time; Brenham regularly verifies that council members feel adequately informed about ongoing CIP which meaningfully improves how fast CIP plans are developed. Zeeming encourages this form of cooperation but acknowledges that some may be disinclined to shift power to other actors when negotiations regarding CIP arise. Similar cooperation efforts are found in the City of Bryan where coordination meetings are prioritized to avoid cutting any relevant actor out of CIP discussions; they also avoid 'siloing' using these regular coordination meetings. Leroux & Carr see bridging gaps between city council and local government departments as a strategic advantage; LeRoux & Carr demonstrate that cooperation between elected and appointed officials can result in more easily brokered deals, quicker contract signing, and improved citizen opinion of government.[34] Overall, the internal structures that manage CIPs should be interrogated by city officials with the intention of understanding where communication with city council and appointed officials may fall short. Avoiding misalignment in goals or priorities will benefit the City of Navasota's CIP in the long term.

(2) Citizen Feedback: Citizens often provide feedback related to services and projects implemented within their cities; this subsection makes relevant the advice given by Brenham, Bryan, and Tomball regarding citizen feedback with literature on citizen feedback in local government:

Advancements in technology have changed government feedback and engagement notably in the past 30 years; a significant portion of the US population now regularly uses online or digital forums to communicate government on the federal, state, and local level.[35] Reports on the study of social media and other virtual communication platforms indicate that most local governments can benefit from consistent employment of these technologies as a method of reaching their citizens.[36] However, Graham and Avery note that e-government has only recently

[34] LeRoux, Kelly, and Jered B. Carr. "Explaining local government cooperation on public works: Evidence from Michigan." Public Works Management & Policy 12, no. 1 (2007): 344-358.
[35] Kowalski, Radoslaw, Marc Esteve, and Slava Jankin Mikhaylov. "Improving public services by mining citizen feedback: An application of natural language processing." Public Administration 98, no. 4 (2020): 1011-1026.
[36] Hassett, Wendy L., and Douglas J. Watson. "Citizen surveys: A component of the budgetary process." Journal of Public Budgeting, Accounting & Financial Management (2003).

become popularized in the past fifteen years, something that could cause a lag between citizen's, and government's use of online communication platforms in local government.[37] As Graham and Avery predict, many local governments typically underutilize new functions of social media such as polling features that are meant to gauge public opinion.[38] In a similar vein, Hassatt and Watson find that survey instruments used to collect feedback typically need enhancement to meaningfully capture data related to services like CIP.[39] Survey instruments and social media use were each promoted by Brenham, Bryan, and Tomball for the benefit of CIP development. Outreach through both methods was used by these cities to:

- ➢ Share public notices,
- ➢ Promote or host public meetings regarding CIP,
- ➢ Gather insight on where future CIPs should be located, and
- ➢ Build their comprehensive plan.

These methods mirror suggestions from literature on the increase of feedback formats for citizens. Researchers have found that providing multiple channels to deliver feedback increases frequency of comments from citizens (5). Open forms of communication also encourage citizens to leave complaints more often, possibly due to the fact that social media and survey instruments can anonymize citizens. For complaints, Minelli & Ruffini suggest creating a complaint management plan that ensures that even negative feedback is considered in council meetings, logistical planning for service delivery, or the planning of CIPs.[40] This is backed by the City of Bryan who gathers, then addresses complaints during CIP information sessions. These combinations of online and direct public engagement events allow officials to understand backlash regarding CIP and begin updating policies or projects using this information. Not all citizens will engage with both types of events, but governments are more likely to reach the majority of their citizens when issues regarding CIP develop arise using mixed online-direct

[37] Graham, Missy, and Elizabeth Avery. "Government public relations and social media: An analysis of the perceptions and trends of social media use at the local government level." Public Relations Journal 7, no. 4 (2013): 1-21.
[38] Ibid.
[39] Hassett, Wendy L., and Douglas J. Watson. "Citizen surveys: A component of the budgetary process." Journal of Public Budgeting, Accounting & Financial Management (2003).
[40] Minelli, Alessandro, and Renato Ruffini. "Citizen feedback as a tool for continuous improvement in local bodies." International Journal of Public Sector Management (2018).

feedback sessions.[41] Lastly, citizen feedback can be better facilitated when governments work with community organizations to host engagement events. When new CIP are proposed, or changes to ongoing CIP are suggested, governments and trusted actors in the community play an integral role in helping community members feel heard. Local groups directed at economic development, nonprofits organizations, and businesses can join governments to engage in dialogue with citizens about local CIP. These sessions hosted by nongovernmental organizations can often lead to the end of deadlocks, generate new ideas, or encourage new members of the community to join in efforts to improve CIP management in their area of the City.[42] As demonstrated by both the case studies and literature, analyzing current communication between CIP actors, and the channels used to communicate with citizens, can ease manager's CIP related workload.

(3) Downtown Revitalization and Economic Development: Relevant to the City of Navasota is also the topic of economic development through downtown revitalization. Passed discussion with the City of Navasota as well as case study data collected from two interviews with the City of Bryan are used in this section to convey how the City of Navasota might continue with its efforts to develop their downtown area for the benefit of their community

The revitalization of downtown Bryan has been an on-going process for more than 19 years. The City began with a master plan devised in late 2001 which outlined multiple phases in which CIP would be used to improve the downtown area.[43] This included beautification projects meant to fix their Main Street, the rehousing of a small homeless population, and lighting areas of downtown that were deemed too dark by their public. As noted on the City of Bryan's website, business is valued and considered the heart of downtown Bryan's environment.[44] This is a downtown characteristic promoted by the National League of Cities whose advice on CIP encourages the invitation of new businesses to join their community.[45,46] The City of Bryan's

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[41] Nabatchi, Tina, and Lisa Blomgren Amsler. "Direct public engagement in local government." The American Review of Public Administration 44, no. 4_suppl (2014): 63S-88S.
[42] Ibid.
[43] "Downtown Bryan Master Plan." Looney Ricks Kiss ArchiTexas, September 2001. https://docs.bryantx.gov/planning_development/DTMP.PDF.
[44] "Downtown Bryan." City of Bryan, Texas, n.d. https://www.downtownbryan.com/.
[45] Berger, Gideon. "Why Downtown Development Is Crucial for American Cities." National League of Cities, August 3, 2018. https://www.nlc.org/article/2018/08/03/why-downtown-development-is-crucial-for-american-cities/.
[46] Giusti, C., & Maraschin, C. (2017). Downtown revitalization and urban space: A case study in downtown Bryan, Texas. Cities, 60, 50-63.

Public Works Director noted that businesses have transformed their downtown area from a place with abandoned buildings to a place where revenue is constantly generated. Johnson, Kacker, and Kramer note that treating downtown areas as “foundations for the local economy” can be crucial to economic development from downtown areas.[47] This was also supported by the University of North Carolina School of Governance who posit that downtown areas with strong ties to businesses support job creation, business retention, and growth.[48] Similar to supportive business relationships are ‘downtown partnerships’ with art, food, and cultural organizations that increase the likelihood that both citizens and noncitizens visit the downtown area.[49] In Bryan, festivals like the “Texas Reds Festival" or “Fiestas Patrias" are welcomed as a method of both enjoyment and to showcase the development that has been achieved. These events along with the monthly ‘First Friday’ events ultimately help improve citizens' opinion of downtown revitalization and generate revenue for business in the area.[50] Lastly, in terms of timelines, the capacity for small towns to grow is often limited by human, financial, and organizational resources. The City of Bryan’s 19-year investment in the downtown is what Morgan describes as typical for small towns.[51] Long-term time horizons have helped the City of Bryan effectively revitalize and build off of their original master plan rather than sticking to a rigid plan. Accepting the use of longer time horizons was suggested by Berger of the National League of Cities.[52]

Best Practice Takeaways

- ➢ For the benefit of Navasota, it is recommended that consistent and clear communication be prioritized between appointed and elected officials - this will likely increase cooperation, improve citizen’s view of local government, and facilitate CIP planning.

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[47] Johnson, Nora, Adhir Kackar, and Melissa Kramer. "How small towns and cities can use local assets to rebuild their economies: Lessons from successful places." Environmental Protection Agency (2015).
[48] Morgan, J. Q. (2009). The role of local government in economic development. Survey finding from North Carolina, University of North Carolina School of governance.
[49] LeRoux, Kelly, and Jered B. Carr. "Explaining local government cooperation on public works: Evidence from Michigan." Public Works Management & Policy 12, no. 1 (2007): 344-358.
[50] Giusti, C., & Maraschin, C. (2017). Downtown revitalization and urban space: A case study in downtown Bryan, Texas. Cities, 60, 50-63.
[51] Johnson, Nora, Adhir Kackar, and Melissa Kramer. "How small towns and cities can use local assets to rebuild their economies: Lessons from successful places." Environmental Protection Agency (2015).
[52] Berger, Gideon. “Why Downtown Development Is Crucial for American Cities.” National League of Cities, August 3, 2018. https://www.nlc.org/article/2018/08/03/why-downtown-development-is-crucial-for-american-cities/.

City council relations should also be prioritized when analyzing and making changes to organizational structures.

- ➢ In regards to citizen feedback, updating online communication channels and survey methods, offering multiple ways to provide feedback, making plans for addressing complaints, and partnering with local organizations to host feedback sessions each improve what can be gained from citizen feedback on CIPs.
- ➢ Lastly, economic development through downtown revitalization can be enhanced by making downtown areas the 'heart of business', partnering with art and culture organizations to host showcasing events, and lengthening time horizons for development in the area.

Survey Analysis

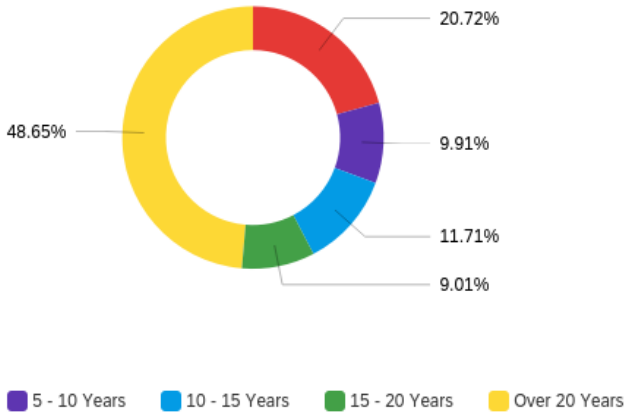
Survey Methods and Demographics

The Team created and distributed a survey to Navasota residents to gauge public satisfaction with and knowledge of CIPs the City has completed. This survey allowed respondents to express their opinions by answering questions and leaving comments. The Team also included a few demographic questions to better understand the characteristics of the survey sample. The complete list of survey questions can be found in Appendix A. The survey opened December 2020 and closed at the end of January 2021, receiving 168 responses. The primary methods of survey distribution were through social media and email. The Team used these responses to determine how satisfied Navasota residents were with projects, how they prioritized them, and when they became aware of each CIP. The following sections of the report will go into detail in each of these areas.

The survey concluded with a series of questions about the respondent's demographics to better understand what segments of Navasota's population the survey sample represents. The complete survey findings for the demographics section can be found in Appendix B. According to survey results, the majority of respondents have either lived in Navasota for at least twenty years or fewer than five years. The breakdown of results for this survey question are in the graph below. Respondents who have lived in the City for a long time may keep up with topics such as

CIPs because they have invested so much time in Navasota and chose to participate in this survey to have their voice heard. Respondents who moved to Navasota recently could be eager to provide feedback and have ideas for improvements.

Number of years respondents have lived in Navasota



The survey asked respondents to identify their location so the Team can analyze how people in different parts of the City feel about CIPs. The Team took several steps to ask this question while remaining respectful of the respondent's privacy. This question was optional, so the respondent could choose for their location to remain unknown. The Team identified twelve landmarks throughout the City, placed them on a map, and asked respondents to select the landmark closest to them. The table below shows the breakdown of responses to this question.

City landmark closest to respondents' residence

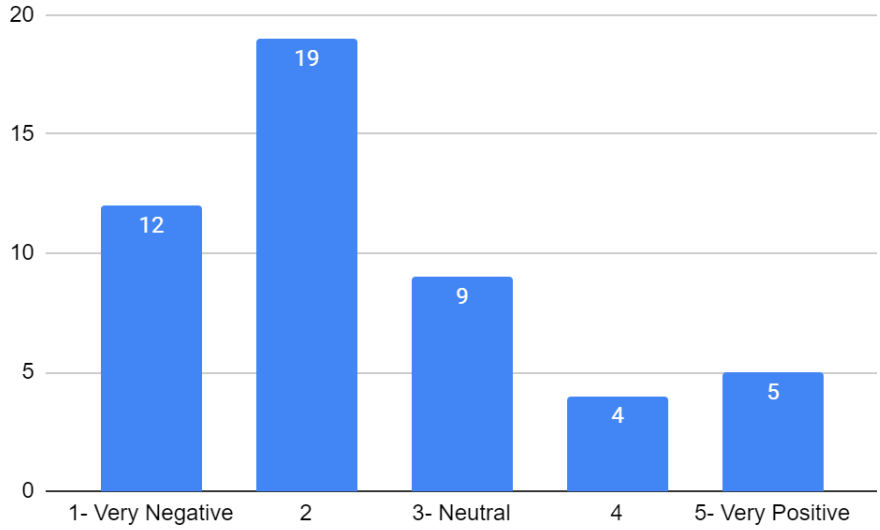
Field	Choice Count	
Hillside Park	6.31%	7
Navasota High School	6.31%	7
Walmart	3.60%	4
Navasota Public Library	15.32%	17
Navasota Center	8.11%	9
Navasota Fire Department	10.81%	12
Manley Park	2.70%	3
City Hall	7.21%	8
Progressive Outreach Center	5.41%	6
Water Treatment Plant	0.90%	1
Navasota Municipal Airport	6.31%	7
Stone Ridge Subdivision	1.80%	2
Not sure/prefer not to answer	25.23%	28
		111

25% of the respondents chose not to disclose their location. This is important to consider later in the report when discussing how people in different locations responded to different projects. Due to a smaller sample size, the Team does not have as complete of an idea of respondent satisfaction when results are broken down by location.

Survey Comments

After analyzing the survey demographics, the Team shifted focus to the comments respondents left. This question was useful for hearing recommendations from residents and gauging how strongly they felt about their responses earlier in the survey. Each comment was reviewed by two team members and given a score of one to five based on tone, with 1 being very negative and 5 being very positive. Responses that were left blank or contained responses such as "N/A" were excluded from the sample for this question. The distribution of scores is displayed in the graph below.

Distribution of survey responses based on tone



As shown by the above distribution, comments on the survey skew towards a negative tone. A recurring theme throughout the comments is the quality of roads in Navasota. People are concerned that the City is more focused on short-term solutions such as patching rather than sustainable repairs. A few examples of comments from respondents include:

- "Residential streets are in bad shape in a lot of neighborhoods!!"
- "Several roads need repair and not just patched"
- "All roads need repairs but I have only heard/seen them repair one and patch one."

Although many of the comments involved street repairs, the survey comments provided useful recommendations in other areas. Respondents proposed preferred companies for business expansion including H-E-B, Walmart, and diverse new restaurants. Many people requested the City provide more youth activities such as after school tutoring and renovations to recreational areas. Respondents were highly complimentary of the City's aesthetics, particularly in the downtown area. The following section will go into more detail on the varying perspectives of the downtown revitalization project.

Satisfaction with CIPs

While survey feedback on resident satisfaction was consistent across many CIPs, downtown revitalization was the most divisive CIP the City has undertaken. Respondents were asked if they felt all residents were positively impacted by CIPs. When looking at respondents who live in downtown, reactions are split equally at 37.5% positive and 37.5% negative. Several respondents left comments at the end of the survey regarding downtown revitalization. Again, comments were split between positive and negative attitudes towards this project. Given that responses to downtown revitalization are consistently mixed across multiple survey questions, this report will examine the arguments made by residents for and against the revitalization.

According to the survey, people support the revitalization project because it preserves Navasota's aesthetic appeal and encourages business development. Several people left comments expressing excitement about the idea of new businesses opening downtown. They want revitalization to lead to diverse businesses that improve quality of life. Other respondents supporting the project appreciate the City's commitment to maintaining aesthetic appeal. They like the design choices of the revitalization and hope that new businesses will follow a similar architectural style to maintain continuity.

Opponents of the downtown revitalization are concerned that the benefits of the project will not be distributed equally and believe other improvements should be prioritized. Out of the six capital improvement projects covered in this report, respondents ranked downtown revitalization fourth in terms of importance to them. The full rankings of project importance is located in Appendix B of the report. They would prefer the City use time and resources to focus on projects such as road repairs and flood control infrastructure. People see other projects as a more valuable use of their funds than improvements to downtown. Respondents would prefer to see streets in areas outside of downtown take higher priority. There are respondents that do not believe that all parts of Navasota receive the same attention in terms of improvements. Opponents of revitalization are more concerned about the equity of capital improvements in general, but appear happy with the quality of work Navasota has done downtown.

Knowledge of CIPs and Spending - Project Development

A goal of the Team's survey was to learn how much knowledge Navasota residents have about the projects the City completes. The survey asked respondents if they knew about each of the six capital improvement projects and which stage of development they learned about them. The table below shows the stage that most respondents learned about each project.

Stage of development respondents learned of each CIP

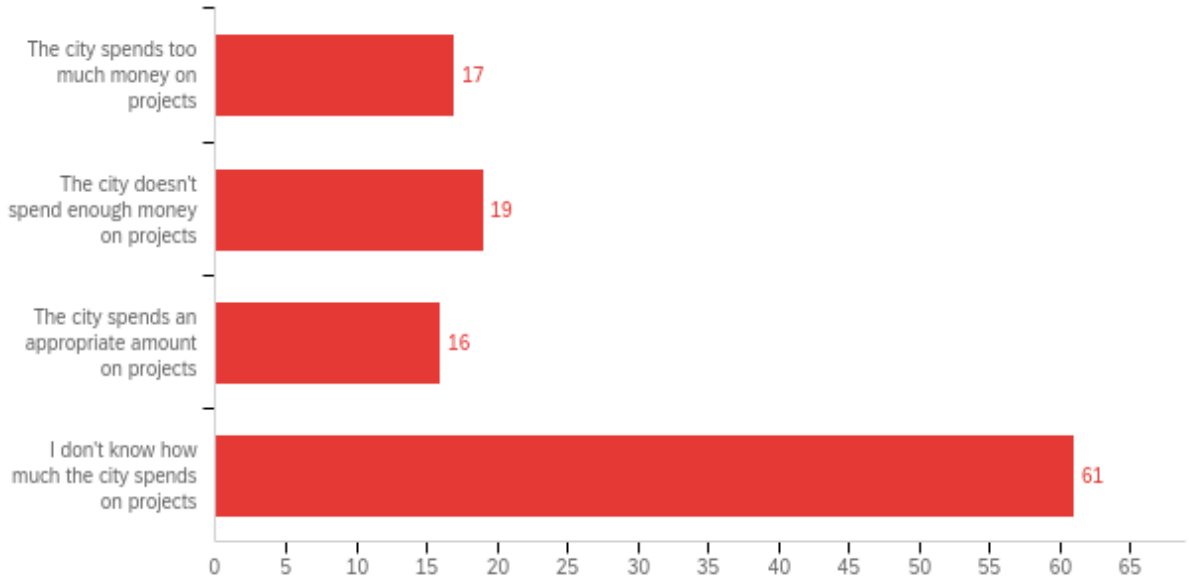
Capital Improvement Project	Most Common Response
Airport Runway & Taxiway Improvements	Did not know about this project (76.61%)
Improvements & Renovations Made to City Hall	Did not know about this project (69.35%)
Replacement & Repairs Made to Aging Utility Infrastructure	Did not know about this project (37.10%)
Streetscape Improvements to Downtown Areas	Did not know about this project (33.87%)
Street & Road Rehabilitation Projects	Initial planning (33.87%)
Improvements made to Water Drainage & Flood Control Infrastructure	Initial planning (33.87%)

The survey results above indicate that residents fall into the extremes in terms of when they learned about projects. They either have never known the projects happened or they have known about them since the beginning of the process. Initial knowledge of two projects suggests that there is resident interest about capital improvement projects. The marketing materials the Team has created should help keep residents interested and informed about projects.

Spending

In addition to lack of knowledge of project development, survey results also indicate that residents are not aware of how much the City spends on projects. Residents were asked to describe their satisfaction with the amount the City spends on CIPs and "I don't know how much the City spends on projects" was listed as a possible option. The majority of respondents chose this option. Since survey respondents as a demographic tend to be knowledgeable about city affairs, it is noteworthy that knowledge of spending is significantly low. The complete breakdown of responses to this question are in below.

Respondent knowledge and satisfaction of City spending on CIPs



Stakeholder Feedback

On evaluation of the work completed during the first phase of the Capstone project, the Navasota Team decided to conduct more in-depth interviews with relevant stakeholders. Combining more qualitative, open-ended research with the survey analysis brought greater clarification from important community members. Specifically, the interviews were conducted with City Council members, heads of significant public or nonprofit organizations in the community, and a few active citizens. The following section will detail key takeaways from each

of the interviews and will serve to highlight community members' opinions on the implementation of capital improvement projects in Navasota.

Council Members

The Capstone Team first conducted interviews with all members of the Navasota City Council. This decision was made because of the importance of local elected officials and their decisions on the community. Questions asked in the various interviews were built on top of the survey questions and were designed to obtain perspectives on the City's implementation of capital projects. The Team asked about various elements of the implementation including financial management, the impact of COVID-19, and prioritization of different projects. The full list of questions that were asked to each council member are included in Appendix D. The Team also assembled a list of significant quotes from each council member interview, included in the "Significant Quotes from City Council" graphic on the next page.

The majority of Navasota council members agree that the City Staff has aggressively pursued external funding and have effectively sought out ways to finance crucial projects. As many capital improvement projects require solid fiscal management, having innovative, yet realistic plans is vital to upgrading infrastructure well. Each member of the Navasota City Council has been described as having diverse expertise and experiences.[53] Naturally, this means each councilor has preferences or knowledge of certain projects that others do not. By working together and prioritizing based on sound financial decisions and community needs, the City Staff and elected officials work effectively and efficiently to pursue these various projects. Fortunately, despite forecasted economic downturn, the City of Navasota experienced an *increase* in sales tax revenue during the last half of 2020.[54] This increase in funding will help alleviate some of the costs incurred from COVID-19 and can significantly help with putting more money towards capital improvement projects in the future.

COVID-19 has given many government organizations the ability to rethink long-term planning and improve sustainability of City projects. Building up physical and financial resilience against future emergencies and incorporating these ideas into strategic plans is essential as public servants look to the future. Councilman Holt described a recent trend in

[53] Pattie Pederson, phone interview, Feb 9, 2021.
[54] Grant Holt, phone interview, Feb 9, 2021.

residents shopping locally and local tourism increasing from relatively close communities.[55] Navasota should be sure to capitalize on this staying local trend and market its valuable assets and unique community. The City should also continue to demonstrate the past and present projects that contribute to infrastructure, such as its downtown revitalization, street projects, water drainage projects, etc.

Another significant aspect of capital improvements is prioritization. The City serves many demographic groups, including people of different ethnicities, ages, socioeconomic statuses, etc. When identifying which projects or neighborhoods to select for future capital improvement projects, it is important to accommodate for the costs and benefits to these different groups. Proactive thinking in this area can promote equity and foster improvement in lower socioeconomic neighborhoods in Navasota. Across most of the interviews with the City Council, when asked about which demographic groups have benefited the most from CIPs, most indicated vague groups such as 'taxpayers' or 'residents'. Projects that focus on helping the community generally oftentimes do help the whole of Navaosta, but can lead to potential disparities in which groups are helped more. Focused planning and prioritization that would help the greater community alongside plans that assist those in lower or middle income areas would be a fantastic solution for Navasota in future planning.

Significant Quotes from City Council

"I am pleased with what the City staff has done in regards to Capital Improvement Projects and I am excited for the future!"

Mayor and Councilman, Bert Miller

[55] Grant Holt, phone interview, Feb 9, 2021.

"The economic effect of COVID has surprisingly benefitted the City, in terms of sales tax… people are staying closer to home and helping the local economy."

Mayor Pro-Tempore and Councilman, Grant Holt

"Over the long run, Capital Improvement Projects are spread out pretty well around various neighborhoods."

Councilman, Bernie Gessner

"Getting ahead on these Capital Improvement Projects has served as a preventative medicine to helping our City's long-term infrastructure."

Councilwoman, Pattie Pederson

"The recently approved Capital Improvement Project plan is excellent and I am excited about it and the future of projects in Navasota."

Councilman, Josh Fultz

Community Organizations

The Capstone Team also interviewed relevant stakeholders in community organizations. Specifically, the Team interviewed a representative from the Navasota Economic Development Corporation (EDC), the Navasota-Grimes County Chamber of Commerce (COC), and Navasota Independent School District (ISD). Each representative from the three organizations identified the significant relationship their organization had with the City of Navasota. They also highlighted how the quality of CIPs have increased in their time in the community. The full list of questions that were asked to each community organization representative are included in Appendix E.

Generally, the feedback from all three community organization interviews indicated a collaborative relationship with the City staff and that the City does a tremendous job on public outreach and education regarding CIPs. The COC representative expressed that he was "blown away" by the effort City staff had put into educating their community, especially in Navasota's public forums.[56] Dr. Stu Musick, superintendent of Navasota ISD, praised the City's coordination efforts, describing the City's assistance in getting the word out regarding different school bonds and sharing information regarding stimulus grant funding for COVID-19 related school expenses.[57] The EDC President also described a solid relationship between the City staff and EDC and explained how those relationships allow for stronger CIP implementation.[58] All

[56] Johnny McNally, phone interview, March 15, 2021.
[57] Stu Musick, phone interview, March 10, 2021.
[58] Mike Harris, phone interview, March 24, 2021.

community organizations were very appreciative of the insight and assistance the City provides, especially during COVID-19 uncertainty, and indicated the desire to work closely with Navasota well into the future.

Citizens

As an initiative to get more specific citizen feedback, the Team also conducted two in-depth interviews with active citizens within the community. A list of questions that were provided to them are listed in Appendix E. For anonymity purposes, the names of the interviewed citizens will not be disclosed. Both interviewed citizens said that the City Manager and other staff go "above and beyond," are "very approachable," and "have an open door policy" which contribute to transparency and strengthen community trust with the City. One citizen described their experience with the staff and elected officials as being "fantastic, very friendly and helpful" even before they became active in the community. The other interviewee echoed this sentiment in saying that "the best part about living in the City is that the elected officials are always available." Both citizens also described a perception among residents that the City does not do enough for regular street improvements, but, through conversations with the staff and councilmembers, understand the City puts forth its best effort to address as many issues as possible while remaining fiscally responsible. Finally, the interviewed citizens discussed three unique proposals for future projects, including revamping the Navasota Community Center, adding a fire station on the west side of the railroad, and improving the readability of some street signs.

Development of Public Promotional Collateral Pieces

One need expressed by Navasota City leaders was a method by which the City could demonstrate to the citizens of Navasota the value, equality, and scope of capital improvement projects across the area. They mentioned early on that most citizens are only aware of a fraction of what the City does to maintain quality services and develop community amenities and economic activity. They further voiced concern over some citizens' complaints that the City is not equitable in their deployment of city resources towards improvement projects.

In response to this need, the Team determined that by developing effective public-centric promotional collateral for the City, we could potentially illustrate to citizens: a) the additional value created for taxpayers as a result of capital improvement; b) the equitable distribution of projects of all types across all areas of the City over the past 15 years; c) the general process through which improvement projects progress; d) the proportion of funds derived from grants which effectively save the City and allow it to maintain a lower burden for taxpayers; and e) the economic activity that resulted from some of the more controversial beautification and revitalization projects conducted.

To this end, the Team invented a marketing concept called *Navasota Works*.

The design was inspired by the City's *So Much, So Close* campaign and served to honor the City of Navasota's Public Works Department and its efforts to improve the quality of life for Navasotans. The brand also sought to convey the idea that Navasota, as a City, *works* (i.e., it is able to *function* or *perform*). The choice of colors in the logo derived directly from the logo for the *So Much, So Close* logo to establish continuity among the City's various service marks (should they decide to continue the use of our design in future publications).

Two separate pieces were imagined that could foreseeably accomplish the established communications objectives:

1. ***Navasota Works Tri-Fold Brochure***

A basic tri-fold was designed to very quickly communicate to the average citizen the general message that the City is committed to delivering quality and equity in its capital improvement process, and that the City has, over the last 15 years, successfully achieved those goals while helping Navasota grow in a manner that ensures growth of wealth for Navasota property owners and savings for taxpayers.

2. ***Navasota Works Magazine***

A 12-page full-size magazine format was selected to more thoroughly communicate the same message delivered through the aforementioned tri-fold, and to add a brief overview of: a)

the history of capital improvement projects in Navasota; b) the description of what a capital improvement project is and how they are developed in Navasota; and c) an infographic spread presenting significant findings of the Bush School Research Team with whom the City contracted.

While the tri-fold is aimed at bulk distribution to all citizens via various public sites including City Hall and the Library, the magazine is aimed at a slightly more informed group of business owners, economic developers, and other groups that represent pillars of the community, as well as City Hall staff and City Council.

Both publications feature a map which highlights the various projects completed throughout the City, categorized and easily identified by the type of project they represent (from a list including: water and wastewater management, flood mitigation and drainage improvement, utility infrastructure improvement, road and street maintenance and expansion, and beautification and revitalization). By reviewing the map, one can easily see the distribution of such projects and imagine the impact across all of Navasota.

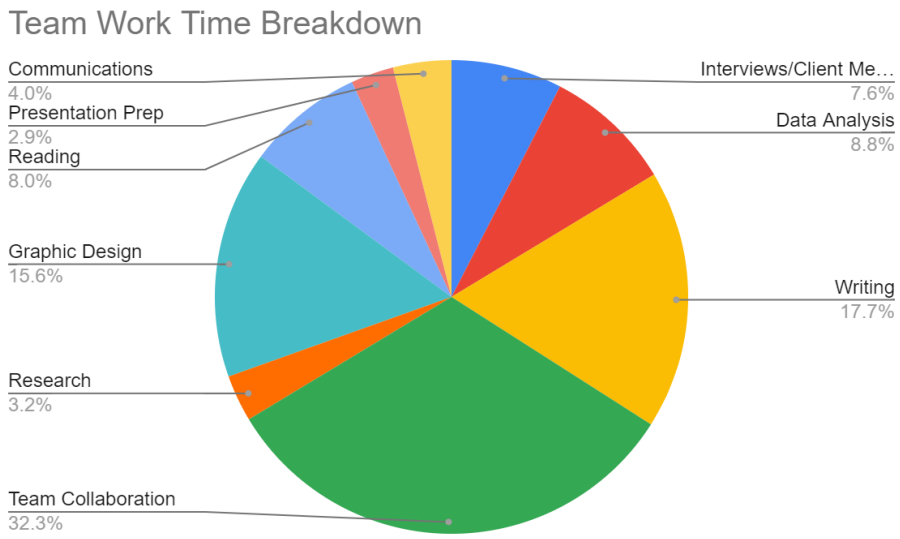
We believe the materials created will serve as one of the most significant deliverables to the City, allowing them to present themselves in a favorable view to their citizens for years to come. Because of this, the digital commercial print-ready files were presented to the City for future editability and revision as well as the hard copies of the final design we completed.

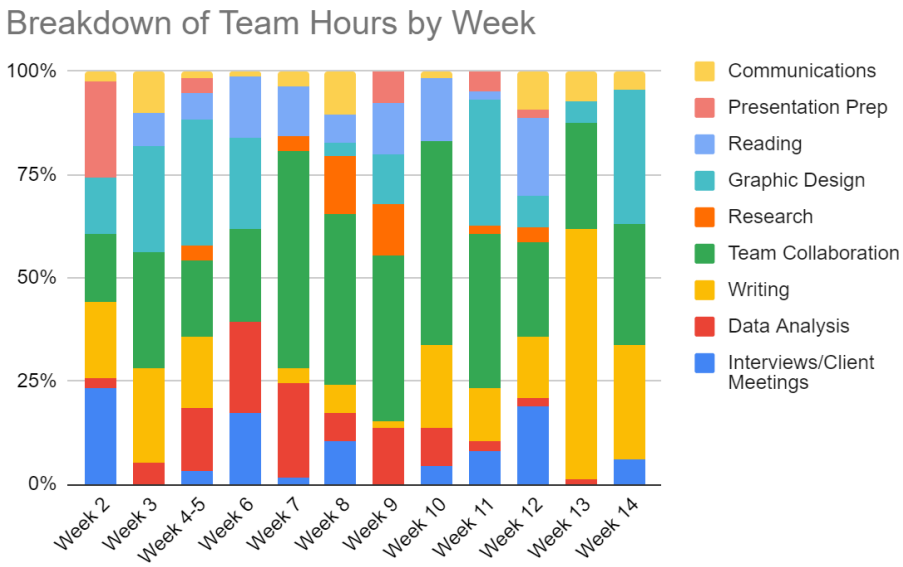
Team Work Summary

The Team logged 410.5 hours of work during Phase II of the project. In both phases combined, the Team completed 857.25 hours of work with Navasota. Adjustments were made to the weekly time sheets consolidating categories. This made the timesheet visualizations less cluttered and easier to understand. Following the same format as the Phase I report, the bar and pie charts for team timesheets are below.

Similar to Phase I, a significant amount of time was spent in internal meetings. The Team combined any internal meetings in our out of class time into a single Team Collaboration category. These meetings were used to look over drafts of deliverables, give feedback, and provide updates on team progress. Weeks 4 and 5 of Phase II were combined due to the winter storm. Several team members lost power or Internet access and were unable to work during that

time. The Team quickly got back on track after the storm and completed all deliverables on schedule.





Appendix A. Residential Survey Questions

1. Do you feel that all residents in the community are positively impacted by the projects completed in Navasota?

-Yes
-No
-I don't know

2. Rank the following six projects carried out in Navasota in order of their importance to your needs (1 being the most significant and 6 being the least significant, click and drag to reorder):

-Improvements & Renovations Made to City Hall
-Streetscape Improvements to Downtown Areas
-Replacement & Repairs Made to Aging Utility Infrastructure
-Improvements Made to Water Drainage & Flood Control Infrastructure
-Street & Road Rehabilitation Projects
-Airport Runway & Taxiway Improvements

3. For each of the following capital improvement projects carried out in Navasota, select the best description of your knowledge of the project using the following options:

-Improvements & Renovations Made to City Hall
    -I did not know anything about this project in Navasota.
    -I heard of this project through local news media.
    -I learned of this project directly from non-government community leaders.
    -I learned of this project from the City of Navasota.
-Streetscape Improvements to Downtown Areas
    -I did not know anything about this project in Navasota.
    -I heard of this project through local news media.
    -I learned of this project directly from non-government community leaders.
    -I learned of this project from the City of Navasota.
-Replacement & Repairs Made to Aging Utility Infrastructure
    -I did not know anything about this project in Navasota.
    -I heard of this project through local news media.
    -I learned of this project directly from non-government community leaders.
    -I learned of this project from the City of Navasota.
-Improvements Made to Water Drainage & Flood Control Infrastructure
    -I did not know anything about this project in Navasota.
    -I heard of this project through local news media.
    -I learned of this project directly from non-government community leaders.
    -I learned of this project from the City of Navasota.

-Street & Road Rehabilitation Projects
    -I did not know anything about this project in Navasota.
    -I heard of this project through local news media.
    -I learned of this project directly from non-government community leaders.
    -I learned of this project from the City of Navasota.
-Airport Runway & Taxiway Improvements
    -I did not know anything about this project in Navasota.
    -I heard of this project through local news media.
    -I learned of this project directly from non-government community leaders.
    -I learned of this project from the City of Navasota.

4. For each of the following capital improvement projects carried out in Navasota, select the best description of your knowledge of the project using the following options:

-Improvements & Renovations Made to City Hall
    -I did not know anything about this project in Navasota.
    -I heard of this project while it was being planned.
    -I learned of this project during its initial stages.
    -I learned of this project after it was completed.
-Streetscape Improvements to Downtown Areas
    -I did not know anything about this project in Navasota.
    -I heard of this project while it was being planned.
    -I learned of this project during its initial stages.
    -I learned of this project after it was completed.
-Replacement & Repairs Made to Aging Utility Infrastructure
    -I did not know anything about this project in Navasota.
    -I heard of this project while it was being planned.
    -I learned of this project during its initial stages.
    -I learned of this project after it was completed.
-Improvements Made to Water Drainage & Flood Control Infrastructure
    -I did not know anything about this project in Navasota.
    -I heard of this project while it was being planned.
    -I learned of this project during its initial stages.
    -I learned of this project after it was completed.
-Street & Road Rehabilitation Projects
    -I did not know anything about this project in Navasota.
    -I heard of this project while it was being planned.
    -I learned of this project during its initial stages.
    -I learned of this project after it was completed.
-Airport Runway & Taxiway Improvements
    -I did not know anything about this project in Navasota.
    -I heard of this project while it was being planned.
    -I learned of this project during its initial stages.
    -I learned of this project after it was completed.

5. Based on your understanding of Navasota's spending on capital improvement projects,

which one of the following best describes the City of Navasota?

-The City of Navasota spends too much money on capital improvement projects.
-The City of Navasota spends an appropriate amount on capital improvement projects.
-The City of Navasota doesn't spend enough money on capital improvement projects.
- I don't know how much the city spends on projects.

6. Which one of the following best describes your satisfaction living in Navasota?

-The City of Navasota offers me a lifestyle that I am very satisfied with.
-The City of Navasota offers me a fair amount of services and amenities.
-The City of Navasota should spend its funds on more important projects.

7. Do you feel as if each part of the city is equally prioritized when projects are chosen?

-Yes
-No
-I don't know

8. Thinking about the future, which of the following would you like to see more focus on in Navasota (rank the following six in order of personal preference (1 being the most preferred and 6 being the least preferred, click and drag to reorder):

-Downtown Historical Preservation & Beautification
-Road & Street Repairs
-Water & Sewage Improvements
-Commerce & Economic Development
-Flood & Drainage Control Improvements
-Parks & Natural Spaces

9. Do you have any other thoughts or comments about projects in Navasota? (Open ended)

10. Which location on this map do you reside closest to? (This question is optional.)

11. How long have you lived in Navasota?

-0-5 Years
-5-10 Years
-10-15 Years
-15-20 Years
-Over 20 Years

12. How many children under the age of 18 live in your household? 0

-1-2
-3-4
-5+

13. In what zip code is your place of employment located? (Open ended)

14. On average, how many minutes per day do you spend driving in Navasota?

-0-15 Minutes
-15-30 Minutes
-30-45 Minutes
-45-60 Minutes
-Over 1 Hour

15. Select the type of residence which best describes where you live:

-Single family home (owned)
-Single family home (rented)
-Condominium / Duplex (owned)
-Condominium / Duplex (rented)
-Apartment
-Mobile/Manufactured Home
-Other (describe)

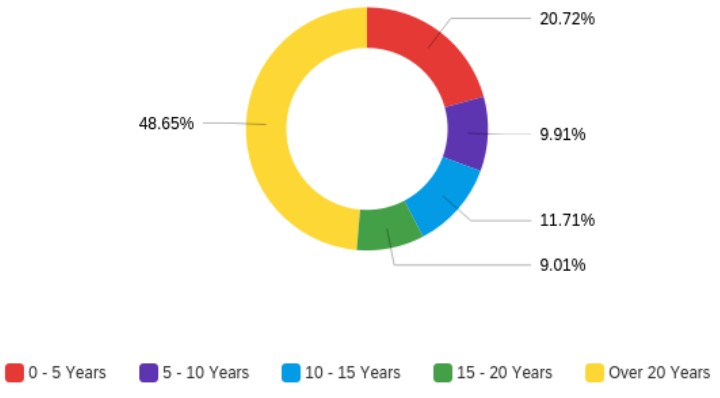
Appendix B. Survey Analysis Results

Survey Demographics

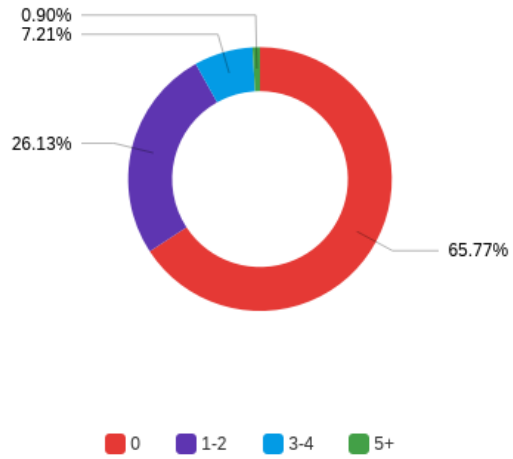
Which city landmark is closest to where you live?

Field	Choice Count	
Hillside Park	6.31%	7
Navasota High School	6.31%	7
Walmart	3.60%	4
Navasota Public Library	15.32%	17
Navasota Center	8.11%	9
Navasota Fire Department	10.81%	12
Manley Park	2.70%	3
City Hall	7.21%	8
Progressive Outreach Center	5.41%	6
Water Treatment Plant	0.90%	1
Navasota Municipal Airport	6.31%	7
Stone Ridge Subdivision	1.80%	2
Not sure/prefer not to answer	25.23%	28
		111

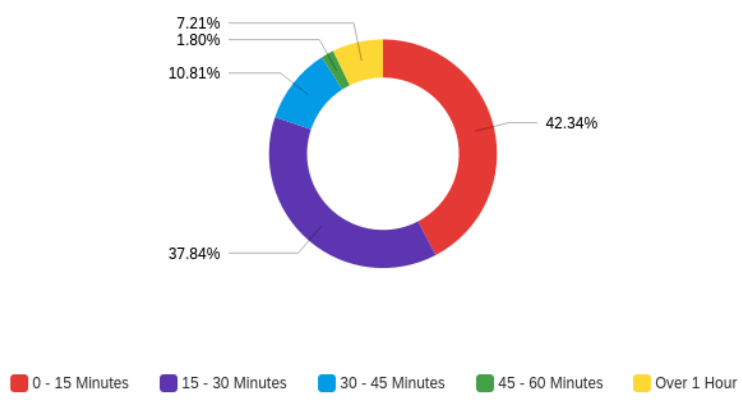
How long have you lived in Navasota?



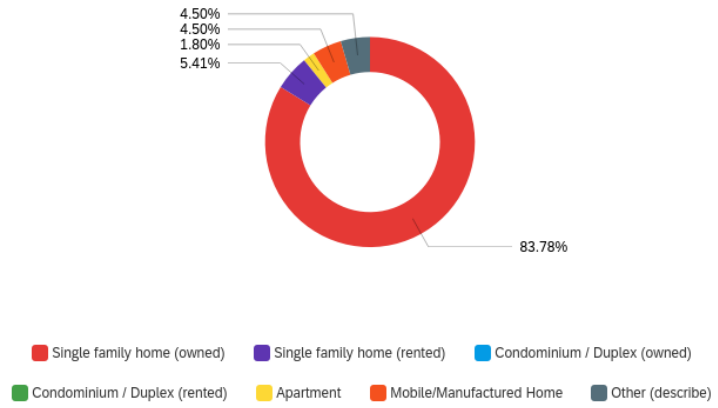
How many children under the age of 18 live in your household?



On average, how many minutes per day do you spend driving in Navasota?

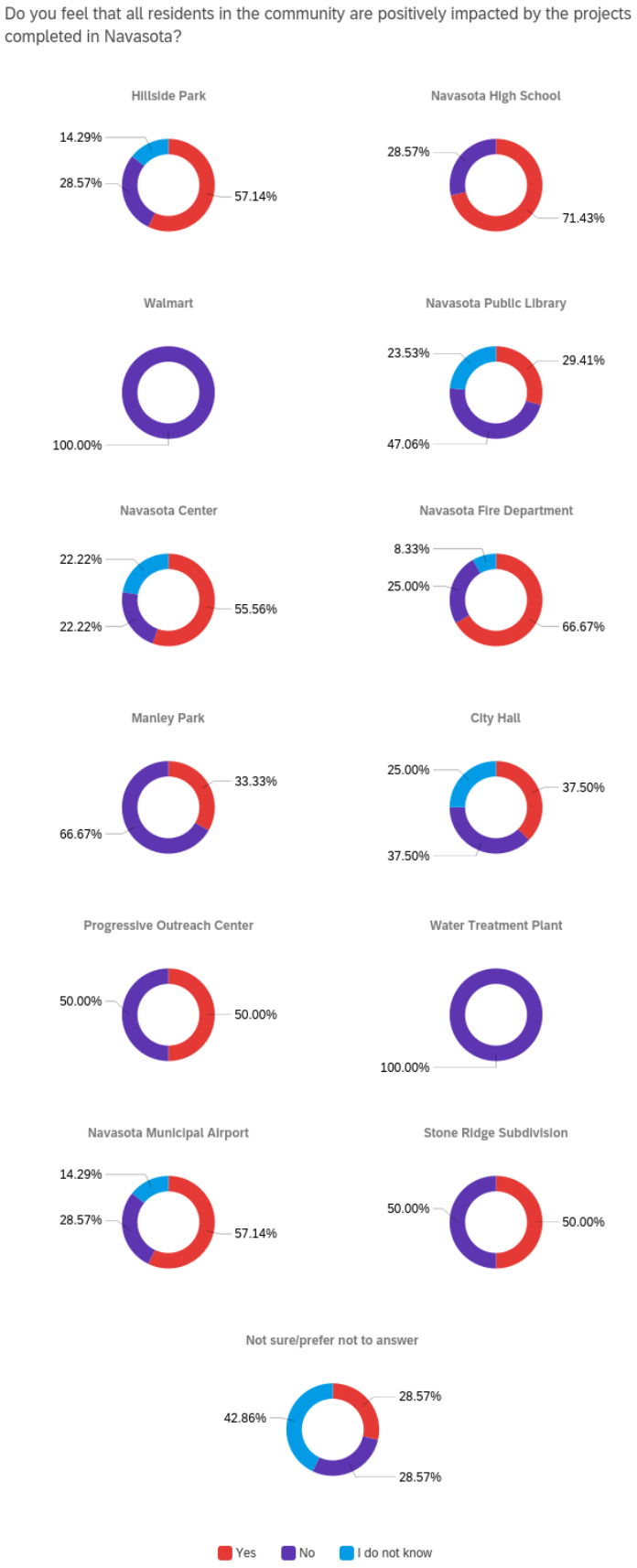


Select the type of residence which best describes where you live:

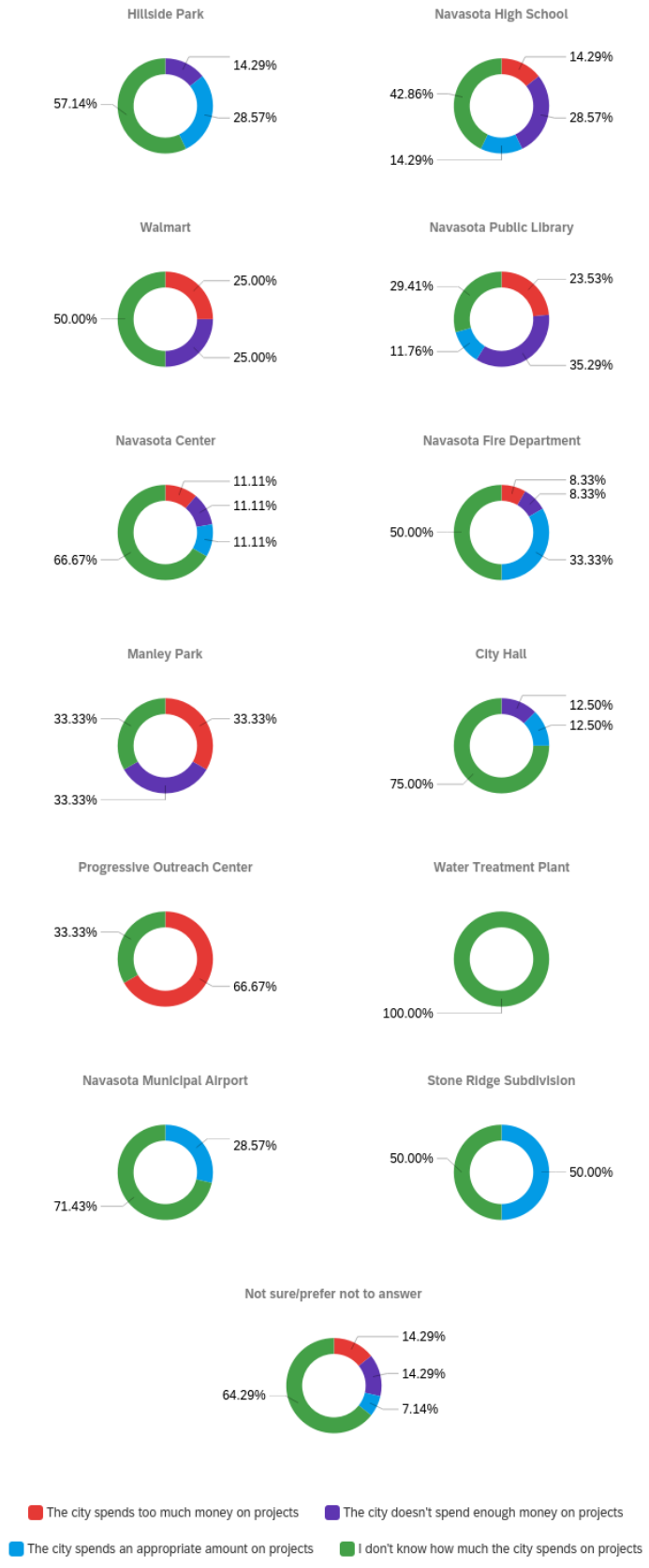


In what zip code is your place of employment located?

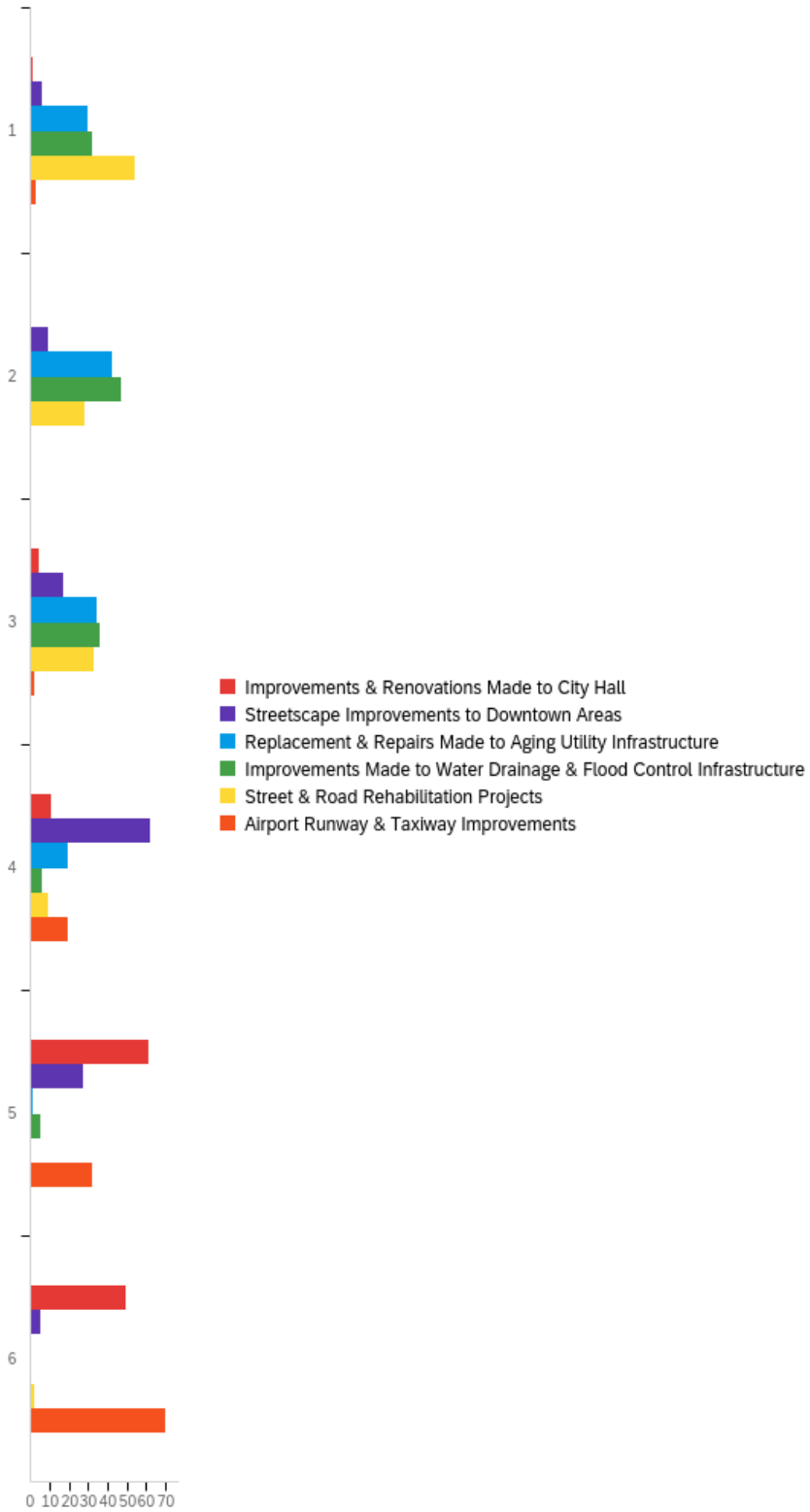
Citizen Satisfaction



Spending


Hillside Park
14.29%
57.14%
28.57%
Navasota High School
14.29%
42.86%
28.57%
14.29%
Walmart
25.00%
50.00%
25.00%
Navasota Public Library
29.41%
23.53%
11.76%
35.29%
Navasota Center
11.11%
11.11%
66.67%
11.11%
Navasota Fire Department
8.33%
8.33%
50.00%
33.33%
Manley Park
33.33%
33.33%
33.33%
City Hall
12.50%
12.50%
75.00%
Progressive Outreach Center
33.33%
66.67%
Water Treatment Plant
100.00%
Navasota Municipal Airport
28.57%
71.43%
Stone Ridge Subdivision
50.00%
50.00%
Not sure/prefer not to answer
14.29%
14.29%
64.29%
7.14%
The city spends too much money on projects
The city doesn't spend enough money on projects
The city spends an appropriate amount on projects
I don't know how much the city spends on projects

Rank the following six projects carried out in Navasota in order of their importance to your needs (1 being the most significant and 6 being the least significant)



Appendix C. Survey Comments

Question: Do you have any other thoughts or comments about projects in Navasota?

NOTE: The following responses are to the above question provided in the survey. Grammar and spelling are reflective of original comments left by those who participated in the survey.

More work in poor areas

Unfortunate that funds are designated for projects that don’t add value. The streets are a disaster and need repair.

Continue making improvements

Navasota please if you can .Fix the streets! It's horrible out in these bumpy streets. Strert potholes are only being filled over and over You! You only keep downtown Navasota "Beautiful" for once look at all the streets in Navasota! As a resident here in town I've only seen importance in Downtown Navasota.

Do No Harm to Existing Merchants. Please keep the Washington Avenue Corridor as "Residential and Professional Business" ONLY. NO MORE COMMERCIAL ACTIVITY NEAR THE EXISTING WALMART AREA. THE TRAFFIC IS INSANE AND DANGEROUS ALREADY. WE NEED TO DEVELOP THE INTERSECTION OF FM3090 AND HWY 6 NEXT. I AM A REAL ESTATE BROKER. OUR LOVELY PATHWAY INTO TOWN ON WASHINGTON AVENUE NEEDS TO BE PRESERVED. EVENTUALLY WE NEED TO COMPLETE THE LOOP AROUND NAVASOTA ON THE WEST SIDE OF TOWN. KEEP NAVASOTA BEAUTIFUL AND QUIET. ONE WAY STREETS ARE NOT A GOOD IDEA . TAME THE TRAIN WHISTLES. KEEP THE EXISTING MERCHANTS HAPPY.

"I am so pleased to see how the downtown area is being riy so happy to see the downtown area being revitalized"

Would like to see more Senior Citizen activities and youth activities.

Dog parks, trees planted at August Horst, improvement to hillside park (more walking paths) and improve ponds

It's important that ya'll make a population growth plan. Waiting to see is not a plan.

Need more help for the down trodden.

The existing Downtown project needs to be completed with haste.

Many of the city parks need renovations. All roads need repairs but I have only heard/seen them repair one and patch one.

The city does a lousy job maintaining soccer fields and baseball fields for the youth.

Need more commercial businesses

Bury all the phone and power lines when repaving roads

If the downtown area is beautiful, businesses will come and so will customers! Keep beautifying downtown. Love the unique and old structures. Would love to see all new businesses forced to build in a similar style. There's enough buildings in the world that look like Walmart, McDonalds, etc. Keep what little style we still have and maintain the old world feel.

They should allow tiny houses in the derelict sections, for low cost living and city appearance.

Hire minorities

Fix our streets

Maintain the beauty ...roads..utlities

Like to see more places for our children to go to

After school tutoring program at Carver Center

need to fix roads over lay not just patch. judson water Felder parts of nell and more in that erea

I would like to see the city give incentives to property owners to beautify and maintain their properties within the city, especially on main street. I would also like to see a renovation on the old school next to the fire station. At least clean it up. It is desperate need of some TLC before it becomes a derelict building.

Fix the streets and roads. Waste on pet projects! Fix the dam.pot holes and streets

Parts of the city look like a third world country. We could do better.

I have only lived here 18 months, but the roads are awful. I would like to see those improvements and sidewalks so people can walk safely. The first priority is taking care of the loose dog problem.

It looks like they pick and choose what they would like to repair and fix versus what is needed for the community.

The rankings don’t let us tell how much we don’t want a project. For example, there is a large gap to me between roads, utilities and infrastructure Compared to historic district, economic development and the airport. We should be asked to weight the importance, it just rank them. The conditions of the streets in this town is ridiculous.

Residential streets are in bad shape in a lot of neighborhoods!!

We need a recreation park. A splash pad, a sports complex where leagues can be held not just for children but adults also, softball, soccer. The old gold course is the perfect spot for all this.

Love the City

There is to many roads in town that need to be fixed before downtown.

So many roads in this town are really in sad shape.

Navasota need to expand their commercial space out further and stop cramming all businesses into one area. Youths need more programs. Downtown need updated. The businesses around City Hall need updated. Businesses around City Hall look terrible. They seem to crowd out City Halls beauty. Buildings look dirty.

The Mayor and City Council work well together to do everything they can to make our town welcoming to outsiders as well as its citizens.

It would be nice to see more development in areas along Highway 6.

Yes. The Mayor refuses to allow new business in town due to it dipping into his profits since he owns most of the buildings in Historic Downtown

I would like to see Navasota bring in a lot more retailing places to eat other than Mexican food restaurants!!

Need any prisoners picking up the trash along the Highway.. Improvements are great.. But need simple beautification and clean look along with.. Thanks for your interest.. If I read the paper more I might be more informed... 🙋‍♀️🙌💜💞🔥🔥🔥🔥🔥

The animal control, the police department and the fire department needs to be looked at

Replace Moore Street. No more patching!!!

Need other fast food type restaurants. Whataburger. And need H-E-B OR WALMART TO CARRY MORE GROCERIES

Downtown looks greaf

Please stop moving here!

The link for reporting issues is buried deep inside the website and most residents don't even know about it. Also, followup status on projects approved by City Council, would be great. Seems like items are approved but then may or may not be done, hard to find out if the project is on time or even ever finished.

Keep up the great work. One project at a time, eventually it will get done until it’s starts again. The city is looking great and we thank you all.

Several roads need repaired and not just patched. Too much focus on 'preservation' and not enough on projects that'll actually fix the entire issue. Need more growth. Jobs are grim. Some projects, like over by the barbershop in downtown, are taking WAY too long.

We need to focus on bringing in jobs to benefit the local economy instead of consignment shops

I love my Navasota. It is?a beautiful nostalgic town.

Biggest problem is when Entergy loses power, it affects the internet and cell service. Most people do not have home phones, or if they do, it is a voip phone. it does them no good when power or

internet is down. The city needs Verizon and other cell companies to step up and provide the needed towers to support to town. The cell service is mediocre between Navasota and south College Station.

Appendix D. Elected Official Questions

1) *How do you feel about the general direction of Capital Improvement Projects over the last fifteen years? Or your time in office?*

2) *Do you believe the money spent on these infrastructure projects result in an overall improvement that positively affects the City of Navasota?*

3) *Who do you think benefits the most from recent Capital Improvements Projects initiatives?*

4) *Do you think the City does enough to pursue external grants and other means of funding from state and federal agencies?*

5) *Has the economic impact of COVID-19 affected your perception of how much the city should spend on infrastructure in the near future?*

6) *What direction would you like the City to focus on, in terms of long-term Capital Improvement projects? Can you name a specific project or two that you would like to prioritize?*

7) *What Capital Improvement project are you most proud of during your time as an elected official?*

8) *If there was one thing you could change about the way the city manages projects, what would that be?*

Appendix E. Organization and Citizen Questions

1) **IF ORGANIZATION:** *What does your organization do within the community?*

2) **IF ORGANIZATION:** *How would you describe your organization's relationship with the City of Navasota over your time in your position?*

3) **IF RELEVANT TO ORGANIZATION (EDC, Chamber of Commerce):** *Do you believe the money spent on these infrastructure projects result in an overall improvement that positively affects the City of Navasota?*

4) **IF ORGANIZATION:** *How has the economic impact of COVID-19 affected your organization or the community generally?*

5) **IF ORGANIZATION:** *On a scale of 1 to 5, how well do you/your organization believe the City does in terms of educating/providing outreach to stakeholders, organizations, and/or citizens on various projects?*

6) **IF CITIZEN:** *What is your view of the general of City staff and elected leadership, in general?*
    a) *What is your role in the community?*

7) **IF CITIZEN:** *In your conversation with other citizens, what would you gauge to be the resident's view on how the City handles projects and public outreach/education? On a scale from 1 to 5, how would you rate their public outreach/education?*

8) *How do you/<u>your organization</u> feel about the general direction of Capital Improvement Projects in the City?*

9) *What organizations or demographics (groups of people) do you think benefits the most from recent Capital Improvements Projects initiatives?*

10) *What direction would you/your organization like the City to focus on, in terms of long-term Capital Improvement projects? Can you name a specific project or two that you would like to prioritize?*

11) *Can you give an example of a Capital Improvement project that you/your organization believe was implemented well and one that was not implemented well?*

APPENDIX B. Kragujevac Report

TEXAS A&M UNIVERSITY
The Bush School
of Government & Public Service

Spring 2021

Final Report

Technology and Government: Application Form for Waste Management and Parking Services

Capstone Team

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Capstone Advisor

Justin Bullock,
Ph.D.

ЈАВНО КОМУНАЛНО ПРЕДУЗЕЋЕ
ШУМАДИЈА
КРАГУЈЕВАЦ

Table of Contents

Abbreviations

PUCŠ	Public Utility Company, Šumadjia
SWOT	Strengths, Weaknesses, Opportunities, and Threats
AI	Artificial Intelligence
WMS	Waste management system
RFID	Radio-Frequency Identification
SMS	Short Messaging Service
PGIS	Parking Guidance and Information System
CEM	Cloud Enabled Mobility
GPS	Global Positioning System
LPR	License Plate Recognition

Executive Summary

Technology innovation is a critical tool for fostering current and future efficiency as well as growth and development in the public service sphere. For the 2020-2021 academic year, The Bush School partnered with the City of Kragujevac, Serbia, to administer one of the projects within the technology in governance capstone. The capstone was divided into two project units with our team, comprising five students, undertaking a research and implementation project geared towards recommending the best technological solutions to meet the challenges faced in the areas of parking services and waste management services in the City of Kragujevac for the client, The Public Utility Company of Sumadia. The project consists of two main goals including:

- Implementing new technologies and strategies for the city's waste management system
- Improving the city's urban parking systems

These goals were then operationalized and refined as assessments of conditions and research on best practices in both areas were conducted. The team was able to refine the outcome goals with the approval of the client and focused more on efficiency in recycling for waste management and greater automation for parking services to streamline revenue collection.

Thorough research and analysis allowed the team to determine that of the many case studies conducted and solutions discovered, Ecube Labs and Cleverciti were better options for the city's waste management and parking service needs, respectively. While challenges with securing vendor responses and follow through persisted, the team delivered critical information on the elements of each product, which would prove beneficial, the implementation strategy, and the shortfalls of each product in meeting the city's needs.

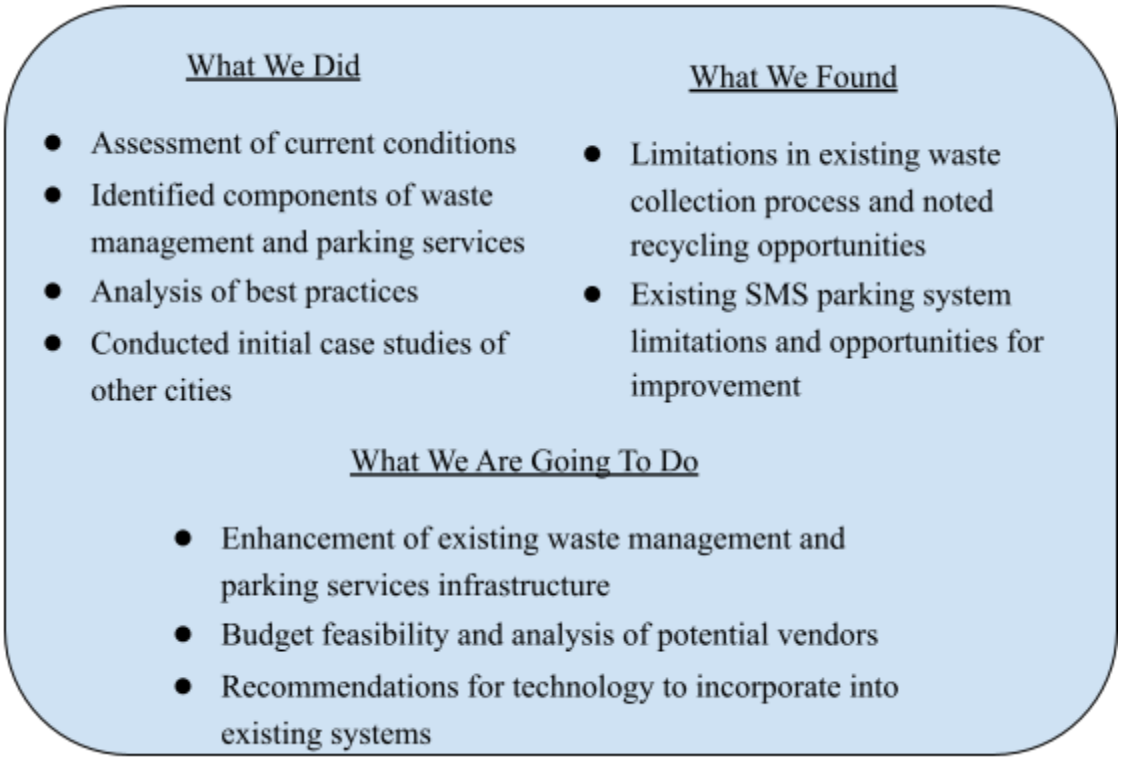
At the direction of the client, the team was able to illustrate the benefits of the project, particularly the benefit to citizens, as well as its effectiveness to holistic city development by utilizing elements of the European Union project application form. This was used to justify feasibility and provided a platform for the team to highlight potential future gains for the city and its citizens in both the areas of waste management and parking solutions.

Project Overview

The negative effects of COVID-19 posed additional challenges for our initial PUCŠ, the city of Bryan, which resulted in the cancelation of the cooperation on the capstone project. Faced with this challenge, the team's first assignment was to find a suitable PUCŠ that will accommodate our academic research needs and offer additional practical learning opportunities related to the topic of implementing new technologies in the work of local governments. The city of Kragujevac was one of the options. PUCŠ's needs for improved waste and parking management demand and an academic approach to a fairly new topic for most capstone team members. At the same time, it also demanded the development of analytical skills when analyzing the PUCŠ's current conditions and present work. The work on the capstone project included internal and external coordination of multiple stakeholders and activities, which helped team members develop managerial and leadership skills related to their interests.

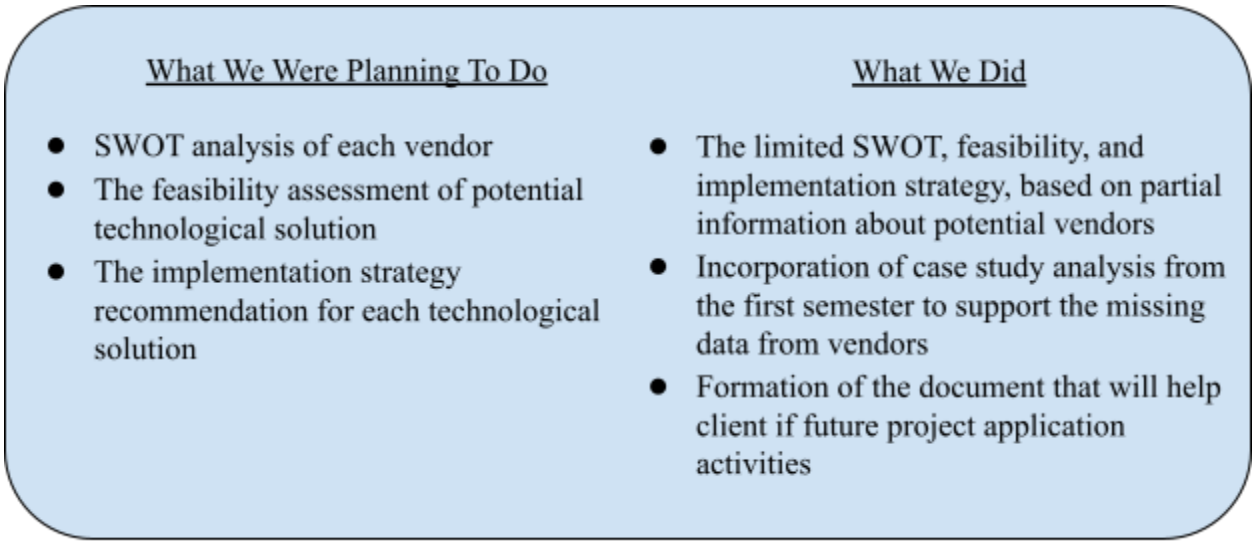
The goal in the first semester was to provide a detailed analysis of the current conditions of the waste and parking management services provided by PUCŠ. By analyzing the work of PUCŠ, the team assessed its strengths, weakness, and possible threats to the current service provision system. The assessment of opportunities was connected with the research of the possible technical solutions suited for improving the work of PUCŠ. The analysis was supported by the data provided by the PUCŠ, literature review on waste and parking management, and numerous case studies that served as an example of good practices and possible solutions for the Kragujevac. The following figure outlines the work conducted in the first semester.

Figure 1. Project Highlights



In the second semester, the feasibility study and implementation strategy were hindered by inappropriate feedback from the potential vendors. Namely, the plan was to contact a targeted group of vendors providing technologies that were recognized as possible solutions. Based on the interviews with them, the SWOT analysis would be conducted, along with the specific analysis of implementation strategies relevant for each technology. Unfortunately, only a few vendors responded, and the provided information was partial. Due to this challenge, a redefinition of the final deliverable was conducted in cooperation with the PUCŠ. The final agreement was to create a document that will have a project application form listing the findings from the first semester, along with limited feasibility analysis and assessment of implementation strategy. The following figure outlines the work conducted in the second semester.

Figure 2. Phase Two Overview



Summary of Team Activity

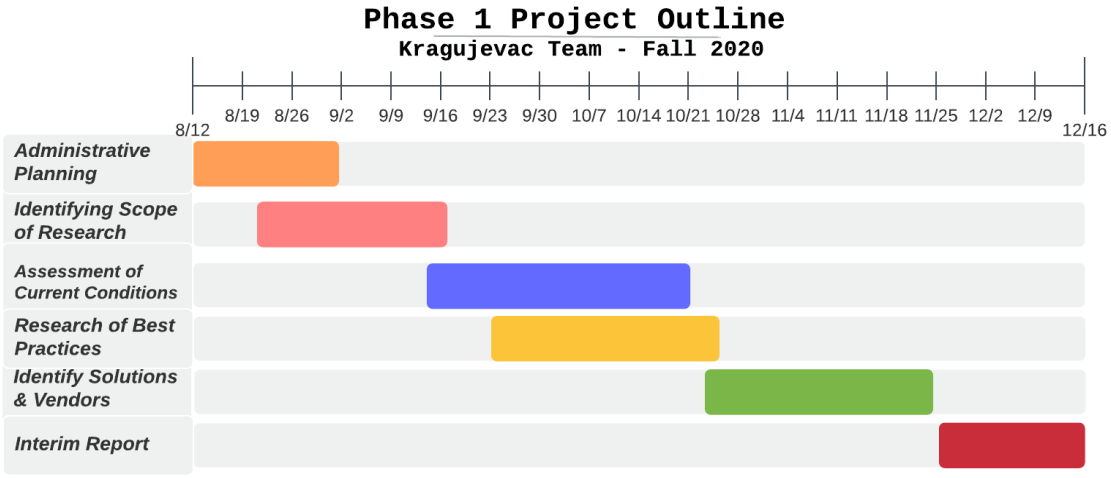
The Capstone Team is committed to transparency and authenticity. Therefore, the Team would like to present the following findings on how we spent our time throughout the project's timeline. This project was facilitated over the course of the 2020-2021 academic year, which was divided into two phases: phase one to reflect the efforts of the autumn semester (August 2020 - December 2020) and the spring semester (January 2021 - May 2021). With this timeline in mind, we utilized a series of Gantt charts and project outlines to manage key deliverables that culminate in this final report and the interim report. The following section presents breakdowns of team activities, explains why each category of time spent is justified, and how time limitations impacted the project.

The project's first phase, Phase One, marked the official start of the project, which required team efforts to establish organizational structures, internal policies and procedures, and the development of the leadership team. Additionally, Phase One was rooted in the assessment of current conditions for the Waste Management and Parking Services sectors of PUCŠ. This

thorough analysis provided the foundation to begin researching possible solutions from a variety of sources, including:

- Best practices from case studies
- Vendor services
- Emerging technologies

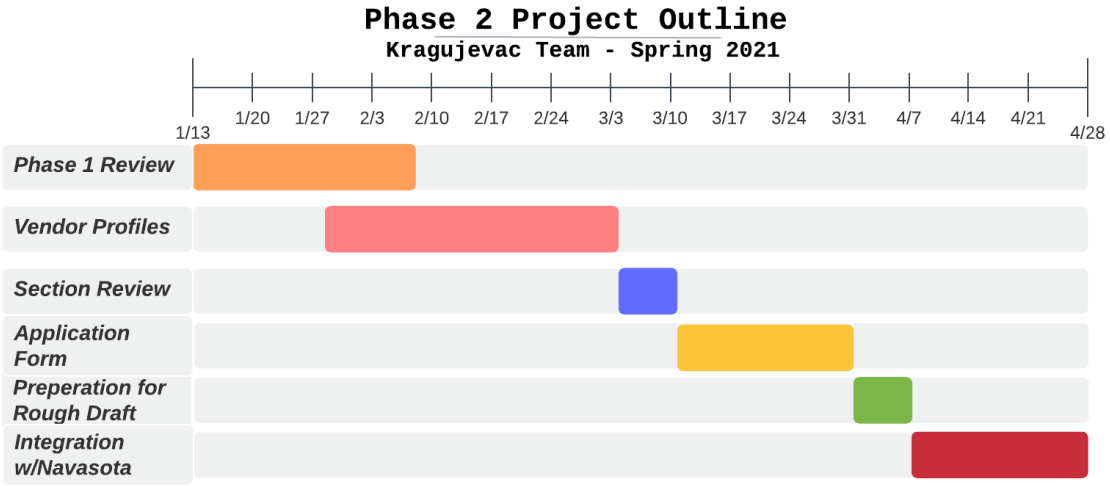
Figure 4. Phase One Outline



In total, the team spent approximately 1,175 hours over the course of this project for an average team total time of 42 hours per week. The second phase is also noted for the addition of one new team member. To reflect the project's goals and the PUCŠ's needs, the team focused largely on the practical application of emerging technologies identified in the first phase of the project. This discovery phase was emphasized by interviewing possible vendors and researching the overall feasibility of identified technologies.

The team's activity in the project's second phase was rooted in the idea of finding feasible and sustainable solutions to solve the PUCŠ's needs now and into the future. The resulting deliverable was the Application Form, which consists of the bulk of this report. While unique to Parking Services and Waste Management, this form's structure can be molded to other projects the city is interested in. Essentially, the goal of the application form is to act as a roadmap to navigate innovative solutions, vendor relationships, and how to incompatible case studies into the overall findings.

Figure 5. Phase Two Outline



Context and Problem Analysis

Waste Management

This project aims to address the problem of inefficient waste management practices in the city of Kragujevac. The challenges are caused by:

- Data deficiency and inadequate performance measurement tools
- Limited infrastructure
- Imbalance of resource distribution

The city of Kragujevac is the fourth largest city in Serbia. Historically, it has been one of the main industrial and trading centers of the Sumadija region. Currently, Kragujevac has a population of 179,417 who are daily, on average, producing 0.82kg of waste per capita. The PUCŠ services cover 60,493 households, 2,020 business entities, and 1,266 public institutions and enterprises. In 2020, concluding with September, the total amount of disposed waste was 138,257.29t, of which PUCŠ collected 39,601.66t. For the same period, the total amount of recycled waste was 633t.

The current measuring tools and data sets do not provide the information on the generated waste that correlates with individual trash containers' geospatial layout. Further, because of the lack of data and measuring tools, PUCŠ is not familiar with the trash disposal habits of different city areas. This is causing a disproportionate allocation of available trash containers throughout the city and their mislocation. Consequently, this is raising the prices of the collection process and the provision of service in general since garbage trucks are operating without knowing the exact level of disposed trash. The waste collection routes are still being organized without exact data on the need for collection. For example, in September, the total number of routes taken by garbage trucks was 874 tours, collecting 4,533.51t of waste, making an average of 5.2t per truck tour. The average capacity of garbage trucks is around 10t. This means that, on average, every truck on their route when collecting garbage was half empty. This implies that the same amount of garbage collected in September could be collected with half as many trips. This drastically decreases the expenses of fuel, truck maintenance, the carbon footprint of PUCŠ, and employees' working hours.

Municipal waste collection is divided into three zones. One of them is *Rural Zone* - settlements in rural areas around the city. These rural areas have 9,204 households where almost 31,000 people reside. Some of the rural settlements until recently were not even included in the PUCŠ waste collection system. The rural zone has 109 containers – volume 5,000L and 7,000L. Besides these containers, plastic bags for waste collection are distributed twice a month, and they primarily represent the disposal system. Due to their size, these trash containers are located in special areas, often far away from most households. Disposing trash to these designated areas demands additional time and resources from citizens of rural settlements. This makes them come with alternative trash disposal methods, such as creating wild dumps, which are not aligned with regulations and ecological standards adopted by the city. Currently, in the Kragujevac city area, there are more than 242 wild dump sites. The estimated volume of these illegal landfills is around 22,000 m^3 covering 50,000 m^2 of land. At the same time, wild dumps represent an ecological issue damaging the ecosystem of the sounding rivers and forests and send an ugly picture about the city itself. The most concerning issues are that wild dumps consist of hazardous waste, which can be harmful to the citizens' health. An increased number of trash containers with

a smaller volume, displaced on locations where the wild dumps are usually created, could potentially solve the problem.

The recycling center has 20 collection stations (recycling islands) that are placed within the city zone. Each recycling island is equipped with three plastic containers that have a volume of 1,100L. Containers differ in colors indicating the type of recyclable waste (blue for paper/cardboard, red for glass, and yellow for plastic, tetra pack, and metal packaging). Additional 40 locations are equipped with blue and yellow containers. PUCŠ also has 770 wire and plastic containers volume 1,100L, 5,000L, and 7,000L placed within both city zones. Waste that is to be recycled in rural zones is disposed of in special green bags collected twice a month and transported to recycling centers for further treatment. In 2020, the recycling center successfully collected and treated 941t of waste. With all of its resources, the recycling center manages to reach the national recycling quota and goals set by cities' strategic planes. However, compared with the amount of disposed waste, recycled waste represents 0.5% of the total amount. This implies that there is a huge potential for recycling projects and activities in the future. Also, this further implies that the number of recycling islands is not enough for a city with Kragujevac's size. The city should consider increasing the number of recycling islands and the number of garbage containers intended for recycling. In this way, a larger area would be covered, and recycling would be more convenient for citizens.

Inefficient waste management contributes to environmental deterioration, thus affecting citizens' quality of life and well-being (Latif et al. 2011). By improving waste management practices, PCUS also promotes healthier life for the citizens of Kragujevac and more sustainable and environmentally friendly solutions. New technological solutions can reduce the carbon footprint of PCUS by improving waste collection practices. There are technological solutions that can incentivize people to recycle more and keep the city cleaner. Harmful gasses generated by landfills can also be reduced by implementing technologies that turn them into fuel. Additionally, there is an economic incentive for both PUCŠ and their service users. The new approach to waste management, based on technological solutions, can drastically reduce the operating cost of waste management, leading to reduced cost of services for the users. These are some examples of how technology can improve service provision and the well-being of the whole city. Finally, waste management practices are a perfect example of how local actions can have a global impact.

Parking Services

The increasing trend of private car usage surges the demand for parking services. However, poor management of city parking spaces makes the parking process time and energy-consuming and costly. Like most of the cities in the world, the city of Kragujevac parking spaces suffers from a lack of management, coordination, and foresight. The inefficiency of the existing parking information exchange system, poor parking space monitoring mechanism, and less flexible payment system faces the city the following problems:

- Increased cruising time for drivers
- Increased congestion
- Increased CO2 emission and noise in the city
- Delays and inconvenience for drivers to pay parking tickets
- Lost revenue for the city

The main goal of this project is to support the city of Kragujevac in improving the efficiency of parking service delivery by implementing smart parking technologies. Transition to the smart parking system would improve the planning of parking spaces around the city, optimize enforcement officers' surveillance rounds, decrease congestion and cruise time for citizens searching for available parking spots. Moreover, it will increase the revenue stream from the parking service to the company that will be reinvested to improve the parking services further.

Implementing new technologies for parking services can prove to have a positive effect on the city of Kragujevac's ability to collect revenues and improve the quality of life for commuters. Recent studies focusing on extra costs associated with commuter cruisings for parking spaces with and without reservations, like those proposed by smart parking systems, have been promising. Tsai and Chu (2011) note that the environment can expect to see carbon emissions reductions of nearly 432 kg-1,245 kg along with cost reductions of 27.06%-43.77% if parking reservation systems are used. This furthers the argument for reducing cruising times for commuters. Similarly, parking garage revenues increased 13-25% when they included reservation-type smart parking systems.

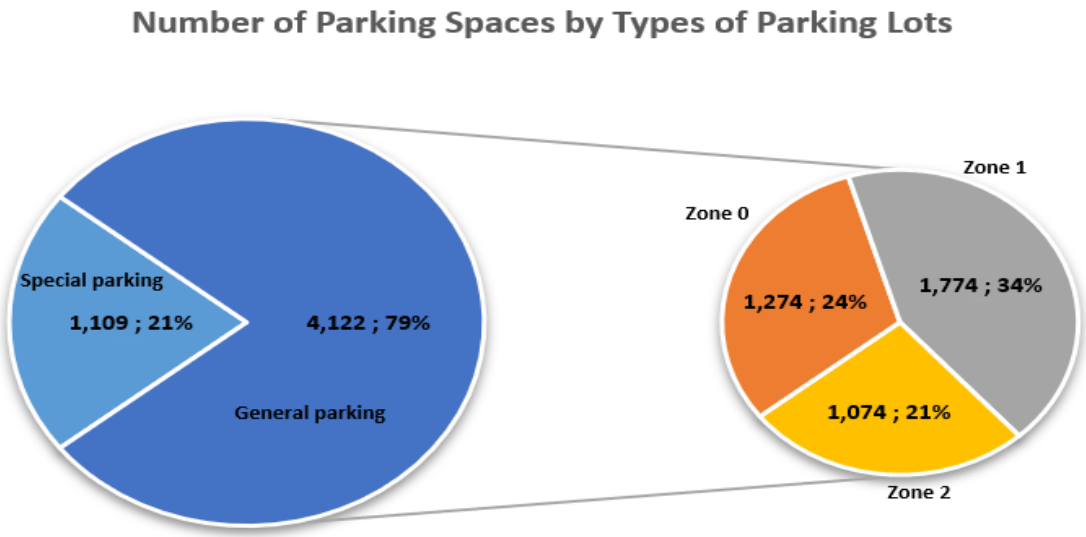
Smart-parking solutions offer increased convenience for both the city and customers by offering real-time data into available parking spaces within the city as well as where the parking spaces are located. Rather than manually issuing tickets, smart-parking solutions can offer a more convenient way to enforce parking policy and increase customers' likelihood to pay (Fabusuyi et al. 2014). This can result in a more efficient commute and increased revenues for the city's parking services department.

The City of Kragujevac Parking System

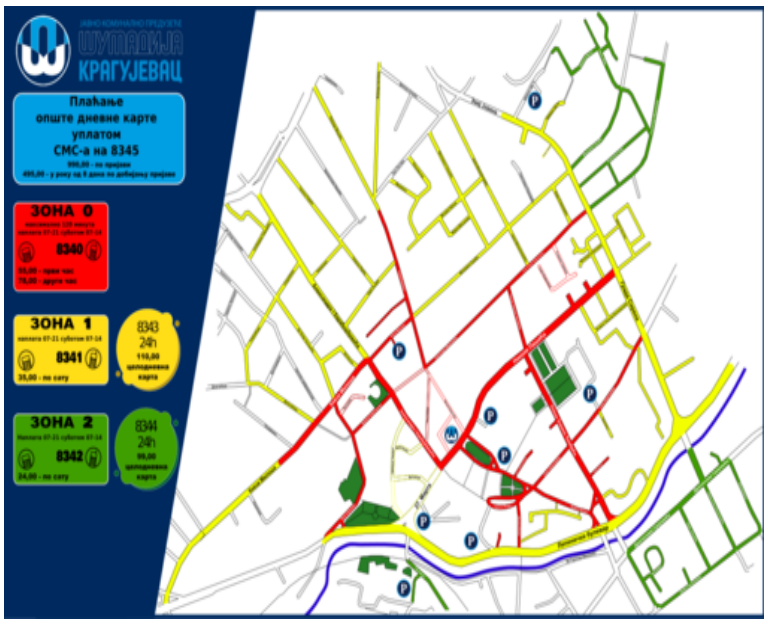
In Kragujevac, the public parking spaces are classified as open (general) and closed (special) parking areas, which the Public Utility Company of Šumadija manages. The special parking areas cover seven different streets[59] and one parking garage[60] across the downtown areas of Kragujevac and account for 21% of total public parking spaces. The remaining 79% of parking lots in the general parking area are divided into three different geographical zones, each with different prices: Zone 0, Zone 1, and Zone 2. As of January 2021, the company oversees 5,231 spots (4,122 general parking and 1,109 special parking spots) (see Figure 5). In addition to these parking lots, the city has other parking spaces, but drivers are not charged for them. The PUCŠ plans to make parking areas in the Aerodrom district chargeable in a few months, which will increase the number of parking lots to manage.

[59] Street 27, Plaza Svetog Đorđa, Save Kovačevića, Plaza Topolivaca, Nikole Pašića, Lepenički bulevar, Zmaj Jovina
[60] Kneza Miloša

Figure 6. Parking Spaces by Lot Type



Breakdown of Parking Lot Space

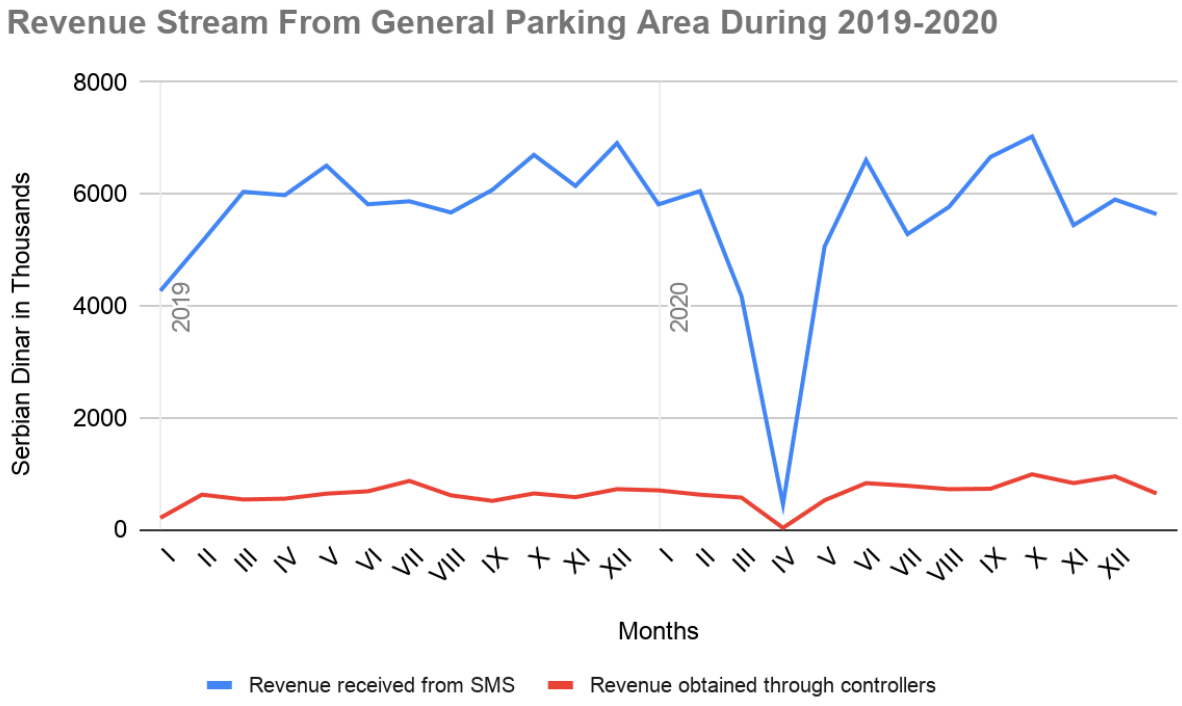


On the map, red lines represent the Zone 0 parking area, where the first hour of parking costs 55 and the second hour 78 Dinars[61]. Whole-day parking passes are not available for this zone because it is the busiest part of the city, and the company tries to discourage long period occupancy of the lots by one car, with high parking costs. Zone 1 is presented with yellow lines and covers the biggest share (34%) of the parking lots across the city. The price for the first-hour parking is 35 Dinars and the full day ticket costs 110 Dinars. Zone 2 is illustrated by green lines and covers 21% of the total parking spaces. The first-hour parking costs 24 Dinars and the whole day passes 99 Dinar.

[61] As of May 5, 2021 Serbian Dinar is 0.010 United States Dollar and 0.0085 Euro

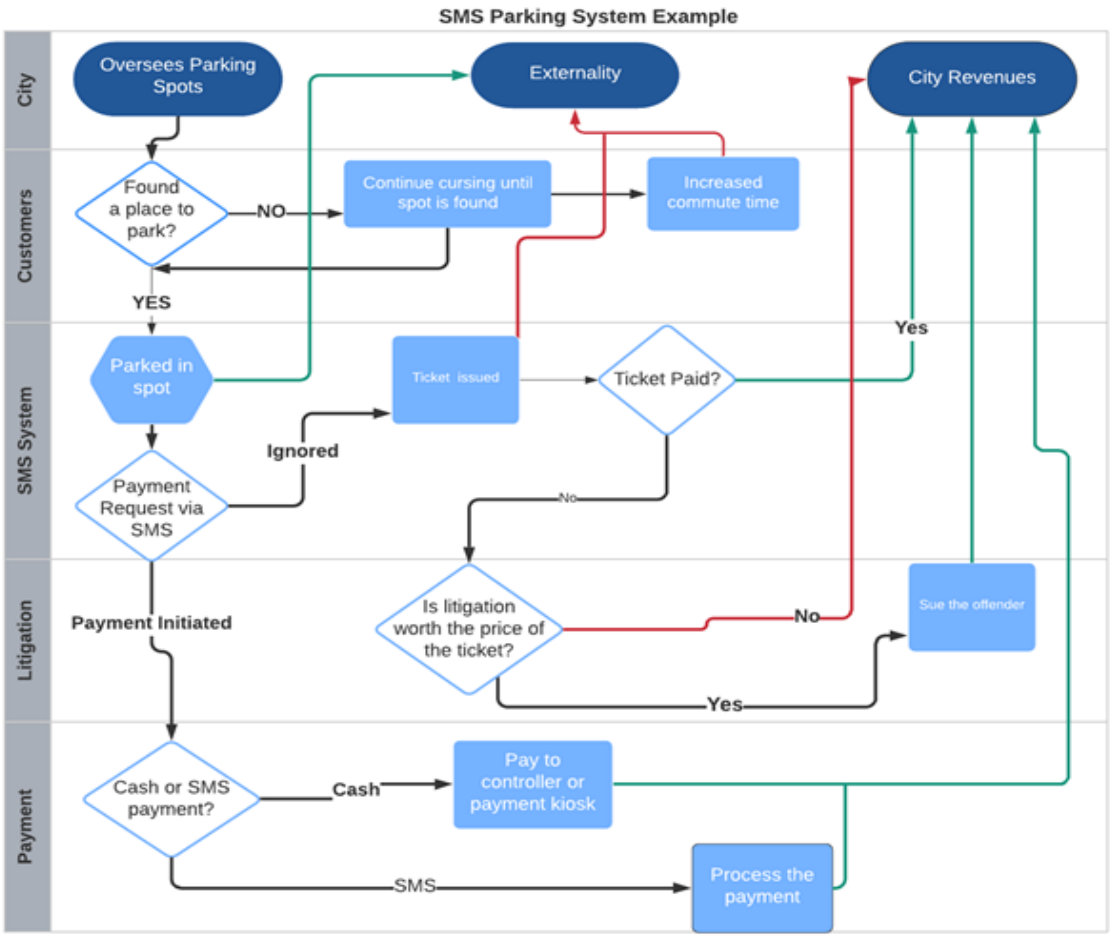
Despite the fact that the general parking area has approximately four times more parking lots than the special area, it generates slightly less revenue than the latter. For instance, during December 2020, income generated from special parking areas reached 6.4 million Dinars, while general parking revenues accounted for 5.9 million Dinars. Revenue generated from general parking areas monthly fluctuates around 6 million Dinars if we exclude only a one-time negative shock of COVID-19. In addition to income generated from parking passes that are mostly paid through SMS (99%), the company earns money from parking tickets issued by controllers when cars are parked in the parking areas without paying for the service. Parking tickets are issued only for general parking lots because access to the closed parking lots is not allowed without paying for them. That's why controllers monitor only open parking lots.

Figure 7. General Parking Revenue



The company gets revenue also from reserved parking (on average 2-3% of total income), fines issued for removing the illegally parked cars (10-12%), subscriptions (5-6%), and "tenant" and "entrepreneurial" tickets (4-5%). The city's parking payment system relies heavily on Short Messaging Services (SMS). Drivers send SMS to notify the mobile operator and the PUCŠ to charge their mobile account for parking pass/ticket. Around 97-99% of parking passes are paid by SMS. Figure 7 below shows the city's parking system.

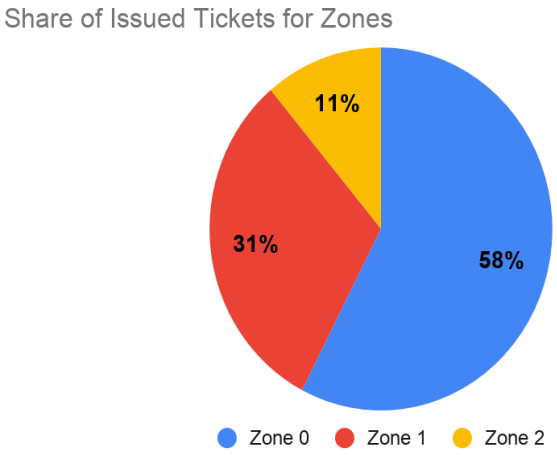
Figure 8. Current Parking System Flow Chart

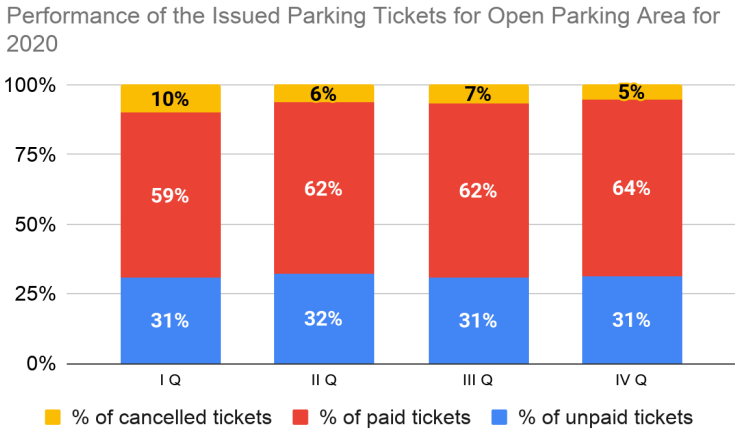


Despite the flexibility of the SMS payment system, the drivers still try to avoid paying for parking services. According to controllers' check-ups, on average, 4% of the observed cars are parked without paying for service, thus decreasing the company's revenues. Currently, the PUCŠ employs eleven parking controllers to help monitor parking spaces and enforce parking regulations. It is challenging for the controllers to simultaneously monitor all parking spaces since they are spread out around the city, limiting a chance to discover illegally parked cars and encourage drivers to avoid parking fees. Parking ticket data analysis for the year 2020 shows that, on average, 58% of the tickets are issued in Zone 0. This explains controllers focus on Zone 0 since, on average, monthly, they check approximately 10,000 SMS notifications for Zone 0, while only 6,000 for Zone 1 and 1,000 for Zone 2. The PUCŠ during the last meeting mentioned that the company decided to increase the number of controllers because they plan to increase the number of parking lots; however, in the long run, the PUCŠ is interested in implementing smart

parking solutions that can minimize the reliance on the controllers and increase the efficiency of their raids.

Figure 9 & 10. Parking Ticket Breakdown





Discovering illegally parked cars is the first step to enforce parking regulations. The second stage is to ensure that the issued tickets are paid by parking rule violators, which is another big challenge for the PUCŠ. As Figure 9 illustrates, on average, only 62% of the issued tickets are paid. PUCŠ is concerned over the infeasibility of litigation costs attributed to unpaid tickets. In essence, it typically costs more for the city to sue offenders for their unpaid fines. This sets a hard limit on how the city can enforce its parking policies. The inability of the city to recoup unsolicited revenues causes the city to face difficult budgeting challenges.

Expanding the quality of life for residents allows the city to become more attractive to both businesses and potential residents. Investing in the city's parking service does not necessarily require a full-scale upgrade of the city's infrastructure. Many emerging smart parking technologies have been designed to adapt to many infrastructures currently installed in Kragujevac like lampposts and buildings and can be easily integrated with existing infrastructure. Other possible parking solutions include vertical parking spots and in-depth comparisons between parking spaces on the street and inside parking garages.

Target Group

The technology implementation project is designed to target and benefit the Public Utility Company of Šumadija Kragujevac and the people of the city of Kragujevac. The citizens will derive direct and indirect benefits, and the PUCŠ organization will directly benefit from the changes. The benefits of the project will be numerous and include:

Public Utility Company of Šumadija

- Increased revenue collection efficiency by the city
- Improved data collection and analytics upon which effective policy can be based
- Improved resource allocation and management of the city's parking and waste management facilities

Citizens not directly receiving the services from PUCS will also derive great benefit from this project. The expected outcomes for citizens include:

- Health benefits derived from the more efficient collection, management, and disposal of recyclable waste
- Increased ease of transport as a result of a more streamlined parking system
- A reduction in exhaust emission pollution as a result of a more efficient parking service

The direct beneficiaries of **The Waste Management Services** project will include all citizens who engage in recycling waste materials and those who undertake private motorized transport to traverse the city. Indirectly, this project benefits all citizens of the city and the wider Šumadija district in four main ways.

1. The time inefficiencies created from inefficient parking facilities have been previously well noted. Shorter commute times and ease of city parking have been shown to increase overall work productivity and subjective perceptions of wellness (Ma & Ye, 2019).
2. Issues resulting from extended drive times to find parking and traffic congestion contribute to higher levels of inner-city pollution, which affects all residents of the city.
3. An indirect benefit is the reduction of littering and poor and improper disposal of many recyclable waste materials which occur within the city. This extends to those who may not participate in the recycling process as city spaces are essentially a public good.

4. Increases in revenue collection can translate into greater investments in infrastructure, including roads and utility reliability, as city management is better able to finance projects.

Project Objectives

Waste Management

The overall objective is to improve the waste management system of the PUCŠ by implementing some of the relevant technological solutions. This would make the work of PUCŠ more effective and efficient in providing services for its users. As previously mentioned, the most alarming problems are the lack of equipment, resources, and inadequate infrastructure. This is followed by a lack of data and performance measurement systems. By adopting specific technological solutions, the waste management system would improve almost all of its sectors. New technologies would allow PUCŠ to organize its data collection and utilization better, recognize important trends in waste disposal, improve the efficiency of the current resources, and finally lower the operating costs.

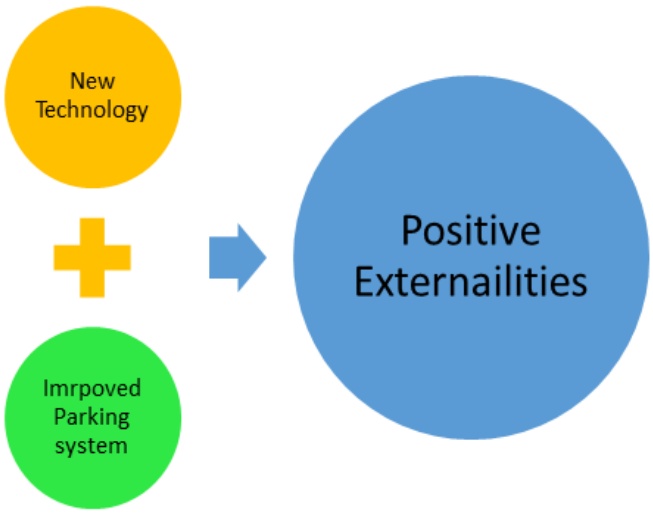
The more specific objectives would be to improve each waste management component, from waste generation to waste disposal. Even though the PUCŠ can not directly influence waste generation, promoting recycling practices and applying some of the technological solutions that can incentivize people to recycle can eventually impact how and what kind of waste people generate. The next component is temporary disposal which includes discarding used material, handling, disposal, and possible waste processing. Technological solutions, such as EcubeLabs trash bins with a hydraulic compressor, can greatly impact how waste is being disposed and pre-treated. New technologies offer solutions such as compression of waste volume, which can positively affect resource utilization when it comes to garbage collection. Collection and transport is the next phase, and it relocates temporary disposed waste for further processing or final disposal. Sensors that can detect the waste level inside containers and send real-time data back to the data center are examples of how new technologies can help PUCŠ reach its objective to improve the collection process of its management system. GPS devices with additional vehicle

monitoring tools can navigate the garbage collection fleet and assess the conditions of garbage trucks. Data collection is most important for this phase of waste management, and mentioned technologies are some of the possible solutions. Waste treatment is the most complex phase of an integrated waste management system. This phase includes sorting, preparation, the technological process of waste treatment, and reuse. The current capacities of the recycling center are insufficient to meet the recycling needs of citizens. To face this challenge, the PUCŠ has decided to install reverse vending machines. This is a good example of how recycling practices can be incentivized and improved. Finally, by meeting these specific objectives, certain positive externalities will follow. The carbon footprint of PUCŠ would reduce, new technologies carry certain educational components of responsible disposal behavior, and the city itself would experience beautification due to properly managed waste.

Parking Services

Generally, the project's objective is to find technological solutions that can help address the PUCŠ's capacity to govern. Project objectives for the city's parking services are highlighted by the increased technological capacity to manage parking spaces, parking payments, and ticket management in real-time. Essentially, the project aims to equip PUCŠ with technologies to solve inefficiencies within the overall parking service system. This, in turn, will strengthen the current parking system with improved data analysis capabilities and a more integrated parking service experience for both PUCŠ and commuters.

Indeed, the collaboration between technology and government is an area of importance for local leaders around the globe. The technological capabilities of governments are crucial for increasing efficiencies of services provided by PUCŠ. Ultimately, the goal of the project is to translate technological improvements into improved services. Installing cameras with license plate



recognition (LPR) technology, integrating smartphone applications to facilitate billing, and using smart-signage are indicative of effective project objectives.

Project Implementation Strategy

Based on the current information available to the team, it is difficult to propose a substantive implementation strategy for the proposed solutions. This section of the report heavily depends on the information provided by vendors. Since the team experienced major difficulties obtaining information from vendors, this section will be dedicated to some challenges and possible solutions for them. Some challenges to project implementation include the limitations of the LoRa network system for parking and waste services and the lack of available vendor information (timelines, cost estimates, etc.). However, common elements of a proper implementation strategy of this caliber are detailed below.

The key to this project with regard to waste management is to find vendors who can provide these solutions. This work has been carried out since last fall, and vendors with sufficient experience with these solutions have been screened. Information and performance on these vendors' solutions were also provided, and case studies achieved by these vendors are also presented. Based on this, we can select the best vendor for the improvement of waste management. Before selecting a vendor, we need to contact vendors directly to coordinate opinions regarding the project. It is important to select vendors who are willing to participate in this project. The conditions necessary for vendors to install and operate solutions should also be considered. Before consulting with vendors, PUCŠ should keep in mind the size and scope of the project, considering the budget and workforce available for this project, which will facilitate consultation with vendors and the project's progress to speed up.

One challenge which impacts the applicability to Kragujevac's particular needs is its inability to take video imagery of the license plate numbers of vehicles parked. The system still requires parking monitors to issue tickets, which is represented as one of the primary needs of the Public Utility Company Šumadija. This was one of the major challenges encountered in securing Cleverciti, Smart Parking, and other systems on the market. The team discovered that no parking monitoring system had developed an all-encompassing design which allowed for the full

automation of parking monitoring, thus relying on parking attendants to determine infringement of street parking regulations.

Another challenge related to securing vendors was the lengthy response times the team experienced to emails and correspondence. This occurred because the project was attributed to a graduate program, thus perhaps rendering it a non-business opportunity in the eyes of vendors.

In response to these challenges, the team developed a roadmap to navigate vendor hesitancy to engage in the project. The team determined that adding the credentials of the CEO of the public utility company in any initial email correspondence. The team then formulated a template that was to be used in any official communications to vendors. Subsequently, meetings with vendors would indicate the clear intention to implement this project within a short-to-medium-term horizon.

One of the best ways to encourage the vendors to be interested in and actively participate in this project is for executive-level officials to contact the vendors directly. All of these vendors want to expand their markets and track records. However, it can be a natural response for them to have doubts about discussing projects to be carried out in European cities with graduate students in the U.S. Therefore, if the high-level officers contact the vendors that we contacted in the process of registering, the progress of the project can be rapidly accelerated.

Impacts

Waste Management

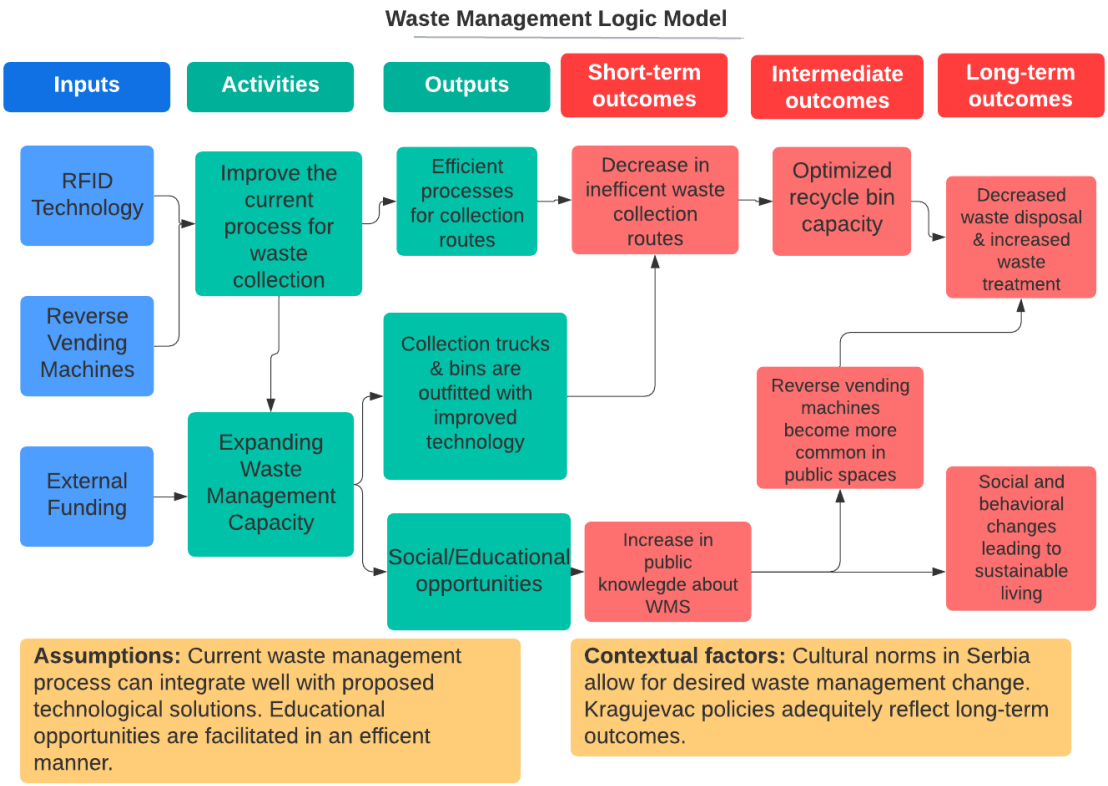
In terms of waste management services, impacts are primarily seen in areas of operational efficiency, consumer reach, and overall recyclability rates. To measure the operational efficiency impacts of waste management services, performance measures should also be utilized. Measures like the number of recycled goods per waste management truck routes, the amount of waste collected per bin, and the amount of consumer use (including additional use) should be assessed. When analyzing the overall impacts of waste management systems, it is important to note how the inputs become outputs given the activity involved. This process, then, culminates in measurable impacts that can be studied over time. Separating these impacts into short-term,

intermediate, and long-term outcomes can give a holistic picture of the project's overall effectiveness. The inputs for waste management implementation vary on the type of technology and/or the vendor utilized to provide services. Radio-Frequency Identification (RFID) technology, on the one hand, has the input requirement of RFID-enabled chips. This allows real-time data to be transmitted to truck drivers to plan their routes more efficiently. Overall, the inputs involved in the Waste Management System (WMS) have been identified as sustainable technologies and vendor solutions. The activities of the project identify the processes by which inputs are transformed into outputs.

If the WMS is working as intended, the outputs of the activities will align with PUCŠ's goals and desired outcomes. To measure the impact, then, we must use a series of performance indicators. This is achieved by analyzing the effects outcomes have on financial, social, and environmental factors. Divided into short, intermediate, and long-term outcomes, the timeline to measure how the inputs influence waste collection routes, reverse vending machine usage, and how much waste is disposed and/or treated can take place on a quarterly or yearly basis.

Potential areas of opportunity for PUCŠ to expand its waste management capacity are through external funding sources. Grants and other awards issued from third parties like the United Nations and the European Union are constantly seeking innovative projects designed to tackle sustainable solutions.

Figure 12. Waste Management Logic Model



Parking Services

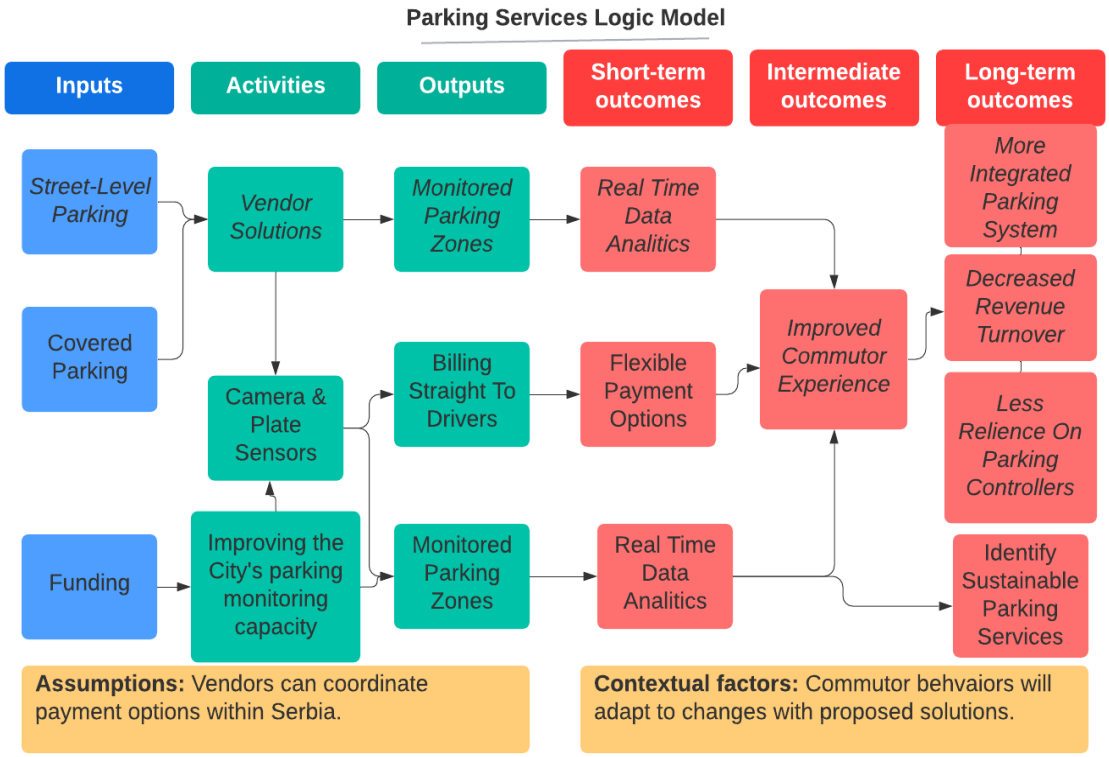
First, the inputs of this project involve the plethora of parking spaces under PUCŠ' jurisdiction. The parking spaces, both open and closed, act as a blank canvas that is ripe for the opportunity to innovate. Additionally, external funding sources have the opportunity also to influence the project as an input. Activities in this project are three-fold: vendor solutions, technological improvements, and overall parking capital improvements. Through these activities, PUCŠ can invest in improving its capacity to provide parking services to the people of Kragujevac.

The primary input source for this project are street-level parking spaces and covered parking spots. The activities, then, would be the technology and vendor solutions used to analyze and

monitor parking spots. Allowing PUCŠ to access real-time data analytics, streamlining the payment process, and issuing parking tickets operate as the project's overall outputs. The outcomes, however, give more insight into how impactful the project.

Relating the installation of improved parking technologies to positive community externalities is at the heart of translating outcomes to impacts. In the short term, the project expects to see improvements in real-time data analysis and flexible payment options for commuters. This, then, translates to an overall improved commuter experience in the intermediate time frame. Even if commuters are not directly using parking services provided by PUCŠ, an efficient parking system can improve road congestion and lessen commute times for other drivers.

Figure 13. Parking Service Logic Model



Finally, the long-term outcomes of the project are highlighted by spillover benefits to the surrounding community. These positive externalities include an overall more integrated parking system, lower revenue turnover rates, and decreased reliance on physical parking controllers.

Coinciding with the overall project objectives, identifying and achieving a sustainable parking service will set PUCŠ up for long-term cost-saving measures.

Project Sustainability

In order to ensure that this project continues in perpetuity, societal buy-in is essential. The project calls for the sensitization and cooperation of the citizens of Kragujevac, who must be particularly aware of how they can take advantage of and derive benefit from the changes to be made in recycling and parking services. Consequently, the team proposes that an aggressive marketing campaign be undertaken in order to make citizens aware of the proposed changes and their net gain now and in the future. Maintenance of software and hardware (including machinery) will be facilitated by the implementing companies of the parking service and waste management solution. The monitoring of this process is a mandate undertaken by city technological experts, who will engage in continuous competence development in managing the implemented solutions.

The solutions we present regarding waste management are trash cans, sensors, analysis programs, or software, which are the types of products companies sell. Therefore, maintenance and updates are important to achieve the original purpose of these products. This is a mission that can be achieved only when the city connects closely with vendors providing solutions. And the people who will operate these solutions need to understand how to deal with the solutions. To this end, training of those personnel needs to be conducted with the help of vendors. Fortunately, vendors that provide the solutions we offer are achieving sufficient success in this area.

The most important thing in implementing these policies is the high understanding and support of citizens and a city parliament. If these are not secured, the policy could be stopped early on. To prevent this, the effect of the solution must be actively known to citizens and the local government after it is implemented. Therefore, the city needs to ensure that they continue to support the solution. Many vendors, like parking services, are somewhat passive about the project. We've provided sufficient data on the materials we requested from them, and this seems to be because they do not have business confidence in the project. It is a problem that needs to be

addressed before completing this project or when the city of Kragujevac pushes ahead of the project even afterward.

Evaluation Strategy

Waste Management

In order to effectively evaluate the solutions for waste management, the city can consider the following four indicators:

1. The number of collections per bin a week
2. Yearly savings for collections
3. Recycling rate
4. The amounts of waste thrown away

The number of collections

The solution of Ecube labs is basically to monitor trash bins and provide optimal collection routes. Currently, waste is collection happens even when the trash bin is not filled or not collected when the trash bin is overflowing. What PUCŠ wants to accomplish through this project is to minimize such inefficient waste collection. This performance can be evaluated by comparing the number of waste collections per bin a week separately before and after the project. In other words, this means that waste is collected based on needs.

Yearly savings for collections

It is necessary to ascertain how much expenditure on waste management decreases after implementing this project. And if that happens, this is what makes this project sustainable. To do this, the effect of cost-saving on investment needs to be visible. If the savings are not sufficient, an alternative must be devised immediately to increase them.

Recycling rate

The reverse bending machine the team has presented and PUCŠ is considering introducing is a recycling-related solution, and its effectiveness can be easily verified through the recycling rate.

The recycling rate is one of the most widely used indicators for monitoring the progress of waste recycling. It is calculated as the proportional value (%) of the recycled waste from the total waste generated.

The amounts of waste

The total amount of waste thrown away is also related to recycling. If the recycling rate increases, there is a high possibility that the amount of waste that is thrown away, and, consequently, needs to be collected will be relatively reduced.

Parking Services

In order to effectively evaluate the project, the city will consider three key metrics, namely:

1. Subscription to the app in comparison to the number of registered vehicles in the city
2. The number of parking tickets issued after one year of full implementation
3. The increase in overall parking occupancy of paid parking spaces within the city

Subscription

The subscription metric allows the city to determine societal buy-in of the new parking service system and the future potential usage of the strategy. The goal here should be to ensure that the majority of drivers within the city have placed the application on their devices in order to facilitate usage.

Parking Tickets issued

Since the goal of the system is to increase revenue and ensure that illegal parking is curtained, a decrease in parking tickets issued, along with increased revenue from parking, will indicate the effectiveness of the parking service system in use. If there is an increase in parking tickets issued, the city can surmise that the system is capturing those drivers who previously parked unmonitored.

Parking Occupancy

Increases in parking occupancy indicates that the issue of finding available parking spaces is being resolved. This metric will also be reflected in an overall revenue increase in parking revenue by PUCŠ.

Potential risks - Parking Services

As with any project which seeks to promote large-scale changes in city function, there are a myriad of risks that we account for. Some of these include:

- Poor adoption of technology by PUCŠ- This can occur as a result of an asymmetry of information, poor communication of goals, poor consensus-building surrounding outlined goals, or a general unwillingness to change cultural practices
- Budgeting and financial constraints - The ability to maintain and eventually improve the implemented technology depends on funding and resources from district governments. As economic volatility increases, projects of this nature may face fiscal and financial constraints as the city reevaluates priorities based on surrounding local and regional circumstances.

Case Study Summary

The key to this project's success are the vendors that will provide the solutions recommended by the team. These solutions should be continuously implemented and upgraded for sufficient time, rather than being implemented in a single task. This means that the vendors must have sufficient experience for these solutions. The case studies below have us identify those.

Waste Management

As mentioned above, Kragujevac's problems with waste management are the lack of data and tools to measure performance, the lack of resources and inefficient infrastructure, the lack of resources, and the inefficient infrastructure for recycling. These problems are not only Kragujevac's problem, as was examined in our first report. Many cities around the world are struggling to solve these problems, grow into smart cities, and try many things.

Ecube Labs

One of the vendors recommended, Ecube Labs, is remarkably running solutions in 104 cities around the world. Sensors (CleanFlex), which help waste managers recognize how full the trash bins are, will be Installed in the trash bins around the city. Waste managers can also accumulate and analyze this data through a platform (CleanCityNetworks) also provided by Ecube Labs. It is a solution that helps to collect waste efficiently. In addition, Ecube Labs provides the best route for collection vehicles to make garbage collection more efficient through CleanTrack.

Figure 14. Ecube Labs SWOT Analysis

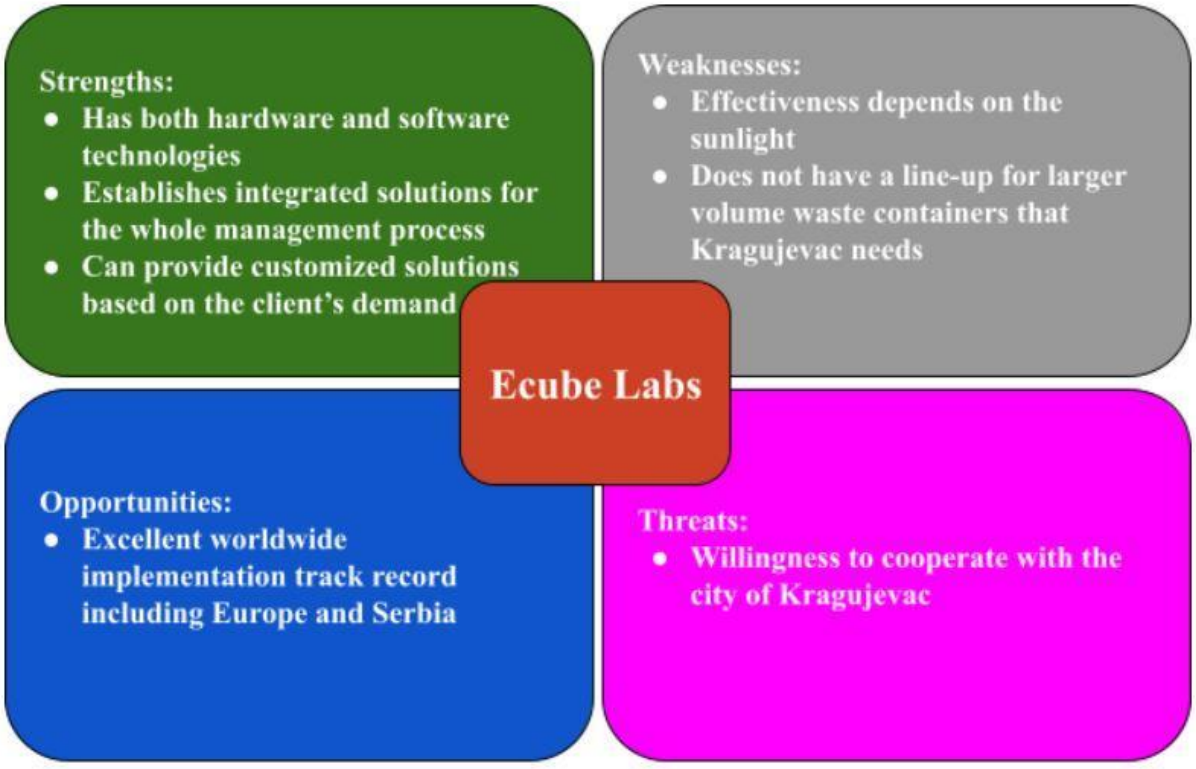
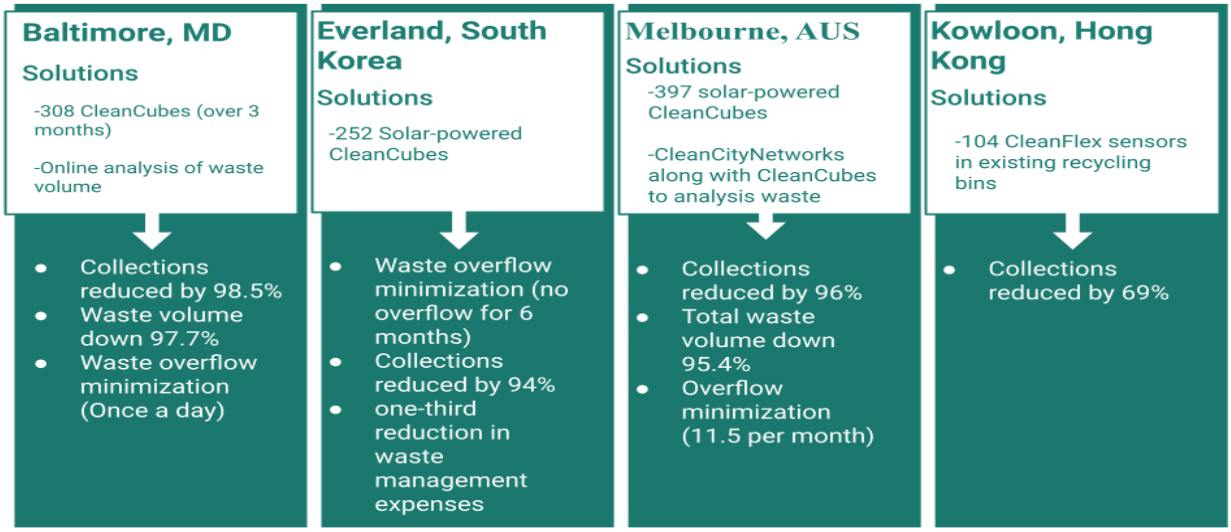


Figure 15. Case Study Impacts



Another option we recommend, Rubicon, provides software (RubiconSmartcity) similar to Ecube Labs' too. Data related to waste management is analyzed and collected, which makes waste management more efficient. Rubicon has accumulated track records around the U.S. and recently completed a successful project in Atlanta, GA. As a result, it is expected to save about $780,000 a year, preventing 83% of recyclable waste from being thrown away.

These vendors have meaningful and significant track records related to smart waste management and are expanding them. Nevertheless, in the process of researching, we cannot be certain that these vendors' active interest in pursuing their business in Kragujevac. This will be a major challenge to successfully implementing this project.

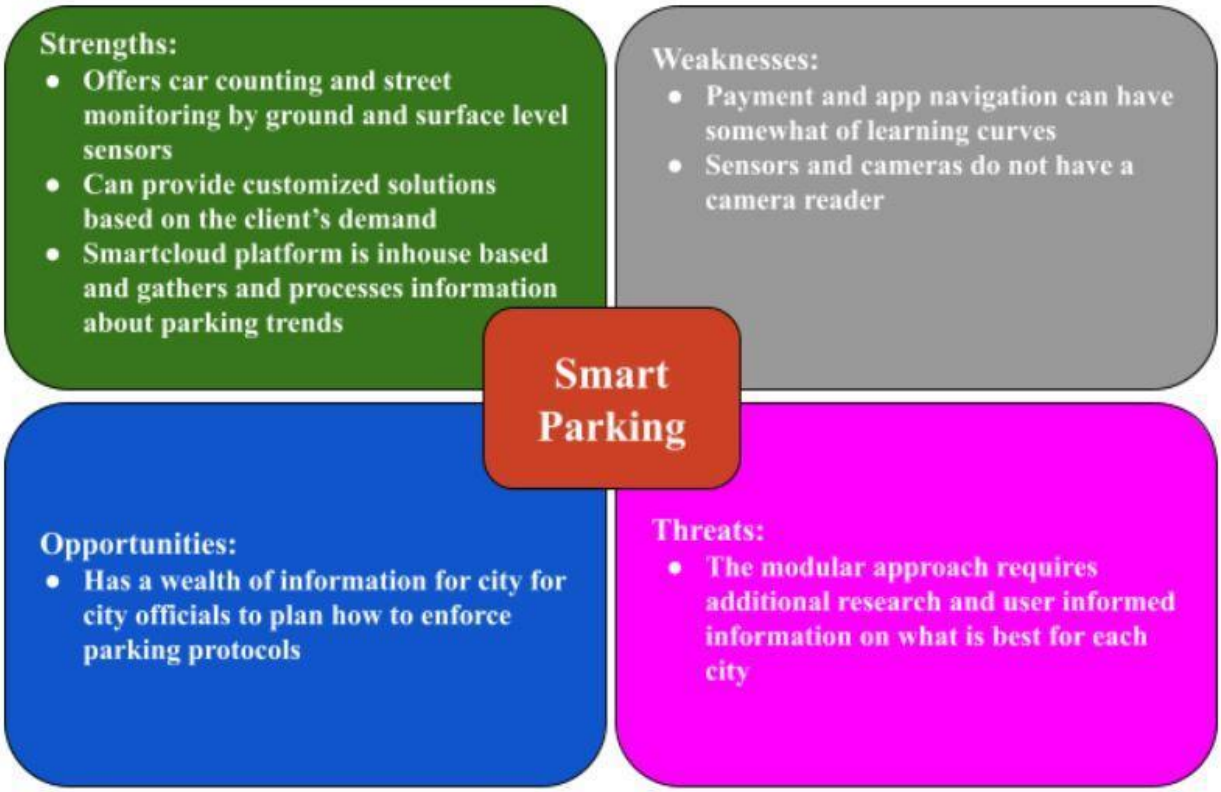
Parking Services

Several parking service solutions were researched in order to determine the most feasible solution for the city of Kragujevac. The three most feasible solutions were determined to be Smart Parking, Cleverciti, and IEM Solutions. The team studied the implementation of these three solutions in the cities of Cardiff, Wales, South Holland, and Geneva.

Smart Parking

In early March 2017, **Smart Parking** installed Europe's first city-wide deployment of **SmartSensor** bay occupancy detecting equipment and SmartSpot technology platform in central Cardiff. This included over 3,000 in-ground SmartSensors, as well as a network of SmartSpot gateways to relay communications into the SmartCloud platform. Smart Cloud processed this data and fed live information into variable message signage that was strategically placed around the city, as well as into the bi-lingual (English and Welsh) Park Cardiff app that Smart Parking developed. The combined solutions meant that a motorist, using the Park Cardiff app, could check for parking conditions before they left home and was then afforded the ability to see real-time guidance and availability once they were in the city.

Figure 16. Smart Parking SWOT Analysis



Cleverciti

In this city located in the South Holland province of the Netherlands, Technology propelled by **Cleverciti** was installed. Cleverciti utilizes overhead sensors, which are usually installed on

streetlight poles and sometimes on nearby commercial businesses and cover a range of over 20-30 parking spots with a range of 400 meters and up to 320 degrees as long as there are no obstructions. Cleverciti's parking app guides users to the closest parking space by GPS navigation, reducing the time that a space is open and not collecting revenue in cities like Doormanstraat (Alvarez et al., 2017).

In addition, the sensors also measure the duration a car was parked and can alert the authorities if a vehicle has been parked over the time limit designated for its parking space. The app also displays the cost of parking and provides the option to pay through the app rather than having to deal with a kiosk or meter. This system was very beneficial to the city as it increased revenue and decreased the level of congestion within the city.

Figure 17. Cleverciti SWOT Analysis

IEM

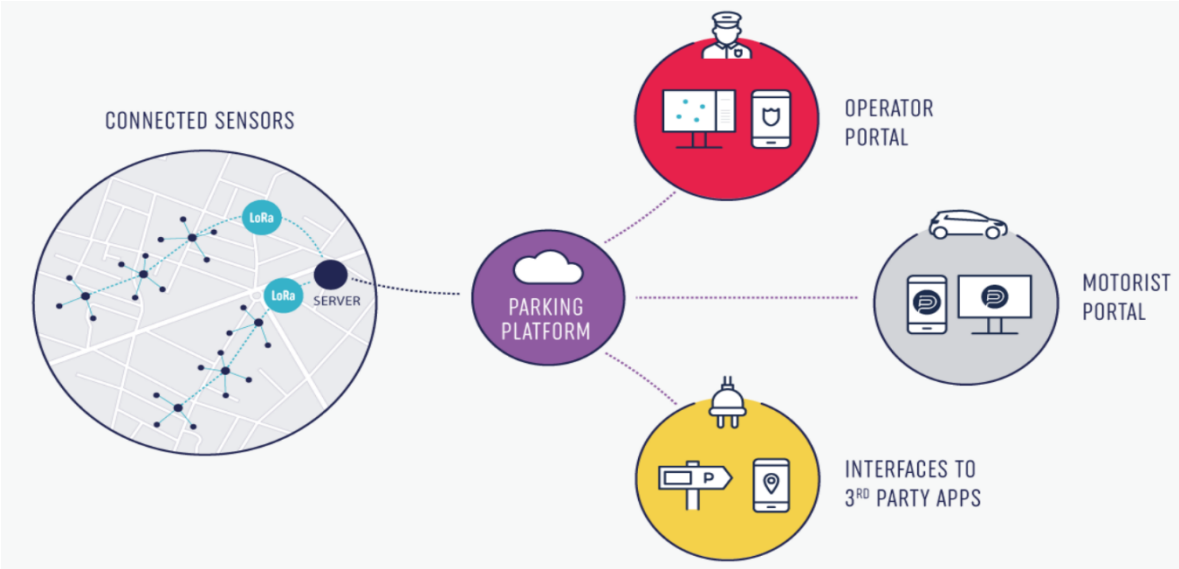
IEM is a Swiss company that provides a wide spectrum of parking solutions, including parking payment meters, sensors, parking management platform, and mobile application for drivers. The IEM offers three types of parking meters that are installed near the parking areas and are used to

pay parking tickets. Since the PUCŠ aims to make the parking payment system fully online through a mobile application, we will not discuss meters in this report; however, the city should consider that at the beginning, it can face challenges to implement only mobile payment systems because not everyone has smartphones and is capable of doing transactions online. For instance, transferring to the mobile payment system could exclude the elderly from this process that could be considered a discriminatory act (IEM Solutions, 2021).

The team found sensors called PrestoSense in combination with parking management platform (Presto1000) and mobile application (PrestoPark) the most useful tools to fit the city of Kragujevac purposes. PrestoSense is a vehicle detector tool similar to Clevercity sensors, but they should be installed on on-street parking bays, and each parking lot needs one sensor. PrestoSense sensors feature dual detection, both magnetic and ultrasonic. The sensors communicate via LoRaWAN (Low Power Wide Area Network). The installation is simple, done with 3 screws into the ground. The lifespan of a sensor is 8 years under normal usage conditions.

PrestoSense helps parking managers monitor space occupancy in real-time and detect not only a vehicle's presence but also the parking duration of a car. The information is forwarded to the parking operator. The operator uses the data to analyze the load and turnover rate of his/her car park and to optimize enforcement. The motorist uses the information directly on his/her smartphone. The city's traffic guidance system or the motorist's GPS guide him to the next available parking bay. The infographic below illustrates how the information is exchanged between sensors, parking managers, and drivers.

Figure 18. Parking Services Integration



More than 650 Prestosense sensors were installed in the different areas of Geneva. They provided real-time data to both parking administrators and motorists on the currently available and soon-to-be-available parking spaces in the city. The city installed sensors in high-demand areas to increase monitoring and revenue generation. Like Geneva, Kragujevac could install sensors only on those areas where there is a high demand for parking and the big share of the observed cars by controllers are illegally parked. The table below describes the approximate costs associated with the installation of sensors on 10% of the general parking lots.

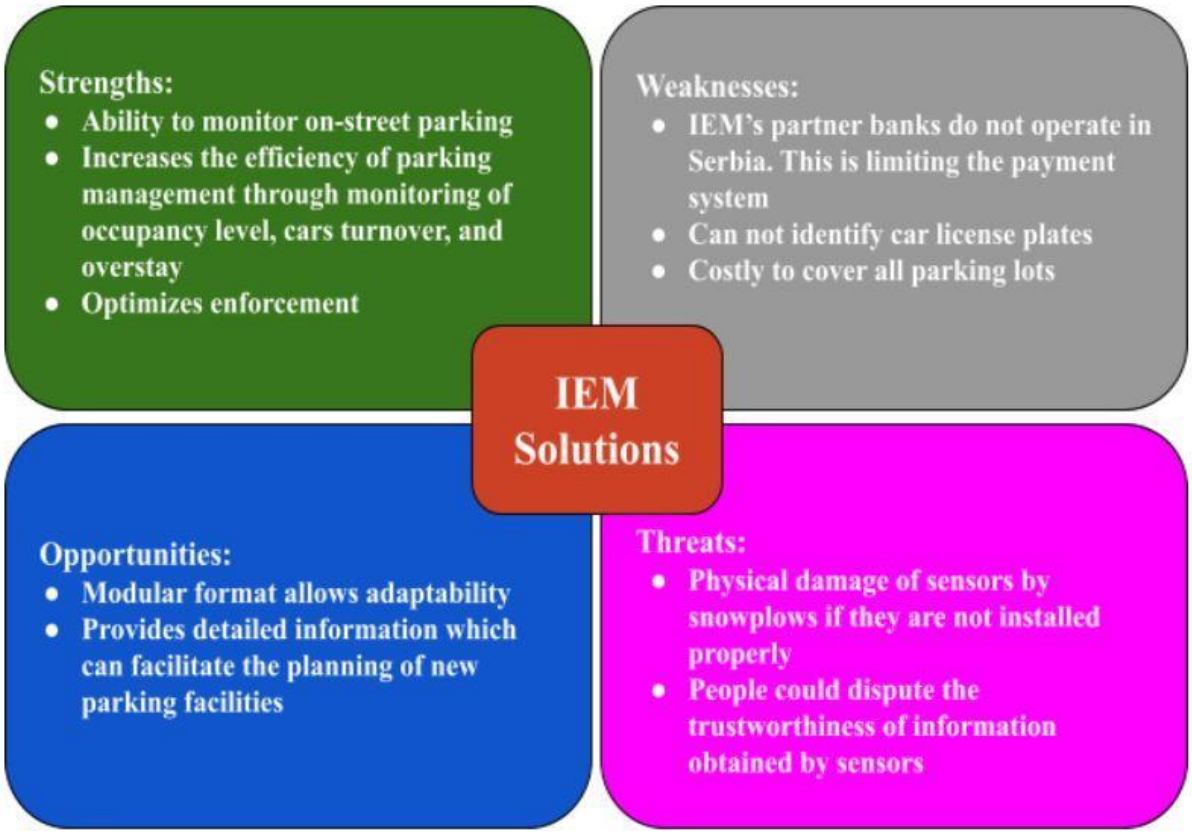
Figure 19. Projected Cost Analysis

	Per Unit Cost (€)	**Cost of Instaling 413 Sensors (€)**
Initial Fixed Cost		1110,271
Price per sensor	250	103,250
Software license per sensor	2	826
Installation cost	5	2,065

Transportation cost	10	4,130
Monthly Maintenance Cost of Sensors		
Software license per sensor per month	2	826

The graph below summarizes the strengths, weaknesses, opportunities, and threats of implementing IEM solutions in Kragujevac. The SWOT analysis shows that at this point, it will be challenging for Kragujevac to implement the suggested technologies mostly because of the absence of partner banks in Serbia and the costs associated with the project.

Figure 20. IEM SWOT Analysis



Closing Thoughts

Throughout this capstone experience, the Team is fortunate enough to work closely with amazing, intelligent, and professional leaders in government. From our networks in Navasota, Texas, to our friends half a world away in Kragujevac, Serbia, the most important takeaway from this capstone project was that we are more alike than we tend to believe. Indeed, utilizing technology to serve communities better is an issue local professionals must address for years to come. While our language, cultural norms, and geography is different, the challenges we face could not be more similar. It is through these common challenges, then, we can work together to find innovative solutions to complicated problems.

This capstone project was not without trials and tribulations, however. One area for future research can explore is the relationship between policy and technological innovation. Inherent limitations arose during our research that spoke to the challenges that faced the PUCŠ team. These challenges were primarily outside the scope of influence of the PUCŠ and outside of the scope of work for the Team. Nevertheless, the study into the intersection between policy and technology implementation is an area in need of future research.

As an issue identified early on in the project's first phase, it notes the limits within the Team. The capstone process takes place over a one academic year period, and it proved difficult to include policy aspects alongside case studies and the analysis of current conditions. Therefore, it was determined to note how the policy fits into the application-feasibility relationship without in-depth analysis. The limitation of the Team's time commitments, personnel capacity, and overall project scope are primary reasons for not exploring policy analysis. It is recommended that future capstone projects and research in this space should consider the policy aspect in the technology and government dichotomy.

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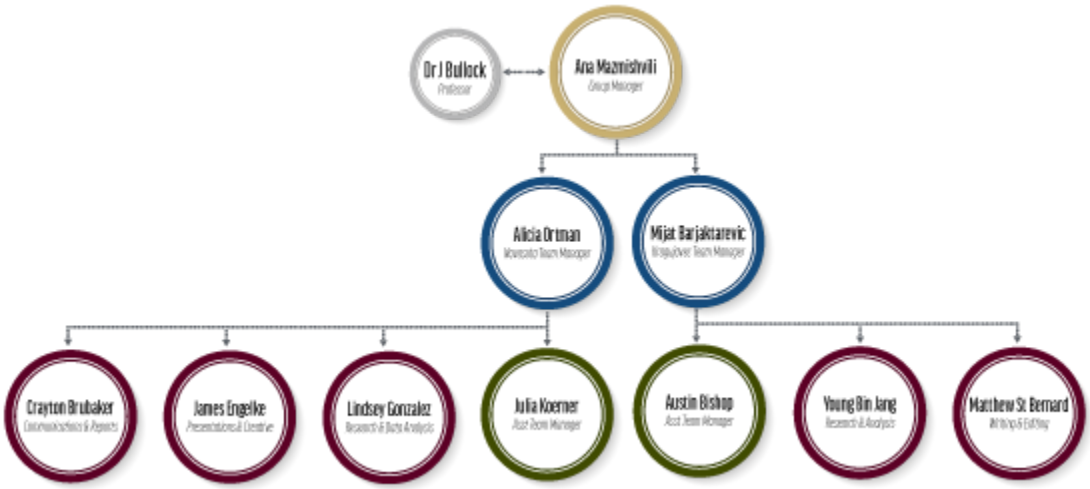
APPENDIX C. Organizational Charts

First Semester Organizational Chart



Second Semester Organizational Chart