Exploring Opportunities for Using Citizen Science to Expand the Usability of Crop Diagnosis Tools in Uganda

Appendix

1. Graphic: Political Institutes

The graphic depicts the main agencies that are responsible for enforcing policies and providing support in the form of resources, research, finances, or knowledge centers within the Ugandan cassava sector. The operating agencies can be categorized as governmental, international, private sector, community-based, and non-governmental organizations according to the nature of their organization. The graphic attempts to visualize the complexity and the great number of parties involved in the political ecosystem of the Ugandan cassava sector.

Fig. 1 Agencies operating in Uganda[1]

[1] https://typeset.io/papers/the-role-of-institutions-as-actors-influencing-uganda-s-1972qx6ise

2. Interview Questions: Farmers

This section lists the questions and structure of the interview with the farmers. The interviews followed the questions provided below while including additional explanations about the meaning of the questions according to the needs of the interviewees. The included graphic was presented to the farmers for visualization purposes.

Normal reaction if the plant is diseased

1. How do you react if you know that your cassava plants are diseased?
2. What do you do with the diseased plants?
3. Who do you inform about the diseased plants?
4. What kind of medicine or chemicals do you have on your farm for plant treatment?
5. What kind of medicine or chemicals can you get within a few days?

Required information on mitigations

6. What kind of information are you lacking for dealing with the diseased cassava plants?/What kind of information to hope to receive?
7. How do you like to get informed about the needed steps for treatment?
8. How much additional information and explanations do you wish for?
9. How would you react if the removal of the cassava plants is proposed?
10. Do you need any additional information about next steps?
11. To which degree would you follow the advice of the app?

Interest in data about the region and Uganda

12. How much do you know about the health of cassava plants from neighboring farmers?
13. From where do you currently get information about plant diseases in the region?
14. How much more would you like to know about cassava diseases in the region?

Reaction if neighbor has plant diseases

15. How would you feel if you know that the fields of your neighbors are diseased?
16. How would you react if you know that the cassava plants of the neighboring farmer are diseased?
17. What do you expect your neighbor to do about it?
18. What would you do?

Activities if neighboring farmers are at risk

19. How would you react if you know that your cassava fields endanger the fields of your neighbor?
20. How would you feel about removing healthy cassava plants for keeping the cassava diseases from spreading?
21. How would you expect your neighbors to react?
22. How is the relationship between you and neighboring farmers?

Usability of a map

1. How would you feel if you see such a map?
2. How do you interpret this map?
3. How would this map help you to understand the current spreading of cassava diseases?
4. How would such a map be better than a simple message of your fields being endangered?
5. Would you feel motivated to act based on such a map?
6. Do you like to have access to such a map with current data? Why/Why not?

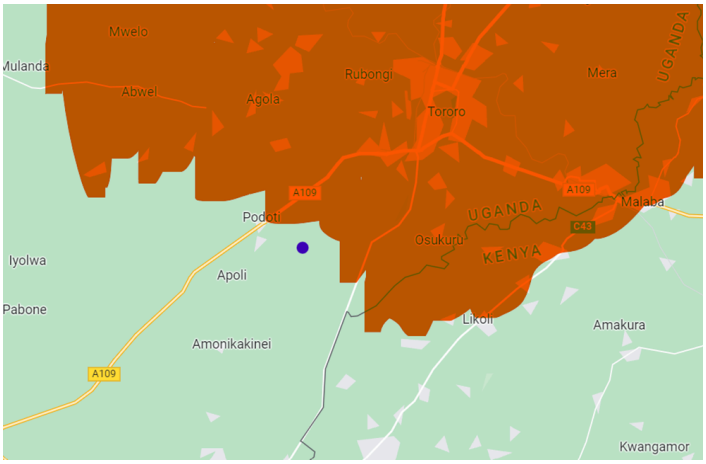

Fig.2 Example Map for Concept Visualization during the Interviews

Other stakeholders

7. Who else should have access to such a map and data about the spreading of the cassava diseases?
8. How could this help you?
9. How would you feel if other people know that your fields are diseased?

Internet

10. Do you have access to internet?
11. Can you connect to internet at any time?

Size and location of the fields

12. Where are your fields?
13. How big are your fields?
14. Do you have all your cassava fields together? Why/Why not?
15. Do you have alternatives of growing cassava?
16. How dependent are you on your cassava harvest?/ What happens if your cassava harvest turns out bad?

3. Interview Questions: AI Lab

This section lists the questions and structure of the interview with the AI Lab. The interviews followed the questions provided below while including additional elaborations and follow-up questions according to the flow of the interview. The included graphic was presented to the AI lab for visualization purposes.

About the project

1. Can you introduce me to the project about the AgroDiagnosis Tool you are working on?
2. What is your current way of operating?
3. With what kind of stakeholders are you working?
4. What is the vision of the project?
5. What are the next milestones the project is targeting?

Current Challenges of the Project

6. Do you perceive any shortcomings of the current project?
7. Are there any challenges that the current operation faces?
8. Is there any information that you are currently missing even though it might be helpful for increasing the performance of the project?

Introduction to the Mapping Tool

9. What is the potential value of having such a map?
10. (How could this map contribute to your project?)
11. What kind of insights is this map giving you?
12. How would you be able to utilize such insights within your project?
13. Is there anything that should be included in this tool to be more useful to your project? Why?
14. Would you like to have access to such a map with up-to-date data? Why/Why not?

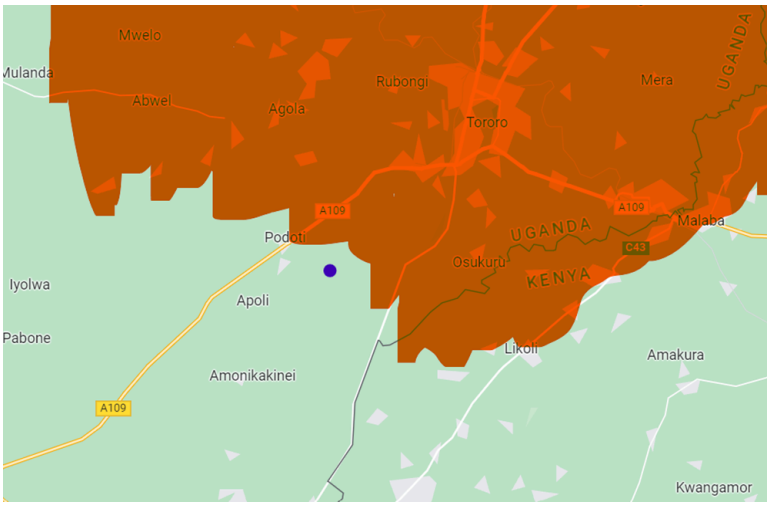

Fig.2 Example Map for Concept Visualization during the Interviews

Other stakeholders

15. Who else should have access to such a map and data about the spreading of cassava diseases?
16. How could this help you?

4. Interview Questions: Experts at the Agricultural Institute in Namulonge

This section lists the questions and structure of the interviews with the experts of the Agricultural Institute in Namulonge. The interviews followed the questions provided below while including additional elaborations and follow-up questions according to the flow of the interview. The included graphic was presented to the experts for visualization purposes.

About the expertise

1. Can you introduce me to field of work?
2. What is your current way of operating?
3. With what kind of stakeholders are you working?
4. What is your vision in the context of plant diseases on the fields of small-scale farmers?
5. How do you see the future of Ugandans agriculture (Cassava in particular)?
6. What are the next milestones for reaching the described vision?

Current Challenges of the Project

7. Do you perceive any shortcomings or complications in your current work?
8. Are there any challenges that the current operation faces?
9. Is there any information that you are currently missing even though it might be helpful for increasing the performance of your work?

Introduction to the Mapping Tool

10. What is the potential value of having such a map?
11. How could this map contribute to your work?
12. What kind of insights is this map giving you?
13. How would you be able to utilize such insights within your work?
14. Is there anything that should be included in this tool to be more useful to your work? Why?
15. Would you like to have access to such a map with up-to-date data? Why/Why not?

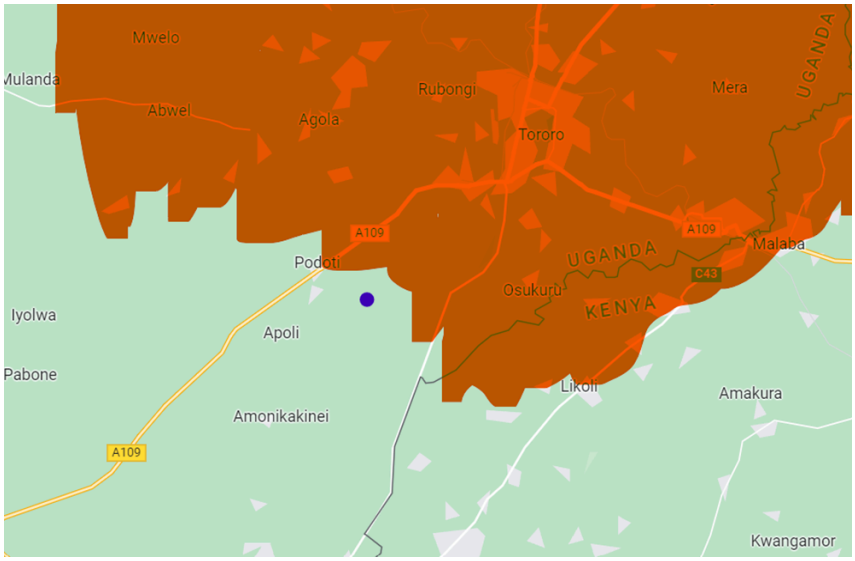

Fig.2 Example Map for Concept Visualization during the Interviews

Other stakeholders

16. Who else should have access to such a map and data about the spreading of cassava diseases?
17. How could this help these stakeholders?
18. How would help this with your work?

5. Chat GPT Prompts

This section lists all the prompts used during the data analysis using ChatGPT. These prompts and the scripts of the interviews were subject of the qualitative data analysis. The prompts can be taken literally.

Prompt 1:

You are a researcher. I will now upload an interview transcript and you will do what is called qualitative coding - specifically, initial coding also known as open coding. The text is an interview transcript, I do not want you to code any questions asked by the interviewer. I want the codes to be detailed and descriptive. I want you to apply codes to sentences or parts of sentences, and later when you develop a list of codes, I want you to be able to tell me what sentences or parts of sentences these codes were applied to. In other words, when I ask you to provide me example quotes for the codes that you create, I would like you to be able to do it. Here is the text to be coded:

Prompt 2:

Please develop more detailed codes. I would also like the codes to be a bit more descriptive, and please separately list quotes that show all sentences or parts of sentences coded with each code.

Prompt 3:

Can you create some more codes and quotes from the provided text?

Prompt 4:

You are a researcher. I will now upload an interview transcript and you will do what is called qualitative coding - specifically, initial coding also known as open coding. The text is an interview transcript, I do not want you to code the questions asked by the interviewer. I want the codes to be detailed and descriptive. I want you to apply codes to sentences or parts of sentences, and later when you develop a list of codes, I want you to be able to tell me what sentences or parts of sentences these codes were applied to. In other words, when I ask you to provide me example quotes for the codes that you create, I would like you to be able to do it. Here is the text to be coded. I want you to use exactly the same approach and the same format as you did above.

Prompt 5:

I would like you to categorize the submitted topics into the following categories: Acces to up-to-date data and consistent information flow, Access to proven credible data, Direct contact with information sources, Access to a big and comprehensive sample population, Access to comprehensive data including multiple factors, Information Exchange with other Experts, Aligning own Work with ongoing Projects, Feedback, Suggestions and Insights from Stakeholders, Conribution to a collarborative Effort, Collarboration with other Experts on Projects, Open, equal & easily accessible Communication with Stakeholders, Engagement with Experts of different Backgrounds in interdisciplinary Research, Engaging Stakeholders in the Research by Comunity led Projects, Sharing of FIndings with all involved Stakeholders, Input on and Contribution to Implementation and Usage of Findings, Implementation of the findings into other Research and physical World, Feedback and Discussions about follow-up Projects and Research, and Other.

Prompt for approach 1:

You are an undergraduate researcher who has just completed a capstone project about cassava farmers' challenges. Below is a list of 22 Interview Questions used. You are required to use thematic analysis to code the data. For the first round of analysis, you asked ChatGPT 3,5 to identify codes which resulted in many codes presented in the attached document - Codes from farmer interviews. Analyze these codes a second time and group them into 5-7 themes or categories that can be used to interpret the data. Normal reaction if the plant is diseased 1. How do you react if you know that your cassava plants are diseased? 2. What do you do with the diseased plants? 3. Who do you inform about the diseased plants? 4. What kind of medicine or chemicals do you have on your farm for plant

treatment? 5. What kind of medicine or chemicals can you get within a few days? Required information on mitigations 6. What kind of information are you lacking for dealing with the diseased cassava plants?/What kind of information to hope to receive? 7. How do you like to get informed about the needed steps for treatment? 8. How much additional information and explanations do you wish for? 9. How would you react if the removal of the cassava plants is proposed? 10. Do you need any additional information about next steps? 11. To which degree would you follow the advice of the app? Interest in data about the region and Uganda 12. How much do you know about the health of cassava plants from neighboring farmers? 13. From where do you currently get information about plant diseases in the region? 14. How much more would you like to know about cassava diseases in the region? Reaction if neighbor has plant diseases 15. How would you feel if you know that the fields of your neighbors are diseased? 16. How would you react if you know that the cassava plants of the neighboring farmer are diseased? 17. What do you expect your neighbor to do about it? 18. What would you do? Activities if neighboring farmers are at risk 19. How would you react if you know that your cassava fields endanger the fields of your neighbor? 20. How would you feel about removing healthy cassava plants for keeping the cassava diseases from spreading? 21. How would you expect your neighbors to react? 22. How is the relationship between you and neighboring farmers?

Prompt for describing own limitations:

If you would write a section on the limitations of using Chat GPT for thematic analysis, how would you describe your own limitations?