Application of the Concerns-based Adoption Method to Agriculture Innovations: Farmer Concerns About the Participatory Guarantee System in Cambodia

By

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Abstract

While there is large body of adoption and agricultural education literature noting that introducing a new technology or system is a process rather than a single event, agricultural development projects are often expected to produce immediate results that do not always allow for programs to integrate these theories into programming. The Concerns-based Adoption Model (CBAM) is an adoption framework that places participants at the center of the change process to identify their concerns and challenges, providing a roadmap for guiding individuals with the correct support for their particular stage of adoption. While this model has typically been applied to the introduction of new curriculum in formal education settings, this case study assessed the potential for the CBAM Stages of Concern tool to be applied to agriculture innovations.

The objectives of this study were to: (1) adapt and pilot the CBAM Stages of Concern instrument to an agriculture innovation context, specifically for the introduction of the Participatory Guarantee System (PGS) to Cambodian vegetable farmers; (2) assess the concerns of Cambodian vegetable farmers with a range of exposure to and use of PGS; and (3) describe the potential for CBAM to be a useful tool for project management of international development programs. In this study, I found that the adapted Stages of Concern survey instrument consistently placed farmers in the anticipated Stage of Concern. Identifying users' Stages of Concern can inform program designers and assist them in providing tailored support across the adoption process. In this case study, the program management team found that the tool allowed them to target support to farmers in different stages of adoption. The CBAM framework has the potential to inform participatory project design and give project administrations an evidence-based, systematic protocol for assessing the adoption process of an innovation – adding another

tool to the development practitioner toolbox. This method also has the potential to be applied more broadly across other agriculture projects and innovations.

Chapter 1: Introduction and Literature Review

a) Introduction

Within the context of international development, there is a resurgent movement towards participatory programing while at the same time there is an increased pressure for implementers to demonstrate rapid results and have major evidence-based impacts (Ticehurst & Cameron, 2000; Woolcook, 2011). These two mandates oftentimes contradict; participatory development programming frequently takes a great deal of time, and results are incremental. In this environment, there is a need for tools that systematically help development projects integrate participant feedback and concerns into programming and evaluation (Ticehurst & Cameron, 2000).

The disciplines of agricultural extension and experiential education recognize that change is an ongoing process in which individuals move through stages of learning, adoption, and integration into the community of users (Dewey 1932; Kolb, 1984; Rogers, 2003; Baker, Robison, & Kolb, 2012). In the education sector, the Concerns-based Adoption Model (CBAM) presents a framework for critically assessing the adoption process when introducing new teaching curricula or educational tools to instructors, acknowledging that new users go through a cycle of concerns and levels of use as they engage with the new material, try out new skills, and integrate these into their existing schema (Hall, Wallace, & Dossett, 1973). In regard to change, the CBAM theorists acknowledge:

> "it is dynamic, it is difficult, its success or failure is affected by many interdependent factors and variables, many of which we still know little about. [The Concern-based Adoption Model] provides the framework in which to consider some of the tools we

might take to make that journey more memorable and productive (George, Hall, & Steigelbauer, 2006)."

Participatory agricultural development often involves a similar presentation of new tools or systems that farmers might want to incorporate into their ongoing activities. CBAM has the potential to be a useful tool for participatory agriculture programs to monitor the change process at the individual level to aid them in supporting communities throughout the adoption process. While there are many studies on the CBAM in the broader field of education and teacher training (Tunks & Weller, 2009; Kelly & Staver, 2004), the literature indicates that there are only two existing studies that apply this method to the field of agricultural education (Cashman, 1990; Myers, Barrick & Samy, 2012). Myers, Barrick, and Samy (2012) used CBAM to evaluate the introduction of active learning into agriculture technical schools in Egypt as part of a USAID-funded project. While this study did apply CBAM to agriculture, it still was in the context of a more traditional educational setting and focused on classroom tools and curriculum. In the 1980s, Cashman evaluated the adoption process of alley cropping by Nigerian farmers using an adapted version of CBAM for an agricultural extension program. Cashman "demonstrate[d] how the CBAM provides a diagnosis of farmers' needs, as well as prescription for action" (1990). As CBAM has only been adapted and implemented a single time in the context of agriculture innovation, further research is needed to assess CBAM as a tool for integrating farmers' concerns into program design and create simplified tools for easy implementation.

This case study does that assessment and presents possible methods for adapting CBAM to the agricultural development context by specifically focusing on an adoption of a new marketing system, known as the Participatory Guarantee System, with Cambodian vegetable farmers. This paper also explores the farmers' concerns about this new system and recommends how the

information gathered through the CBAM survey tools can be used to inform project management decisions in the context of international participatory development programming.

b) Background and Literature Review

Cambodian Horticulture and Quality Standards

The Cambodia Development Resource Institute estimates that 70% of all vegetables consumed in Cambodia are imported, primarily from China, Vietnam, and Thailand (Janssen et al., 2018). Simultaneously, Cambodia has high rates of food insecurity, and families typically spend 70% of their income on food (FAO, 2014). Across the region, food safety is a rising issue with biological and chemical contaminants being major concerns (Prabhakar, Sano, & Srivastava, 2010). In response, there is an increasing shift in demand for locally produced vegetables that are safer and use fewer chemicals. Globally, farmers involved in vegetable production typically earn higher incomes compared to cereal producers, and Cambodian horticulture farms incomes are 117% of non-horticultural smallholder farms (Lumpkin, Weinberger, & Moore, 2005). This increased demand and higher potential income provides significant potential for farmers to move towards higher-value crop production, increasing farmer incomes and improving overall food security. However, similar to many areas in the region, Cambodian vegetable production typically uses high quantities of chemicals and often farmers do not follow application and safety guidelines, either due to lack of awareness or lack of necessary equipment (LeGrand et al., 2016). A study that conducted a Strength-Weaknesses-Opportunities-and Threats (SWOT) analysis of the agriculture education and training system in Cambodia noted that there is a push to improve agriculture training and extension and noted there is a particular demand for technical training in value chain development and topics such as food processing and food safety (Gill, Ricciardi, Bates & James, 2017).

Quality standards can be valuable incentives to increase food safety in global supply chains. However, it can be difficult for smallholder farmers to adopt advanced standards that are mostly geared towards export markets (Krause, Lippe, & Grote, 2016). As a result, smallholder farmers can be marginalized from the supply chain (Minten Randrianarison, & Swinnen, 2016; Lee, Gereffi & Beauvais, 2010). Shifting national food production to export markets in some cases can actually decrease food security, particularly for smallholder farmers (Minten et al. 2016; Mulekorn et al., 2006).

As Cambodia and neighboring countries aim to increase agricultural exports and food security in their own countries, farmers operate in a landscape of complex market systems and competing food safety-oriented labeling systems. Countries increasingly strive to meet Global Good Agricultural Practices (GAP) and other standard systems in order to export within and outside the region (Lumpkin, Weinberger, & Moore, 2005; Prabhakar, Sano, & Srivastava, 2010). These standards and traceability requirements can be obstacles for farmers to expand into regional and global markets (Lumpkin, Weinberger & Moore, 2005; Prabhakar, Sano, & Srivastava, 2010). In order to promote quality standards and exports, the Cambodian government established the CAMGAP, a tailored GAP standard system specific to Cambodia. Farmers receive certification for following these complex standards, and more and more wholesalers and retailers are offering higher prices for CAMGAP certified produce (Chhunhy, 2017). The Cambodian Ministry of Agriculture, Forestry, and Fisheries operates a training series to help farmers meet CAMGAP standards and become certified (Chunnhy, 2017). The Cambodian horticulture market also contains a number of organic labels, and many upscale and midrange wholesalers and retailers have their own “chemical-free” labeling system. With these new

labeling and quality standards, farmers who are able to tap into these markets can be rewarded with much higher prices for their produce.

Project Context: the Safe Vegetable Value Chain Program

In partnership with the Royal University of Agriculture in Cambodia, the University of California, Davis Horticulture Innovation Lab's Safe Vegetable Value Chain (SVVC) program in Cambodia helps farmers meet market demands for safe, domestically produced vegetables by introducing production and postharvest technologies to improve phytosanitary quality. The SVVC program is based on the fundamental principle of using a participatory approach to empower local supply chain actors to become leaders and teachers in their communities as they work towards building stronger, safer vegetable value chains (LeGrand et al., 2016). The program first operated in the Kandal province from 2010 to 2015 and thereafter moved to the Battambang province given the United States Agency for International Development's (USAID) shifting geographical priorities. In the Kandal province, SVVC partnered with Natural Agriculture Village, a wholesale vegetable company focused on safety and quality, to introduce the Participatory Guarantee System (PGS) and net house vegetable production. The Kandal province is situated very close to the capital city of Phnom Penh and as such has an advantage in accessing those urban markets. In contrast, Battambang is on the northeastern side of the country on the board with Thailand. While Battambang is somewhat near the populous city of Siem Reap, it faces significantly more transportation barriers in reaching Phnom Penh markets.

In Battambang, SVVC has thus far introduced net houses, an enclosed net that protects crops from pests, reducing the need for chemical pesticides; a new packinghouse to consolidate and process vegetables; and a cold room to cool and temporarily store produce. Moving forward, the

project aims to mentor farmers through the adoption of these technologies and help them establish new connections to access markets that focus on safer, higher quality vegetables.

Participatory Guarantee System

As an alternative to conventional marketing systems and those managed by international authorities, locally-defined standards and certification programs such as the Participatory Guarantee System (PGS) emphasize building confidence and trust between stakeholders and offer a way for smallholder farmers to reach higher standards and safety of agricultural products destined for local consumption (Nelson et al., 2016). The SVVC program considered PGS as a possible innovation as many farmers in Battambang noted the lack of trust in across the vegetable value chain.

In PGS, buyers, growers, and other stakeholders self-define production and handling standards based on organic principles that are realistic and relevant to that unique community and market, ensuring compliance based on a participatory community evaluation process (Figure 1). By involving all stakeholders in the process, the community sets standards that farmers can realistically achieve and simultaneously aims to build trust between buyers, growers and consumers (IFOAM, 2017). These products tend to be more directed towards community and national markets, increasing food quality and food safety at a local level (Castro, 2013). To ensure adherence to the agreed upon standards, stakeholders equally participate in annual peer-evaluations with agreed upon consequences for non-compliance. Using an internal evaluation process reduces costs relative to other labeling and standards systems that rely on external evaluation.

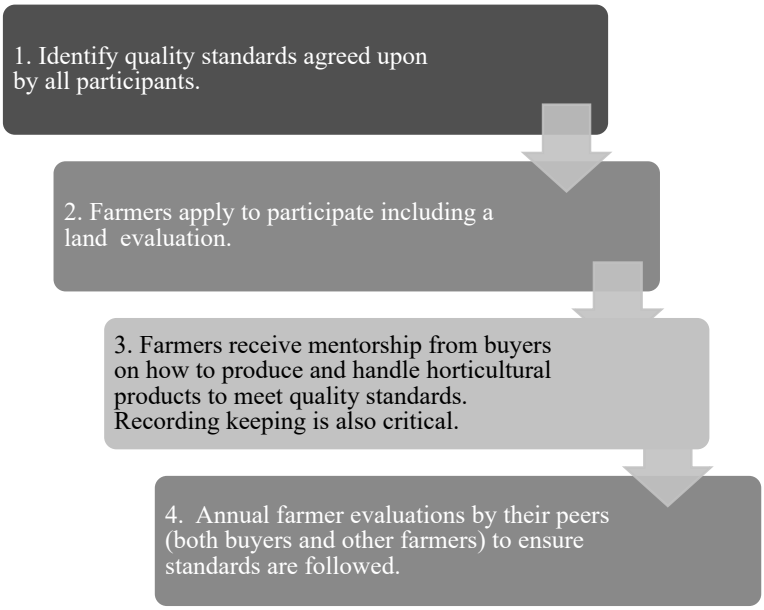


Figure 1: Process for establishing a Participatory Guarantee System (Mize, 2018)

At this time, PGS initiatives are fully operational in 43 countries and an additional 23 countries are in the process of establishing PGS (IFOAM PGS Maps, 2018). PGS has a particularly high usage and governmental support in Latin America, though Asia has the highest number of producers involved in PGS (Castro, 2013). In Cambodia, PGS was originally introduced by the non-governmental organization (NGO) Caritas Cambodia along with the Food and Agriculture Organization (FAO) and other donors. IFOAM currently notes there are 18 self-registered groups using PGS in Cambodia (IFOAM PGS Maps, 2018).

In the case study analyzed by this paper, the SVVC project has identified domestic wholesalers who are seeking to buy vegetables that adhere to PGS standards. The wholesalers and SVVC program staff believe it can help serve as a stepping stone for famers within the

project who are on the path towards more complex certification systems like CAMGAP while at the same time helping to improve the relationship between wholesalers and producers (LeGrand & Borarin, personal interview, January 31, 2019; Sieng, personal interview July 14, 2019).

Adoption Theory and the Concerns-Based Adoption Model

Based on empirical evidence, Hall, Wallace and Dossett (1973), developed the Concerns-based Adoption Model (CBAM) as participatory framework that integrates the concerns of individuals into the adoption process of a new tool, technique, or process. Founded on the theoretical constructs of experiential learning, CBAM recognizes that it is not sufficient to provide a new technology and assume that learners will adopt it automatically. Rather, experiential learning and change theory suggests that adoption is a process that occurs when a user participates in the identification of the new technique or technology, is able to integrate it into their existing experiences and knowledge and is allowed ample opportunity for practice and reflection (Baker, Robinson, & Kolb, 2012; Dewey, 1932; Havelock, 1971; Kolb, 1984; Lewin, 1947; Rogers, 2003). CBAM is consistent with these principles and is rooted in the idea that learning is a process that occurs in a series of stages, not a single event, that occurs at the individual level. Experiential learning theories also place an importance on understanding the group dynamics and the influence of society and culture (Lewin, 1947; Rogers, 2003). In contrast, CBAM does not specifically take these factors into account but acknowledges that users within a group may move through the adoption process at different rates. Learning also occurs at the level of the individual; thus, when introducing a new innovation to a group, users with in that group might be at different stages in the adoption process, or they might progress through the stages at different rates.

CBAM combines the Innovation Configuration Map, the Stages of Concern, and the Levels of User, presenting a systematic process to induce an innovation and monitor the adoption process over time, thereby allowing project leaders the opportunity to provide custom support to each new user as well as predict what type of support will be needed in the more immediate future as the users move through the adoption process (Figure 2).

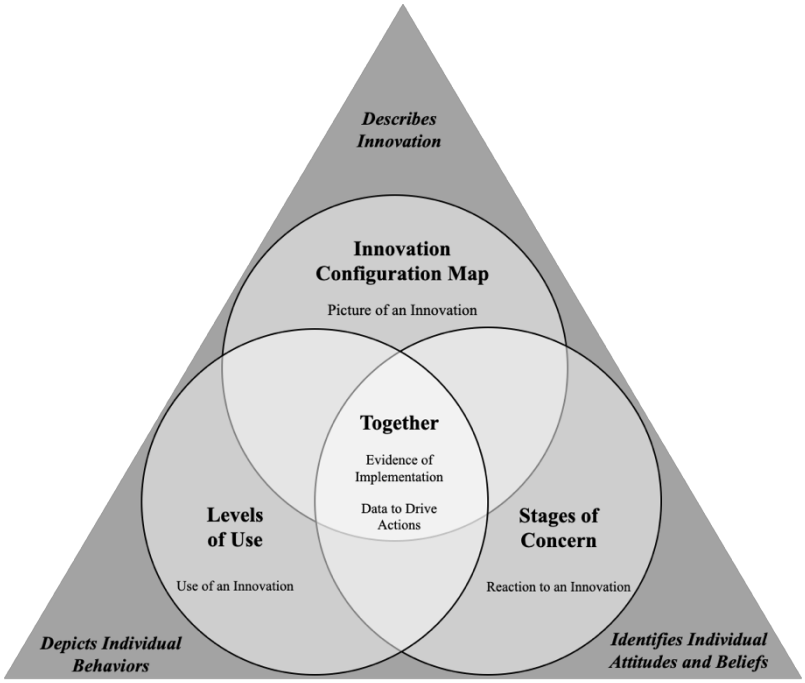


Figure 2: Concerns-based Adoption Model framework adapted from (CBAM, 2018).

According to the American Institute for Research, CBAM involves three key methods:

1. *Stages of Concern:* Program participants are placed at the center of change process to including their concerns, challenges, and worries about the new process in the activity design.
2. *Innovation Configuration Map*: Program designers describe clear and specific vision of what each element of the technology or practices should look like in practice including ideal,

acceptable, and unacceptable usage or outcomes. This is typically documented in the form of an Innovation Map and can also be used to evaluate the project.

3. *Levels of Use*: Program designers and evaluators incorporate level of use interview protocols (Nonuse, Orientation, Routine Use, Refinement, etc.). This method helps program leaders tailor support to users over the adoption lifecycle (CBAM, 2018).

For each of these components, CBAM uses a prescribed set of survey tools and methods that assess an individual's concerns for and use of the new technology. At the conclusion of the survey process, the facilitator calculates the Stage of Concern and Levels of Use of each user. Using the Stages of Concern and Levels of Use, CBAM identifies a user's progress in their use of new techniques and technologies relative to defined stages of adoption in order to better support them through the adoption process

CBAM has been primarily used in education, teacher training, and curriculum development (Tunks & Weller, 2009; Kelly & Staver, 2004). International development programs and donors also make use of the CBAM, though exclusively in education and teacher training settings (Myers, Barrick & Samy, 2012; Hosman & Cvetanoska, 2010). Only one existing study applied the Stages of Concern CBAM to an agriculture innovation (Cashman, 1990). However, other adoption literatures use a concerns-based framework and similar methods as the CBAM tools such as a study to introduce web-based extension tools to Cooperative Extension. While this method is almost exclusively applied to educational contexts, it aligns well with agriculture extension and adoption of technologies.

Agricultural extension emphasizes the importance of acknowledging the previous experiences of the individuals and providing opportunities for the individual to practice and reflect on the new agriculture innovation (Baker, Robinson, & Kolb, 2012). CBAM has the

potential to not only serve as a way to assess adoption but to also provide a structure for key learning and reflection processes inherent to agricultural extension and adoption of new techniques and technologies.

An extensive literature review found there has been only one study that has applied CBAM to an agricultural context outside of a formal educational setting (Cashman 1990). In this case, Cashman adapted CBAM, creating a construct to categorize farmers into Stages of Concern and Levels of Use based on interviews with farmers. This study used CBAM as a method to assess the adoption and use of ally farming, but it did not explore how CBAM itself could be used as a tool to increase and ease the adoption process.

Agriculture Development Programming Landscape

The paradigm shift from top-down, structural development toward participatory models began to take place in the 1990s after the backlash from neoliberal policies in the 1970s and 80s. Robert Chambers described this trend as a shift from the development of things to the "paradigm of people" (1994). The participatory development paradigm moved away from pre-established, and centralized programming designed and carried out top-down by development "experts" towards a more bottom-up approach with evolving goals set by local actors (Chambers, 1994). Participatory programs generally aim to empower program participants to be decision-makers. Project outputs are diverse and often focus on capacity building.

However, in the 2000s, development programming began to face increasing pressures from donors for evidence-based impacts and were asked to scale-up to large numbers of beneficiaries. One World Bank report noted, "A key issue for many critics is that evidence on the actual record of [community-based/community-driven] initiatives still lags considerably behind

the speed at which such projects are being implemented and 'scaled up'." (Mansuri & Rao, 2003). Monitoring and evaluation are now critical components of nearly all donor-funded projects. Projects are expected to justifying project spending by reporting on an established list of output- and outcome-indicators within the short lifespan of the project. An internal evaluation of USAID's efforts at encouraging participatory approaches cited "[the pressure] to meet short-term quantifiable targets that did not capture the value of the participation" as one of the main reasons for the failure to adopt participatory development (Corneille & Shiffman, 2004). Due to budgetary constraints, USAID priorities focused on establishing procedures that would ensure efficient project spending and maximum impact to justify development funding (Corneille & Shiffman, 2004). "Rapid start-up" and "impact indicators" became part of the development sector vernacular due to the mandate to quickly prove to donors that implementors could demonstrate change and results in a short amount of time.

The current development landscape still encourages aspects of participatory design and implementation, but at the same time requires program administrators to demonstrate evidence-based impacts. The dichotomy between these two paradigms presents a challenge to program administrators. Participatory programming necessitates a slower pace to incorporate the viewpoints of all program actors. They also often aim for more incremental change. Chambers warned that a common pitfall of participatory programs is tendency to rush and a failure to "facilitate an on-going process" (1994). In line with many education models, Chambers refers to change as a process that takes place over time. It can be difficult for projects to prove results in a short time period. The need to assess impact and report change in terms of pre-set number of indicators more aligns to the "development of things" paradigm, but donors still insist on a people-centered, capacity building approach, resulting in "participation" being used as a "label

without substance" (Chambers, 1994). It is much more difficult to prove results of change when a project is focused on the development of people relative to projects focused on more measurable "things".

If development programming is to continue to aim for participatory programming in the current landscape, there is need for assessment tools that allow participatory project to track small changes in communities and justify slower-paced, inclusive programming (Ticehurst & Cameron, 2000). There are a limited number of monitoring and evaluation tools for that assess change at the individual level. The CBAM has the potential to fill this gap and be used as evidence of change over the stages of technique or technology adoption, justifying the slower-paced participatory programming.

c) Conceptual Framework

The process of adopting new innovations has been extensively studied alongside the sociology of agricultural education since the 1930s and 1940s (Dewey, 1932; Baker, Robinson & Kolb, 2012). Many of these theories arose from the context of agricultural education in the United States school system, specifically with the project method as a form of agricultural education (Roberts & Harlin, 2007). Dewey posited that education is a process at the individual level based on "the organic connection between education and personal experience" (Dewey 1932). Dewey set the foundation for a number of paradigms and educational frameworks that acknowledge the prior experiences of the individual, the quality of the experience, and the integration of that experience through reflection (Dewey 1932; Kolb 1984; Roberts & Harlin, 2007).

Kolb defined "learning [as] the process whereby knowledge is created through the transformation of experience" (Kolb, 1984). Learning is a process, not a single event or a

product, that takes place over time in a continuous cycle of experience and reflection (Kolb, 1984; Baker, Robinson, & Kolb, 2012). However, not all experiences can be considered positive; experiential learning requires purposeful planning and assessment. Baker, Robinson, and Kolb explicitly connected Kolb's existing experiential education model and taxonomy to models of agriculture education in the Growth and Development Model for Secondary Agriculture Education (Baker, Robinson, & Kolb, 2012; Steinaker & Bell,1979). In this model, individuals move through the cycles of experience and reflection, but also vertically from exposure, participation, to dissemination as they become full participants in their field.

Building off learning models, change-theorists such as Lewin and Havelock developed step-wise models for change. Lewin's theories focused on the importance of involving participants in the planning phase and the importance of group dynamics (Lewin, 1947). Havelock found deficiencies in other models and introduced the concept of the "linkage model" that develops transferable skills in a user and builds collaborative relationships to help solve problems (Havelock, 1971). Havelock's change theory was built on a six-phase model that included pre-contemplation of the need for change, diagnosing the problem, acquiring the resources for change, identifying the solution, implementing the change, and maintaining the change (Havelock, 1973).

Around the same time experiential learning theories were developing in the United States, diffusion of innovation theories began to emerge (Rogers, 2003). Originally based on his experience in agricultural extension in Iowa, Rogers' defined diffusion as "the process by which an innovation is communicated through certain channels over time among the members of a social system" (Rogers 2003). Similar to the experiential education literature, diffusion theory's behavior-change framework roots itself in the idea that change is a process over time where

individual adopt the new concept in a predictable process within the context of a social system (Rogers 2003). According to Rogers, the rate of adoption is influenced by "the perceived attributions of the innovation…, the type of innovation-decision, the nature of communication decision process, the nature of the social system, and the extent of change agents' efforts in diffusing the innovation" (2003). Based on how individuals moved through the adoption process they could be categorized as innovators, early adopters, early majority, late majority, or laggards (2003). Rogers also placed a significant emphasis on the importance of the compatibility of the innovation based on the "sociocultural values and beliefs, previously introduced ideas, and/or client needs for the innovation" (2003).

In the 1970s, Hall, Wallace, and Dossett developed the CBAM which aimed to "provided a framework from which to understand the personal side of the change process" (George, Hall & Stiegelbauer, 2006). Hall, Wallace and Dossett (1973) noted that much of the framework behind education theory had a foundation in agricultural education, and they aimed to create a model specifically for teacher training and the adoption process of new curriculum and educational tools on the part of educators. Similar to the experiential learning and agricultural education theorists, Hall Wallace, and Dossett (1973) believe "the adoption of an educational innovation is a complex process involving a multitude of variables". Based on the theories of Rogers and Havelock, the CBAM model centered the change process in the individual and created a framework for integrating individual users' conceptions and concerns into the adoption of a technique or tool (Hall, Wassace, & Dossett, 1973). This model is composed of three elements: the innovation concerns, the stages of concern, and the levels of use. Essentially, program designers identify a clearly communicated vision of each element of the new innovation (innovation concerns) and then monitor new users concerns (stages of concern) and practice with

the innovation (levels of use) to better tailor support as adopters move through the cycle of adoption.

Stages are grouped into three major categories based on the empirical evidence of the adoption process. New user's initial concerns about a new technique or tool are focused on their own individual use or the "self". In the "self" stages, the individual's primary concerns are about awareness or lack of awareness of the technique and understanding how adopting it might impact them as an individual and if that person has the ability and means to succeed in its use. The next phase in the Stages of Concerns deals with the concerns of the learning how to successfully use the new processes, or the "task". This stage is often marked with the challenges and frustrations of learning and practicing a new technique or tool. The final set of stages are grouped into the "impact" phase. This phase is characterized with a mastery of the basics of the technique and an outward shift of perspective towards understanding how the technique impacts their immediate sphere of influence, sharing the technique with others, and making improvements to the technique itself (Table 1).

Table 1: The Stages of Concern About an Innovation

Impact	6	Refocusing	The individual focuses on exploring ways to reap more universal benefits from the innovation, including the possibility of making changes or replacing it with an alternative.
	5	Collaboration	The individual focuses on coordinating and cooperating with other regarding use of the innovation.
	4	Consequence	The innovation focuses on the innovation's impact on their immediate sphere of influence.
Task	3	Management	The individual focuses on the processes and task of using the innovation. Issues related to efficiency, organizing, managing, and successful functioning of the innovation dominate.
Self	2	Personal	The individual is uncertain about the demands of the innovation and his/her/their adequacy to meet those demands. The individual is analyzing their financial or status implications of the innovation and the implications of the innovation on their personal situation.
	1	Informational	The individual is generally aware of the innovation and is interested in learning about it. Interest is confined to the general characteristics, effects, and requirements.
	0	Unconcerned	The individual indicates little concern about the innovation or is unaware of it.

Adapted from George, Hall & Stiegelbauer, 2006

CBAM theorists note that "[r]esearch suggests [the existence] of a developmental process of [the necessity] of easing earlier concerns before later concerns are developed" (George, Hall & Stiegelbauer, 2006). They found that process of concern resolution along the stages of adoption holds true for most process and product innovations (George, Hall & Stiegelbauer, 2006). Extending CBAM from an educational context to agriculture would follow a similar process – identifying farmers' concerns that are then categorized into systematic "Stages of Concern" from unconcerned to refocusing that farmers experience in the adoption process of PGS. Similar to Bark, Robinson and Kolb's Growth and Development Model and Roger's Diffusion Theory, individuals move through these stages of concern and as they advance through the adoption process.

In line with the theoretical and participatory approach of the SVVC project as a whole, this study combines the CBAM theories to the specific context of assessing the adoption of PGS among Cambodian farmers. Experiential education and agriculture extension education establish a foundation for importance of reflection and assessment that can be found in CBAM and Stages of Concern. It acknowledges that change is a process of an individual going through set stages as they move to full participation with the new innovation within the societal context. The adaptation of the CBAM Stages of Concern tool is grounded in the concept of inserting assessment, reflection, and acknowledgment of the individual experience to aid in the implementation of a participatory project.

d) Purpose and Objectives

The purpose of this study was to explore the potential of the Concerns-based Adoption Method (CBAM) as a tool to improve the adoption process of agriculture innovations. Specifically, the objectives were to:

1. Adapt and pilot the CBAM Stages of Concern instrument to an agriculture innovation context, specifically for the introduction of Participatory Guarantee System (PGS) to Cambodian vegetable farmers
2. Assess the concerns of Cambodian vegetable farmers with a range of exposure to and use of PGS
3. Describe the potential for CBAM to be a useful tool for project management of international development programs

Below, I outline the methodology, findings, and conclusion from this study.

Chapter 2: Methods

a) Introduction

This chapter describes the methods used to conceptualize and carry out the study. First, I describe how I adapted the CBAM tools to the specific context of the Participatory Guarantee System in Cambodia. Next, I outline the survey methodology, data analysis and triangulation. I also discuss the methods used to ensure validity and reliability of the study.

b) Adaptation of Concerns-based Adoption Model Survey Mechanism

The CBAM Stages of Concern Manual prescribes a set methodology, survey tools, and analysis frameworks (Hall, Wallace, & Dossett, 1973). Using this manual as a guide, Stages of Concern survey instruments were adapted to assess the farmer's concerns about their use of PGS. The survey mechanism was divided into two sections: the Stages of Concern questionnaire and supporting open-ended questions.

A series of statements were presented to respondents where each statement corresponded with one of the Stages of Concern. These statements were adapted to align with the expressions of typical expressions of concern identified in CBAM literature (George, Hall & Stiegelbauer, 2006; Cashman, 1990). As the surveys would be administered in the Cambodian language of Khmer, the CBAM survey templates were modified to simplify language for ease of translation and understanding. Question modifications followed the typical expressions of concern (Table 2) corresponding to each Stage of Concern. In the adapted survey mechanism, there were four statements that corresponded to each stage (Table 2).

Table 2: Expressions of Concern About an Innovation

Stage of Concern			Expressions of Concern
"Impact"	6	Refocusing	I have some ideas about something that would work better or improvements that could be made to PGS.
	5	Collaboration	I would like to know how others use it. I would like to coordinate my effort with others to maximize the effect of using PGS
	4	Consequence	How is my use affecting the output of my farming system and my family?
"Task"	3	Management	I seem to be spending all my time on PGS. PGS is too tedious.
"Self"	2	Personal	How will using PGS affect me? What will others think if I use PGS?
	1	Informational	I am aware of PGS and would like to know more about it.
"Unconcerned"	0	Unconcerned	I am not concerned about PGS or have little information about it. I don't know anything about PGS.

Adapted from George, Hall & Stiegelbauer, 2006 and Cashman 1990

For each statement, respondents were asked to rank their level of agreement with each statement on a scale from zero to seven where zero indicated that the statement is "not very true" of the respondent and seven indicated that the statement is "very true" for the respondent. Survey participants indicated their relative intensity score using a visual response system that had Khmer numbers and text as well as Roman numerals to ensure comprehension of the scale.

In addition to the Stages of Concern questionnaire, surveys included open-ended questions to gauge the concerns of PGS users and protentional users. These open-ended questions were used to validate the Stages of Concern questionnaire responses and provide additional context to respondents' feedback about their adoption and use of PGS.

To assess the process of modifying and piloting the Stage of Concern survey, I documented my own feedback throughout the study as well as noted feedback from enumerators in pre- and post-surveying group discussions after each round of surveying for a total of six discussions with ten enumerators. Interviews were also organized with SVVC program staff to gather feedback on

their perceptions of CBAM and the Stages of Concern as well as how this may or may not have aided them in the management of the SVVC program.

c) Survey Sampling and Focus Groups

Survey respondents were selected from two Cambodian provinces based on past and current activities of the SVVC project and the Natural Agriculture Village produce wholesale company. Given time and resource limitations, it was not feasible to track the same population of individuals over time. As such, respondents came from groups of farmers with varying levels of experience and exposure to PGS to represent the maximum number of predicted Stages of Concern as possible.

The adapted CBAM stages of concern questionnaires were administered to a selection of farmers (n=76) with varying levels of exposure to and use of PGS from the SVVC program target regions of Kandal and Battambang. In Kandal, the SVVC project previously assisted interested farmers in adopting nethouse vegetable production and helped connect them to a PGS system through the vegetable wholesaler, Natural Agriculture Village. All farmers who participated in PGS in Kandal were surveyed (n=15) as well as a contrasting group of famers who live in the same community as the PGS-users but do not currently use it (n=16). Most of these farmers had limited exposure to alternative marketing systems of any kind but a few knew about PGS from their neighbors. In Battambang, the SVVC program is actively working with a farmer cooperative on improving production and postharvest handling through nethouse production and by installing a cold room for vegetable processing and short-term shortage. These farmers had received a number of trainings on improved agriculture production, marketing, and food safety. Many of them also currently sell to a wholesaler that imposes some quality standards in return for stable purchase quantities and high prices. A sample of farmers (n=30) from this

cooperative were selected to assess whether the cooperative might be interested in trying PGS. The last group of participants came from Battambang and expressed wiliness to join the PGS system with Natural Agriculture Village and participated in a PGS training (n=17). Some of these farmers were members of the Battambang cooperative and other were individual farmers identified by Natural Agriculture Village. However, after the training, some participants decided not to continue with PGS (n=4). Two of these individuals were not available for surveying and thus the total sample size for this group was 15. In total, I surveyed 76 farmers within the seven groups.

Surveys were originally written in English (Appendix A) and then translated to Khmer by a senior Director at the Royal University of Agriculture. Native Khmer-speakers from the SVVC project and Royal University of Agriculture served as enumerators for the survey. Enumerators received a training on administering the survey from an international team of native-Khmer, seasoned surveyors and myself. A pilot survey was conducted to both validate the survey mechanism and give enumerators the opportunity to practice, ask questions, and ensure they followed survey protocols. After administering the surveys, lead enumerators then translated responses into English for analysis.

In addition to the survey, lead enumerators organized a total of seven focus group discussions in the Khmer language with group of participants of similar exposure to PGS. Survey participants and other community members were invited to participate in the discussions, and participants were divided into groups to respond to a series of nondirective questions modeled after Krueger's (2000) suggested methods for crafting focus group questions. With the exception of the post-training focus group, discussions aimed to accommodate five to ten individuals with at least three focus groups for each type of participant (Krueger, 2000; Weiss, 1995). Due to

logistics, availability of participants, and resource constrains, it was not possible to subdivide participants for some certain focus group contained more than the recommended maximum. Focus group participants were organized as follows:

1) Battambang farmers engaged in other innovative marketing systems but have never been exposed to PGS (n=8, n=10, n=12; total = 30)
2) Kandal farmers who have used the PGS for at least one year (n=8, n=6, total= 14)
3) Kandal farmers who live in the same community as PGS farmers but did not use it (n=8)
4) Battambang farmers who recently completed a PGS training (n=15)

Native Khmer-speakers facilitated the discussion based on standardized questions for each group (Appendix B) aimed at determining farmers' experience with and concerns about PGS with the intention of using these to triangulate and validate Stages of Concern scores from the survey mechanisms as well as provide additional context. Moderators were given guidelines for facilitating the discussions including the welcome, introduction, setting ground rules, and the order of the questions (Krueger, 2000; Merriam, 2009; Weiss, 1995). The training also included advice on best facilitation practices (Krueger, 2000; Merriam, 2009; Weiss, 1995). Key points from the discussion were recorded in real-time by assistant moderators on poster paper for the group to validate and ensure that all points of view were included. Additional note takers transcribed the conversation in Khmer and then translated the notes into English for analysis.

d) Scoring, Coding, and Triangulation

Stage of Concern data were analyzed on both an individual and group level based on the methods suggested by the CBAM Stages of Concern manual (George, Hall & Stiegelbauer, 2006). Each question in the Stage of Concern questionnaire corresponded to a particular Stage (Unconcerned, Informational, Personal, etc.). At the individual level, participants responses were

grouped according to Stage and then mean scores were calculated, resulting in a relative intensity score (0-7) for each stage for that individual. A high relative-intensity score indicated that a participant's concerns align more closely with that stage while a low relative intensity score indicated that the participant did not resonate with that particular stage. At the group level, mean relative intensity scores were calculated for each of the four sample populations (Kandal PGS Users, Kandal non-PGS user, Battambang farmers from the advanced cooperative, and Battambang farmers who participated in the PGS training).

Qualitative data from the Stages of Concern open-ended survey questions were analyzed using content analysis and analytic induction (Merriam, 2009). Responses were grouped thematically and analyzed for frequency relative to the respondents Stage of Concern. Transcribed focus group notes were also analyzed similarly. Composite Stages of Concern scores for each respondent were then generated from the raw Stage of Concern data, the open-ended survey data, and focus group discussions to account for survey instrument wording. This is described in more detail in Chapters 3 and 5.

Focus group discussions were analyzed based on note-based analysis due to resource availability and translation necessities (Kreuger, 2000). The focus group discussion notes were coded based on the category construction method and analyzed using content analysis and intergroup comparisons (Merriam, 2009). Data from focus groups were then organized into case studies and used as references to contextualize data from the Stages of Concern survey (Merriam, 2009; Weiss, 1995). The Stages of Concern scores, qualitative survey responses, and focus group notes were then triangulated, developing a fuller picture of the adoption process and farmers concerns about PGS.

e) Validity and Reliability

Validity and reliability of this study were approached from numerous angles. First, the study was designed using multiple methods including the Stage of Concern scores, qualitative survey questions, and focus groups. Data gathered from each of these sources were cross-checked against each other for consistency, using triangulation as a form of validity check (Merriam 2003). Second, the surveys themselves were tested for validity in multiple ways. Surveys were reviewed for content validity by a number of experts in survey design, education, agriculture, and food safety both from University California, Davis and the Royal University of Agriculture. Draft surveys were piloted with an initial test group for face and content validity as well as readability and consistency, and modifications to the survey were made to help clarify nuances between questions to both the enumerators and respondents.

Reliability analysis of the survey instrument was analyzed using Cronbach's alpha with an understanding of the critiques and limitations of this method (Cronbach, 1951; Tavakol & Dennick, 2011). Cronbach's alpha scores above 0.70 – 0.95 are considered ideal for group uniformity (Tavakol & Dennick, 2011) (Table 3).

Table 3: Cronbach's Alpha Values for Each Stage of Concern

Stage	Number of Respondents (n)	Cronbach's Alpha

0	Unconcerned	n= 7	0.93
1	Informational	n=4	0.90
2	Personal	n=16	0.90
3	Management	N/A	N/A
4	Consequence	n=7	0.75
5	Collaboration	n=7	0.72
6	Refocusing	n=4	0.80

Stage 0, 1, and 2, and 6 all had uniformity values at or above 0.80. As expected considering the issues with word nuance discussed in Chapter 4, Stage 4 and 5 had lower uniformity values, but these scores were still above 0.70. Stage 3 was not tested as there were no individuals in that Stage at the time of the survey.

f) Summary

Methods for this study were chosen with specific purpose to address need for systematic assessment and integration of farmer perspectives into participatory programming in the SVVC project with the potential to be applied to other agriculture development initiatives. The CBAM method follows a long history of experiential education and agriculture education, but it was originally intended for the field of education. This study's adaptation of the CBAM reinserts the method into the agriculture extension and education field and assesses its utility as a tool for systematic participatory projecting planning. In the following chapters, I present and discuss the finding and conclusions of this study.

Chapter 3: Findings

a) Introduction

In this chapter, I present the study's findings of each of the main objectives. Under Objective 1, findings are presented on the process of adapting and piloting the Stages of Concern tool as well as the resulting relative intensity scores and composite scores that resulted from the survey. Findings from Objective 2 include thematic data gathered from the open-ended survey questions on farmers' concerns about PGS as well as case studies on each sample group developed from focus group discussions. In Objective 3, I present data and observations collected about the potential use of CBAM as a program management tool based on the experiences of the SVVC program.

b) Objective 1: Adapt and pilot the CBAM Stages of Concern instrument for the introduction of PGS to Cambodian vegetable farmers

Adaptation of the Stage of Concern Survey Tool

With the objective of piloting the CBAM Stage of Concern tool in the context of an agriculture development project, I adapted the original mechanism from the CBAM Stage of Concern manual for the context of introducing PGS to Cambodian famers. For each of the survey questions, the "innovation" described in the survey questions was specified to be the Participatory Guarantee System. The CBAM framework and Stage of Concern tool proved very adaptable for different innovations. Wording of the questions was adjusted to better fit the context of a farmer as opposed to an educator. Given the level of nuance in between the questions associated with each stage, this process proved somewhat challenging, however.

Through analysis of the raw Stage of Concern scores, I discovered that some participants who did not have experience with PGS responded positively to statements aligned to the

Consequence (Stage 4) and Collaboration (Stage 5) stages that normally represent individuals who actively used the innovation and are beginning to think about how it is impacting them and how to work with others. For example, some of the farmers from the *Battambang, No Training* group who had never before been introduced to PGS scored the Impact stage very highly.

To address this issue, additional modifications were made to the processing of the raw Stage of Concern scores. The standard CBAM Stages of Concern model typically assigns users with a particular Stage of Concern by ranking their top two relative intensity scores (George, Hall & Stiegelbauer, 2006). In some cases, the user's lowest intensity score is also used to give a fuller picture and identify where that individual might be in the adoption process (George, Hall & Stiegelbauer, 2006). I followed a similar procedure but also took into account the open-ended survey questions and focus group discussions to generate a composite Stage of Concern Score for each individual. By doing so, I attempted to correct for some of the survey word choice that resulted in some farmers who did not yet have experience with PGS to similarly give high rankings to both the Self and Impact stages. In the case where an individual who had not yet used PGS scored the Consequence stage highest and the Personal score the second highest, the composite score was adjusted downward to the Personal stage to generate the composite scores. All adjustments were cross-referenced with the open-ended survey responses to ensure that verbal responses aligned with the overall expressions of concern rubric for each Stage of Concern category (Table 2).

Feedback from enumerators about the surveying process was also documented as a way to assess the revised Stages of Concern tool. Lead enumerators who translated the survey noted that the Stage of Concern questions were challenging to translate into Khmer to their level of nuance and complicated sentence structure. This remained a challenge even after I attempted to

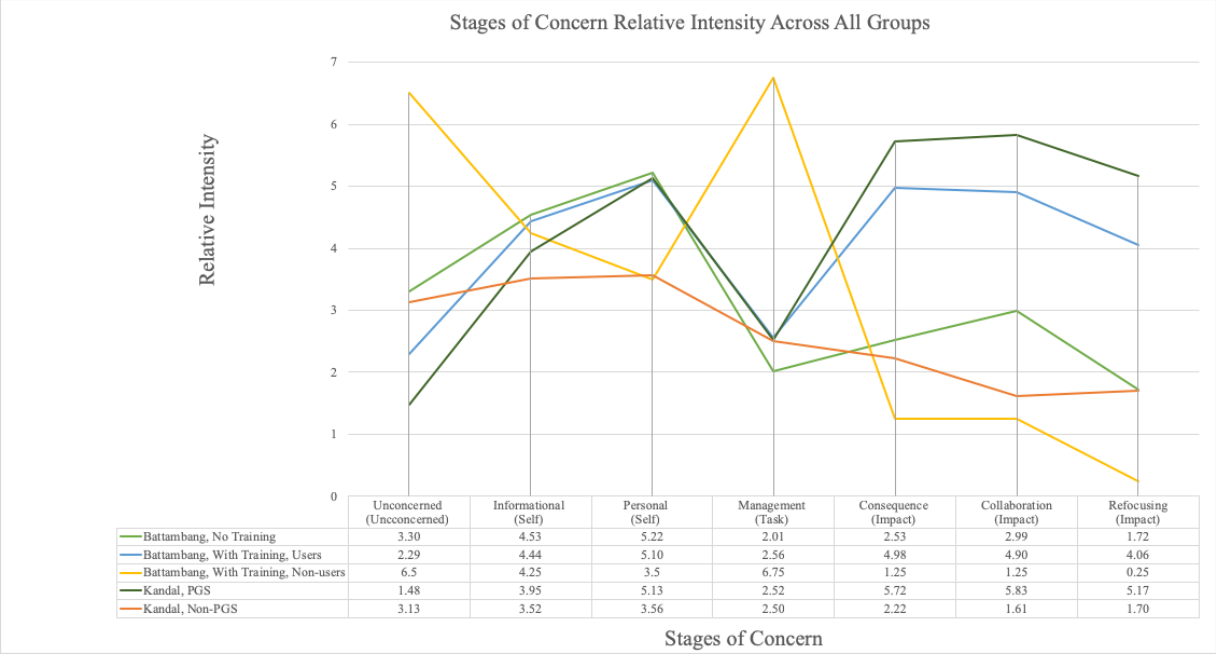
streamline some questions based on the CBAM manual for clarity and simplicity. To clarify the translated survey with enumerators, lead enumerators organized a full day training to talk through each question and practice administering the survey. After this training, enumerators felt more confident in understanding the questions. While most of the enumerators had not administered a Likert-type questionnaire before, they noted that it was fairly easy to use. One lead enumerator who was also designing their own separate study at the time, even decided to use this style of question in their own research. Enumerators also noted that farmers with limited exposure to PGS, such as the *Kandal, Non-PGS* farmers, had trouble understanding the Stage of Concern questions but were more comfortable answering the open-ended questions.

However, given these documented challenges with the process of adapting CBAM, the resulting Stage of Concern data aligned with expectations. These findings in the form of relative intensity scores and composite Stage of Concern scores are presented below.

Relative Intensity Scores

The Stage of Concern surveys were administered to farmers with a variety of levels of exposure to and experience with PGS with the objective of piloting the survey tool and assessing its usefulness to the SVVC program team. Farmers responded to a series of questions that each correlated to one of the Stages of Concern on a scale from zero to seven with zero representing "irrelevant" and seven being "very true". Responses were then grouped by Stage of Concern category and averaged for each individual as well as each sample group of farmers. The average scores of each stage represent the relative intensity a particular individual or group for each stage. Higher relative intensity scores denote a strong positive response to that stage while low relative intensity scores indicate a low association with that stage.

Below, I depict the average relative intensity scores from all survey groups (Figure 3). The groups *Battambang, No Training*; *Battambang With Training*, *Users*; and *Kandal, PGS* all follow a similar pattern. Each group had increasing intensity scores from the Unconcerned to the Personal Stages, a sharp decline at the Management Stage, and then some level of increasing relative intensity through the Consequence, Collaboration, and Refocusing Stages. The *Kandal, PGS* farmers had the highest relative intensity scores in the Consequence and Collaboration stages while the *Battambang, No Training* group had higher Unconcerned, Informational, and Personal intensity scores relative to the more advanced Stages of Concern. *Battambang With Training, Non-Users* did not follow this pattern and instead had high relative intensity peaks at the Unconcerned Stage and the Management Stage and low intensity scores in the more advanced stages. *Kandal, Non-PGS* farmers had relatively higher scores for their Unconcerned, Informational, and Personal stages with declining intensities across the more advanced stages.



	Unconcerned (Uncconcerned)	Informational (Self)	Personal (Self)	Management (Task)	Consequence (Impact)	Collaboration (Impact)	Refocusing (Impact)
Battambang, No Training	3.30	4.53	5.22	2.01	2.53	2.99	1.72
Battambang, With Training, Users	2.29	4.44	5.10	2.56	4.98	4.90	4.06
Battambang, With Training, Non-users	6.5	4.25	3.5	6.75	1.25	1.25	0.25
Kandal, PGS	1.48	3.95	5.13	2.52	5.72	5.83	5.17
Kandal, Non-PGS	3.13	3.52	3.56	2.50	2.22	1.61	1.70

Figure 3: Stage of Concern relative intensity scores for all groups (Battambang, No Training (n=30); Battambang with Training, Users (n=13); Battambang with Training, Non-users (n=2); Kandal Users (n=15); Kandal, Non-PGS (n=16))

Relative intensity scores were also analyzed by contrasting particular survey groups. I compared farmers from the Kandal province including both users and non-users of PGS (Figure 4). Survey results from *Kandal PGS farmers* who have been using PGS for at least one year show that they have moved beyond the Self and Task stages and are now in the outward-facing Impact stages looking to collaborate with others on improving PGS in their communities. In contrast, *Kandal, Non-PGS* have higher intensity scores in the Unconcerned and Self stages.

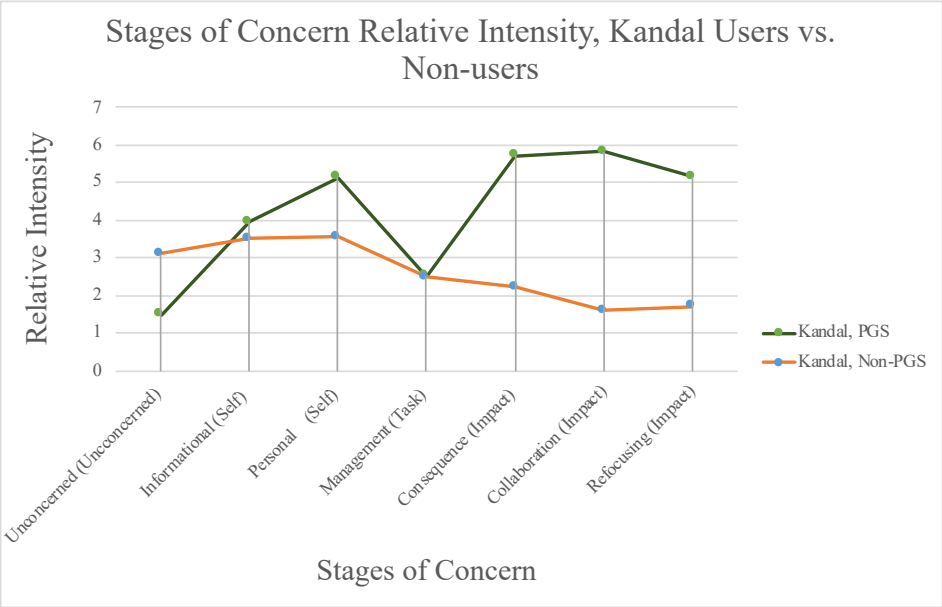


Figure 4: Stages of Concern relative intensity scores for both Kandal groups (Kandal, PGS (n=15); Kandal, Non-PGS (n=16))

To give a clearer picture of some groups, I grouped together all farmers who do not currently use PGS: *Battambang, No Training; Battambang With Training, Non-users*; and *Kandal Non-PGS* (Figure 5). The *Kandal, Non-PGS* and the *Battambang, No Training* follow a similar pattern of high relative intensity scores in the Unconcerned and Self stages followed by much lower scores in the Task and Impact stages. On the other hand, the *Battambang, With Training, Non-users* show very high relative intensity scores for the Unconcerned and

Management Stages of Concern and lower scores for the Informational, Personal, and all of the Impact stages. Farmers in this group received a training giving them basic information about PGS but ultimately decided this was not a compatible innovation for them at this time.

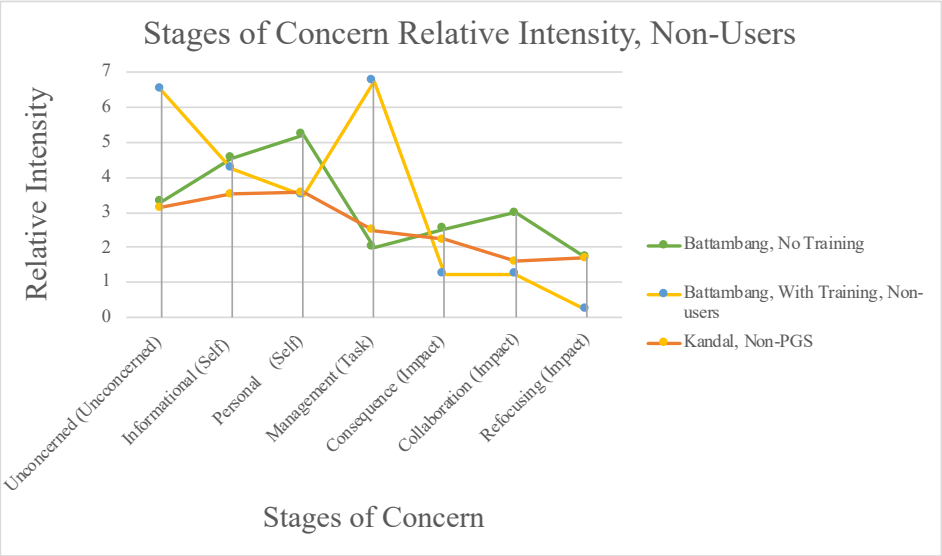


Figure 5: Stages of Concern relative intensity scores for all non-users (Battambang, No Training n=30; Battambang, With Training, Non-Users n=2; Kandal Non-PGS n=16)

Likewise, I wanted to contrast the Battambang farmers who completed a PGS training and either decided to join the PGS marketing group or to discontinue with the program (Figure 6). As discussed above, those farmers who did not decide to continue with PGS have higher intensity scores in the Unconcerned and Management Stages. In contrast, the Personal Stage of Concern is ranked highest among the farmers that decided to join the PGS marketing group. This group also scored the Consequence and Collaboration Stages of Concern relatively highly.

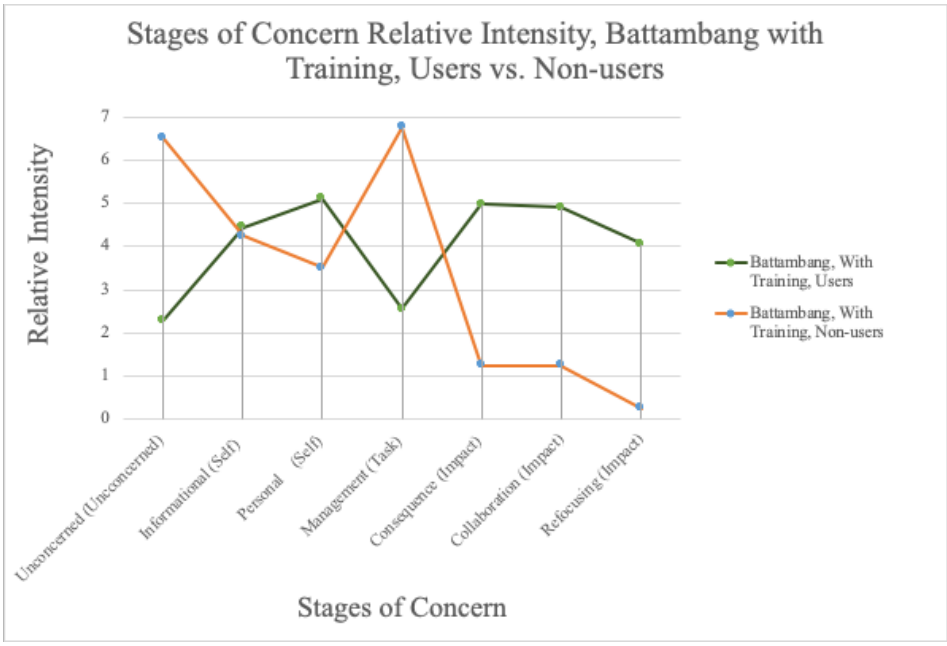


Figure 6: Stages of Concern relative intensity scores for Battambang with Training, Users (n=15) compared to Non-users (n=2).

I compare the two groups of PGS farmers: *Kandal, PGS and Battambang with Training, Users* (Figure 7). These two groups have very similar relative intensity score patterns characterized by high responses in the Personal Stage of Concern as well as all of the Impact stages (Consequence, Collaboration, and Refocusing). The Kandal farmers who used PGS for a period of time have higher Impact relative intensity scores while the Battambang farmers who were about to begin using PGS have slightly higher Self scores. The *Kandal PGS* farmers have moved beyond the earlier phases of adoption and are now more outward-oriented focusing on how to increase the impact of PGS at their own farms and in their communities.

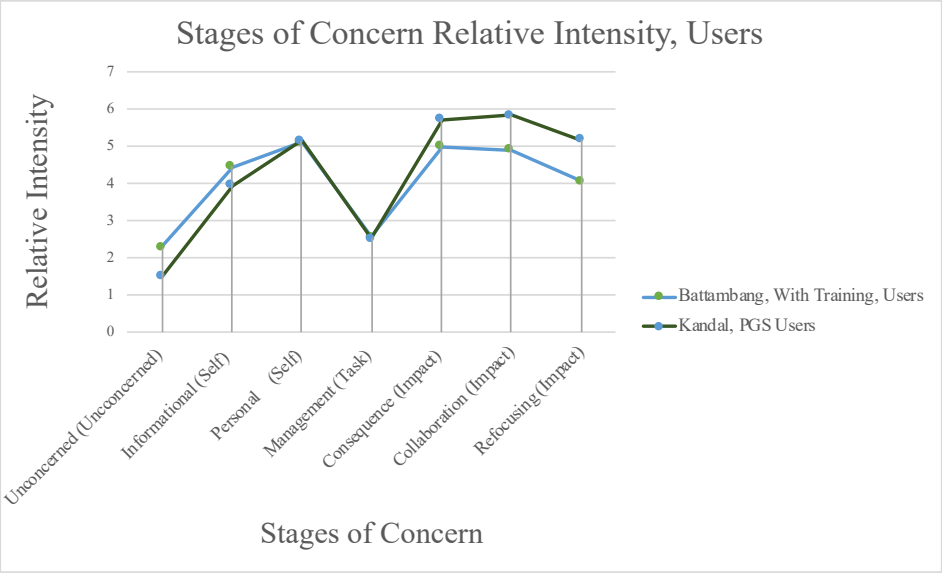


Figure 7: Stages of Concern relative intensity scores for users (Kandal PGS Users (n=15; Battambang With Training, Users (n=13).

Composite Stage of Concern Scores

As discussed above, the composite Stage of Concern score aimed to present a clear picture of the respondents' stages by taking into consideration both the raw Stage of Concern scores and the open-ended survey questions. I illustrate the distribution of survey respondents across the Stages of Concern grouped by location and experience with of PGS (Figure 8).

Figure 8: Stage of Concern Composite Scores for each group (Battambang, No Training (n=30); Battambang with Training, Users (n=13); Battambang with Training, Non-users (n=2); Kandal Users (n=15); Kandal, Non-PGS (n=16))

Kandal, PGS Non-users are categorized into the Unconcerned, Informational, and Personal Stage. *Kandal, PGS Users* are placed in the Impact stages with the highest concentration in the Collaboration stage. *Battambang With Training, Users* are exclusively in the

Personal Stage while Battambang With Training, Non-Users are in the Unconcerned stage. Finally, the group with the most diversity of stages was the *Battambang, No Training group*. Most farmers in this group fell into the Self stages (Unconcerned, Informational, and Personal) while there were a small number in the Consequence and Collaboration stages.

Here I presented the findings of the first objective of adapting and piloting the CBAM Stages of Concern. These findings were consistent with expectations and demonstrate that the survey accurately represented the stages and concerns of the survey participants. I will discuss this further in Chapter 4.

c) Objective 2: Assess the concerns of Cambodian vegetable farmers with a range of exposure to and use of PGS

Cambodian farmers' concerns regarding their use of or interest in PGS were assessed through analysis of themes that emerged from open-ended questions added to the Stages of Concern survey as well as from focus group discussion themes and case studies. In addition to the Stages of Concern Leikert-type questions, farmers were asked open-ended question based on their level of exposure to PGS. The following two main questions were posed depending on if the respondent already used PGS or not:

(1) Why were farmers interested in using PGS or what how does using PGS benefit them?; and

(2) What challenges, if any, did farmers anticipate from using PGS or what are their current challenges with their use of PGS?

For each of these questions, farmers responses were categorized into themes and then analyzed for frequency according to each composite Stage of Concern score. In Figure 9, I depict a frequency of themes in the form of a heatmap related to farmers' interest in PGS while in Figure

10 I display the frequency of themes surrounding farmers' current or anticipated challenges with PGS. These two figures show the similarities and differences between farmers from each Stage of Concern as well as some themes that are common across all farmers.

In the figures, themes and Stages of Concern are listed on opposite axes. Ovals at each intersection indicate the percentage of farmers that responded with that particular topic. As indicated in the key, darker ovals indicate a higher percentage of farmers from a certain Stage of Concern that expressed that theme. Longer ovals indicate that multiple stages had the same level of intensity for that particular topic. The Management stage is not represented as there were no farmers who aligned with this stage at this time based on their composite Stage of Concern.

Figure 9: Percent frequency of themes across all respondents (n=73) in regards to their perception of the benefits of PGS.

Figure 10: Percent frequency of themes across all respondents (n=73) in regards to their perception of the challenges of PGS.

Farmer Concern Case Studies

In addition to the open-ended survey questions data, farmers' concerns about the adoption of PGS were assessed from data gathered from focus group discussions. As focus groups were organized based on level of exposure to PGS, themes and content were grouped into two categories: 1) concerns of adopters of PGS and 2) concerns of non-adopters of PGS. Data from these two groups are presented below.

1) Concerns of Non-adopters

Battambang Farmers, No Training

Farmers from this group were members of a Battambang-based cooperative that participates in the SVVC program. These farmers sold to a combination of outlets including traditional middlemen, directly at markets themselves, and a Phnom Penh-based wholesaler that has higher quality standards and chemical use rules in exchange for higher prices. The SVVC project helped developed this market connection and assisted them in obtaining the infrastructure and techniques needed to meet these standards. Unlike most Cambodian farmers, the cooperative had access to a cold room and processing center where it aggregates, sorts, and stores produce from its members. With assistance from the SVVC project, a few members also used nethouses. Farmer members that contributed towards the cooperative's sales to the Phnom Penh-based wholesaler had more advanced marketing and production skills as well as more market opportunities than farmers without these resources and connections. Even still, market access and a lack of trust between farmers and sellers were major concerns and recurring themes among each of the focus groups of cooperative members. All farmers who participated in the focus groups sold part of their harvest through middlemen. Farmers repeatedly mentioned the concern that middlemen frequently place orders with farmers in the morning and then never show up to

collect, causing farmers to lose out on income and waste a harvest. Farmers also noted that the price from selling to middlemen was much lower than what they receive from the Phnom Penh-based wholesaler, but due to refrigerated transportation limitations, farmers could not sell leafy greens to this outlet. Farmers would have preferred to sell leafy greens because of the relative ease of growing them and short time to harvest.

The cooperative was not a single unit, it was comprised of members with a variety of experiences and comfort level meeting the higher standards. When introduced to the concept of PGS, some of the farmers engaged in more advanced marketing questioned how PGS would be different than what they currently use. They did not necessarily see the benefits even though almost all farmers said that they had limited markets and needed more selling outlets. There was a divide in the group between those that wanted to learn more about PGS and those that did not. The group's leadership ultimately decided not to continue exploring PGS at this time, despite interest among some of the members. The cooperative's upper leadership was more advanced than most members and felt that GAP standards are a better investment at this time. At this time, the leadership did not necessarily see how PGS could be a stepping stone towards reaching GAP standards for the majority of the cooperative as well as introducing another marketing another outlet. Farmers were also concerned about being able to supply a sufficient quantity given the quality standards and that organic production may lower yields.

Battambang farmers, with Training, Non-PGS

After the initial survey and introduction of PGS to the cooperative, a selection of those farmers who were interested in learning more about PGS attended an introductory training on PGS. However, after the end of the training four of the Battambang cooperative farmers decided

that PGS was not appropriate for them. Based on the feedback from two of these farmers, their primary concern about PGS were the cost of the nethouse installation.

Additionally, these farmers noted that the requirements seemed overly difficult and they did not want to give up control of what they plant. Under this particular PGS group, the wholesaler worked with the farmers to determine a cropping calendar so that there is continuous harvest and supply for their markets. These farmers also noted that their land size was not appropriate for PGS and nethouse production.

Kandal farmers, Non-PGS

Kandal farmers who did not use PGS typically sell their vegetables through middlemen or directly themselves at markets in Kandal as well as in Phnom Penh due to its close proximity. These farmers noted that low prices and price fluctuations due to competition from vegetable imports were there primary general concerns. In regard to PGS, most farmers cited their lack of knowledge and experience as the primary concern. “No one has asked me to join” and “no one has introduced PGS to me” were frequent statements. Cost and lack of financial capital were also frequently noted as a concern, though most farmers indicated they were interested in learning more if there was financial assistance. A few *Kandal, Non-PGS* farmers knew a lot about PGS from their fellow community members and didn’t want to join because they had heard that payments were sometimes late. They also believed that under PGS farmers earn a low profit because the wholesaler only buys a small quantity of vegetables at a time. These farmers typically harvested their entire crop at one time and were not familiar with a model that is based on continuous harvesting that might be more profitable overall and ease cash flow. *Kandal, Non-PGS* farmers were also concerned about the lack of control over what they could grow.

Labor was also frequently cited as a major concern of Kandal farmers who were aware of PGS. Despite testing to the contrary, there was a misconception that the inside of the nethouse is hotter than outside temperature, and thus in Kandal it was impossible to hire outside labor for weeding and other tasks, a typical practice in this area. Some Kandal farmers expressed that they did not want to use PGS because they have small families or insufficient household labor to manage nethouse production. This concern was also confirmed by the *Kandal, PGS* farmers.

2) Concerns of Adopters:

Kandal, PGS

This group of farmers were experienced PGS famers who primarily sell to the Natural Agriculture Village wholesaler. In addition, these farmers sold their PGS vegetables to neighbors in their community who are looking for "safe" vegetables. Many farmers also had additional non-PGS vegetables that they sell to middlemen or directly themselves to Kandal and Phnom Penh markets. The most common concerns among *Kandal, PGS* farmers were weather related. Heavy rains damage crops and cause flooding. Some farmers were located right on the banks of a river that floods seasonally meaning they cannot farm in their nethouse during the rainy season. This was a missed opportunity as vegetable prices for certain crops are very high at this time of the year. Strong winds could also break net supports or tear the nets which could be expensive to replace.

Farmers noted that at this time they felt comfortable with the PGS requirements and other than the weather did not face many challenges with the technical aspects of producing PGS vegetables. However, many farmers noted that PGS was very difficult in their first year. Farmers experienced soil, pest, and weed problems in the first year, but over time these challenges lessened and now most farmers feel comfortable implementing PGS.

The other concern expressed by farmers in this focus group was labor. As discussed above, hired labor for weeding is characteristic of the area, but there was a misconception that the nethouse is hotter than outside temperatures. This prevents this particular group of PGS farmers from hiring outside labor. Some farmers noted that this was a positive characteristic of PGS, noting that they spend less money on labor. Others described the labor issue as a downside of PGS. It was particularly challenging for farmers with small families or otherwise insufficient household labor.

Consistently across the *Kandal, PGS* farmers, health was a recurring theme. Farmers expressed that one of the reasons they decided to join PGS with Natural Agriculture Village was for the health of their families, their communities, and for the consumers of their products. The other farmer-expressed benefits of using PGS included higher incomes and stable prices, the reduction of input costs and time, the guaranteed market for their products, and the ease of finding markets outside of Natural Agriculture Village due to their high-quality products.

Battambang, With Training

This group of farmers consisted of SVVC program farmers as well as additional farmers identified by the wholesaler Natural Agricultural Village. These farmers had heard about PGS and decided to participate in a PGS training. Upon completion of the training, a focus group discussion was organized with farmers who decided to join the PGS group to gather post-training concerns about PGS. After the training, these farmers expressed a strong interest in PGS as a way to meet their needs for more technical information on vegetable production. Acquisition of technical knowledge was a consistent theme expressed across the group. Additionally, farmers noted that their desire to improve their own health, the health of their community, and the health of producers by producing vegetables in a way that reduced the risks of chemical contamination.

Some farmers indicated they were concerned about being able to follow all the requirements and producing enough quantity of quality process to be profitable.

d) Objective 3: Describe the potential for CBAM to be a useful tool for project management of international development programs

In order to assess the potential of CBAM to be a useful project management tool, feedback was gathered from the SVVC program administrators about their experiences during this pilot. In an interview with SVVC project, program administrators noted that the CBAM survey informed project administrators about the concerns of project participants (LeGrand & Borarin, personal interview, January 31, 2019). The method helped the project identify farmers that were ready to try PGS as well as those that either do not wish to join or might need more time to consider the system. CBAM also gave the SVVC project an understanding of the stages existing users went through as they adopted PGS and their past and present challenges with PGS. I describe the potential for CBAM within development more within Chapter 5.

e) Summary

Kandal and Battambang farmers with varying levels of PGS experience piloted the CBAM Stages of Concern instrument in the context of participatory agriculture extension. Survey questions adapted from the CBAM framework sorted new PGS users into Stages of Concern categories based on their expressed concerns about the new system. Farmers were also asked open-ended questions to gather qualitative background on their interests and challenges with PGS. This helped confirm the results of the Stages of Concern mechanisms and provide context on farmers' feedback about the new marketing and production system. The qualitative data gathered from the open-ended questions were grouped into themes and analyzed for frequency and compared against the Stages of Concern scores. Focus group data analyzed thematically and

presented as farmer case studies. In the next chapter, I build on these findings by discussing the implications for both the SVVC project as well as the to other agricultural development programs.

Chapter 4: Discussion, Recommendations, and Conclusion

a) Introduction

Within the context of the main objectives of the study, in this chapter I discuss and analyze the results of the SVVC project case study which used CBAM to introduce a participatory guarantee system to vegetable farmers in Cambodia. I discuss the recommendations under each objective including for future use of the CBAM Stages of Concern tool, for how the SVVC program might integrate findings on farmers' concerns into their programming, and how CBAM Stages of Concern could be used as a tool for program management. Finally, in the conclusion I describe the potential for broader application of CBAM across disciplines as well as its potential impact on sustainability of participatory international development programs.

b) Objective 1: Adapt and pilot the CBAM Stages of Concern instrument for the introduction of PGS to Cambodian vegetable farmers

Stage of Concern Scores

In general, these finding from adapting and piloting the CBAM Stages of Concern are consistent with each group's level of exposure to PGS. Those farmers with more experience with PGS had higher relative intensity scores for the Impact stages which are typically associated with more advanced use of a new innovation. Conversely, those farmers with less exposure to the PGS aligned more closely to the Unconcerned and Self stages which characterize individuals who are either uninterested in the innovation or would like to know more about it. Patterns in the Stages of Concern scores (Figure 3) demonstrate support for the concept that farmer move through a series of adoption stages and that the tool was effective at identifying Stages of Concern.

I compared and contrasted all survey groups that do not use PGS at this time. I *Battambang, No Training* and *Kandal, Non-PGS* farmers follow a similar pattern of high relative intensity scores for the Unconcerned, Informational, and Personal stages followed by a declining response to the remaining stages (Figure 5). *Kandal, Non-PGS* farmers' highest relative intensity score was the Personal stage which aligns with their level of exposure to PGS. Since these farmers are in close proximity to the *Kandal, Non-PGS farmers*, the non-users had the opportunity to learn about PGS and express a high readiness and interest in continuing to learn about how PGS might help their farming operations. While the *Battambang, No Training* group followed a similar pattern to the *Kandal, Non-PGS* group, the Battambang farmers had lower relative intensity scores in the Self stages compared to Kandal, and the Battambang farmers equally ranked the Informational and Personal. This is consistent with the fact that the *Battambang, No Training* farmers had very little exposure to PGS and none had heard of PGS prior to the brief introduction given prior to the survey. Additionally, more *Battambang, No Training* famers ranked the Unconcerned stage higher than the *Kandal, Non-PGS* farmers. Given that the Battambang cooperative members mostly decided not to pursue PGS, this finding is consistent with expectations. Even though *Battambang, No Training* farmers had less exposure to PGS than *Kandal, Non-PGS* farmers, the Battambang farmers ranked the Collaboration stage the highest of all of the non-PGS users. Some of these farmers had much higher Impact relative intensity scores compared to the Self stages that could not be explained by survey wording issues alone. As I discussed in Chapter 3, the Battambang cooperative had more exposure to alternative marketing systems and advanced production tools and techniques. These responses are most likely attributable to the fact that these farmers already use an alternative marketing system and have a more advanced understanding of quality standards. Some individuals in this group may have

responded to the survey based on their existing knowledge of those techniques rather than PGS. These farmers were thus primed to be willing to share their knowledge gained from the multitude of projects and activities to which they had already been exposed. They were mostly likely considering their use of their existing marketing program. This was confirmed from open-ended survey data.

In contrast to both the *Battambang, No Training* and the *Kandal, Non-PGS*, the *Battambang, With Training, Non-Users* showed a completely different patter of relative intensity scores, with very high Unconcerned and Management scores and much lower scores for all other stages, including the lowest Impact stage scores of all three groups. This group received a training in PGS, but then decided that PGS was not appropriate for them at this time. Their relative intensity scores are consistent with this development as the Unconcerned stage can represent farmers that are completely uninterested PGS. It was surprising that the *Battambang, With Training, Non-Users* ranked the Management stage as highly as the Unconcerned stage as the Management stage is typically associated with individuals who have just started PGS and are experiencing the challenges of using a new technique for the first time. *Battambang, With Training, Non-Users* may have ranked the Management stage highly in anticipating of the challenges they anticipated from using PGS (rather than those they have actually experienced) after learning more about it during the training.

I compared the relative intensity scores of two groups who use PGS: *Battambang, With Training, Users* and *Kandal, PGS*. These two groups have similar patterns of relative intensity scores with high rankings for the Informational and Personal stages as well as for all of the Impact stages (Consequence, Collaboration, and Refocusing) (see Figure 7). While the patterns are generally similar, the *Kandal, PGS* farmers have slightly lower Unconcerned and Self scores

and higher Impact scores relative to the *Battambang, With Training, Users* group. This is consistent with the fact that the Kandal famers have more experience with PGS and are farther along in the adoption process than the newly trained Battambang farmers. The *Battambang, With Training, Users* group highest score was the Personal stage which aligns well with their current exposure to PGS. Having just received an in-depth training about the program, these farmers are preparing to begin using it themselves and would be expected to move into the Management stage very shortly. The *Kandal, PGS farmers* also gave the Management stage a low relative intensity score. This supports the idea that the Kandal farmers have been using PGS for a period of time and have move past the Management stage and onto the Impact stages. This is further supported by the concerns data discussed in more detail under Objective 2.

Surprisingly, the *Battambang, With Training, Users* scored the Impact stages rather highly. These stages are typically associated with individuals who have used PGS for some time and now are comfortable with the technique and are interested in sharing their knowledge with others and improve the system itself. This phenomenon may be explained by the similarity in the wording of statements related to the Personal and Consequence stages. As established in the CBAM framework, the Personal stages statements were crafted to align with individuals contemplating "how *will* PGS impact me" while the Consequence stage statements model the idea "how *is* PGS impacting me". Additionally, after received the training in PGS, farmers may have felt competent enough to share what they had learned with others even though they had not yet practiced PGS firsthand. This may explain the high Collaboration stage scores.

<u>Adaptation of Stage of Concern Tool</u>

The Stage of Concern findings from this study align well with expectations from the CBAM literature as well adoption literature more broadly. Across all of the survey findings,

individuals with various levels of exposure and experience with PGS can be placed on a spectrum of adoption in the form of the Stages of Concern. As seen with the composite Stages of Concern score, even among each survey group, individuals associate with different Stages of Concern, and thus it would be inappropriate to provide everyone in the group with the same types of support and resource or to expect them to adopt PGS at the same rate.

The *Kandal, Non-PGS* groups provides a clear example of potential users that all have different levels of experience with PGS. Though these farmers would be classified as non-users, many of these farmers had already heard of PGS from their neighbors and made many valid perceptions and concerns about the system. It would be a mistake to assume that these farmers had no prior knowledge about PGS and would readily accept information about the innovation. The CBAM results and concerns discussed further under Objective 2 provide valuable insight on the current stage of adoption and the concerns of the farmers in this group as well as the others.

Additionally, the survey results, particularly of the Battambang cooperative, demonstrate the importance of acknowledging group dynamics, social context, and compatibility as found in the theories of Lewin (1947) and Rogers (2003). Some farmers in the Battambang cooperative did not feel that PGS was an appropriate system from them at this time while other were interested in learning more. The opinions of the upper leadership of the cooperative ultimately made a decision for the cooperative as a whole, though because of the CBAM some of those farmers who were interested in the practice were able to continue exploring PGS since the project was able to readily identify them and ensure they had the opportunity to attend the PGS training. This example demonstrates the functionality of the Stages of Concern and how this adaptation of to an agriculture innovation can help provide tools to actualize adoption and agriculture education theories.

In the context of agricultural extension and adoption literature, CBAM can serve as a specific tool set to help structure experiential-based learning. As Dewey (1932) notes, not all experiences result in constructive and positive learning, and experience learning requires intentional organization and the acknowledgement of the individual nature of the learning experience. With the CBAM's focus on the individual process of moving through the stages of adoption, this method offers a toolkit for actualizing experiential education. Dewey, Kolb, and other experiential learning theorists discuss the importance of reflection as a way to integrate learning (Kolb 1984; Barker, Robinson & Kolb, 2012). When combined with the interview and focus group approach as in this study, there is the potential for CBAM to serve as a structured method for this reflection. CBAM can create a space to share concerns and connect with other users, both those of similar stages and those of either more or less advanced use. Additionally, this could also aid in creating a community of practices where individuals could meet with peers from similar stages as well as more advanced stages (Kolb & Kolb, 2005; Lave & Wenger, 1991). Conversations and reflections could be structured to allow newer users to reflect among themselves and then to introduce individuals of more advanced stages to share how they felt when they were beginning use and their advice about advancing to the next stage.

Throughout the surveying process, feedback was gathered to assess the Stages of Concern tool and the process of modifying for the context of the introduction of PGS to Cambodian farmers. The findings of this feedback indicated that adapting the tool for the PGS innovation was uncomplicated, but, as noted in Chapter 3, there were some challenges in simplifying the wording to ease translation but also preserve the intentions of each question. This phenomenon is not unique to the Stage of Concern tool and is common in most situations when working in across languages (Brislin, 1970; Hennink, 2008; Merriam, 2009).

However, there are some challenges unique to the Stage of Concern tool that might influence the difficulty of the translation process. The Stages of Concern tool is designed to repeat several of the same types of questions to ensure reliability and consistency of a respondent's scores. Similar questions with are posed that correspond to each stage, and these questions have very subtle differences in meaning that might be hard to translated in a field-based research setting.

Another finding regarding the tool was the difficulty of the *Kandal, Non PGS* farmers to understand the survey questions. Enumerators noted that farmers from this group who had never heard of PGS had difficulty answering questions about their use of PGS. Similar to most Likert-type surveys, farmers with no experience with PGS were expected to answer that some of the questions were "irrelevant" to them, or a 0 out of 7 on the scale. These farmers sometimes became confused with this concept and needed more guiding from enumerators to follow the logic of the survey tool. This difficulty was also heightened by the fact that the survey asks similar questions to assure reliability of scores for each stage as discussed above. Some farmers were confused as to why the enumerator continue to ask questions about PGS when they already indicated that they had never heard of the concept before. This issue was discovered during the field-testing of the instrument prior to surveying. Adjustments were made to allow farmers to skip certain sets of questions if they had never been exposed to PGS before and answered consistently the initial set of questions about their awareness and understanding of the technique. While this improved comprehension and flow of the survey and the issue was not completely resolved, but enumerators were able to fully execute the survey.

To address some of the issues with wording nuance, particularly for Stages 3, 4, and 5, I generated composite scores by downward adjusting scores of respondents with Stage of Concern

scores of 3, 4, or 5 when their open-ended responses indicated they did not use PGS. Once raw scores were correct for these factors through the composite scores, Stage of Concern frequencies (Figure 8) were in line with expectations. The single previous study that used the Stages of Concern to assess the adoption of an agriculture innovation also free response-type method as opposed to the Likert-style approach presented in the CBAM manual (Cashman, 1990; George, Hall, & Stiegelbauer, 2006). Cashman (1990) modified the CBAM method by using interviews to gather data on the concerns of Nigerian farmers in regard to alley cropping and then used a coding system to classify statements according to the Stages of Concern. Further research should be done to assess the relative effectiveness of using the interview or the Likert-style approaches. This study used a combination approach as a way to cross-reference each method. A combination of these two approached proved effective in this particular context, but this might not be appropriate for all contexts. More research should be done to assess various implementations of the Stages of Concern in the assessment of the adoption of agriculture innovations.

Given that these issues were relatively minor and easily controlled, there is a potential for CBAM and specifically the Stages of Concern to be used in the context of agriculture innovation adoption. Overall, the relative intensity scores aligned with expectations indicating that the tool has the potential to be useful for other similar purposes. The one existing study that used the CBAM for an agriculture innovation found similar results. Cashman (1990) noted the utility of and consistency of Stage of Concerns scores when applied to alley cropping in Nigeria. Cashman (1990) also found that there was a time progression with the same individuals in their scores, proving that the tool successfully showed movement of individuals between stages of adoption over time.

Currently, the tool is used almost exclusively in education, and CBAM was originally developed due to the lack of tools for assessing curriculum development innovations (Hall, Wallace, & Dossett, 1973). Hall, Wallace, and Dossett (1973) noted that much of the existing adoption, change theory, and education literature was focus on agriculture education, and a unique tool was needed to address the teacher training and curriculum. However; CBAM developers noted that the theory of a progression of concerns across the adoption process are generally applicable to most processes, tools, and innovations (George, Hall, & Stiegelbauer, 2006). Specifically related to the adaptation of the Stage of Concern tool, the survey methods are general enough to be easily adapted to a wide range of innovations. I make the case that this tool can be also be a useful addition to agriculture extension and agriculture development programming.

Objective 1 Recommendations

The following are recommendations for modifying the CBAM Stages of Concern tool to the non-formal education settings. To overcome translation and wording nuances between stages, surveys should be piloted with enumerators to ensure full comprehension. When in a cross-cultural setting, it is important to integrate the feedback of native speakers into the test to ensure translations are accurate and have valid survey results. Multiple rounds of testing may help improve the accuracy of translation given available time and resources. The Stages of Concern tool can be extremely useful at identifying where individuals fall across the stages of adoption, though when used on its own, it does not give a complete picture of why users have those types of concerns about an innovation or identify with a certain stage. Adding open-ended questions to the Stage of Concern can help clarify the results of the scores and provide more context to the concerns, as presented under Objective 2.

Further research should be conducted to analyze CBAM and the Stages of Concern in more agriculture innovation adoption contexts. Specifically, various methods should be trialed to assess the level of accuracy of capturing Stages of Concern data. CBAM should be more broadly integrated into the adoption literature outside of curriculum development and be used as a tool to achieve structured experiential learning. Agricultural extension and education should further explore how the Stages of Concern can be used to fulfill the role of reflection and as a way to create communities of practice. The full CBAM framework, including the Innovation Configuration Map and the Levels of Use, should also be explored for their potentials to serve as a structure for agriculture extension and experiential learning.

c) Objective 2: Assess the concerns of Cambodian vegetable farmers with a range of exposure to and use of PGS

Connecting Stage of Concern Scores to Famer Concerns

The CBAM Stages of Concern framework was originally developed through the analysis of teacher concerns to curriculum and policy changes. Researchers noted that there were trends across body of concerns and hypothesized that "(a) there were definite categories of concerns among innovation adopters and (b) the concerns changed in what seemed to be a logical progression as users became increasingly confident in using innovations" (George, Hall, & Stiegelbauer, 2006). This progression of concerns ultimately was classified into seven stages that became the Stages of Concern. In analyzing the concerns discovered in this study, similar trends can be observed that support the functioning of the survey adaptation as well as the underlying CBAM framework and theory. Additionally, understanding the expressed concerns of farmers at different stages of the adoption process can help inform project administrators and ease the adoption process of new PGS farmers.

In comparing the concerns among Cambodian farmers with varying levels of exposure to the system, trends can be seen according to farmers' Stages of Concern. Analyzing the progression of the perceived benefits and challenges of PGS of farmers of similar Stages of Concern provides insight in the type of information and support required by farmers at each given stage and points to a roadmap for the SVVC project to ease the adoption process for new PGS farmers. Generally, farmers of similar stages noted the same perceived benefits and challenges of PGS.

In the two heatmaps of farmers' concerns (Figures 9 and 10), I show that there are some themes and concerns that are shared across famers of all stages while others are more closely associated with a subset of the Stages of Concern. When asked about why they use PGS or why they might be interested in using PGS, farmers from all stages noted that PGS increasing profit and have access to more and better markets were major motivating factors. Stability was another common theme expressed by farmers from all Stages of Concern. Farmers noted that they sought stability in the form of consistent access to markets and ability to sell their harvests as well as price stability. Interestingly, these benefits of PGS reflect both the expressed concerns of famers in this study as well as the challenges around market access noted in the literature for horticulture farmers in the region (Lumpkin, Weinberger, & Moore, 2005; Prabhakar, Sano & Srivastava, 2010).

In addition to the common themes represented by farmers of all stages, there were some themes around the benefits of using PGS that were only expressed by farmers of certain Stages of Concern. While all farmers were interested PGS from an income and market access perspective, farmers in the Unconcerned and Self stages perceived benefits of PGS were more conceptual while the concerns of the Impact stages were more concrete and related to the specifics of PGS. For example, farmers in the Unconcerned and Self stages noted that they were

interested in learning more about PGS because that thought it might give them higher yields and producing high quality products. Farmers in these stages also frequently noted that they thought PGS would help them increase their knowledge about vegetable production more generally and would increase trust between producers and buyers. In contrast, farmers in the Impact stages noted that their primary benefits from using PGS were saving time and money on inputs, particularly labor. Impact stage farmers also mention that improving their soil and the environment was another benefit of PGS. The differentiation in the perceived benefits of PGS were directly in line with famers exposure to PGS and their respective Stages of Concern. Farmers farther along in the adoption process described more specific benefits associated with the use the system while those in the earlier stages of adoption noted more theoretical benefits such as trust building and gaining knowledge. Being aware of the specific benefits of PGS from users of different stages can help the SVVC better advertise the benefits most important to actual users to farmers in the earlier stages of adoption. I explore this further under Objective 3.

Unlike the discussions of the benefits of PGS, when farmers were asked about the challenges and concerns of using PGS, there was no single theme that was consistent across farmers from all Stages of Concern. However, some concerns were mentioned by adjacent stages in along the spectrum of adoption. This may suggest that there are some universal aspects of interest in PGS regardless of stage of adoption, but challenges and concerns are more specific to each particular stage or set of stages. There is a clear progression of concerns and challenges of PGS users at various stages that that supports the concept that farmers move through a series of stages of adoption. This may also be helpful for the SVVC project to provide targeted support to farmers as they move through the adoption process. For example, the Unconcerned, Informational, and Personal Stages (Stages 0 – 2) all farmers noted that lack of knowledge and experience was a

challenge for their adoption of PGS, but this concern was not expressed by any of the farmers in the more advanced stages. As users become more familiar with PGS and overcome the initial challenges of learning and using this new system, farmers moved past the concerns about limited knowledge and experience and developed new concerns related more to the actual implementation of PGS.

The progression of how farmers of different stages discuss profits also serves another example of the utility of understanding the progress of farmer challenges according the Stages of Concern. Farmers in the Informational, Personal, and Consequence stages (Stages 0-2 and Stage 4) all mentioned low profits as a challenge of using PGS, however, low profits are not mentioned by any farmers in the Collaboration or Refocusing stages (Stages 5 and 6). This may suggest that more advanced farmers have move past the struggles of learning a new system, and low profits are no longer a concern for them. This is further supported by the fact that farmers in these more advanced stages noted that they used to have more concerns and challenges with PGS, particularly in the first year of adoption, but those challenges disappeared over time. Farmers in the more advanced stages regularly noted that the first year of using PGS was very difficult, and they had major issues with insects and nethouse integrity due to strong winds and flooding. However, now these farmers do not have these challenges anymore. As this study was unable to survey users in their first year of implementing PGS, these reflections on farmers' first year of use may be used as a guide for the SVVC project to anticipate the challenges that new users will face as they move into the Management stage. Awareness of the progression of challenges across the stages may guide farmers new to PGS through the adoption process. Most importantly for the SVVC project, this shows there is a key point of intervention for PGS trainers, and program managers must ensure that new PGS users overcome this one-year barrier.

As suggested by CBAM researchers, combining the context of farmers challenges and concerns with the Stages of Concern scores can help identify how to provide the correct level of support for various groups of farmers (George, Hall, & Stiegelbauer, 2006; Hall, Wallace, & Dossett, 1973). For example, farmers in the Unconcerned stage noted their lack of knowledge about PGS more frequently of all the other stages. The Unconcerned stage is typically made of up of both farmers who are too uninformed about the innovation to know if they are interested it as well as those who do know about the innovation but have decided it is not appropriate for them at this time or perhaps fundamentally unsuitable for their activities. As a large portion of the Unconcerned farmers from this study noted that lack of knowledge about PGS was challenge, this may suggest that many farmers in this stage require some more background information to decide if they are interested in learning more about PGS. This information may help the SVVC project identify those farmers who are ready for new information as well those who may not be interested. CBAM literature argues that"[c]oncerns cannot be engineered by an outside agent" but that "[p]roviding affective experiences and conative resources in a timely manner" can facilitate the development and progress of concerns along the adoption process (2003). Potential adopters need to be ready to receive the information about the innovation, and inappropriate levels of information can slow or derail the adoption process (George, Hall, & Stiegelbauer, 2006; Rogers, 2003). The CBAM creates a space and a framework for concerns to be heard and gives program managers the opportunity to be receptive to farmer feedback

Focus Group Case Studies

The focus group case studies provide an additional lens to view farmer concerns and are a way to identify opportunities provide targeted support on the part of the SVVC project as well as to better understand how the Stages of Concern tool can function within a project. CBAM

identifies concerns at the individual level, but often agricultural projects work in cooperatives or other types of groups or systems. In the case of the Battambang cooperative, there are clear benefits for farmers working in a group such as aggregation of supply, access to finance, and shared equipment and infrastructure. However, as CBAM and the general body of adoption literature recognizes, not all members of a group are typically at the same level or ready to move forward in the adoption process (George, Hall, & Stiegelbauer, 2006; Hall, Wallace, & Dossett, 1973; Rogers, 2003). A particular innovation might not actually be appropriate for all group members as was the case with the Battambang cooperative and PGS. The Stage of Concern survey results were in line with these observations as the farmers from the *Battambang, No Training* group were mostly in the Unconcerned, Informational, and Personal stages (Stages 0, 1, and 2). Combined with the context from focus groups and the open-ended survey questions, this information could be used by the project to identify who is ready for the next steps. The survey results also could help the project think about whether the innovation is compatible with the cooperative and the social context (Rogers, 2003) or if there are appropriate ways to slowly increase interest in PGS by respective the group dynamics. In this case, the decision-makers of the Battambang cooperative did not believe that PGS was appropriate for them as they already had a relationship with a Phnom Penh wholesaler that used different quality standards. They did not believe they would have enough quantity of products to supply both of these buyers. Additionally, the leadership felt it would be more advantageous to invest in GAP standards, and so the cooperative decided they would not pursue PGS. However, not all farmers in the cooperative were ready to meet CAMGAP standards, and the decision in some other contexts may have limited the opportunities of some members. Alternatively, other types of projects may have decided to offer a training to the entire cooperative, but many of the attendees would not

end actually end up using the innovation. By using the CBAM in the context of a participatory project like the SVVC program, they were able to connect a few of the cooperative members who did want to join PGS with a network of other farmers in Battambang who were also ready to learn more and attend a PGS training. As discussed in the adoption literature on the importance of readiness (Rogers, 2003), CBAM allowed the project to target PGS information directly to those who were ready to progress to the next stage.

Some of farmers from the Battambang cooperative ultimately decided to continue with the training. After the training, some of the Battambang cooperative members decided that after learning more about PGS, it was not the right system for them. As expected, these farmers' concerns manifested themselves as high relative intensity scores for the Unconcerned and Management stages. One of these farmers sited that the reason they did not continue with PGS was that it required too much financial capital to invest in the nethouse that would be required by this particular PGS system. There is some cost sharing available for nethouse construction, but farmers do have to be able to contribute some funds towards the construction of the nethouse. With this understanding, I recommend that the SVVC project may think of ways of connecting farmers to sources of financing who might be interested in PGS but don't have adequate financial resources. The second farmer who did not continue with PGS was not financially constrained but cited the complicated production requirements and the lack of control over the planting schedule as major deterrent. This demonstrates an important aspect of adoption literature on the importance of compatibility of the innovation (George, Hall, & Stiegelbauer, 2006; Hall, Wallace, & Dossett, 1973; Rogers, 2003). It is also important to note that the innovation might not be compatible with all individuals, but the project may consider thinking about how to address these concerns for farmers that may have similar reservations and address

these topics in future trainings for new PGS farmers so that these concerns do not lead to drop off.

Those Battambang farmers that did decide to continue with PGS also noted concerns that aligned with expectations. Some of these farmers indicated they were concerned about being able to follow all the requirements and producing enough quantity of quality produce to be profitable. Their composite Stages of Concern scores also aligned with these concerns as these farmers were exclusively in the Personal stage which represents the stage where a new user is seeking detailed information about the technique and is about to move into practice. SVVC can take these concerns into account as farmers begin to implement PGS and nethouses. Connecting these farmers with more advanced mentors could be a way to ease these concerns and help guide new users though the difficult Management stage.

The farmers from the Kandal focus groups could serve as mentors. Their primary concerns with PGS were mostly weather related as they are situated along a riverbank that is prone to flooding in the wet season. All of these farmers noted they felt comfortable with the PGS requirements, and their Stages of Concern scores aligned with these findings. However, many of these farmers noted that PGS was very difficult in their first year. This finding supports the idea of the CBAM Stages of Concern framework and specifically the logic behind the Management Stage (Stage 3) (George, Hall, & Stiegelbauer, 2006). The project can use this information to advise the Battambang farmers who are about to begin PGS. Connecting these two groups of PGS adopters would provide opportunities for each group to exchange ideas and best practices. As an example, the Kandal focus group brought up the issue of being unable to hire labor for weeding in the nethouse because of perceptions that the nethouse is hotter than outside temperatures. It would be helpful to make new users aware of this potential issue. Additionally,

the being aware of this challenge can help the SVVC program present the nethouse to the wider community in a way to dispel this mischaracterization.

The concerns expressed by the *Kandal, Non-PGS* also point to protentional actionable support activities to encourage more of these farmers to participate in PGS. While some farmers in this group noted they were not interested in PGS due to its requirements, many farmers did wish to join if they had access to technical assistance and guidance. They are not necessarily connected to a project or have access to finance for the nethouse that would be required. Knowing these concerns from non-participants can help the project anticipate what concerns new users might have and create a plan to allay these concerns.

Objective 2 Recommendations

Context from open-ended survey questions or focus group discussions should be used better understand why participants identify with certain stages. This information can guide programs to provide tailored support for users as they progress through the stages of adoption. The SVVC program administrators and other PGS system participants should use the findings of the perceived benefits and challenges of the system to improve programming and provide target support for users across the Stages of Concern spectrum. Context from open-ended survey questions or focus group discussions should be used to understand why participants identify with certain stages. This information can guide program managers to provide tailored support for users as they progress through the stages of adoption. For example, program managers should be aware of the difficulties users will encounter during the Management stage of implementation and provide support to overcome those specific concerns and challenges. It is important to ensure new farmers have access to the right information and skills at the right time and are ready to progress in the stages of adoption.

The SVVC program has a unique opportunity because it is connected farmers at various stages of adoption. The program staff should capitalize on this opportunity by connecting farmers in Kandal and Battambang to share best practices and help guide new users in overcoming the challenges they will face as the enter the Management stage. The SVVC program should also consider continuing to use the CBAM Stages of Concern tools with the recently trained PGS farmers in Battambang to observe changes over time and provide targeted support. Below are specific recommendations for possible ways to support users at each of the stages of PGS adoption based on the CBAM literature (George, Hall & Stiegelbauer, 2006; Cashman 1990) (Table 4).

Table 4: Suggested Support for the SVVC program for Users at Each Stage of Concern

Stage of Concern			Suggested Support
Unconcerned	0	Unconcerned	Determine if more background information on PGS is appropriate for some cooperative members or if the innovation itself needs to be reconsidered or redesigned for this specific community.
Personal	1	Informational	Provide an overview of PGS. Gauge interest in learning more. Don't go into too much detail to overwhelm new users.
	2	Personal	Provide more detailed information on the concepts of PGS. Discuss in detail the next steps for joining PGS. Connect with more experienced users to talk realistically about how PGS has impacted them.
Task	3	Management	Prepare farmers for the challenges they might anticipate as they adopt PGS. Hands-on mentoring and demonstration of specific techniques and practices through farm visits. Connect with more experienced users on specific task-oriented items.
Impact	4	Consequence	Once PGS is mastered and in a stage of "routine use", help farmers individually analyze how PGS is impacting their operation at all levels (profits, cash flow, relationships with wholesalers, etc.)
	5	Collaboration	Provide opportunities for farmers to share their knowledge with others: both experience users and new users.
	6	Refocusing	Create the space for farmers to share their ideas on how to improve PGS, nethouse production and pilot those ideas. Be prepared and supportive of farmers who would like to "graduate" from PGS or start some new innovation that is more compatible with their operations as they grow.

d) Objective 3: Describe the potential for CBAM to be a useful tool for project management of international development programs

The SVVC case studies described in Objective 2 demonstrate the potential for the CBAM framework to be applied to a broader range of agricultural education and extension programming. The SVVC project team aimed to gauge project participant's interest in PGS and learn about the experience and challenges of existing users. As discussed in Chapter 3, an interview with SVVC program administrators revealed that the CBAM survey informed project

administrators about the concerns of project participants (LeGrand & Borarin, personal interview, January 31, 2019). The method helped the project identify farmers that were ready to try PGS as well as those that either do not wish to join or might need more time to consider the system. CBAM also gave the SVVC project an understanding of the stages existing users went through as they adopted PGS and their past and present challenges with PGS. This can provide some guidance as to the challenges and concerns farmers will face as they adopt PGS and move through the Stages of Concern. CBAM allowed the SVVC project to tailor their support for farmers and systematically gather feedback to further their participatory approach in expanding market access and improving food safety. The learnings from the SVVC program experiences in their use of CBAM may ease adoption and improve outcomes for other similar projects.

Implications for Development Practitioners

As seen in the SVVC case study, the CBAM framework has the potential to inform participatory project design and give project administrations an evidence-based, systematic protocol for assessing the adoption process of an innovation. This method also has the potential to be applied more broadly in across other agriculture projects in a number of ways. First, it is important for projects and development professionals to generally understand that people go through stages as they adopt technologies or new processes, and that they do this at different rates and at different times. If programs are aware of this process, development practitioners can focus on activities that promote lasting adoption.

Agricultural development project teams are frequently tasked with reaching large numbers of people with objectives to train individuals in the same series of "improved" practices constructed by donors and project administrators. This project setup is contradictory to the agricultural education models and change theories which note that individuals move through the learning and

adoption processes on an individual level (Hall, Wallace & Dossett, 1973; Dewey 1932; Kolb, 1984; Baker, Robinson & Kolb, 2012). While CBAM focused on the individual, it would be possible to group participants according to stage and target support efforts for at those in critical stages such as the Personal and Management stages. CBAM can be a project management tool to allow projects to identity their participants Stage of Concern and provide more inclusive programming for participants of different levels. Adoption researchers discuss the phenomenon that not all individuals might be ready to adopt at a given time, and individuals move through the stages at different rates (Hall, Wallace & Dossett, 1973; Rogers, 2003). For example, not all participants might be ready to move on to the Management phase of adoption and forcing individuals to adopt something that is not compatible with their current agricultural system or societal framework will not result in full adoption of the innovation. Providing the incorrect level of information to new users can disrupt the adoption process (Rogers 2003; George, Hall & Stiegelbauer, 2006). The Stages of Concern provide guidance on the appropriate level of information to share with new users to strategic communicate the innovation as well as ways to create positive experiences for users through guided mentoring individuals of the same Stage of Concern. Informed by the Stages of Concern, project can identify and group participants according to their stage of adoption to make sure each group has the support they require at that specific time and target resources wisely.

CBAM can also be a tool in the context of project monitoring and evaluation. Projects are increasingly expected to demonstrate evidence-based impacts in the short lifespan of an agriculture development project (Mansuri & Roa, 2003). As change and adoption of a new innovation is an ongoing process, it can be difficult for projects to demonstrate results in this timeframe. As Chambers (1994) discusses, a common failure of participatory project stems from

a tendency to rush resulting in projects that are "participatory" in label alone. For projects that sincerely aim to be participatory, there is a need for tools that allow projects to demonstrate the slow and progressive changes being made to funders (Ticehurst & Cameron, 2000). Sometimes it is not possible to show the full impacts of using a new innovation in the lifespan of a short project, particularly when using participatory methods. If used periodically over the life of the project, the CBAM Stages of Concern could be used to show movement across the adoption process over time and serve as evidence for donors that progress is taking place. CBAM can be an ongoing monitoring tool and feedback mechanism for participatory projects. Given there are many project management tools in the literature, in this particular way, CBAM can serve a particular niche for participatory project and those focusing on behavior change and capacity building.

While the CBAM framework is a potential tool for agriculture project management teams, project management teams need to weigh the time and resource requirements of implementing this approach with the potential gains of ease of adoption for participants. The Stages of Concern survey instrument required about 30 minutes per participant to respond the short Likert-type questionnaire including the additional open-ended contextual questions. The survey is designed to be repeated over time and assess how new users are progressing along the adoption cycle. Thus, project resources must allow for frequent monitoring. With small number of participants this is most likely feasible, but projects with a large number of beneficiaries need to consider the time this takes. While the method is best suited as a tool for individualizing support, larger projects might consider using a sampling approach. More research should be done to test the feasibility of the CBAM within a larger project structure.

Participatory projects are typically structured to have frequent feedback with program participants, and it could be feasible to integrate CBAM into normal project operations. However, the CBAM might require projects to shift towards participatory processes that currently operate under more top-down approaches. However, CBAM is not completely new the field of international development, and major donors like USAID are already integrating it into their education programming (Myers, Barrick, & Samy, 2012). The CBAM was presented as component of the Theory of Change for the Let Girls Learn initiative at USAID's 2015 Global Education Summit (Roberts, 2015). As CBAM is already being used in donor funded projects, it might be more readily expanded in this context.

Objective 3 Recommendations

The CBAM framework has much to offer agricultural development projects and agricultural extension. These types of program should acknowledge to the role of adoption theory and education theory in agricultural development projects. The majority, if not all, projects involve some form of learning. Program design and program managers can benefit from acknowledging that technology adoption is inherently a process based in learning and adoption. Agricultural extension models offer theoretical frameworks, but as discussed under Objective 1, CBAM adds to this body of work and existing tools by offering structuring reflection and supporting communities of practice.

In addition to serving as a tool for implementing change and experiential education frameworks, CBAM has the potential to serve a niche role for behavior-change and participatory projects in particular. Adoption researchers extensively note that change is a process that occurs over time, but donor frequently require immediate and tangible results. CBAM could potential be used as evidence of change as project beneficiaries move across the Stages of Concern.

However, when using CBAM, practitioners should be prepared and open to accept all possible survey results, including the possibility that the chosen innovation might not be welcome or appropriate at a given time or at to target population. Practitioners need to have a willingness to be responsive to the community and return to the design phase if the innovation is not compatible. As noted by Rogers (2003), compatibility is one of the interconnected variables that determine the success of adoption.

e) Conditions Influencing the Process and Limitations

While the CBAM framework provided the SVVC program with a foundation for evidence-based participatory planning, the results of this study are limited by several factors related to survey design and context. First, the survey mechanism was modified from the original CBAM framework aimed at instructors in the context of the United States education system to Cambodian farmers struggling with consistent and reliable market access for their vegetable crops. In modifying the CBAM survey instrument, there is a risk of weakening the validity of results (George, Hall, & Stiegelbauer, 2006). The study design attempted to mitigate this issue by combining the survey with other data sources to confirm results, but this should be noted as a limitation for future replication.

As discussed in Chapters 3 and 5, in piloting the adapted Stages of Concern survey, discrepancies existed particularly with Stage 3 (Management), Stage 4 (Consequence), and Stage 5 (Collaboration). These issues were most likely due to the nuances of wording of the particular questions for each of these stages. An attempt was made to correct for this limitation by cross-referencing the open-ended survey data with the raw scores to generate a composite score that accounted for the confusion between some of these categories.

Second, as discussed under Objective 1, the translation of the survey instrument into Khmer posed some challenges that may have influenced data collection. The wording of the English version was extremely nuanced and initially confusing for translators to fully understand. I, along with the other native-English speakers, noted that understanding the nuances of the in English version was also challenging. Efforts were made to streamline questions for clarity and to correct results for these factors, though this may be considered a limitation of the study

Finally, as with all studies that rely on describing the feelings and concerns of others, there may be inherent limitations from the biases of the research team (Merriam, 2009). This study attempted to mitigate this bias through ethical and standard data collection methods and analysis protocols based on best practices for qualitative research (Krueger, 2000; Merriam, 2009, Weiss, 1995). However, there may be residual bias due to the nature of the process of capturing, translating, and analyzing qualitative data.

g) Conclusion

The CBAM frame was originally intended for assisting the adoption process of new curriculum or teaching tools in schools. The developers of this method originally constructed this framework because they thought existing adoption theories were overly specific to agriculture. As proven in this study, CBAM has the potential to applied to agriculture innovations and is a useful addition to the body of agriculture extension and education literature and tools. Even as noted by CBAM literature, all extension and technology introduction involves learning and change. The findings of this study showed the adapted Stages of Concern tool was effective at placing people into the appropriate Stage of Concern category along the adoption process. The concerns expressed by farmers aligned with the Stage of Concern findings and support the effectiveness of the tool. These concerns also provide context and direction for project

professionals to target support to program participants across each of the Stages of Concern. The Stages of Concern also has potential to be a tool to document outcomes of participatory project and ensure lasting results. I propose that this method continue to be assessed in agricultural extension and development projects to continue to fine tune the methods and analysis procedures for agricultural contexts. Further studies are needed to evaluate the CBAM framework in different agricultural and cultural contexts. Additional data from the application of CBAM to participatory project planning are also needed. There is also great potential for the other elements of the CBAM framework including the Innovation Configuration Map and the Levels of Use to be explores as potential tools for agricultural development and extension.

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Appendix A: Stages of Concern Questionnaire

Stages of Concern Questionnaire

UC Davis researchers, in partnership with the Royal University of Agriculture and the University of Battambang, are interested in assessing the opinion of vegetable farmers in regard to the adoption of the Participatory Guarantee System. The end goals of this project are to help the Safe Vegetable Value Chain project better support farmers in their adoption of new Participatory Guarantee System according the self-expressed needs of the farmers. This project also aims to promote the integration of farmer's concerns into agricultural research and development projects.

We would appreciate your participation in this survey to help us achieve these goals. Please answer each of these questions honestly and to the best of your ability. You should know that your responses will be treated confidentially. Please feel free to ask any questions or express any concerns you may have along the way. The responses you provide will be anonymized and will not be shared with anyone outside the project. Thank you for your assistance, your responses are important to us, and to the success of our project.

The purpose of this questionnaire is to determine what people who are using or are thinking about partaking in Participatory Guarantee System are concerned about at various times during the innovation adoption process. Therefore, **many of the questions may appear to be of little relevance or irrelevant to you at this time.** For the completely irrelevant items, please circle "0" on the scale. Other items will represent those concerns you do have, in varying degrees of intensity, and should be marked higher on the scale.

For example:

This statement is very true of me at this time.	0 1 2 3 4 5 6 (7)
This statement is somewhat true of me now.	0 1 2 3 (4) 5 6 7
This statement seems not very true of me now.	0 (1) 2 3 4 5 6 7
This statement is completely irrelevant to me at this time.	(0) 1 2 3 4 5 6 7

Respond to the items about your concerns now, or about your feelings about your involvement or potential involvement with **this innovation.** We do not hold to any one definition of this program, so please think of it in terms of **your own perceptions** of what it involves. Remember to respond to each item in terms of your **present concerns** about your involvement or potential involvement with the above-named innovation.

Thank you for taking time to complete this task.

Date: _____
Enumerator: _____

A. General Participant Information

A1. Respondent ID Number		A2. Respondent Name	
A3. Province		A4. District	
A5. Commune		A6. Village	
A7. Gender		A8. Age	
A9. Farm Size (Square Meters)		A10. Area devoted to vegetable production	
A9. Years of Farming		A10. Years of Farming Vegetables	

A11. What vegetables have you grown in the last three years? (please list):

_____

_____

_____

_____

A12. Where are do you sell your produce (list top 3 buyers or markets)?

1. _____
2. _____
3. _____

_____

B. Knowledge of Participatory Guarantee System

B1. How long have you used the Participatory Guarantee System?

Never		3 months		6 months	
1 year		2 years		3+ years	

B2. Have you received formal training regarding the Participatory Guarantee System (workshops, courses)?

Yes		No	

B3. In your use of the Participatory Guarantee System, do you consider yourself to be a:

Non-user		Intermediate		Old hand		Past user	

0 1 2 3 4 5 6 7 Irrelevant Not very true Somewhat true Very true	
B4 I have very limited knowledge of the Participatory Guarantee System. (Stage 1)	0 1 2 3 4 5 6 7
B5. I don't use the Participatory Guarantee System very much because I am more concerned or busy with another innovation or management practice. (Stage 0)	0 1 2 3 4 5 6 7
B6. I would like to know how the Participatory Guarantee System might improve my other farming practices. (Stage 2)	0 1 2 3 4 5 6 7
B7. I would like to know what the Participatory Guarantee System might require of me for my farming operation. (Stage 1)	0 1 2 3 4 5 6 7
B8. I would like to have more information on the labor and time commitments required by the Participatory Guarantee System. (Stage 2)	0 1 2 3 4 5 6 7
B9. I would like to know how the Participatory Guarantee System is better than what we have now. (Stage 1)	0 1 2 3 4 5 6 7
B10. I want to know if other farmers are successfully using the Participatory Guarantee System. (Stage 2)	0 1 2 3 4 5 6 7
B11. Currently, other priorities prevent me from focusing my attentions on the Participatory Guarantee System. (Stage 0)	0 1 2 3 4 5 6 7
B12. I do not want to use the Participatory Guarantee System at this time. (Stage 0)	0 1 2 3 4 5 6 7
B13. I am preoccupied with other things that prevent me from using the Participatory Guarantee System. (Stage 0)	0 1 2 3 4 5 6 7
B14. I may not have enough time each day to carry out the requirements of the new Participatory Guarantee System. (Stage 1)	0 1 2 3 4 5 6 7
B15. If I were to begin using Participatory Guarantee System, I would what to know what agriculture production practices I might need to change. (Stage 2)	0 1 2 3 4 5 6 7

C. Use of Quality Standards

C1. What types of quality standards have you used?

Grading		Labeling		Drying		Participatory Guarantee System (PGS)	
Sorting		Washing		Good Agriculture Practices (GAP)		None	

Other: _____

C2. Do your buyers ask for certain quality in regard to:

Cleanliness/Washing		Size		Maturity		Packaging Materials Requirements	
Color		Shape		Organic/Chemical Free		None	

Other: _____

If respondents <u>did not</u> select to PGS for C1, please answer question C3 and then proceed to C6 . Otherwise, skip C3 and go to question C4.

C3. Are you interested in beginning to use Participatory Guarantee System?

Yes		No	

If yes, why?

_____
_____
_____
_____
_____

If no,
why?_____
_____

C4. Do you have any challenging following Participatory Guarantee System?

Yes		No	

If Yes, what challenges?

_____
_____

C5. What benefits do you receive by following Participatory Guarantee System?

_____

_____

_____

_____

0	**1**	**2**	**3**	**4**	**5**	**6** **7**
Irrelevant now	Not very true		Somewhat true			Very true of me

C6. I would like to improve my use of Participatory Guarantee System. (Stage 4)	0	1	2	3	4	5	6 7
C7. Using the Participatory Guarantee System is taking too much of my time. (Stage 3)	0	1	2	3	4	5	6 7
C8. It is difficult for me to follow all the requirements of the Participatory Guarantee System (Stage 3)	0	1	2	3	4	5	6 7
C9. I would like to help other farmers/ cooperative members understand the benefits of Participatory Guarantee System. (Stage 5)	0	1	2	3	4	5	6 7
C10. I would like to improve my use of the Participatory Guarantee System based on the experiences of other farmers. (Stage 4)	0	1	2	3	4	5	6 7
C11. I would like to know what other farmers are doing in their use of the Participatory Guarantee System. (Stage 4)	0	1	2	3	4	5	6 7
C12. I would like to help other farmers use the Participatory Guarantee System. (Stage 5)	0	1	2	3	4	5	6 7
C13. Participatory Guarantee System requires too much labor and work relative to the benefits. (Stage 3)	0	1	2	3	4	5	6 7
C14. I have ideas based on my experience and the feedback of other farmers on how to improve our community's use of Participatory Guarantee System. (Stage 6)	0	1	2	3	4	5	6 7
C15. I would like to exchange ideas on how to work collaboratively to maximize our use of the Participatory Guarantee System. (Stage 5)	0	1	2	3	4	5	6 7
C16. I have new ideas I would like to pilot that could improve the Participatory Guarantee System (Stage 6)	0	1	2	3	4	5	6 7
C17. I have ideas that could improve the way the community uses Participatory Guarantee System. (Stage 6)	0	1	2	3	4	5	6 7
C18. It is challenging for me to follow all the requirements of Participatory Guarantee System. (Stage 3)	0	1	2	3	4	5	6 7

C19. I would like to work with other farmers to increase our use of the Participatory Guarantee System. (Stage 4)	0 7	1	2	3	4	5	6
C20. I would like to help other farmers/ cooperative members understand the benefits of the Participatory Guarantee System. (Stage 5)	0 7	1	2	3	4	5	6
C21. I have ideas to improve the community's use of the Participatory Guarantee System. (Stage 6)	0 7	1	2	3	4	5	6

D. Expanding or Improving Use of Participatory Guarantee System

D1. Are you currently in the first or second year of use of some other major farming practice, program, or agricultural innovation?

Yes		No	

If yes, please describe:

D2. Have you ever or are you current engaged in contract farming?

Yes		No	

If "No", proceed to D3. If "Yes", skip to question D4

D3. If no, why have you never engaged in contract farming?

D4. If Yes, does the contract have quality requirements for:

Cleanliness/Washing		Size		Maturity		Packaging Materials Requirements	
Color		Shape		Organic/Chemical Free		None	

Other: _____

D5. What the benefits to you and your farm by using a contract? Please describe.

D6. Do you have any challenges meeting the contract requirements or with the contract arrangement? Please describe.

E. Net House Production

E1. Do you use a net house for vegetable production?

Yes		No	

If "*No*", go to E12

E2. Total net house area for vegetable production in square meters (m^2):

_____

E3. How long have you used a net house for vegetables (number of months):

_____

E4. How did you finance or acquire your net house?

E5. What vegetables do you grow in the net house? Please list their yields for the last season and the price per kg?

Vegetable	Total Yield (kg) for Season	Harvest Date	Price per kg

E6. Do you use a cropping calendar?

Yes		No	

E7. Do you rotate crops?

Yes		No	

E8. How do you decide what crops to plant? Who decides what crops to plant and when to plant them? Please describe.

E9. Where do you sell vegetables produced in the net house (list top 3 buyers)?

1. _____
2. _____
3. _____

E10. What are the benefits to you and your farm from using the net house?

E11. Do you have any challenges using the net house?

Yes		No	

If yes, please describe:

STOP HERE. Continue to E12 for non-net house users only.

E12. Have you heard of net house production before?

Yes		No	

If yes, please describe where you learned about net houses:

E13. Why do you not use a net house for vegetable production?

Appendix B: Sample Focus Group Questions

Non-PGS Farmers

1. What types of crops do you grow and where do you sell them?
2. What are your experiences with net houses? What benefits and challenges have you experienced using net houses?
3. Can you describe how you decide what to grow and when to grow? Do you ever collaborate with other farmers to make decisions about what and when to grow?
4. Have you ever had any challenges with selling or marketing your produce? If so, what types of challenges?
5. What are your experiences with contract farming?
6. Have you ever changed your farming or harvesting practices to meet market or a buyer's requirements?
7. Can you explain the concept of quality standards?
8. What challenges or concerns might you have with using or adhering to quality standards?
9. Would you be interested in adhering to quality standards? Why or why not?
10. Have you heard of Participatory Guarantee System? (*If not explain as below*) Would you be interested in adopting this program? Why or why not?

PGS Farmers

1. What types of crops do you grow and where do you sell them?
2. Can you explain the concept of the Participatory Guarantee System?
3. How did you learn about the Participatory Guarantee System?
4. Why did you decide to join the Participatory Guarantee system?
5. What benefits and challenges have you experienced using the Participatory Guarantee System?
6. What are your experiences with net houses? What benefits and challenges have you experienced using net houses?
7. Can you describe how you decide what to grow and when to grow? Do you ever collaborate with other farmers to make decisions about what and when to grow?
8. Have you ever had any challenges with selling or marketing your produce? If so, what types of challenges?
9. What are your experiences with contract farming?

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