Defining a Cultural Context to Underutilized Crops in the Minnesota Food System

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Abstract: Culture can be used as a tool to provide significant insights in numerous contexts. Yet, culture has yet to be defined within a food system. As communities are subject to food system(s) increasingly operating on international scales, not only is the biodiversity of various organisms being affected but cultural diversity as well.[1] In order to fully develop and identify barriers and challenges in food systems, culture as operationalized within a system needs to be understood and represented as a part of the entire framework.[2] This article makes an attempt to define the Food System Cultural Analysis Tool (FSCAT) developed from independent research and analysis conducted remotely within the context of the barley food system. The resulting FSCAT was developed with the intent of use in rural food systems to identify the cultural barriers within.

Introduction

The global community is currently faced with various challenges such as rising demands for food production, food insecurity, obesity, disparities in farming communities, and accompanying income challenges, diet-related diseases, pollution, greenhouse gas emission, and loss of biodiversity.[3,4] Global and local food systems contribute directly and indirectly to all these issues. A food system is all procedures, inputs, and outputs involved in bringing a food item to the consumer.[2] The concurrent issues in the food system are commonly referred to as the diet, health, and environment trilemma.[4] Professionals in food, health, and agriculture are tasked with

finding a socioeconomically equitable solution as the trilemma grows.

Several studies have suggested biodiversity as a viable strategy to impact the diet, health, and environment trilemma.[5,6] Finding nutritionally resilient and diverse crops will assist in improving landscape diversity and health outcomes.[7]

With Minnesota being the 5th largest agricultural state in the nation, agriculture is a critical component of the Minnesota economy.[8] Minnesota also produces several underutilized crops such as oats, barley, sunflower, canola, peas, and snap beans. Increasing use and consumption of these crops may allow improvements in

community health and biological biodiversity. Previous work has examined the Minnesota small grain supply chains but has not considered culture as a factor.[9] For example, barley may be a viable candidate to contribute to the increased demand on the food system, and to improve health outcomes.

Barley is rich in fiber and bioactive components such as phenolics and phytates. Barley also has consumption linkages with reduced risk of type 2 diabetes, coronary heart disease, cancer, and improved weight maintenance.[10] Despite the many benefits barley offers, production and consumption are minimal, mainly due to systemic challenges throughout the supply chain. For instance, the low availability of barley is a result of declining acreage dedicated to this crop due to competition with other mainstream crops. With the diverse use of barley across the globe and over 130 years of cultivation in Minnesota, it offers a culturally rich context to view and gain insight into barriers and opportunities in the food system.[11]

The following study explores the preliminary research and coding to establish a method for analyzing the underlying cultural systems and the challenges that may aid the recovery of underutilized crops - such as barley - in the Minnesota food system. The resulting tool, the FSCAT, aims to eventually integrate various sectors of the food system to allow for a more operational consumer focused approach that would meet the needs of each sector within. In the context of this study, culture is defined as the practices that people create to give themselves continuity across generations.[12] Therefore, the questions were formulated by considering what experiences, practices, and beliefs each sector holds in relation to the product analyzed.

Methods

This study utilized Systems Mapping Assessments (SMAs), the process of assessing linkages between key stakeholders, processes, and functions throughout the food system via a manually drafted visual display of research data. This tool visually displays how processes fit together to produce an outcome. SMAs are also used to identify key challenges, barriers, opportunities, and unintended consequences of systems.

Preferences and cultural characteristics were collected through deductive coding of multiple studies and journals that had covered specific cultural areas that were identified in the initial SMA created for this study. Deductive coding is described as codes that arise from research questions or via literature analysis, were the main approach used in this study.[13]As an example of this, Figure 4 displays the normal education, characteristics valued, preferred seller and buyer qualities, and product priorities of the Implementation category of the barley specific food system.

The use of a semi-structured interview approach, guided by the questions outlined in the Barley Specific FSCAT Questionnaire in Figure 3, was utilized in New Ulm for this study to grade the effectiveness of the FSCAT in the lens of the underutilized grain, barley. Interviewees

were selected based on their prevalence within New Ulm, willingness to participate, and availability. Responses were evaluated and documented via inductive coding, the
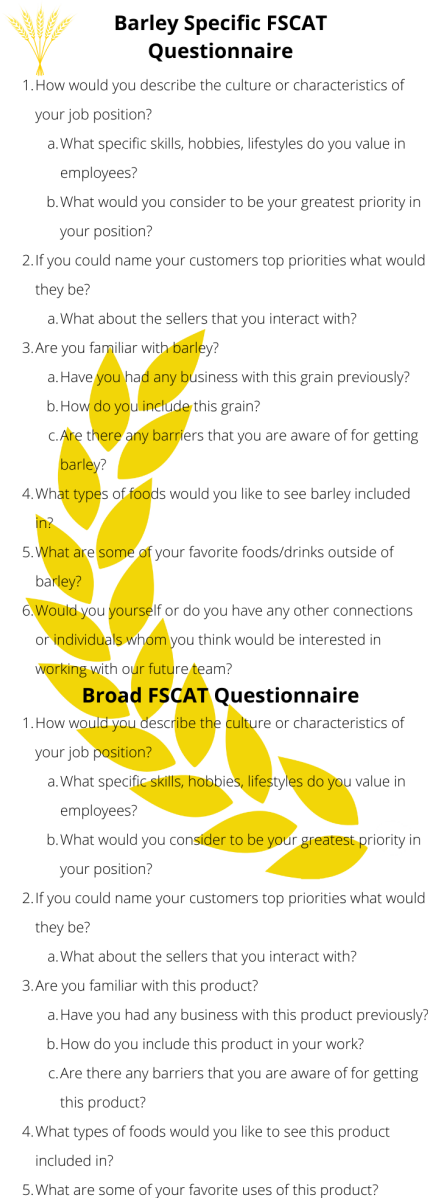
Barley Specific FSCAT Questionnaire

1. How would you describe the culture or characteristics of your job position?
   a. What specific skills, hobbies, lifestyles do you value in employees?
   b. What would you consider to be your greatest priority in your position?
2. If you could name your customers top priorities what would they be?
   a. What about the sellers that you interact with?
3. Are you familiar with barley?
   a. Have you had any business with this grain previously?
   b. How do you include this grain?
   c. Are there any barriers that you are aware of for getting barley?
4. What types of foods would you like to see barley included in?
5. What are some of your favorite foods/drinks outside of barley?
6. Would you yourself or do you have any other connections or individuals whom you think would be interested in working with our future team?

Broad FSCAT Questionnaire

1. How would you describe the culture or characteristics of your job position?
   a. What specific skills, hobbies, lifestyles do you value in employees?
   b. What would you consider to be your greatest priority in your position?
2. If you could name your customers top priorities what would they be?
   a. What about the sellers that you interact with?
3. Are you familiar with this product?
   a. Have you had any business with this product previously?
   b. How do you include this product in your work?
   c. Are there any barriers that you are aware of for getting this product?
4. What types of foods would you like to see this product included in?
5. What are some of your favorite uses of this product?

Figure 3. The complimentary FSCAT Questionnaire. A basic questionnaire tool developed for this study to analyze participants and the significant data collected. The Barley Specific FSCAT Questionnaire was utilized for this study. The broad FSCAT Questionnaire was created by refining and broadening the previous questionnaire to be utilized within any food system.

process through which codes arise through interaction from a direct source.[13] More interviews were anticipated, as will be further explained in the limitations section of this journal.

Both forms of coding contributed to the development of the SMA. The SMA was then analyzed and simplified to develop the FSCAT model in Figure 1, to assist in further barley specific and food systems research.

Results

The collected data displayed in Figure 4 contributed to developing the Food System Cultural Analysis Tool, which is intended to guide future research in integrative and sustainable food systems. This tool has the ability to analyze the systemic relationships with a given food product to assist in streamlining the availability of the product to the public by emphasizing the barriers and opportunities for improvement in that product's specific food system.

The FSCAT was inspired by Bronfenbrenner's ecological model in that each category has a multidirectional relationship with the structures contained within. Bronfenbrenner's ecological model is a theory developed in the early twenty-first century to gain greater insight into child development. Bronfenbrenner's theory places emphasis on the impact of the relationship the child has with greater systems surrounding them.[14] In a similar manner, the businesses and professionals involved in the conceptualization, implementation, and development of a given food product are also affected by greater systemic structures.[4]

The determined cultural categories were external factors, distribution, conceptualization, implementation, and creation. External factors include regulation, mainstream culture, economy, education, public health, and environmental health representing the area in which the system is located. The factors of distribution are determined to be the transportation, food safety, and demand of the given products of concern. At the center of the model, there are three separate categories: conceptualization,

chemical research. The category of creation entailed milling, farming, and feed supply. The category of implementation entailed restaurants, co-ops, bakeries, chefs, butchers, and brewing. These factors would vary with each product being analyzed yet the categories would stay the same. The use of the SMA shown in Figure 4 was used to determine factors in each area. The grouping defined by the SMA showed clear barriers of cultural methods and communication,
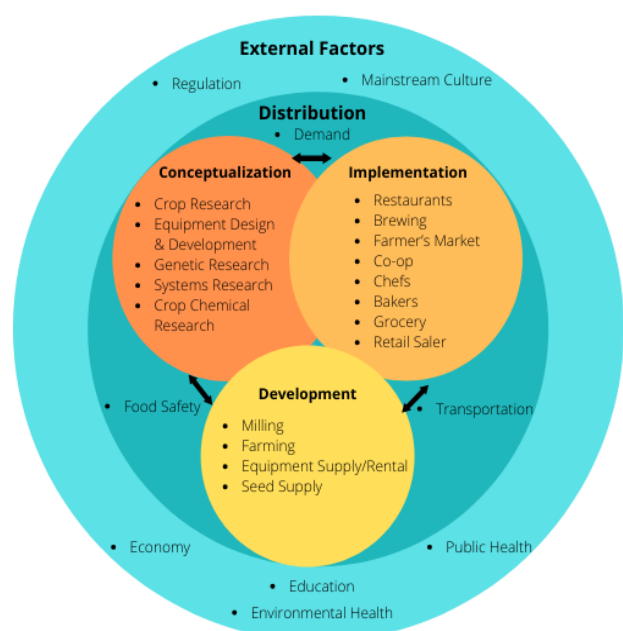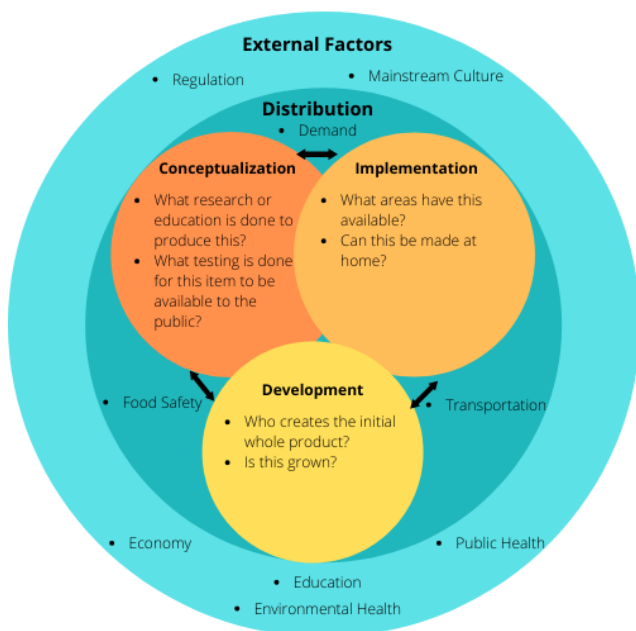
Figure 1. The FSCAT Model Template. The Food System Cultural Analysis Tool (FSCAT) that was conceptualized during this study to reflect and relay the data collected from inductive and deductive coding. The template displayed was produced by simplifying the information collected from the barley specific FSCAT for the purpose of generalizing this tool to be utilized in analyzing any desired food product.

Figure 2. The Barley FSCAT Model. The FSCAT Model resulting from visually simplifying the data collected relative to the barley specific food system shown in Figure 4. This model puts an emphasis on the groups defined from the barley food system analysis by placing these groups in the circled areas as shown to visually represent cultural barriers, unique domains of knowledge, and areas in need of communication.

creation, and implementation. The category of conceptualization entailed crop research, equipment design and development, genetic research, systems research, and crop
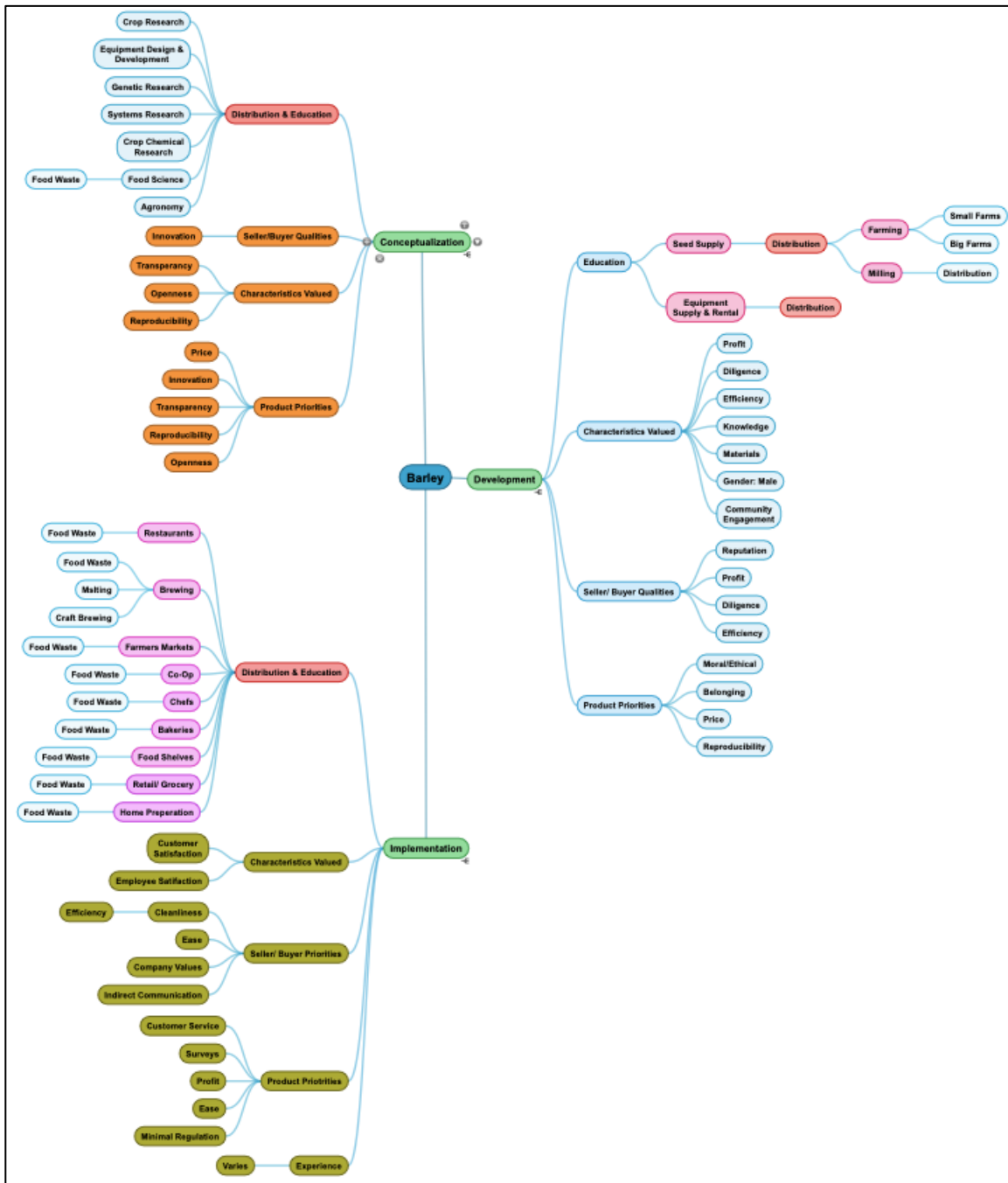
Figure 4. Systems Map of Barley Culture. This figure visually displays the relationships supported by data collected via deductive and inductive coding.

therefore in the FSCAT model the circled areas were put in place to highlight areas that have cultural barriers in place, unique domains of knowledge, and areas in need of communication.

Limitations and Future Research

Many experts were contacted throughout this study including manufacturers, product developers, chefs, and consumers for the collection of data used to structure the FSCAT. These professionals had no prior knowledge or relation to this project. The combination of this and

stressors due to the COVID-19 pandemic may have contributed to professionals placing this study as a lower priority during this time.

Due to the restrictions in place resulting from the COVID-19 pandemic, only indirect communication was available for this study. Several of these experts were not able to be contacted, which hindered the possibility for this study to analyze the New Ulm food system. It is possible that in person interactions may change the nature of the results for this study.

During the deductive coding process, it became apparent that there was a lack of current documentation of culture and preferences particular to one specific area over time. Thus, limiting realistic and applicable predictions specific to one area and requiring the scope of this study to be broad in nature. However, many of these cultural norms are well known throughout the United States and have been dramatized through stereotypes that have arisen over the years. The main concern that remains is to consider the aspects that may be present outside of these cultural norms to truly understand if a food item would be accepted and supported in each area within a specific food system.

Additionally, this study aimed to develop a new tool to analyze specific products in the food system through a communicative and cultural lens. However, with this being a new tool developed during this study, the validity and reliability of this tool has not been pilot tested. Further replication within a specific food system is necessary to justify use. The given tool was developed by combining data from the

Systems Mapping Approach and the multidirectional nature of Bronfenbrenner's ecological model, which are both regarded as reliable tools in many research fields.

Conclusion

This study provides a unique analysis of the food system by pulling together many different fields as they are inherently connected within food systems. The tool developed in this study may allow future research to target a whole system approach in a way that can also be easily communicated to the public. To depict the food system of emerging underutilized crops and the underlying cultural map more accurately, further analyses will be necessary. Replications of this work should include a series of intensive individualized interviews, via phone, virtual teleconference, or in person when appropriate, with key stakeholders and experts throughout the food system. Future research may be more successful by returning to an area of previous research to increase the likelihood of more open and honest data to accurately depict how a food item can enter or re-enter the competitive food system.

The tool is intended for further refinement to tailor the research experience to the specific food product. This process has set an initial basis to identify key challenges, barriers, and opportunities throughout the supply chains of emerging and underutilized crops and will be useful to future food systems researchers.

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