Green Army

INNOVATION REPORT

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Miljøpunkt Loop 2

We'll match you with your destined plants

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Executive summary

The NGO Miljøpunkt Indre By (MP) has been working on an a goal to "greenify" the city of Copenhagen, approaching the goal through a multitude agendas and projects, working with inclusion of stakeholders from different spheres of interest to create a network and a knowledgebase that can perform the greenifying changes they wish to see in the city. Recently, MP have been working on including citizens, housing associations, shops, restaurants and more to collaborate on making Copenhagen's outdoor areas greener, in a literal sense, trying to broaden the spectrum of who can actively participate in the green agenda, besides the Municipality of Copenhagen. Even though the greenifying movement has been gaining traction in recent years, there are still several obstacles for these new stakeholders to actively be able to greenify the city. Obstacles range from regulations to economy, from people's behaviors to plant upkeep and maintenance, from the seasons changing effects on plants to the simple fact that many peoples do not know which plants to buy for their specific context or environment. To overcome these obstacles, we propose an easy way of matching "plant solutions" with businesses and citizens who want to have plants in their outdoor or indoor areas. We wish to enable everyone to be start having plants customized for their tastes, context and needs. The matching begins whHen a customer uses our app *PlantMatch* to swipe through questions that leads him/her to a plant solution that fits his or her wishes. Both shop owners and citizens know how hard it can be to keep plants and it can be an unnecessary expenditure to buy new plants, especially in times where the COVID-19 outbreak changed the income security for the worse. Making the right choice of plant or combination of plants can save shop owners from avoidable expenditures, whilst giving a businesses' a green branding profile and making their shop more welcoming for new and regularly coming customers. Furthermore, easy troubleshooting of maintenance problems in our app can limit the time and money business owners use on keeping their plants healthy. Citizens can start with simple plants that our app helps them chose for their situations, whilst more experienced plant owners can use the app to troubleshoot problem or get in contact with right support. Essentially, we think the app PlantMatch can help strengthen the green agenda in Copenhagen and beyond and make more peoples engaged in greenifying their city, spreading it like ripples in water.

Introduction to the innovation problem

Since the *Rio Declaration of 1992*, there has been a broad agreement between states and cities alike, that something must be done with the global environment including both the local and global scales. In the past several decades the City of Copenhagen has become famous for being one of the greenest cities in the world and has received several international prizes for being the best city in the world to visit, to live in and to invest in. This was not always so. From the 1950'ies up until the 1990'ies Copenhagen was a broken city with much of the population emptying out of it. This route for the city has been turned, in part by Copenhagen Municipality's many measures to invest in a more "livable" city, which includes measures that heightens the life quality of its citizens (Bisgaard, 2010). One such measure that encompasses both a local engagement with environmental challenges and an increase in livability for Copenhagen's citizens is the municipality's *Agenda 21 strategy*. (Teknik- og Miljøforvaltningen, 2019)

MP is a part of this strategy and is an organization that works as facilitator and supporter of green projects across Copenhagen. The MP in Copenhagen Inner City and Christianshavn works with four different interrelated efforts, one of which is a greener city. Plants and greenery in the urban environment are known to have soothing effects on stress levels in humans (Bringslimark, Hartig, & Patil, 2007), and has a multitude of beneficial side effects, such as lowering runoff caused by rain (Zhou, Mikkelsen, K.Halsnæs, & Arnbjerg-Nielsen, 2011), lowering the temperature of cities (heat island effect) (United States Environmental Protection Agency), insulating building from the cold or from heat and minimizing noise from hard surfaces (Davis, Ramirez, F.R., & M.E.Pérez, 2017). Not only does plants enhance the public amenity value (herlighedsværdi) but also the cultivation of plants in the city can be a breeding ground for entrepreneurship, it can increase property values and most importantly, it can be the foundation for communities and can support a healthier lifestyle (Realdania, 2014)

For companies' having plants and greenery can enhance the wellbeing of employees and plants can be a part of businesses branding strategy. However, plants can also be a big expenditure for many shops and businesses. Outdoor plants are exposed to the city's everyday hustle and bustle, which can weaken and even kill plants. From bike owners destroying plants and their containers by making them fall over, to nightlife goers urinating or throwing garbage in the plant containers. Indoor plants can also live a hard life if placed wrong or wrongly taken care of. Some plants will die of from being put the direct sun from a sunny window, while other plants would love the sunshine, but simply do not get

enough even if put at the window. Dead or shabby plants will not stay long, as it will reflect poorly on the company. Hence, business will either buy new plants, stop buying plants or get plastic lookalikes. See figure 1.

Figure 1. Left: Example of plants and plants and plant boxes of sufficient height and stability to support the cities many bikes. Right: Dying plant on Frederikgsborgsgade in inner city Copenhagen. Notice signs on plant container.

For privates' plants gives the benefit of a better indoor environment (Løgstrup & Thorhauge, 2009) by cleaning air and giving a personal decorative touch to a home. Housing associations can use plants and greenery to engage in community activities or by teaching city kids about nature (TagTomat, besøgt: 20-08-2020). But plants must be watered regularly in the summer months and will die off if they are forgotten during the owners' vacation, while plants that thrived in the summer heat can die off when the winter cold hits. Other plants still die from too much watering or too much rain, with many pots or plant containers not having a drain or having a wrong mixture of soils, making them prone to disease or pests. Many are the difficulties which a plant owner faces when he or she has plants or wants to get plants for their indoor or outdoor areas.

If it was possible to guide plant owners to the right choice of plants, for their needs and their particular environment - from the moment they first ponder on getting a new plant - peoples would use less unnecessary money on buying new plants or would have an easier time beginning to greenify their homes and their cities. And if the same guide mechanism can be used for customers to properly troubleshoot their own plant maintenance problems, money can be saved on wrong plant treatments or on more new plants. By creating this guide mechanism, we would help MP in their effort to greenify Copenhagen Inner City and Christianshavn, *and beyond?* We have tried to "make" such a guide mechanism and will elaborate further on the proposal.

Problem owners

Even though there is a plethora of "know how" on how to choose the correct plants, on how to choose the correct plant container or on how to maintain your plant, peoples do not have the time or interest to gather this knowledge, not to speak of putting the knowledge into effect. Companies with office space or bigger restaurant/café chains (Sticks 'n' Sushi) will use plant service and delivery companies such as Greenify (Greenify ApS, besøgt: 20-08-2020) and Deichman (Deichmann ApS, besøgt: 20-08-2020).

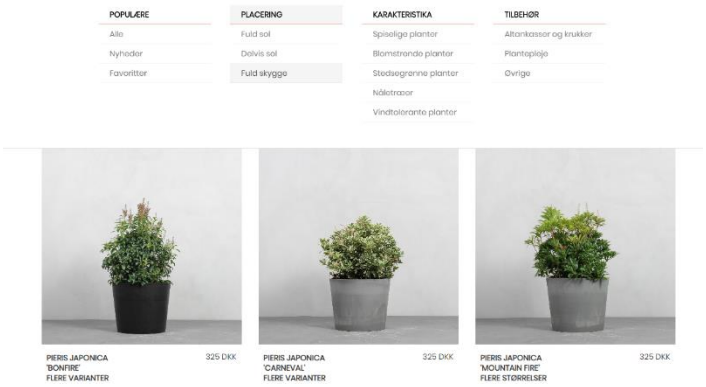

Figure 2. Example of one of the bigger plant service and delivery companies, Greenify, where a couple of choices leads you to a solution space of nine plants which are between 20-60cm in height with the pots. The choices were (1) outdoor plants, (2) full shadow.

Housing associations, privates and smaller businesses will visit or contact nurseries or local plant shops and yet others will choose more community-oriented services such as TagTomat. Most of these companies have filtering mechanism on their websites or gives advice on plant solutions (plants, greenery, pots, jars, et cetera.). Filtering mechanism though are very different from site to site, their selection of plants varies vastly and companies such as Greenify and Deichmann are very expensive compared to visiting nurseries on your own. As an aspiring plant owner, you will run into a cacophony of plants and greenery, plants solutions, rules of thumb, pseudoscientific gibberish and down to earth advice from experienced gardeners. For the aspiring plant owner, you will have to spend a lot of time to find a plant that you love, either on the internet or by visiting plant shops. This does not necessarily have to be a bad thing, but as our findings will show, we propose a method that tries to fit these disparate findings.

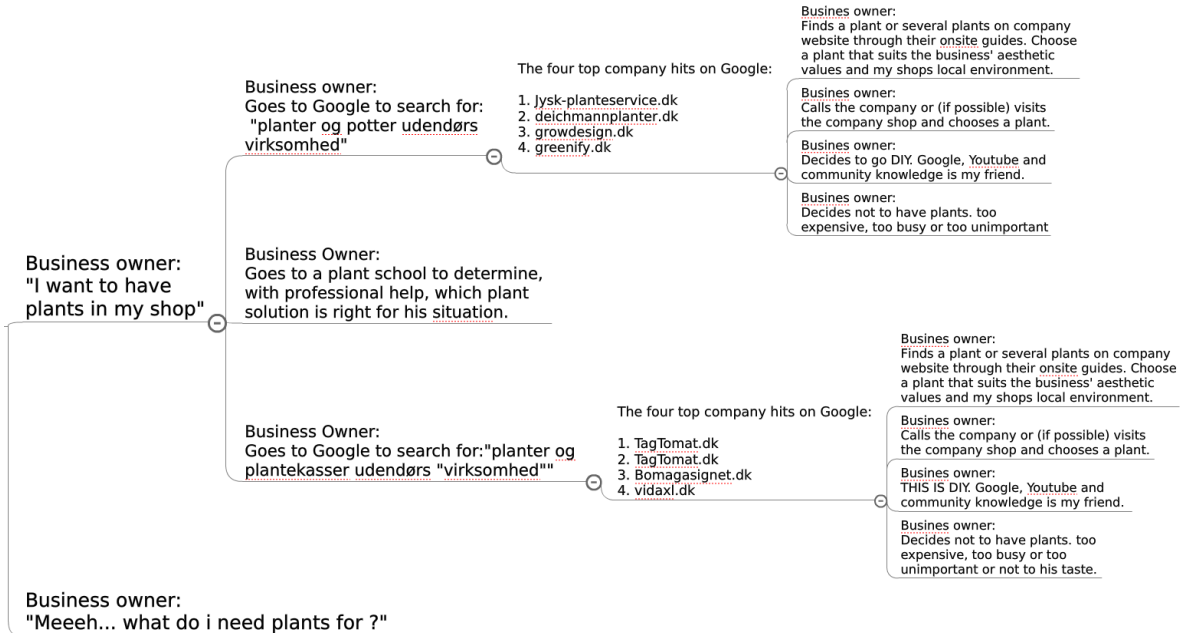

Figure 3. Visualization of imaginary business owner decisions when you first want to buy a new plant for your shop. Business owner: Small restaurant or café example 1: Early in our research we searched for plant services and plant delivery companies.

We have not tried to solve stated problem description in the description which MP sent out. We have tried to circumvent our thoughts from trying to greenify Copenhagen Inner City and Christianshavn only, to try and come up with a solution that can let more peoples become plant owners and in doing so spread a literal green agenda. MP has still been our main concern and we have wanted to present something to the NGO, that they could use our app to brand themselves as the incubator of green ideas and we would be able to use their network to get into contact with relevant partners in a green movement. We have worked with following innovation question to guide our research and argumentation:

Innovation question

How do you help aspiring plant owners, choose the right plants customized for their needs, these being aesthetic, installation or maintenance wise?

Our proposal and how we came up with it

In this section, we will propose a solution but before that we will go through why we chose the given solution. We used known concepts and worked ours way through them So we could understand the most important aspects, so could build the right strategies through analysis and getting an overall view of the problems MP was facing.

To begin with, we went against the rules and directly worked the possible ideas and solutions, se table 1 and table 2 for these.

First ideas

MP is interested in developing a concept and / or (technical) solution that can enable citizens and companies to plant more plants in the urban space.

△ How to develop a concept or solution that citizens and companies can and will adopt?

Concepts/Challengers	Challenge1	Challenge2	Challenge3	Challenge4
Automated green area	Maintenance.	Human behavior.	How to collect rainwater.	The space for the project.
Small greenhouses	Obsolete soil and maintenance.	Human behavior.	How to automatically collect rainwater.	The space for the project.
Balcony gardener.	Maintenance.	Minerals, fertilizer, new soil.	The time and tools.	The space for the project.
Plant box.	Expensive.	Material consummation.	Too many components.	The space for the project.

Table 1. Concepts and challengers.

Concepts/advantages	Advantage1	Advantage2	Advantage3	Advantage4
Automated green area	Automatic watering and collection of rainwater.	A green area for all.	Self-sufficient.	Community gardening.
Small greenhouses	Automatic watering and collection of snow/rainwater.	Protected in all seasons.	Self-sufficient.	Community gardening.
Balcony gardener.	Grow your own food.	Save money.	Your own private garden.	Be self-sufficient.
Plant box.	Automatic watering.	measurements of pH-value, humidity, fertilizer.	Self-sufficient.	Controlled by an app.

Tabel 2. Concepts and advantages.

The tables were made the first days of the project, but then we realized that we were lacking on information of the challenges of having plants. So, the group went on a road trip in the inner city to analyze the challengers and the opportunities.

Analysis and synthesis

MP, which is our primary customer, wants to make the Copenhagen inner city greener and their plan is to plant more plants. We know that the head of MP Marianne is already in contact with the residents' associations in her area of work. So now we wanted to understand the greys areas of MP, which was at this point the different businesses around the center of Copenhagen.

The idea was to assess the environment physically and interview those who were whiling or had the time to talk with us. This would give the teams a better view of the problems through the analysis function and help synthesis a solid solution.

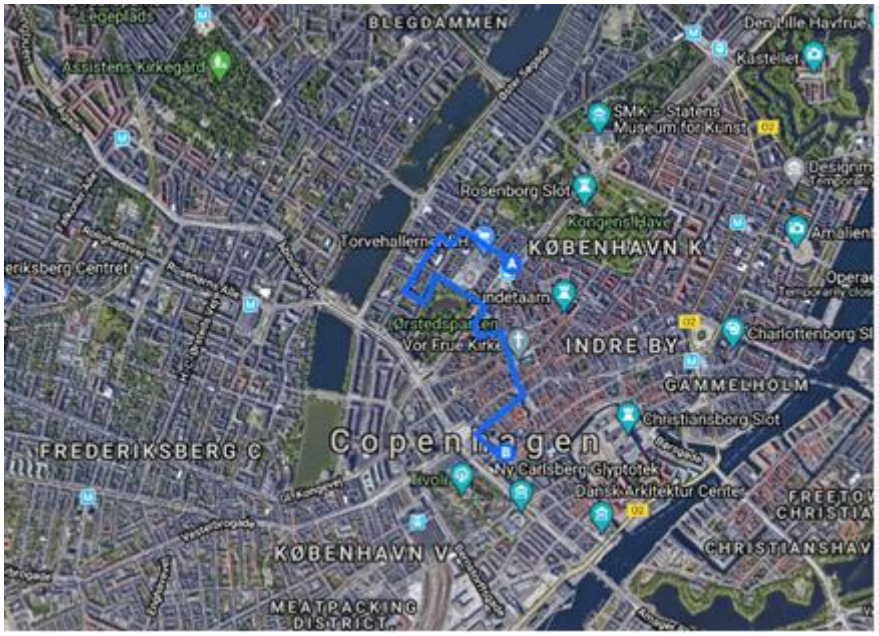

Figure 4. Area of interest (blue line).

The team met at Nørreport station the 2 of July 2020 around 10 o'clock and started walking towards Nansensgade, Nørregade.

Assessing the terrain, the team noticed that, a lot of shops did have plants in front of their shops, some had life in them, some others were slowly dying of lack of maintenance. The area was full of shops, restaurants, bars (bodegas, small corner bars), coffee shops, hair saloons et cetera.

We spoke to those who had success in planting plants in their surroundings but besides questioning them we were also looking around and remarkably the area was successfully green. Some of the shops had plants inside and outside, and others had a small forest in front of theirs shop. There were different reasons to why they had plants, the overall conclusion was of the spiritual and the psychic proportion. We know that people like taking walks in the parks to get some sense of peace and healing in a noisy big city life.

Green comes after blue; the thought here is that while peoples' primary choice would be to take a walk by the ocean or water (blue) the secondary would be taking a walk in a park (green). That was just to show the importance of a green area, and that was the short version of how the shop owners who had success with having plants viewed it.

It was also important for the team to know how they took care of their plants, eventually how much time and money too, so we could categorize the issues. It was also interesting to see how the shop owners were handling those issues. Here are some pictures of what we saw at some of our excursions.

Figure 5. Our lovely team member Kamyar by a kebab restaurant, a possible solution to the bike problem.

Figure 6. High on maintenance, low on protection.

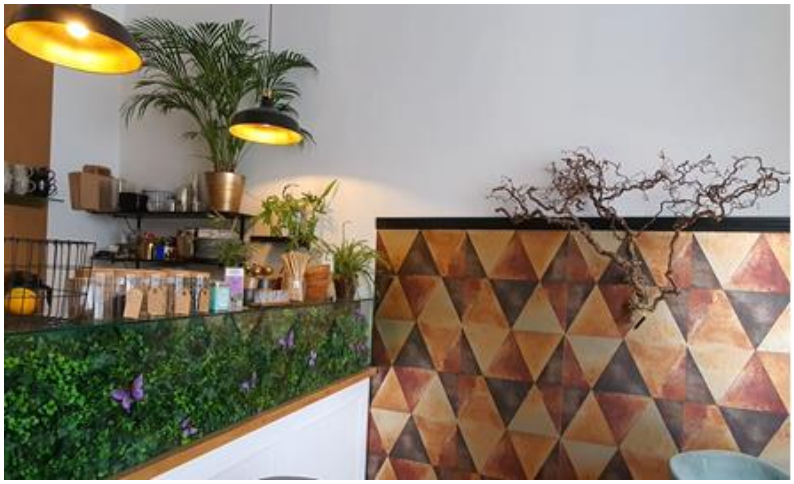

Figure 7. Inside some shops.

Figure 8. Low on maintenance and low on protection. '

Figure 9. The night life is also an issue.

The team did not stop there since they were also shops/stores which did not have plants. We were also interested in the reason why they did not have plants or if they ever considered having plants. Theirs answers were important inputs to how the inner city could get a greener look.

The meeting with MP executive

When we finished our walk at the given locations, the team continued toward their meeting with the head of MP, but on our way there, we could not help noticing that a lot of shops did not have plants and we also spoke to them to get their perspectives on the matter.

The meetings with Marianne the executive of the inner-city area and Christianshavn.

The reason for this meeting was to know how the field is like, what are the challenges? how do they operate? And what are their limits?

She told us about her neighbor, a restaurant who changes their plants several time in a year. She also told us a second time that she was in contact with a lot of residential associations around Copenhagen. However, Marianne confided in us, that she was not in contact with that many businesses in the Inner City of Copenhagen.

She was also helpful on how to proceed with the project or if you like, how to look at it. We were given contacts to people we could approach in the field, gardeners, residential representatives and so on. We tried to contact those experts by e-mail, but we were not lucky because of the given season.

After our interviews:

In the wake of understanding the challenges, which is finding the right concept for the primary a suitable product to the secondary costumers which are shops and residentials and the experts in the industry. There were a lot of considerations that needed to be processed by the whole team, because we had different ideas for the case (in tabel1 and 2).
We started with a Question-Tree, of which we could write all questions we had and deal with the main question 'how to make Copenhagen greener' and then we went further and further deeper. We came up with some very different triggers, and solutions to what can be done.

After interviewing people in Central Copenhagen about plants and what they think was the problem, the difficulty with having plants and what was holding them back from getting any. This made everything we thought we knew about the cause of the problem to backflip. We found out that bikes were a big problem likewise with the nightlife. The only thing we could hold on to, was that maintenance was still a big part of the problem to why people did not want to get any plants.

Because of the interviewing we ended going away from this idea since we found out that we were trying to find a solution for the symptoms of the problem and not what caused it.

We then began to think about how to make plant boxes that would help fix the bike problems, so the bikes could be around the plant without destroying the plants. This idea was as well rejected by us since we wanted to go out to a wider target group.

What was the widest target group? It was people having problems with maintaining the plants. So, this is where we went deeper and got to the point where the team concluded that the general person did not have the facts easily available.

The primary problems we found by our visual examinations and visual observations where:

1. Lack of basic information.
2. Lack of acknowledgement of MP.
3. Plants are time consuming.
4. Bicycles are a problem for plants.
5. The nightlife has an impact on plants.
6. Maintenance of the plants.
7. Humans behavior.

The group had different ideas on how to deal with most of the above, we had for example A team member who had an idea of fully automated pots or boxes, pots or boxes which would be self-sufficient in terms of watering and nutrition to the plants.

The solution we have chosen.

That would solve some of the problems which were observed by the team, but there was still some downside to that concept and that is, how do we get it out there. How do we get shop owners to participate and how do we get them to purchase the product?
Since we come from different academic directions, we had different ideas on how to solve MP problems.

Before further thoughts on the ideas, another idea rose to our likings, the idea was about how we could solve all the problems at once. The solution was an application, we know it is a cliché in our fields as engineers, but we thought it was the perfect solution for this given situation.

Our considerations and thoughts will be explained in the next section.

Throughout our project we *tried* not to work on the solution to begin with, to keep our minds open to what really matters, which is the real reason for the problems. This was important to prevent finding a solution to the symptoms but instead to find a solution to what caused the symptoms to begin with.

'How to make Copenhagen greener' was the goal and to get to the solution we had to work systematically.

After some research, which will also be presented later in this document, the research is about the usability of smartphones in the world of today. So, the idea was built from that understanding, the idea is an app of which you can match with plants based on your needs and wishes, this app will be called Plant-Match.

Now the idea was in place, but the team were still not sure if it was a good one, there was only one way to figure it out. An investigation was due again, so the team decided to go out and interview again! but this time the team targeted the experts and others went to places in Copenhagen we did not visit.

The important part here was to get some feedback on our ideas from the experts (nurseries, plant shops. et cetera) since they are the ones with knowledge of the given topics. Beside that the team wanted to know, what kind of problems they have notice from dealing their customers. That way we would be able to specify the biggest problems.

The specified problems by the experts:

1. Maintenance.
2. Lack of knowledge.

One of the biggest problems according to the experts is the maintenance of plant, well, people seems to forget to water their plants in a coordinated manner. That can sometimes be because of lack of knowledge of the plants they possess or just because of lack of time.

Prototype

Plant-Match application prototype:

The idea is an app which works as said before, like tinder, very simple you swipe through some pictures and choose which of the opposite sex you find beautiful or not. And with a poke of the finger you can make that decision fast and we wanted to utilize that concept in Plant-Match.

This is how it functions: Swipe through some pictures and choose which PLANTS you find beautiful or not.

Step 1: Preferences and settings

a. You choose your preferences that is if you are *private* or a *company*
b. Do you want to register or not?
c. Are you looking for a plant for the *indoors* or for the *outdoors*?
d. The settings this is where you choose the desired amount of watering, sun / light, price tag and size. Basically, how much time, money and space do you have for the plants. Additional filters can be added according to customer wishes.

Figure 10. visualization of step 1.

Step 2: Plant library

Here is the plant library with some plant suggestions that matches your wishes and conditions, where you can choose to swipe right or left. Which is, choosing the plants you find beautiful/like or not. The ones you liked, will be saved so you can see them afterwards. The other ones you have disliked, will stay in the library so you have an opportunity to see them again.

- Swipe right if you like to know more about the plant later on.
- Left if you are not interested in the plant.

Figure 11. Visualization of step 2.

Step 3: Swipe / decision making.

In this step after going through the plant library (pictures of plants), this is where all the plants you have chosen are. You will have to go through your choices and pick what you like before the next step and the rest will just disappear as soon as you close down the app. At some point it will be possible to register in step 1 so you will have a profile of which you can keep, all you have liked previously.

Figure 12. Visualization of step 3 (first part).

Figure 13. Visualization of step 3 (last part).

Step 4: product delivery / pick up

Here is where you find out how to get the plant near your location and if the plant is in stock at the flower shops address near you, or you can also choose to have it delivered instead. This step is where you have a chance to also consults the private gardeners or just gardeners' companies near you.

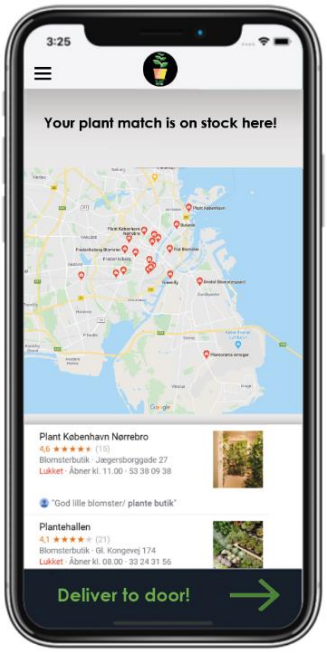

Figure 14. Visualization of step 4.

This is simply the basic settings of the application and how it works, but there is of course room for improvement of the decoration of the whole system. Nevertheless, it is safe to say that there is that possibility of updates and optimizations to the system. For example, with the real app we could make it so that the nurseries and shops, are the ones feeding our plant library.

Testing the prototype

To begin with, we have made a prototype, that we tested with some random people at DTU. Since we did not have the opportunity to test the prototype outside DTU, due to the Corona virus situation. As it was impossible for the team to create an actual app during the course, we decided to create a prototype that could be tested in vivo at campus. The prototype can be seen on Figure 10.

Figure 10. The PlantMatch prototype. The black perimeter was created from cardboard and was open to both left and right sides, so that paper (A3) could be moved seamlessly in and out. The yellow (left) and green (right) slips of paper budding out from the sides were attached to the papers in the perimeter, so that a simulation of the "swiping" function could be tested, by pulling out papers based on the test persons choices in the app

Testing the prototype along the way was very instructive. We got very positive feedback and at the same time some good ideas to improve it. Since we have been lucky and had some very creative team members, we got very positive feedback from the plant interface and beautiful drawing. The materiality of the prototype corresponded well with test person and the playfullnes of the app made peoples laugh or grin while testing the prototype. Many of the respondents think that the app was a good idea, as it makes it possible and easy to choose the right plant for both the outdoors and indoors. Some of the respondents thought that there should be a wider opportunity to choose from many plants, and that was also what we had considered that the final app should contain. We have also tested the prototype at Plantorama, which is a large chain a plant nursery. The girl we tested it on was one of the employees who had the most knowledge about plants. We got much more knowledge about plants, and became wiser on some plants, and on our prototype. On their website you can choose between many plants, but you must have some knowledge about plants to be able to choose the right one, so she thinks it can be nice that you can study in advance plants from home and they can at the end pick these plants they like the most among the offered. Many people thought it was fun to try the prototype, and we think so ourselves. The advantages and disadvantages of an app are as follows:

Advantages

Branding

The most popular apps, such as Facebook, Messenger, Snapchat, have the company logo on the user's screen. The user will register this - consciously or unconsciously, which ensures that the business is always top-of-mind. It improves the recognizability, branding, and increases the chances of converting users into paying customers. This is why we have developed the logo for our app, see Figure 11.

Figure 11. Logo for the app PlantMatch

apps enable 'Push Notifications'

The ability to send instant messages to users is a significant benefit. apps can thereby inform users about new products, offers, or anything of the like. We'll give users of plant app the choice to get push notifications about good offers or advice on the plants they have in their personalized plant library.

Increased profit

It is easier for users to execute orders on the go through apps, which is why we connect app users directly to nurseries and other plant service or delivery companies, so that app works as a brokering tool between disparate customer segments. The sheer simplicity and convenience of conducting purchases via an app in contrast to a website are significant.

Fast and user-friendly service
Many people want a quick and user-friendly service. With a custom-designed app, companies can offer such a service and get in touch with new potential customers who are interested in it. This is why we'll have to pay a company to develop the app according to state-of-the-art app design.

Disadvantages

Compatibility
Mobile sites work on all platforms, but apps do not. All smartphones can open a web page in the browser, but an app for Android does not work on the iPhone, for example, and vice versa. If the user wants to develop an app for the user company, the user must be aware that a separate app must be prepared for each platform. Unless the user has a good reason to choose only to support one platform. Plant Match will need to be developed on multiple platforms, so that it can compete with mobile websites on accessibility to the

Narrow range
Since a website can be viewed across different platforms, it is easier to reach a wider audience than with a mobile app. To properly brand PlantMatch, we'll have to make sure our app pops up on different search sites, so that new customer can be guided to a website, from where he/she will be led to their smartphone's native app vending method.

Support and maintenance
Websites are generally cheaper to upgrade than apps. The user only needs to maintain a single version of a website. After implementation, the updates become active and visible immediately across all types of devices. Since apps are made in several variants (depending on whether it is made for Android or iPhone), several versions need to be updated and maintained, which leads to increased ongoing costs. With that said, it is essential to consider what value the app creates carefully, which is why we created a busines canvas model (see

Figure 2) to highlight what PlantMatch would need to do, to be a successful app. apps are for all businesses regardless of size - but an app that does not create value is a terrible app. With continued growth in new apps on the app store, which already contains over two million apps, it can be challenging to stand out. Therefore, it requires hard work to get the user app displayed. Very few consumers search for information in the app Store. Most people will use the classic web browser on smartphones, mainly websites that appear among the search results, which is further argument for us to guide potential customers from a website to . Conversely, searches for specific functionality in the app Store can help attract new customers who suddenly open their eyes to the user service.

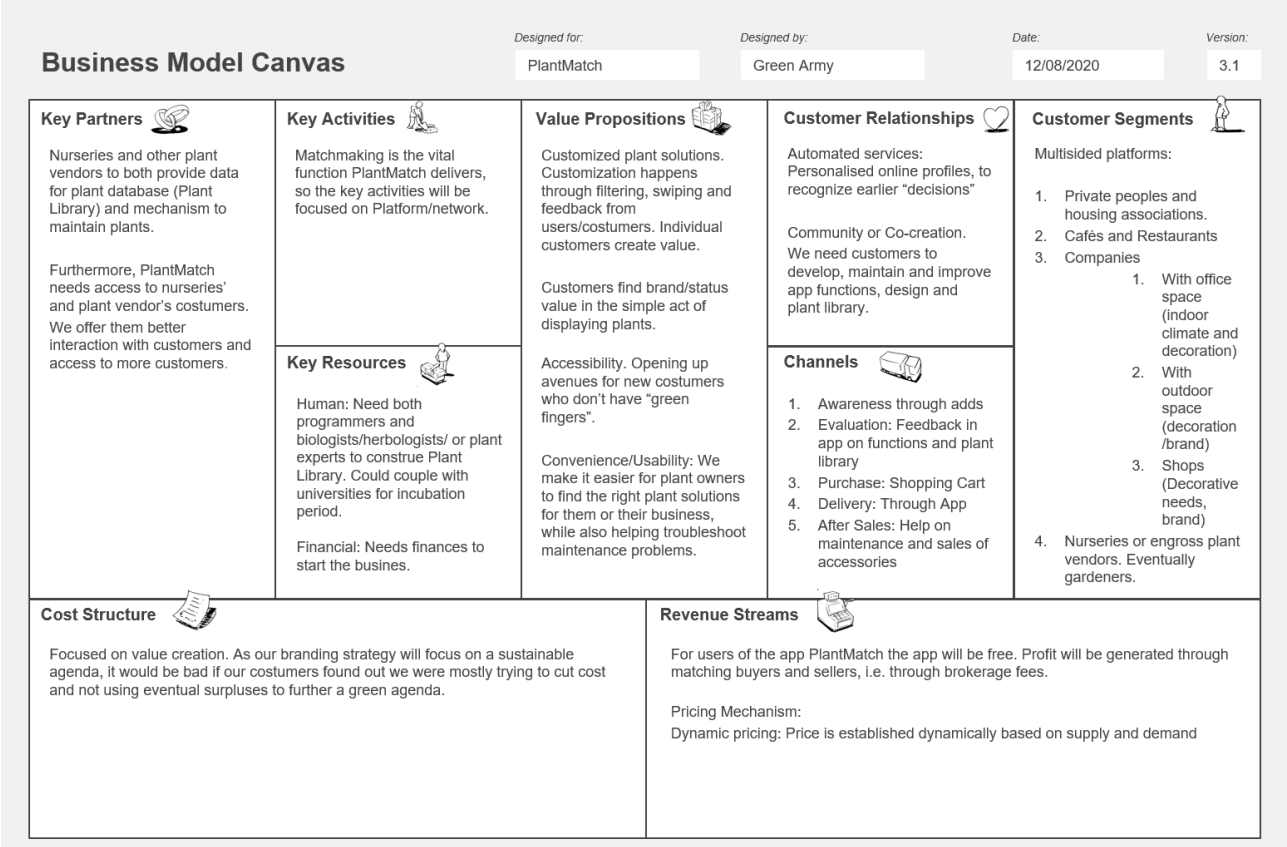

Figure 12. Business canvas model for PlantMatch.

An additional customer service

A significant benefit of apps is the ability to use them offline. The customer is thus not dependent on a good signal, but always has the information at hand. With a specially designed

PlantMatch app, company also has the option to offer customers location-based offers, fast navigation, and other specific needs the user customers may have.

We use apps diligently.
Once the user has the user users install the app, there is a good chance they will use it. The average smartphone owner spends 3.5 hours a day on his smartphone, and 90% of that time is spent on apps. However, unfortunately, 71% of users stop regularly opening the newly installed app after 90 days. Therefore, consider what needs the user app covers and how to ensure the user continues to use the app (quytech.com, u.d.).

Considerations before investing in an app (Kamyar)

There are way many arguments for investing in an app and likewise for not doing so. The first indicator that the user should invest in an app is, looking around at the user's competitors. If these already offer an app that is downloaded and used, there is a good reason the user should do the same. As there currently doesn't exist an app with the same functions as PlantMatch, investors won't know if our app is worth considering investing in. Because of this, we must consider which consumer needs the user wants to cover and which cannot be met via a responsive and mobile-optimized website. There is no need to invest in an app that no one bothers to use, so our app has to stand out through its design and functions which allow for a wide customization of plant solutions, usability in the way that you can swipe your way through filtered plant choices and accessibility by brokering deals between plant owners and plant vendor. These are the main values PlantMatch will offer customers and the reasons why they will download the app.

All businesses around the world have seen and recognized the importance of the mobile apps. The level of the app competition has increased in the last few years, with over 1 million apps in the significant app stores. To win the app competition, it is imperative to recognize how to make a successful mobile app. Because of its inherent nature, mobile is one of the most powerful gadgets in our society and plays axial role in our daily routine too. Mobile is the most used device currently and in fact consumers spend 90% their time on mobile apps compared

to mobile websites (Flurry, besøgt: 20-08-2020). Flurry has published a report on the mobile industry. They issued an analysis of the time that has been spent on the mobile by the average America consumer. "The chart below takes a closer look at app categories. Social, Messaging and Entertainment apps (including YouTube) account for 51% of time spent on mobile."

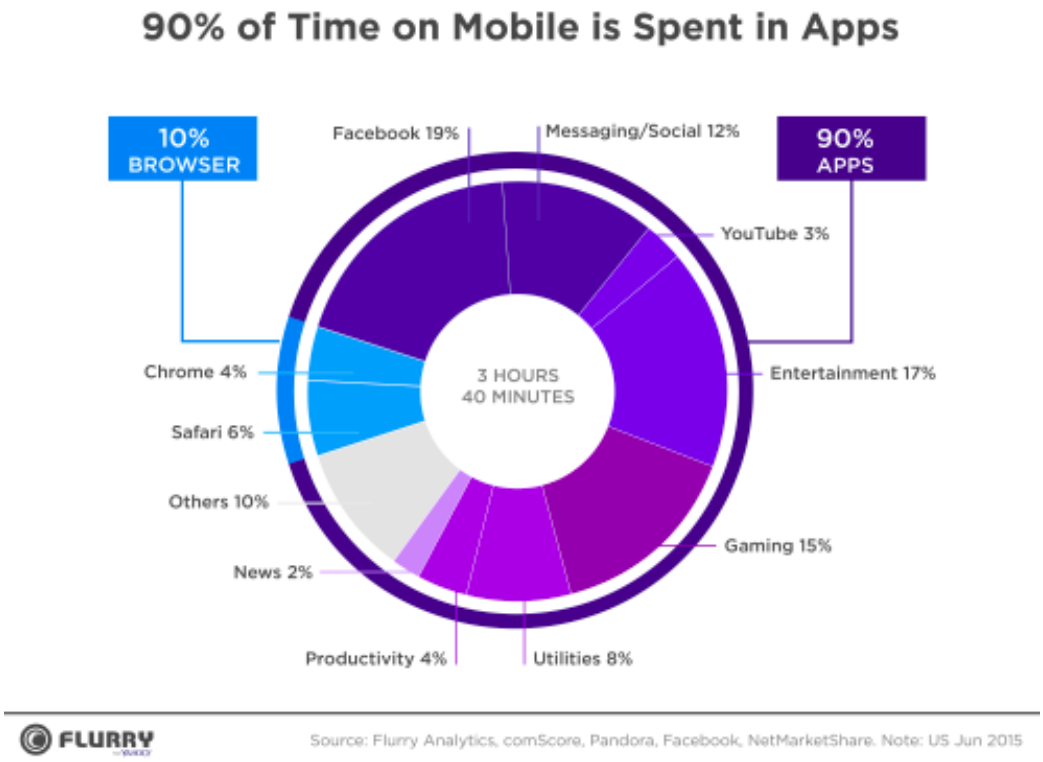

Figure 13. Time spent on the phone (quytech.com, u.d.)

As a result, businesses are started to put focus on mobile apps to create something truly to meet the needs of their consumers. But they are still a question remains. So, *what goes into making a mobile app?* A prosperous mobile app is one that satisfies the user's needs and does so quickly and effectively. The app should do one thing, but it should do it well. Which is why we must carefully construct the aforementioned Plant Library (see appendix 1, for prototype of Plant Library), the design of the filters and design of the swiping function, so that customers freely can navigate on multiple levels in the app, whole constantly being able to save private plant libraries of earlier searches. For more than 10 searches we could suggest a payment or a subscription, but that should wait until an established userbase has been founded. On the other hand, we must remember that a mobile app success is a journey, not a one step process. To reach the goal of a successful app we have maintain 13 golden concepts.

13 golden concepts of app building

Solve a problem

We must ask our self what problem our app will solve and how it can help simplify the users lives. Every successful product solves a problem, gladden the consumer and satisfies their needs. It is important for us that our app is either original or improves on the concept of a competitor app. Our app needs to have a sense of purpose and face the user's need perfectly. We do not want to waste recourses to build emulation that fall to achieve success. Instead, target to have a clear vision of what we want to achieve with our app. To avoid having an irrelevant app, the app has to have a specific purpose, which is specifically to tailor plant solutions for PlantMatch user and match them with the plant vendors that have their one and only/several plant. We will manage the research to recognize our user's pain points or barriers to purchase. This will give an insight into the type of problem our app will be able to resolve.

Deliver real value

Our look to the app is to create a unique value for consumers are time poor; they expect speed and convenience. The app should be able to be used easily in a variety of situations, such as through prototypes with increasing detail level with different customer segments. It is important for us to validate the app idea with investigation to certify that the app deliver the value we predesignate. Value can also increase from using customer input.

Focus on a core feature

Basically, a good app does one thing, but it does it well. A focused app work well for users because they do not want any unnecessary features. We must focus on what is getting us to create an app in the first place. Why the idea is different from the existed app? The journey of app making start with understanding what value the app has to offer the users. The main idea is our core feature. What the app can do for the users?

Keep it simple

Different age group should be able to use the app and it must be user-friendly, easy to work with it and visually charming. As many of the peoples we saw at plant nurseries were older peoples especially elderly women, we would need to make the app work for these types of

customers too. Also, Tpp will be lost if the user must use a lot of time to learn how to use the app before they reach their purpose of using the app.

Develop for iOS and Android

It is important to develop the app for both iOS and Android platforms. The most effective way is to use *cross-platform app development* framework.

Maintain high performance

To avoid a bad user's experience, we must make our app with a high performance. A research from Dimensional Research shows that "80% of users will only attempt to use a problematic, poor functioning app, 3 times or less." For this reason, the app must launch quickly and not keep the users waiting for long time.

Provide offline functionality

It is true that the internet is everywhere, but it could make a good users' experience to have the app to work offline.

Offer it free

To give a chance to the consumer to test out what the app has to offer without any risk. It will increase the number of people who will give the app a try without lose any money. It does not mean that we cannot earn money on app, it means that at a basic level we offer the app for free to provide a risk-free attempt for our user, to hook in users and increase traction.

Test our app

We believe in that the users not going to use the app as we do, so it is important to test the app on real users before launch is vital. Testing the app in order to understand exactly how users are using our app help us to gain a deep understanding of our consumers' needs. The prototype testing was a good step to imagining how testing the real deal will be like.

Plan a marketing strategy

No matter how significant, flawless and streamlined the app is, if no one uses it. We do not want to make this mistake to advertise the app after it is developed, we want to use the power

of the anticipation. We will get the word out early to build anticipation for the app, then do a big push right before launch.

Plan ongoing engagement

After launching the app, it is important to continue to engage users. Usage the notification is one of the keys in this process. By using notification, we can remind our consumers about new features and services in our app.

Provide a feedback channel

To have an increasing number of users and customization of the app it is important to create a channel for communication, feedback, ratings and reviews. To avoid a negative user experience, we must make it possible and easy for the users to get help or connect with the user service.

Create regular updates

In order to fix the bugs and maintain the users checking the app for more, we will need to entrust dropping on going app updates.

How we can optimize the APP further and make it accessible for thousands of users?

With thousands of users in the market, there is a huge opportunity to grow a business through an application. Most of these users will be in an emerging market, so we should consider how they may differ from our current audience, the team discussed and achieved 10 tips to us underway.

1. Speak our user's language, in our APP and on the Play Store.

To make sure our users understand our content by localizing our app. First, dates and time should be internationalized and displayed according to their phone settings. For many markets, numeracy is higher than literacy. Use fewer words and provide graphical cues with audio and voice support. Keep interaction simple. Avoid scrolling menus and use tappable, browsable interfaces. For example, Auto Complete and curated lists can be better than searching and filtering. Design our app for different languages, allowing for different sentence lengths and structures. The app translation service, available for the Developer Console, can help. And we must remember to test everything with native speakers.

2. Deliver the right content and features

Research new markets thoroughly and build features on local trends and preferences. For instance, think mobile first. We do not have to rely on familiarity with email and web passwords. Offer phone number-based registration. Multi-SIM phones are also popular, which we can detect since Android 5.1, in order to, for example, adapt our apps data usage by SIM.

3. Allow for slow and intermittent data connections.

Many users will not have access to reliable data connections. It is important to adapt our app to use less data. Try to separate UI from network activities, so users can precache content over Wi-Fi.

Optimize all images and consider using web-IP. It is smaller in file size than alternatives for the same image quality. We can also give users control over when and what connection they use, particularly for large downloads or syncing.

4. Accommodate low end devices and smaller screens.

In emerging markets, many devices tend to have small screens, so make sure we optimize our UI by testing on multiple screen sizes. We should also adapt our app to low end devices, which may have low memory low processing and low resolution.

5. Ensure our app will run on older versions of Android and iOS

To reach the next billion users in emerging markets.

6. Optimize for less phone memory and shorter battery life

Our user's phone may have 512 megabytes of internal memory or less, so the app needs to be efficient with memory usage. Also, disk space is lower than developed markets, so we have to keep APK size under 10 megabytes. It is good idea to optimize the contents of our APK by using highly targeted images, mobile optimized libraries, remove redundant content, and enable ProGuard to out unused code. Also, make sure our app can run from SD card storage.

7. Consume only the data you need.

In most emerging markets, users will pay for data as they use it. Your app's initial download, each update, and foreground and background data all add cost. Balance the benefits of an update with the cost to our users of installing it.

8. Reflect local buying habits and cycles

Localize our prices and remember a simple exchange rate conversion may not be right. A good onboarding flow is vital to ensure maximum buyer conversion, provide app and subscription trials, so the user can try before buy. And when planning promotions, understand local buying cycles. Link promotional activity with holidays, events and monthly data plan refresh dates.

9. Grow our audience with app Promotion.

When we are ready to launch the globalized version of the app, ads can help us grow an audience and universal app campaigns that we set up straight from the Developer Console make it easy. Our campaign is automatically optimized to meet our CPA targets by finding the right balance on Google Search, Google Play, Google Display Network, and YouTube.

10. Engage and support our users locally.

We will not leave our users to work things out for themselves. Start by reading and responding to app reviews. Then go local by creating user groups for countries or languages through social media channels. Build a core of power users and encourage them with involvement in beta tests and update plans. And look for ways to help them share their findings by offering them access to our support team or developers.

Economy

Development of the app

The price of the app can vary depending on where it has been decided that the app must be developed, here the Danish market has been made available since it ensures quality and communication. To ensure the quality of the app, a sum of money must be set aside for it. The actual production of the app will cost around 100 000.00 DKK according to the options there are for the desired features for the app. If we assess the price according to a website (Weappitforyou.com, besøgt: 21-08-2020) that has made it possible to opt-in and opt-out and thereby provide an ongoing price and a final price. It has been decided that the app must be available on both android and IOS which alone would cost 17 820.00 DKK. The app's appearance will cost 14 850 DKK if you want a design that looks good (3 out of 3).

A table is made over the different options and their cost, which is seen below.

Options	**Price in DKK**
Android + IOS	17 820.00
Login	0.00
Advertising in the app (plant shops)	4 950.00
Aesthetics 3 out of 3	14 850.00
app icon	7 920.00
No multilingual language	0.00
Push notification	5 940.00
Mobiles and tablets	4 950.00
13-20 screens	14 850.00
No admin panel	0.00
Location service	7 920.00
Feedback and analytics feature	4 950.00
Integrations feature	9 900.00
Total	**94 050.00**

Tabel 3. Estimated costs of developing Plant Match (Weappitforyou.com, besøgt: 21-08-2020).

As it can be seen above, then the cost will be around 100 00.00 DKK to develop this app. This estimate is made approximately because it is hard to say precisely what the cost for this app will be with these wishes. This is a minimum as there will also be an additional cost such as "where does the data come from". This data comes from someone which we must pay, and it is difficult to approximate how much it is going to cost to buy someone's data. But from our own assessment it can be assumed to cost about 30 000.00 DKK as the business itself will be responsible for all primary data that the app shall contain. And besides it is a huge advantage for them financial and advertising wise.

Acquisition of money for development and quality assurance

To ensure that the app's development does not stop when the app is installed on the applications where it can be downloaded, some money must be set aside to ensure the quality of the app. This will be 15-20% of the budget which must be set aside to this. This is between 15 000.00 DKK and 20 000.00 DKK.

Loan

Borrowing from the bank could be a help in how to obtain the money which will be used to develop the app itself. However, this require a structured and realistic business plan. In addition, the bank requires that you repay the money back to the bank on an ongoing basis, so that they are let with the minimum amount of money they lent out. Repayment to the bank is not a problem if the app works as desired and the partners have entered a written agreement.

Collection from partners

It could also be an idea to make collection from the various partner that the app is going to have. As the partners will be offered a great advertisement for their service or product, it is conceivable that they are interested in giving an amount for the app to be developed. This means that the more partners who will be associated with the app, the more money there can be collect for the investment.

Loans and collection from partners

It would also make good sense to make a combination of these two, as the bank are happy that you are ready with a percentage of the start amount. If 120 000,00 DKK, is to be used and it is possible to collect 20 000.00 DKK, that is 20 % of the budged, then it would be easier to get an agreement with the bank.

An opportunity to make money on the app is by having to pay to download the app or that there is in-app-payment (IAP). IAP will not be an optimal option, as it is not us who sell the plants et cetera. Payment for the app is an option but it would worsen the number of users, as there is other alternatives (websites) that can provide some of the service the app you be able to provide.

A free app will make it easier to get people to download and use the app, including the young who is not known to have a lot of money. This option provides a larger target group.

Another option for raising money is crowdfunding where donations to various projects are possible. Different people can donate to projects that has captured their interest. Gofundme.com is such a website where this is possible. Of course, donations as such I not a reliable way to raise that amount especially as large as ours.

Conclusion

'How can we make Copenhagen greener' has been the case we have been given by MP. Through our findings, testing and research we have been guided by a slightly different question as we found that we needed to be more specific as we got to know more. We started working out that may plant owners have problems choosing a plant solution (plant, grens, pots, jars etc.) or have problems maintain them for several different reasons.

We worked our way to a solution that was backed up by a lot of research and observations, and we ended up developing a plant matching app, PlantMatch. The app is planned to be developed in such a way that the whole method and the flow you will go through, comes from a world you already know very well. In addition, based on the studies of numbers of users of telephones we can conclude, that our application will hit a large group of the population. Everything in the app will be very user-friendly and attractive as it is fun, cozy and relevant for the users who are interested in finding a new plant or just information and at the same time be on the safe side in relation to the right choice. Furthermore, there are plant nurseries that were interested in collaborating and sharing their knowledge, as they as plant experts will get a lot of benefits from being able to offer their customers this opportunity.

Our conclusion is that this will be a good idea for MP, since it will minimize their challengers around the city. With their name on the application people will notice them even more and they can even use the platform as a way of informing people on the laws and whatever knowledge they may possess in time.

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