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prepared by **Dr Kevin Bardosh**

*co-authors/
contributors/
collaborators* **Dr Mary Johnson and Mr Lachlan Colgrave**

approved by **Dr Clemens Grunbuhel**

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2 Executive summary

Since the 1990s, a broad critique from scholars and practitioners has emphasized the challenges with contemporary agricultural extension services for development (AE4D). While “practice change” has become synonymous with efforts to translate these critiques into improved AE4D programs, the components of what makes practice change successful are often opaque and can vary significantly.

In this report, we present an integrated project-centric framework for applied practice change research to assist with the selection and design of AE4D projects. A framework was developed through an evidence review of published literature (n=351 articles) from 10 case studies in agriculture (rice/cassava, mud crabs, fisheries, acacia and foot-and-mouth disease) and public health (HIV/AIDS, tobacco control, liverflukes, non-communicable diseases and avian influenza) from the Mekong region and refined through a review of ACIAR project reports and expert consultations.

The framework includes three domains and 10 sub-domains that are arranged along a binary spectrum, including practical, socio-political and ethical dimensions. We present our framework while exploring similarities and differences in best practice between agricultural extension and public health in the Mekong region. The first domain (Science) includes the sub-domains of problem conceptualization (understood as a binary between individual/structural factors) and scientific approach (the binary of focused/systems-based science). The second domain (Action) includes six sub-domains, each with its own binary spectrum: scaling, partnership, localization, intervention action, institutional strengthening and governance. The final domain (Learning) includes the sub-domains of learning and ethical engagement.

The framework can assist government, funders and project teams in critically thinking about practice change as it pertains to AE4D, public health promotion and other forms of research for development (R4D). Such efforts are critical in helping smallholder farmers and rural communities in improving food security, natural resource management and health.

3 Background

Agricultural research for development (AR4D) plays a major role with advancing science, technology and practice change in agricultural extension systems. There has been a growing sense that agricultural extension as praxis is “dead” and that various efforts in agricultural transformation and innovation systems have replaced it (Cook et al., 2021; Pretty et al., 2020). Knowledge production has historically relied heavily on the transfer-of-technology model, where scientists linearly move new technologies from field stations to farmer adoption following free market forces. This has been severely criticized for decades as being expert-driven and top-down, overlooking local knowledge, institutional frameworks and the socio-economic contexts of small-scale farmers (Röling & Van De Fliert, 1994; Ison et al., 2000; Van de Fliert, 2003; Anderson & Feder, 2004; Leeuwis, 2013). Broadly, the field has been moving from a linear transfer of technology (from expert to farmer) based on modernistic assumptions to a relational approach (mutual learning and co-production) based on socio-technical transitions and systems theories (Scoones & Thompson, 1994; Scoones & Wolmer, 2009).

Research continues to play a significant role in efforts to advance sustainable food production and livelihoods; however, there is an increasingly recognized need for more collaborative, innovative and participatory processes (Ingram et al., 2018). Research for development organizations faces multiple challenges in helping to support cutting-edge agricultural extension programs as well as research that is effectively communicated for adoption and adaptation at local and national levels. Turning research into practical innovation to improve resilient farming practices and agricultural extension support systems has always been a challenge but has become more urgent because of accelerating global resource demand and anthropogenic change (Sumberg & Thompson, 2012). There is an imperative to think and act holistically across farms, landscapes, markets, institutions and populations (Rickards et al., 2019).

Social and behavioural science insights and praxis have important contributions to offer in re-thinking agricultural extension systems and models, as do emerging scientific approaches (such as One Health) that promote cross-disciplinary and cross-sectoral research and action at the human, animal and ecosystem health interface (Rabinowitz et al., 2018). However, theoretically rich critiques of agricultural extension are often difficult to translate into the world of practice and policy. For example, Rickards et al. (2019) argued that agricultural extension could be interpreted through six theoretical lenses: governmentality, social practice theory, reflexive modernization, coproduction, worldviews and feminist philosophy. Each of these theories helps interpret broad overarching social phenomena and can assist with interpretative reflexivity in how agencies and scientists think about and act in the world. But such work does not provide sufficient practical guidance on how to operationalize many aspects of the theoretical analysis, specifically for project teams doing agricultural research for development or those seeking to fund and support such work.

Public health and agricultural extension have different epistemological and ontological responses to practice change due to the different forces that affect agriculture and health. Health focuses heavily on more clearly defined goals such as disease control and universal coverage of services whereas agriculture engages with the utilitarian nature of land tenure, production and natural assets (i.e. soil and water). Biomedicine and epidemiology approach the world in a different way compared to soil and environmental science, leading the two fields to draw on different theories and concepts. However, common to both health and agriculture is the goal of addressing specific issues at a population-level through the use of scientific research, community-based delivery of services and socio-behavioural change interventions and policy.

This report contributes to the debate about transforming agricultural extension services by presenting a topographic framework for how we can conceptualize the key elements of a practice change approach. The framework was developed through an evidence review of published literature from 10 case studies in agriculture (rice/cassava, mud crabs, fisheries, acacia and foot-and-mouth disease) and public health (HIV/AIDS, tobacco control, liverflukes, non-communicable diseases and avian influenza) from the Mekong region and refined through a review of ACIAR project reports and expert consultations. Our framework includes three domains and 10 sub-domains that are arranged along a binary spectrum. The framework aims to provide a heuristic bridge to guide praxis and, in this way, contribute to bridging theory/reflection and practice/action. Scientists, governments and research funders can use this in assessing and evaluating research projects as well as in designing them for impact. In this paper, we present our framework while also exploring similarities and differences in best practice between agricultural extension and public health.

4 Objectives

4.1 Objectives or terms of reference

The research project had two main objectives.

Objective 1 involved comparing and contrasting public health promotion approaches and agricultural extension in order to explore practical lessons and areas for cross-disciplinary learning and innovation. A framework for analysis was developed to evaluate strengths, weaknesses, opportunities and threats (SWOT) of various public health promotion and agricultural extension models and approaches as they pertain to practice change and community engagement in the Mekong region.

To inform the analysis framework, two distinct literature reviews, as outlined in the methods section below: one on public health and another on agricultural extension. Our focus was on literature from the Lower Mekong region, specifically from Myanmar, Laos, Thailand, Cambodia and Vietnam.

Objective 2 involved two distinct activities: 1) translate the material from SRA ASEM 2016-047 and other relevant sources into operational, actionable recommendations for ACIAR; and 2) deliver a diagnostic framework and guidance for ACIAR to assess proposals to ensure that practice change and community engagement models and approaches are at, or redefining, the cutting edge of agricultural extension and are applicable to the country context(s).

4.2 Activities

The project activities are described in the Table 1 below.

Table 1 Tasks and deliverables

Tasks	<i>Deliverable</i>
Conduct two distinct literature reviews, one on public health and another on agricultural extension. The focus is on literature from the Lower Mekong region, specifically from Myanmar, Laos, Thailand, Cambodia and Vietnam.	<p>Deliverable 1: A 15-page report summarizing and contrasting key practice change and community engagement models and approaches from public health and agricultural extension, with case examples from the Mekong region.</p> <p>Deliverable 2: An academic article summarizing key findings and recommendations for agricultural extension, to be submitted to a peer-review journal (See Appendix 2).</p>
Translate the material from SRA ASEM 2016-047 and other relevant sources into operational, actionable recommendations for ACIAR	Deliverable 3: A short (pg. 3-5) summary document that concisely distils the major findings from SRA ASEM 2016-047 into a set of recommendations for ACIAR program orientation (See Appendix 3).
Deliver a diagnostic framework and guidance for ACIAR to assess proposals	Deliverable 4: A draft diagnostic framework for review by ACIAR RPMs
	Deliverable 5: A final diagnostic framework and report

5 Methodology

The study was divided into three phases: a literature review, the development and validation of the framework and a consultation phase. The focus was on the Lower Mekong Basin covering Myanmar, Lao People's Democratic Republic, Thailand, Cambodia and Vietnam. This is a continuous geographical area that has had long-standing investments by the Australian Centre for International Agricultural Research (ACIAR).

The Mekong River is one of the world's greatest river systems and connects countries through trade, environmental resources and social relations (Hirsch, 2016). Pressures on the Mekong are increasing due to ongoing agrarian and environmental transformations because of climate change, increased land investment, resource scarcity, rural-urban transitions and population growth (Datta et al., 2020).

The study began with identifying online databases for two literature reviews on public health promotion and agricultural extension (AG). The literature reviews included peer-reviewed literature published in English-language journals in the last 20-years (2000-2020). The agricultural literature review was then extended into wider grey literature because the initial trial search failed to identify an adequate number of social science papers.

In general, more diverse and numerous articles were found in public health and more grey literature in AG. Social theory was not woven into many of the papers published from the Lower Mekong Basin, revealing an important gap in the state of social science research in the region, especially in the agricultural sector.

The two reviews were broken down into 10-case studies. After examining the top 30 causes of morbidity in the MRD (IHME, 2019), five case studies of interest were selected to research public health promotion: (1) HIV/AIDS, (2) tobacco control, (3) liverflukes, (4) non-communicable disease (NCD), and (5) avian influenza. For AG broad topics of cropping, livestock, aquaculture, fisheries, and forestry were identified before being narrowed to (1) golden rice, (2) foot and mouth disease (FMD), (3) mud crabs, (4) fisheries, and (5) acacia. After searching "golden rice" on AGRIS, GARDIAN, and Web of Science, 609 results were produced of which 12 papers were deemed relevant by title. However, upon closer inspection, most of these papers focused on GM technology and bioengineering outside the MRD in China and India. Given this, the golden rice case study was altered and split between (1) cassava, and rice.

All public health literature was sourced using PubMed while AGRIS, GARDIAN, Web of Science, World Fish Center, and Google Scholar were used for agricultural literature. A series of appropriate search terms were formulated for each case study. This includes the terms "community engagement" and "practice change" alongside the name of each individual country. A separate search was done for "Mekong."

In total, 351 articles (174 public health and 177 agricultural extension) were found across the 10 case studies. They were classified by country (**Table 2**) and article type (**Table 3**). More articles were available for Vietnam (90) and Thailand (85) in comparison to Cambodia (41), Laos (33) and Myanmar (19). A total of 126 quantitative studies, 70 reviews, 39 qualitative studies, 35 program trials, 33 program evaluations, 12 systematic reviews and 6 commentaries were included. Once the database was complete, two researchers independently scored each article (1-5) based on its relevance to practice change. A total of 128 articles (37%) were included in the subsequent analysis (93 public health promotion and 35 agricultural extension articles), with 35 of these articles (21 in health and 14 in agriculture) being scored as highly relevant, or "model articles." Weekly meetings were undertaken during the project where papers that were graded differently, discussed and a final decision made. While all articles were included in the subsequent analysis, the model articles formed a greater part of the framework development.

The analysis involved reading the 128 research articles and coding select text from each article into an Excel analysis sheet. An initial coding guidebook was developed to guide the separate analysis of the public health and agriculture case studies. The coding guidebook was then inductively refined and tailored based on the data and insights from the individual papers. Chunks of texts were entered into the Excel sheet with the corresponding code. The weekly meetings ensured that the two literature reviews were exploring and emphasizing similar themes. The researchers also aimed to compare and contrast the models and approaches used in public health and AG concerning the state of practice change and community engagement in the Lower Mekong Basin. Once the coding was complete, two reports were drafted for each literature review. These were subsequently merged, ensuring that the framework categories and insights were developed inductively from the literature review coding process.

Once a draft framework was developed, the researchers reviewed 14 Impact Assessments of MRD projects from the Australian Centre for International Agricultural Research (ACIAR). The reports spanned poverty alleviation and food security through economic development; impact pathway analysis; livestock breeding (pigs); and improved fish-farming. This allowed the researchers to explore the relevance of the framework to ACIAR projects and to validate and refine it. The Practice Change Framework Questions (Appendix 1) was developed during this review process. A strong convergence was found between the framework and the project reports.

The final step involved consulting academics and practitioners who work on ACIAR-related projects and are based in the Lower Mekong Basin region to discuss the framework and provide input. An Advisory Group was convened to ensure that the framework: 1) was aligned with regional contexts; 2) aligned with the experience of regional expert.

	Public Health						Agricultural Extension						TOTAL	NET TOTAL	
	HIV/AIDS	Tobacco	Liver Fluke	NCD	Avian Influenza	TOTAL	Cropping		FMD	Mud Crab	Fisheries	Acacia			TOTAL
							Rice	Cassava							
Thailand	4	5	20	8	10	47	2	18	5	6	0	7	38	85	
Vietnam	6	5	0	9	8	28	11	12	8	8	2	21	62	90	
Cambodia	4	2	0	9	4	19	2	5	10	0	3	2	22	41	
Myanmar	5	2	1	3	0	11	3	1	3	1	0	0	8	19	
Lao	5	1	3	0	4	13	3	2	12	0	0	0	17	33	
Multiple	19	5	3	16	13	56	4	9	6	1	4	6	30	86	
TOTAL	43	20	27	45	39		25	47	44	16	9	36			
NET TOTAL			174						177						

Table 2. Number of research articles by case study and country

	Public Health						Agricultural Extension						TOTAL	NET TOTAL
	HIV/AIDS	Tobacco	Liver Fluke	NCD	Avian Influenza	TOTAL	Cropping		FMD	Mud Crab	Fisheries	Acacia		
							Rice	Cassava						
Review	11	8	3	19	9	50	0	3	10	0	1	6	20	70
Systematic Review	6	1	0	4	1	12	0	0	0	0	0	0	0	12
Commentary	3	0	1	1	1	6	0	0	0	0	0	0	0	6
Program Trial	5	2	8	3	5	23	0	3	7	3	1	8	12	35
Program Evaluation	8	1	4	7	9	29	0	2	0	0	1	1	4	33
Quantitative	4	7	7	2	7	27	12	32	21	12	5	17	99	126
Qualitative	6	1	4	9	7	27	12	7	6	1	1	4	32	39
TOTAL	43	20	27	45	39		25	47	44	16	9	36		
NET TOTAL			174						177					

Table 3. Number of research articles by case study and article type

6 Achievements against activities and outputs/milestones

Objective 1: to compare and contrast public health promotion approaches and agricultural extension in order to explore practical lessons and areas for cross-disciplinary learning and innovation.

no.	activity	outputs/milestones	completion date	comments
1.1	Conduct two distinct literature reviews, one on public health and another on agricultural extension. The focus is on literature from the Lower Mekong Basin, specifically from Myanmar, Laos, Thailand, Cambodia and Vietnam.	A 15-page report summarizing and contrasting key practice change and community engagement models and approaches from public health and agricultural extension, with case examples from the Mekong region	December 2021	The draft final report was distributed to the project Advisory Group for review and comment. The Advisory Group consisted of academics and practitioners from the Lower Mekong Basin.

1.2	Develop a framework for analysis in order to evaluate strengths, weaknesses, opportunities and threats (SWOT) of various public health promotion and agricultural extension models and approaches as they pertain to practice change and community engagement in the Lower Mekong Basin.	The framework categories and insights were developed inductively from the literature review coding process.	December 2021	Practice Change Framework Questions (Appendix 1) were also developed during a review of 14 Impact Assessments of Lower Mekong Basin projects from the Australian Centre for International Agricultural Research (ACIAR) research database.
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PC = partner country, A = Australia

Objective 2: To translate the material from SRA ASEM 2016-047 and other relevant sources into operational, actionable recommendations for ACIAR; and 2) deliver a diagnostic framework and guidance for ACIAR to assess proposals to ensure that practice change and community engagement models and approaches are at, or redefining, the cutting edge of agricultural extension and are applicable to the country context(s).

no.	activity	outputs/ milestones	completion date	comments
2.1	Translate the material from SRA ASEM 2016-047 and other relevant sources into operational, actionable recommendations for ACIAR	A short summary document distilled the major findings from SRA ASEM 2016-047. The findings were then incorporated into a set of recommendations for ACIAR program orientation.	June 2020	The findings informed the development of the diagnostic framework, and the final report.
2.2	Deliver a diagnostic framework and guidance for ACIAR to assess proposals	A draft diagnostic framework for review by ACIAR RPMs	December 2021	The draft diagnostic framework was reviewed by the Advisory Group through virtual meetings and email exchange.
		A final diagnostic framework and report.		The final diagnostic framework was accepted by the Advisory Group.

PC = partner country, A = Australia

7 Key results and discussion

The practice change framework, presented below in **Figure 1**, is divided into three core domains (Science, Action and Learning) and 10 sub-domains. These sub-domains were found to be common to both public health promotion and agricultural extension services. Each sub-domain has a set of questions that will help inform the application of the *Practice Change Framework* in the project planning, design and development phases. These questions can be found in **Appendix 1**. This section describes the framework through the use of lessons and case studies gained from the literature review.

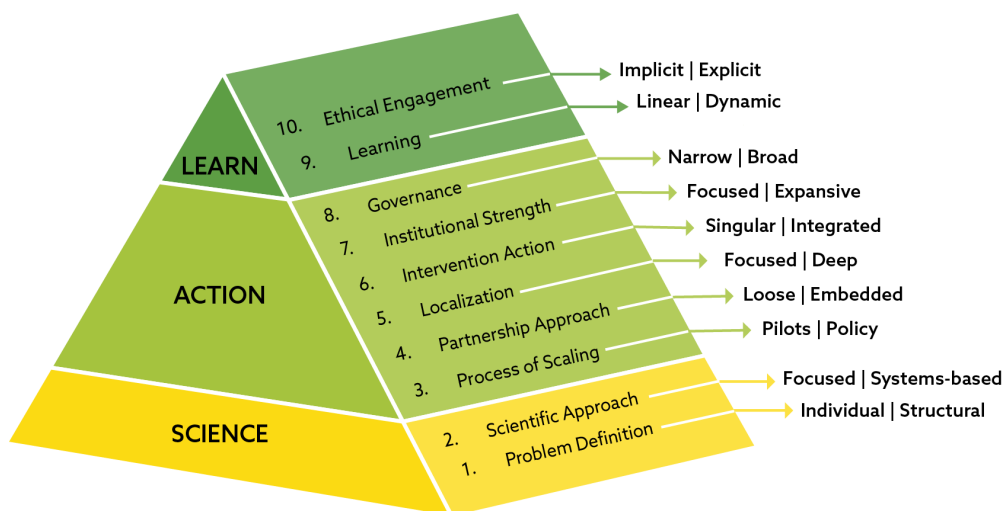


Figure 1 Practice Change Framework

7.1 Science

The first area of the framework is the scientific approach that guides a project, including problem definition and disciplinary inclusion.

Sub-domain 1. Problem Definition from Individual to Structural Determinants

The way a project articulates and defines problems, as well as what it considers and does not consider in doing so, is the first sub-domain in our framework for practice change. Problems are defined according to both implicit and explicit assumptions about the way the world works as well as the range of available knowledge and specific interpretative and ideological judgements. Practice change will depend on the capacity to critically engage with the framing and understanding of a problem.

On the one hand, the researchers found that many projects will locate the foci of attention and change on individual-level determinants. So, for example, avian influenza is viewed as a problem of backyard poultry farming, liverflukes a problem of unhygienic food consumption, HIV a problem of immoral “risky” behaviour and NCDs a problem of personal habits. This approach is followed in the preponderance of research articles; agricultural research will focus on defining farmer adoption characteristics while public health will emphasize behaviour change, measured through risk factors and knowledge, attitude and practice (KAP) surveys. This literature inadequately articulates and minimizes

the role of group dynamics and structural factors and forces, a danger discussed at length by social scientists in general (Schad et al., 2011; Tan et al., 2012). This work also tends to neglect the importance of seeds, drugs, tests and techniques as part of social networks that connect individuals to global processes (Vun et al., 2014). In some cases, farmers and communities are approached as groups inherently resistant to change; these assumptions (about “age-old farming traditions”) are not substantiated or understood as expressions of reasonable risk mitigation practices and group identities (Babendreier et al., 2019; Chouichom & Yamao, 2010).

On the other hand, defining individual-level determinants and sub-group characteristics, particularly knowledge, risk and incentive dynamics for behaviour change and farmer adoption, are important. Much research focuses on the prevalence of some practices in public health, such as smoking rates and usage over time (Laxminarayan & Deolalikar, 2004) or pesticide usage in farming (Upadhyay et al., 2020) but will exclude considerations of social difference, such as gender and class (Morrow & Barraclough, 2003; Upadhyay et al., 2020). The challenge is that such studies often present a superficial understanding of the social world they seek to represent and can anatomise the problem, simplifying how projects approach practice change.

Practice change research also engages with structural determinants, albeit in a much more limited fashion. For example, most of the work we found in the Mekong on NCDs approached the issue predominately from a biomedical perspective that emphasizes metabolic risk factors (blood pressure, BMI, blood sugar) rather than how lifestyle and dietary patterns are linked to socio-economic development, urbanization, social inequality and industrialization (Kosulwat, 2002; Nguyen & Hoang, 2018; Taniguchi et al., 2017; Wagner et al., 2016). Research on the social determinants of health and use of the social ecological model has helped to transcend strictly biomedical emphasis in health but much work still needs to be done. A good example of the evolution of research on individual and structural factors is HIV/AIDS (discussed in **Text Box 1**), as is the movement away from a disease-specific to a socioecological conceptualization of *O. viverinni* risk (Sripa et al., 2015; Sripa et al., 2017).

Text Box 1: Epidemiological research and the HIV/AIDS pandemic

Epidemiological research plays a pivotal role in the construction of risk profiles in public health. When links between HIV and sex work emerged in the 1980s, many governments in the Mekong region (and globally) embarked on campaigns to stigmatize sex workers and eliminate sex work that, together with neoliberal reforms in the 1990s world economy, helped shift in sex workers away from brothels to the entertainment industry (Rojanapithayakorn, 2006; Vun et al., 2014). If we consider HIV part of a moral landscape and need to “eradicate social evils”, as was done in Vietnam in the 1990s (Dao et al., 2013), this will generate policies that, in this case, attempt to eliminate sex work but ended up having unintended consequences. A body of research now shows that sex workers operate within a context of “triple vulnerability” (they are women, financially dependent and are engaged in illegal work) (Kasatpibal et al., 2014; Vun et al., 2014). Based on in-depth research, infection profiles then shifted from the sex industry to men who have sex with men, drug users and trans-people as well as couples and casual sex (Vun et al., 2014). A study among young people in the region found that most individual decisions regarding safe condom behaviours and testing are mediated by structural factors such as fear of stigma, distance, inconvenience, lack of confidentiality and costs (Schunter et al., 2014). Understanding of these structural conditions was actively incorporated into national HIV programs based on epidemiological and social research.

As with public health, we found that when decisions and actions in agricultural programs do not produce the prescribed outcomes, the perceived failures tend to be attributed to

local levels with little review or interrogation of higher levels (Chi, 2008; Zhunusova et al., 2019). This is despite the fact that research clearly shows that farmer decision-making is influenced by a variety of multiple, complex, internal and external contextual factors such as cultural practices, social group identities, labour availability, seasonal conditions, markets, land tenure, global trade networks and policy (Hoang et al., 2006; Kull et al., 2011; Kyaw et al., 2018; Thulstrup, 2014). Furthermore, we found that higher-level practice change research on policy change in the region, including on financing gaps (taxation, domestic spending and foreign aid) is an important component of understanding the political economy of health and agriculture, but is very limited outside our case study on tobacco control (Nguyen & Nguyen, 2020). Moving beyond an individualized articulation of agricultural systems to link individual farmer adoption and behaviour change to larger structural forces, will require consideration of the overall scientific approach taken and how this shapes epistemological assumptions.

Sub-domain 2. Scientific Approach

Problem identification is influenced by the scientific approach taken by a project and how different disciplines are included and integrated. This ranges from projects that are predominately orientated along the conceptual axis of one discipline to those that aim to push the boundaries of conventional knowledge. We define this along a binary spectrum from *focused* to *systems-based* approaches.

The focused scientific approach is grounded in one dominant scientific discipline. We found that in public health this meant a heavy influence on epidemiology and medicine while agricultural extension was predominately shaped by crop, livestock, forestry and fisheries-sciences, ecology and natural resources. These disciplines tend to define problems in specific ways and are especially interested in quantitative data on biological change points and use statistical techniques to define population-level characteristics. This is very important for the improvement of a cultivar like salt-tolerant rice for the Mekong (Kawano, 2003; Paik et al., 2020) or in defining disease patterns such as Foot and Mouth (Nampanya et al., 2012) as part of basic science projects. Many projects, however, assume a natural science perspective on social issues and many publications we reviewed (Dao et al., 2013; Kerrigan et al., 2015; Wilcox et al., 2019) discussed the neglect of social science and the difficulties in integrating socio-economic and anthropological dimensions with epidemiological and medical projects. The agricultural science papers mainly describe the use of technology transfer approaches to extend findings and encourage the adoption of new technologies and innovations by farmers. A major concern was that this lack of disciplinary engagement contributes to an over-emphasis on technical solutions over people-centric approaches that engage with structural vulnerability and social movements. We found only a few instances where behaviour change theories grounded in the psychological sciences (Do et al., 2018; Laithavewat et al., 2020) and broader social and political theories were used to orientate a project. This included the concept of bio-securitization and social capital theory in Avian Influenza research (Waisbord et al., 2008), and stigma in HIV (Brody et al., 2019; Herington, 2010; Tsu et al., 2014; Wilson, 2015) and the food environments in NCDs (Nguyen & Hoang, 2018; Phulkerd et al., 2016). The literature also addressed the importance of trust (often influenced by social connectedness), although there was no critique of how trust could be strengthened. This suggests a lack of theoretical publications in the Mekong region for the case study areas.

Systems-based approaches to practice change seek to integrate different disciplines into a collaborative conversation and often focus on defining the complexity of an issue as well as pushing conventional disciplinary boundaries. New conceptual movements, such as One Health, EcoHealth and Planetary Health, have all drawn on social-ecological and complex adaptive system theories (Rabinowitz et al., 2018). Recent systems-based approaches in public health promotion include work in participatory epidemiology (Phimpraphai et al., 2017) social network analysis (Delabouglise et al., 2017;

Delabouglise et al., 2015) and various access and delivery frameworks (Ansah et al., 2019; Deerochanawong & Ferrario, 2013; Htet et al., 2017; Obrist et al., 2007). An example is provided in **Text Box 2**. In agriculture, ecological systems and participatory farmer research represent a similar movement towards transdisciplinary research. Based on findings from an impact assessment of integrated pest management in rice and maize in the Greater Mekong Subregion, Babendreier et al. (2019) counselled that the uniform application of extension approaches “without considering locally specific norms, networks, and practices may result in biased research results or further concentration of development benefits in the hands of the rich and powerful.” The authors then observed that social networks are the most valuable asset of the resource-poor and can be used to successfully communicate with the target community and that power relations are unique to each village and require appropriate engagement methods (Berg, 2001).

Text Box 2: The LAWA project in Thailand (Sripa et al., 2015; Sripa et al., 2017)

The LAWA project in Thailand used an EcoHealth approach to drive practice change for the control of liverflukes in Thailand (Wilcox et al., 2019). Recognizing the shortcomings of previous biomedical projects, the LAWA project developed a transdisciplinary approach to *O. viverrini* transmission and the linkage with cholangiocarcinoma. In this model, helminth diseases are viewed as problems at the intersection between environment, agriculture, culture and poverty. This led to various innovative research activities including participatory action research using students to explore local landscape dynamics, aquatic ecology, livelihoods, food culture and health education (Ziegler et al., 2016). Shifting the research paradigm that viewed OV as a “host-parasite” problem to this wider system or “ecologic” problem (including landscape and ecosystems dynamics), was not easy. It required involving diverse disciplinary expertise as well as a willingness to challenge accepted narratives about the relationship between OV and cholangiocarcinoma, based on how complex environmental risk and livelihood transitions influence exposure and susceptibility (Wilcox & Echaubard, 2017).

These types of projects often benefit from using a flexible systems framework to define the problem(s) they seek to understand and address, which facilitates inter-disciplinary dialogue including the use of causal loop diagrams (Ziegler et al., 2016) and multidisciplinary workshops (Castillo-Carandang et al., 2020). An important shortcoming, however, is in the lack of high-quality evidence showing community agency can favourably affect health and agricultural outcomes, which has been attributed to the challenges of integrated project designs and under-theorization of participation and empowerment (Brody et al., 2019; Xeuatvongsa et al., 2015).

7.2 Action

The second area of our framework is the action approach, which has seven sub-domains. This includes how a project engages with the issues of scale, partnership, localization, intervention action, institutional strengthening and governance. We discuss each below.

Sub-domain 3. The Process of Scaling: From Pilots to Policy

We found that all projects engage with scale, which essentially includes not only the coverage of activities but also administrative and policy engagement. Many projects start as small pilots, move through various intermediary stages and end, if successful, “at scale,” where they have widespread influence on policy and delivery standards and norms. Other projects operate at the meso- and macro-level from the start where they

engage the problem of scale differently. In all cases, broader governance contexts mediate the direction and nature of scaling.

Pilot research enables teams to test and refine new ideas while also generating interest from stakeholders. In public health, pilot projects are typically launched in areas, or with certain social groups where disease is prevalent (Sripa et al., 2017); whereas in agricultural extension, they typically undertaken in areas with existing farmer groups or on research stations. Such research-intensive efforts test a technology or approach to behaviour change – for example, as part of a randomized control trial with intervention and control groups (Khuntikeo et al., 2015; Laithavewat et al., 2020). Pilots are defined by a high level of attention to detail and are more resource-intensive than subsequent steps in the scaling process. There is a risk that the original research approach can be diluted and subsumed as teams seek to scale. On the other hand, the momentum to scale is often outside the direct control of project teams who have to balance the desire to “get it right” with emerging opportunities around funding, political interest and project timelines (Hall & Dijkman 2019; Llewellyn & Brown 2020). Approaches also change as a scaling process generates new understandings and knowledge and recalibrates them to fit a larger geography and population. We found that manuals, guidelines and training workshops play the role of socializing new teams to the approach with different levels of detail and prescription. The notion of “scaling-up” is often tied to implicit assumptions about the overall impact of a project, sometimes even used as an analogue or substitute for project success or failure. In this regard, articulating a strategy for scaling should be part of defining the different potential pathways to impact of a project, considering the level of “scale” that is possible, feasible and desirable while still recognizing the messy, evolutionary nature of the process.

Project teams often have a project-centric view of scaling; however, evidence suggests that each individual project has the possibility of low impact or scaling failure, especially for seed grants and innovation funds (Woltering et al., 2019). Individual projects add to a field cumulatively over time in synergistic ways. Evidence from the HIV field has shown the importance of a single overarching service delivery framework to guide the work of pilot projects, as well as the importance of multiple rounds of policy formulation and the use of research to facilitate incremental advances and changes (Eang et al., 2012; Vun et al., 2014). Some projects come to play pivotal roles, acting as tipping points in practice change, often due to the influence of a project leader, an idea and/or current events. Gradual change also occurs over time in a step-wise approach. For example, it took four decades for health warning labels on tobacco products and smoke-free places to scale in the SE Asian region (from initial work in the 1960s to the 2000s) due in large part from industry opposition (Minh et al., 2016; Sangthong et al., 2012; Vathesatogkit & Charoenca, 2011). Scaling requires constant attention to dissemination, networking, engagement and leveraging opportunities; it is also a messy, unpredictable process. In Thailand, the LAWA model to fight liverflukes was implemented in others provinces after it had been introduced to policymakers and decision-makers at multiple levels in the country, put on the national agenda as an elimination goal to rally around and relied substantially on the legitimacy of the established research group (Padchasuwan et al., 2016; Tangkawattana & Sripa, 2018). The ‘tree plantation boom’ of Vietnam is another good example, as it was initially linked to large, partly internationally funded reforestation programs (Cochard et al., 2020). Initially, reforestation was centred in areas which had previously been deforested but with new policies, such as forestland allocation (FLA), reforestation efforts alleviated land use pressures in more marginal areas allowing for natural forest regrowth (Cochard et al., 2020). However, sometimes a focus on the national and local comes at the expense of integration through the regional and provincial levels (Christensen et al., 2008).

Sub-domain 4. Partnership Approach

Practice change depends heavily on the type and quality of human relationships in a system of knowledge and action. Partnerships evolve through multiple networks of stakeholders, including peripheral actors outside the core group, who may be engaged for short periods of time (Waisbord et al., 2008; Xeuvatvongsa et al., 2015). Cultural and linguistic barriers as well as different organizational country norms and administrative capacity play important mediating roles (Liverani et al., 2018). Although few publications we reviewed discussed the nature of partnerships in detail, showing a lack of publications on the topic, our analysis identified a binary scale from embedded to loose partnerships.

Loose partnerships are where projects rely on a predetermined template. In both public health and agriculture, many loose partnerships involve research plans designed with little or no input from country experts often reflecting past colonial histories and contemporary geopolitical and economic trends that sideline southern academics and practitioners. These types of relationships are also typically part of the scale-up of pre-existing interventions, with support from foreign aid donors (Csete et al., 2016; Mounier-Jack et al., 2010). Of course, this is not always so problematic as templates can be a very effective way of instigating practice change. A strong lead organization often plays a critical convening and brokering role in loose partnerships (Liverani et al., 2018). A good example is the role WHO-SEARO played in the MPOWER package of tobacco control (Liverani et al., 2018; Singh, 2012). Loose partnerships can benefit from regional networks and communities of practice (CoP) that have emerged in an effort to promote cross-country learning and networking (Duboz et al., 2018; Moore & Dausey, 2011; Pongcharoensuk et al., 2012; Walsh et al., 2008).

An embedded partnership is where researchers, policymakers and practitioners co-create all aspects of the project, from planning to implementation and evaluation, based on principles of equality between actors. An example of an embedded partnership includes a longstanding US-Vietnam medical collaboration for hypertension. This project emphasized the growth of trust and collegiality over time, the need for deliberate cross-cultural learning and shared group experiences, regular online and in person meetings to initiate and consolidate personal relationships and periodic needs assessments for group self-reflection on activities and outcomes (Ha et al., 2019). Similarly, agricultural projects with citrus farmers in Vietnam, sought the uptake and endorsement of local farmers to become 'model farmers' for other citrus growers established networks of 'best practice' (Clarke, 2019).

Sub-domain 5. The Level of Localization

Localization refers to the manner in which project teams engage with intended beneficiaries and is, in many ways, used interchangeably with community participation and empowerment. Localization typically involves working with community-based groups and service delivery providers (Joffre et al., 2020; Long et al., 2020). The level and type of localization is often understood as a dichotomy between "top-down" and "bottom-up" projects, and is linked to notions of trust (a sense of shared collective interest built on commonalities, shared purpose, identity and legitimacy), incentives, the selection of local collaborators and the history of state-civil society-community relationships (Conan et al., 2013). Here, we describe this dynamic as a binary spectrum between focused and deep localization.

Focused levels of localization involve efforts to engage beneficiaries through one-time or short-term sensitization activities, social mobilization, training workshops or research. Landscaping and stakeholder research is a helpful prerequisite to these projects, where teams can define key and secondary stakeholders across society (Deerochanawong & Ferrario, 2013; Sripa et al., 2017; Tangkawattana & Sripa, 2018). For example, Jacobs & Price (2003) showed the important brokering role of Buddhist pagoda volunteers to assist with organisation and delivery of Avian Influenza programs in Cambodia. Similarly, a study

in a Thai high school showed that nurses are uniquely positioned to combat Tobacco addiction (Seal, 2006), and a third study found that community pharmacy services were pivotal in addressing NCDs in Thailand (Asayut et al., 2018). Our literature review found that public health focused heavily on defining “appropriate media channels” (Chunsuttiwat, 2008) with few studies exploring the nuances of educational efforts. In general, this research shows that relying on one mode of education, especially a passive one such as radio or TV, is not as effective as more diverse and didactic inter-personal approaches (Sripa et al., 2017; Waisbord et al., 2008). Social marketing has been adopted to promote condom use in HIV prevention by combining product promotion, peer education, and other forms of interpersonal communication (Longfield et al., 2011). In agriculture, we found that the Vietnamese shrimp farmer groups or ‘clusters’ was a good example of the key role in peer-led validation or verification of information and facilitate knowledge-sharing between cluster members (Joffre et al., 2020).

An important shortcoming of focused localization is the assumption that local extension officers, health workers, and community leaders or influencers have the capacity and resources necessary to engage and deliver program activities, which leads to project teams being under-resourced. Many countries, for example, continue to have poorly designed and supported community health worker systems that are not integrated with primary or tertiary health services (Long et al., 2020; Bhandari et al., 2011; Ozano et al., 2018). Likewise, the Cambodian Village Animal Health Worker (VAHW) system is expected to provide disease surveillance to the national veterinary services, despite their low-level disease diagnostic skills (MacPhillamy et al., 2020). Project teams often assume these networks can be engaged with minimal support, despite extensive research in our review documenting major challenges including: lack of policy support, insufficient training and a lack of professional identity, heavy workloads, and lack of remuneration and desire for professional incentives, irregular support and poor integration and overemphasis on one specific problem at the expense of other local priorities (Bhandari et al., 2011; Long et al., 2020; Ozano et al., 2018). Successful projects have engaged with these issues (Conan et al., 2013; Khoat et al., 2003; Longfield et al., 2011; Taniguchi et al., 2017; Vu et al., 2018).

Deep localization is when project teams seek to work directly with local community organizations and change long-standing social norms through explicit efforts to empower people (Jacobs et al., 2016; Kerrigan et al., 2015). For example, within the HIV field, empowerment is part of a broader social movement for human rights and other cultural transformations (Kerrigan et al., 2015). HIV programs in Laos (Hoy et al., 2008) used youth-based groups to develop skills in situation analysis, planning and skills-building that generated a strong sense of ownership over activity plans. There continues to be important evidence gaps in best approaches for deep localization (Brody et al., 2019), and concerns about the ability of external projects to ‘engineer’ social capital (Labonte, 1999). One risk is that projects over-emphasize implementation of extension programs rather than strengthen existing, farmer-initiated innovations (Landini et al., 2017; Cook et al., 2021). In both health and agriculture, there is a strong collective social dynamic that connects land, history, culture and community. Farmer learning is inherently experiential and strongly influenced by communal attitudes, particularly the perceptions of neighbours and social networks (Babendreier et al., 2019; Chouichom & Yamao, 2010). Agricultural studies show substantial benefits in efforts to foster farmer clusters (Kassam et al., 2011; Joffre et al., 2019) with the goal of facilitating participatory interactions and group-based learning that promotes self-efficacy within the centralized governance model of the Mekong region (Joffre et al., 2020). It is important for farmers to validate knowledge, particularly as information from different sources can be conflicting (Win et al., 2018) and cluster farmers trust the information that is shared between members in preference to other sources. The Samroyod Shrimp Farmers’ Cooperative, a member of the Federation of Shrimp Cooperatives of Thailand (FOSCOT) comprises mainly small shrimp farmers, who through collective action have increased production and access to input and output markets and services. By working together and building partnerships along the market

chain, the members have reduced risks, maximised returns, and adopted sustainable practices (Kassam et al., 2019).

The lack of political, policy and regulatory support for empowerment-based approaches is an important bottleneck in such projects. Studies from the field of HIV prevention show the importance of linking community-based self-help groups to a network of resources and services through an explicit framework (Vu et al., 2018; Vun et al., 2014).

Sub-domain 6. Intervention Action, from the Singular to the Integrated

Our sixth sub-domain, and the final one in the area of action, involves the components and types of intervention tools and how project teams use them. In our analysis, we found that most interventions fall along a binary spectrum, ranging from a single tool focused on a single issue, such as a vaccine or cultivar, to an assortment of intervention tools addressing multiple issues.

A singular action involves the focused implementation of one dominant intervention. This may be one specific technology or type of intervention technique. For example, the core of HIV prevention in SE Asia for many years was the “No Condom – No Sex” approach, which empowered sex workers to refuse sex when a condom was not used (Rojanapithayakorn, 2006). For tobacco control, WHO has promoted the use of the MPOWER package specifically targeting Member states to implement the “Monitor, Protect, Offer, Warn, Enforce, Raise taxes” policy package for tobacco control (Minh et al., 2016; Singh, 2012). In our literature review, we found that school-based education and digital technologies were seen as particular under-utilized approaches that could have significant impact in the Mekong region. Interventions at school included a model for liverflukes in Thailand where an assortment of techniques were used: lectures, curriculum, billboard outside school, several games, student clubs, homework, tests, microscopes and the collection of parasite specimens, followed by a certification process when schools were free of the parasite (Laithavewat et al., 2020; Sripa & Echaubard, 2017; Sripa et al., 2017; Tangkawattana & Sripa, 2018). Digital technologies have surfaced as important tools for information spread, exchange and interaction, seen as low cost and interactive. However there continues to be a lack of high-quality data on how these can be used for public health (Chakranon et al., 2019; Do et al., 2018; L. H. Nguyen et al., 2019). In agriculture, the use of the internet and mobile and social networks among farmers and agricultural extension officers provides access to information, finance and services and has been shown to encourage digital agro-entrepreneurship and innovation (ACIAR Blog, 2021). Yet, many small-scale farmers in developing countries remain isolated from digital technologies and lack the skills to use them (Trendov et al., 2019).

In contrast, integrated action is where activities aim to link issues normally addressed in isolation and siloes, and where projects aim to create more harmonized and integrated systems. For example, there has been a strong effort to integrate testing, peer education and treatment for mental health, addiction, harm reduction and other health issues with HIV services using a continuum of care framework (Eang et al., 2012; Kerrigan et al., 2015; Longfield et al., 2011; Vun et al., 2014; Wilson, 2015). Other integration strategies for HIV have included integrated laboratories and hospitals wards where financing for HIV strengthens TB and malaria control (Eang et al., 2012; Vun et al., 2014). In health, commentators continue to argue for the need to integrate NCD into HIV programs in SE Asia in what is called a “diagonal approach” to health system strengthening (Castillo-Carandang et al., 2020; Jacobs et al., 2016), building on their 30 years of sustained funding. Integration, however, can be problematic. For many years, Vietnam’s smoking cessation programmes are generally integrated into other programmes, leading to insufficient budget and human resources (Tran et al., 2013). A study of mangrove forest management, Camau Province, Vietnam, emphasised the importance of integrated coastal management, which integrates the management of sectoral activities such as fisheries, agriculture and forestry simultaneously. This required integrating multiple

stakeholder goals into a provincial forest and fisheries strategy; however, the economic consequences of fulfilling all goals were unviable for the 10-year planning period (Christensen et al., 2008).

Sub-domain 7. Institutional Strengthening

This sub-domain includes how a project seeks to strengthen capacity as part of its activities. Capacity building has become a mainstay of international agriculture and public health projects and involves an increasing sophistication of the interaction between local communities, extension officers, educators and research. We have conceptualized this along a binary, from focused to expansive.

Focused institutional strengthening involves training, sensitization and normalization of new concepts, techniques and skills. For example, law enforcement policies and curriculum and training for harm reduction as part of a human rights approach to HIV prevention (Sharma & Chatterjee, 2012; Sychareun et al., 2012; Thomson et al., 2012; Tsu et al., 2014). Ferry et al. (2006) describe efforts to develop a realistic two-year Tobacco Control Research Plan to ensure medical students are aware of the tobacco epidemic and have the capacity to obtain external funding to achieve the goals of the proposed research. In Cambodia and Laos, a two-year graduate certificate was developed to promote academic-government capacity building in tobacco control policy (Ferry et al., 2006). English language skills were an important limitation. A new focus includes the use of digital platforms (telehealth, Ehealth, Mhealth) to build project capacity and training programs, for example, using the hub and spoke model of the ECHO approach, including certificate courses, clinical mentoring, case-based learning, support, implementation, coaching for QI, dissemination of new guidelines and policies, webinars and group chats (Bonawitz et al., 2019; Pollack et al., 2020; Sabin et al., 2017; Todd et al., 2017). Such programs have a number of challenges related to internet access and IT and software skills, as well as the need for dedicated staff and strategies to keep participants motivated and engaged, especially when the intention is to promote interactive learning. The emphasis on the technology platform can detract from the learning experience and reinforce non-didactic memorization-based learning instead of creativity.

Expansive institutional strengthening, by contrast, involves the establishment and direct support to building institutions and new capacities. Institutional capacity plays a pivoting role in successful programs but is often poorly documented and few studies explore this. In HIV, Vun et al. (2014) argued that an overemphasis on leadership at the national level neglected the more critical gap of sub-national leadership maintained by poor managerial and logistical competencies. This includes national research centres for excellence, national conferences, community of practice networks and training programs (Brody et al., 2019; Insamran & Sangrajrang, 2020; Vun et al., 2014; Wagner et al., 2018). It also includes the issues of infrastructure and supply chains, which are not widely discussed in our literature review, except for one article on efforts to establish an influenza vaccine production plant in Thailand. In this case, large regulatory approvals and standards and skills and technique transfers from Europe and new institutional structures and coordination mechanisms took many years to establish (Surichan et al., 2011). Crises can help bring about the rapid evolution of institutionalized changes, as shown in **Text Box 3**.

Text Box 3: One Health in Thailand: An epidemic that institutionalized a new approach

Crises are often what drive changes in political involvement, as with the 2004 H5N1 and the 2009 Influenza A (H1N1) that triggered political decisions to adopt One Health into the national agenda (Sommanustweechai et al., 2017). If we look at the spread of One Health in the region we see how it was linked to the 2004 H5N1 and the 2009 Influenza A (H1N1) crises and that domestic technocrats and international development partners played critical roles (Sommanustweechai et al., 2017), as well as the National Health Assembly, a participatory public policy process that heightened awareness of EIDs and widened recognition of One Health (Sommanustweechai et al., 2017). This led to the first National Strategic Plan for Preparedness and Response to Avian Influenza and Influenza Pandemic in Thailand (2005–2007) and a host of other initiatives such as conferences (Prince Mahidol), university training networks (South East Asia One Health University Network (SEAOHUN) and integration into Field Epidemiology Training Programs (FETP) (Sommanustweechai et al., 2017). The AI crises also created regional tripartite coordination mechanisms in the Asia-Pacific region between animal and human health sectors that covered EID, AMR and food safety (Gongal et al., 2020). One Health has also been used in other disease control and ecology research, including with liverfukes in Thailand (Sripa et al., 2017).

Sub-domain 8. The Governance Environment

Engagement with the governance environment refers to how a project navigates wider political, legal and institutional frameworks. Many of the issues discussed above that prevent practice changes are mediated by the policy and political context (Pham et al., 2019; Williams et al., 2008). We found that the idea of “political commitment” was spread throughout all of our case studies as a key to success (Sripa et al., 2017). Paradoxically, it seems that most projects keep their engagement with governance issues to a minimum due to the challenges and uncertainties involved, short-term reporting requirements and also the focus on field activities. We found that engagement with the governance environment spans a binary spectrum, from the narrow to the broad.

Narrow engagement involves working within or helping to define or provide modest changes to a specific legal or policy framework. For example, this may include assisting with a priority setting process for a national strategic plan (Auewarakul et al., 2008; Minh et al., 2016; Nang et al., 2019). Specific interests drive political commitment. For example, national HPAI H5N1 risk management policy in Thailand was influenced by political connections between agribusiness poultry conglomerates and government; strict sanitary standards excluded low-income households and independent farms (Chuengsatiansup, 2008; Gongal et al., 2020). Priorities may also be skewed by development funding itself; in 2012, 87% of financial resources for Cambodia’s national HIV response came from foreign aid donors, which represented 38% of all health expenditure in the country and 3% of all government expenditure (Vun et al., 2014). The sustainability of such vertical systems is largely questionable when HIV financing transitions to the government and more significant health issues, such as NCDs, receive disproportionately less attention and funding (Deerochanawong & Ferrario, 2013; Mounier-Jack et al., 2010; Tuangratananon et al., 2019). The mobilization of financial resources during emergencies also has their own unique challenges (de Sa et al., 2010). In Cambodia, more than 160 NGOs were involved in the Avian Influenza response but only two were still active in 2009 (Ear, 2011), revealing, among other things, a financing gap for community-based service delivery programs since no mechanisms exist to fund civil society groups to deliver for vulnerable groups (Vannakit et al., 2020). Lessons from tobacco control point to the involvement of key figures in health and academia able to mobilize public sympathy

through alliance building (Chantornvong & McCargo, 2001), the need to allow bureaucrats and politicians to claim credit for new initiatives to move the political cycle forward, the importance of discussions with the Ministry of Finance on taxation policy and that broader public support is essential to circumnavigate powerful vested interests (Chantornvong & McCargo, 2001; Minh et al., 2016; Singh, 2012; Vathesatogkit & Charoenca, 2011).

Broader governance engagement refers to efforts to seek high-level political leverage, through advocacy, on major system issues and intersect with the critical issue of public goods. For example, universal health coverage was mentioned by many NCD papers and some HIV articles as “a political decision at heart” or a “big bang policy reform” that combined strategic investments, evidence-based knowledge, technocratic institutional networks and reforms and a populist government (Long et al., 2020; Tangcharoensathien et al., 2018; Vun et al., 2014). Legal instruments have an important effect since governments come and go, but repealing or revising already enacted legislation is time-consuming and costly which makes legislation an important part of higher-level practice change (Dao et al., 2013; Sangthong et al., 2012; Tsu et al., 2014). Strategies require leaders, effective coalitions, consensus, solutions and policy narratives about impact (Shilton et al., 2013). In agriculture, such issues intersect with price controls, ecosystem management and climate mitigation. The primary concerns of governments in Lower Mekong countries are focussed on achieving national food security (self-sufficiency in rice) and reduced rural poverty (Cramb, 2020). Importantly, where the government enacts policy with a follow up process, such as with rice marketing policy (Kyaw et al., 2018), access and smallholder participation can be increased through informed policy feedback, improving policy and livelihoods.

7.3 Learning

The third area of our framework is the learning approach, which involves a range of issues related to how a project engages with the change process as it unfolds, how it collects data and conducts analysis and how it reflects on the ethical and socio-political challenges it encounters and, in some instances, creates. We have divided this into two sub-domains: learning and ethics.

Sub-domain 9. Learning: From a Linear to Dynamic Approach

Learning refers to the ways that projects understand and document change – often under the rubric of monitoring and evaluation (M&E) – as well as how they use this information to make decisions and modify activities. The learning binary ranges, on the one hand, from a linear model of learning (reduced to collecting predefined quantitative M&E indicators) to a more dynamic and iterative approach where learning facilitates adaptation to core activities. Interestingly, we found that the majority of projects actually utilize both – following a linear M&E approach while also trying to engage, to some degree, with the more expansive learning process.

The linear view of learning involves the predetermined tracking of quantitative indicators, through research and M&E frameworks that are assumed to provide sufficient knowledge about change dynamics. M&E frameworks are typically structured around logic models, activity targets (people reached) and products delivered, and depends on a rationalistic description of inputs, outputs and outcomes. This may involve tracking population trends in specific risk factors (smoking, alcohol consumption, daily salt intake and physical inactivity) and linking this to the prevalence of obesity or lung cancer, for example (Tuangratananon et al., 2019), and then drawing causative links between activities and change over time. Methodological tools to track change are a common part of the learning field. In Cambodia, Hong & Chhea (2009) described the use of a behavioural KAP surveillance tool for HIV; Kerrigan et al. (2015) described a “minimalist monitoring information system” for HIV in Myanmar that would produce standard reports on key

indicators in different languages; and Minh et al (2016) & Singh (2012) outlined the use of the Global Adult Tobacco Survey (GATS) and the Global Youth Tobacco Survey (GYTS) in the region, originally developed by the US CDC and WHO. Such tools provide greater knowledge about the project beneficiaries over time. For example, in the HIV field, (Vun et al., 2014) described how research findings evolved over many years to define seven specific high-risk groups that required different types of tailored interventions to best reach them. Similar learning evolution was found across all of our case studies, where survey data (especially when it receives sufficient expertise and funding) has played critical roles in practice change.

However, the tendency towards reductionism and simplistic causal attribution is apparent in the low quality of many risk factor and KAP studies and in the assumption that surveys alone can be used to tailor aspects of program design and implementation. We found that there continues to be an overemphasis on quantitative indicators in the agricultural and public health fields (i.e. kg of rice paddies without considering complex impacts, such as increased production and household income, are used to denote the rate of farmer adoption of a new practice or technology) as well as a lack of robust research-based monitoring and evaluation studies in general (Aggarwal, 2011). For example, very few studies sought to evaluate the effectiveness of the HPAI poultry outbreak response in 2006, despite intensive activities throughout the region promoting a smallholder producer system (Aggarwal, 2011) while studies evaluating community engagement for HIV rarely look at social processes such as collective identity, support, efficacy, agency, access to resources and power (Kerrigan et al., 2015). An important question for practice change is: how many people need to adopt the technology, technique or behaviour in order for the desired change outcome to be achieved? In many cases, this proportion is not clearly defined and even unknown. In fact, determining thresholds to target specific interventions to at-risk households is one of the most important topics for applied research in public health and agricultural extension, although it does not receive as much attention as it should (see **Text Box 4**).

Text Box 4. Integrating epidemiology and anthropology at wet markets in Vietnam

An important aspect of scaling involves the proportion of people who need to adopt the technology, technique or behaviour to achieve the desired change outcome. In Vietnam, over 62 million poultry were culled or killed due to an outbreak of HPAI H5N1 in 2004 that caused 12 recorded deaths in humans (Tiensin et al., 2005). Additional control measures included movement restrictions, mass closure of live poultry markets and banning poultry keeping in some major cities, as well as biosecurity campaigns to educate the public about preventive measures, surveillance and poultry vaccination (Hanvoravongchai et al., 2010; Wilcox et al., 2019). An important focus of the emergency response involved closure of wet markets and poultry trade bans.

Epidemiological research later found that a certain proportion of households maintaining the highest biosecurity levels are likely to prevent village outbreaks (Conan et al., 2013). New interdisciplinary research found that poultry trading is dynamic and occurs outside formal markets in the event of a temporary market closures, which questions the effectiveness of bans (Wilcox et al., 2019). Social network analysis and individual-based modelling found that most wet markets were connected to one another, suggesting that disconnecting the market network could be done by daily disinfection of a few central market hubs including transport vehicles (Fournié et al., 2013). Market closures and mass culling had substantially adverse effects on local farmers and food systems, raised animal welfare concerns and ecological issues with mass burials and also led to significant distrust between vets and communities, who hid sick birds and evaded formal markets (Annand et al., 2020; Farrell et al., 2015; Nguyen et al., 2017). Applied research that explores more targeted control strategies would help mitigate adverse effects by defining the scale of intervention needs to balance risks and benefits.

In contrast to the linear view of learning, the dynamic view— sometimes added to M&E to form a new acronym (MEALs, monitoring, evaluation and learning) – emphasizes the need for evolutionary critical reflection. This essentially has a fundamentally different project management approach, grounded in adaptive management principles. Ikeda et al. (2019) describes the use of the SE Asia Stigma Reduction Quality Improvement Learning Network, which linked a defined theory of action and theory of change to organization-level process change. In Vietnam, Duc et al. (2016) outlined 8 dimensions of a context assessment for community health: organizational resources, community engagement, monitoring services, sources of knowledge, commitment to work, work culture, leadership and informal payments. Sopheab et al. (2008) described key elements of adaptive management in a Cambodia project: decentralized planning, accountability mechanisms and strong technical guidelines. Contextual assessment and process evaluation frameworks also aim to promote learning pedagogy, and are increasingly developed due to the focus on complexity and systems thinking, for example in One Health (Abe et al., 2014; Sripa et al., 2017; Tangkawattana & Sripa, 2018; Wilcox et al., 2019; Woldehanna & Zimicki, 2015). This adaptive management approach to learning draws on ideas of complex adaptive systems, resilience and management theory and inherently links knowledge with capacity building and policy (Wilcox et al., 2019). An integrated adaptive management system conceptualizes practice change as the nexus between leadership, problem solving, social networks and system change.

In general, however, we found that the field of public health promotion has advanced further along the adaptive management continuum than agricultural extension, given the growth of implementation science and operational research that seek to integrate qualitative methodologies and process evaluation into M&E frameworks and develop more didactic learning processes (Nang et al., 2019). There are other aspects of learning, including institutional and historical memory for example, which is often sidelined in short project cycles with staff turnover and shifting diplomatic-political pressures. Many projects fail to conduct an adequate review of past work and reach out to former staff, who may have valuable contextual insights to share.

Sub-domain 10. Ethical Engagement

Our final sub-domain of practice change is the level of ethical risk involved in project activities and how teams consider and navigate harms, trade-offs and the consequences of action. Very few publications discussed ethical considerations, signifying a lack of engagement by ethicists and project teams in the region. At the same time, many publications framed their work as based on ethical principles. This suggests that ethical issues can be engaged along a binary from explicit to implicit engagement.

Implicit ethical engagement appears to be the dominant approach of most projects where notions of equity, poverty reduction, participation, inclusion and human rights are assumed to be guiding project activities. These overarching goals are not explicitly analysed in publications but are rather incorporated into project plans and activities based on existing values and norms. These guide decision-making on team membership, selection of collaborators, localization efforts and partnership building. They may also shape the specific pathways for action and policy. Each course of action emphasizes certain aspects of social reality while minimizing or neglecting other possibilities. Without an explicit engagement with the way that values and norms are influencing a project, it is difficult to consider potential tensions between the assumed ethical framework guiding action and a project's goals, objectives and activities as they play out in the social world. For example, efforts to mandate biosecurity measures may harm the livelihoods of small backyard poultry farmers, who will not buy feed and build expensive fences because of the inherent production logic of small-scale poultry farmers (Waisbord et al., 2008). The implementation of live cattle market closures during FMD outbreaks may lead to exacerbated illegal movement of animals (Nampanya et al., 2013; Wiratsudakul & Sekiguchi, 2018). And the influence of the global agribusiness (Chuengsatiansup, 2008),

tobacco, alcohol, food and beverage industries (Cetthakrikul et al., 2019; Chantornvong & McCargo, 2001; Sangthong et al., 2012; Vathesatogkit & Charoenca, 2011) may have an undue influence on shaping project assumptions and plans.

By contrast, explicit ethical engagement seeks to engage the potential unintended consequences of project activities. Attempting to solve one problem may inadvertently create new ones. Zhunusova et al. (2019) acknowledged the need to address the constraints and risks that smallholders face by viewing the adoption of long rotations on acacia plantations as a risk to local livelihoods. Without acknowledging similar risks, projects may supplant or replace local initiatives. As Patrick et al. (2017) describe in FMD control, consensus with communities is crucial for effective implementation of control measures, particularly where overarching policy can be ineffective or dysfunctional of local realities. This reinforces the need for projects to examine existing capacities in communities ensuring they are not supplanting local knowledge that has meaningful impact and greater potential if upscaled. Are the project activities susceptible to co-optation and politicization, and will certain social groups be harmed or excluded? These are critical questions that, at least based on what is discussed in the literature, appear to be seldom asked in any meaningful way. For example, if the goal is to increase shrimp production in Vietnam, this often comes at the expense of mangrove conservation that is crucial to mud crab rearing and hatcheries in the same area (Christensen et al., 2008; Joffre & Schmitt, 2010).

8 Impacts

8.1 Scientific impacts – now and in 5 years

The diagnostic framework identifies 3 domains (Science, Action and Learning) and 10 sub-domains which provides scientists, project staff and funders with a way to conceptualize the components of practice change in agricultural research for development (AR4D).

The anticipated impact is that academics and practitioners have a tool that can be used to help project teams improve practice change in both project design and funding decisions. We anticipate that the framework will be tested by practitioners, scientists, academics and contribute to the discourses on practice change, research for development and extension.

8.2 Capacity impacts – now and in 5 years

The findings highlight a gap in the state of social science research in the Lower Mekong Basin. It is anticipated that through journal articles, the participation of the Advisory Group, reports and other activities the research findings will inform a wider agriculture (and health) extension discourse thereby building knowledge and capacity.

Furthermore, the use of the diagnostic framework will assist ACIAR, project leaders and others with the selection and design of AE4D projects and improve practice change.

8.3 Community impacts – now and in 5 years

How teams consider and navigate harms, trade-offs and the consequence of action is explored and discussed in throughout the framework but especially in Sub domains 5 (Localization) and 10 (Ethical Engagement). It is anticipated that by bringing about a greater awareness of implicit and explicit aspects of local community involvement and ethical engagement, researchers and practitioners can examine existing capacities in communities to ensure they (the researchers /practitioners) are working in partnership with communities and not creating new problems.

8.4 Communication and dissemination activities

During the term of the research the restrictive impact of the COVID pandemic limited communication and dissemination activities to on-line discussions and meetings. However, a journal article is ready to be submitted and the researchers are incorporating learning into other projects such as ACIAR research project SSS/2019/140 Landcare – an agricultural extension and community development model at district and national scale in Fiji.

9 Conclusions and recommendations

9.1 Conclusions

The research presents a new practice change framework for the various factors and forces that shape how practitioners and researchers engage with the worlds of agricultural extension and public health promotion. The framework is based on an evidence review of academic literature from the Lower Mekong Basin. We identified 3 domains (Science, Action and Learning) and 10 sub-domains, each of which can be understood through a binary spectrum – generally following a “more/less” or “focused/expansive” gradient. Our aim has been to explore the nature of practice change – in an integrated fashion, comparing and contrasting lessons from the fields of agriculture and health promotion – in order to provide scientists, project staff and funders with an approachable way to conceptualize the components of practice change in agricultural research for development (AR4D). A list of questions for each sub-domain is provided in Appendix 1. The framework and guiding questions can be used to help project teams bridge the divide between theory/reflection and practice/action, thereby improving practice change in both project design and funding decisions.

We found some important general philosophical differences between agriculture and health promotion. Agriculture largely frames its problems and responses as slow-burning issues (with longer-term implications) while public health focuses on more immediately high-impact issues by generating a language of urgency. Public health tends to start with a clear numeral articulation of a problem and simplifies the options for how to respond. From one perspective, the forces affecting agriculture and health are very different. Agriculture engages with land tenure, production and climate change. Health focuses heavily on more clearly defined goals such as individual risk and clinical outcomes, disease control and biomedical services. The dissimilar cultures of public health and agricultural influence the respective extension approaches to community engagement and practice change. Public health appears to be more certain of its recommendations and the necessity for intervention and change. The agricultural sector, however, appears more uncertain about the direction of change, with an accompanying appreciation of the historic-political problems associated with large-scale rapid changes and the complexity of relationships between land, food and society. This includes colonialism, nation building, agricultural revolutions, international development, global markets and class conflict.

Yet, as we have shown above, the debate about practice change in health and agriculture largely shares many characteristics. The nature of science for development, social action and collective group learning are largely analogous in both fields, although the specifics may be different. This allowed us to develop our framework in a way that is agnostic: it can be applied to health as well as agriculture. Both fields have also historically been trying to move away from a linear (technology transfer) model to a systems-based (people-centric) approach, reflective of broader academic, cultural and policy evolution in how we think about the relation between science and society. However, in general, we found that the published literature in the Lower Mekong Basin showed that public health is generally further along with this transition. This was, to some degree, represented in our literature review results. We found only 35 relevant academic publications from the five case studies in agriculture (cassava/ rice, foot and mouth disease, mud crabs, fisheries, and acacia) compared to 93 in the five health case studies (HIV/AIDS, tobacco control, liverflukes, non-communicable disease (NCD) and avian influenza). This was despite the fact that both fields turned-up the same number of search results (177 vs 174 articles). This was surprising to us. It is unclear whether this represents a publication bias; public health projects are likely to receive more development research funding to support English-language publications (a potential limitation to our analysis).

We found that social theory was not woven into many of the papers. This reflects a gap in the state of social science research in the Lower Mekong Basin. The exceptions included papers describing the need for multi-stakeholder co-operation in areas such as the management of the Mekong river (Hall & Manarom 2015); wetland agricultural management (Datta et al., 2020) and regional dam management (Baird et al 2020). However, most articles found were epistemologically narrow, based on biomedical and agricultural science lens. This limits the ability to learn from other worldviews such as non-western medicine and healing and indigenous ecological knowledge – knowledge that can prove to be invaluable (Baird & Manarom 2019). Enabling an expansion of views may be accomplished through embedded partnerships where researchers, policymakers and practitioners co-create all aspects of the project and jointly learn from the experience.

We also found very few articles discussing “golden rice”, despite its central role in the Green Revolution and various controversies regarding the role of biotechnology in agriculture. This again suggests a lack of integration of broader political economy issues into pragmatic discussions about agricultural extension in the Mekong. Agriculture extension sits at the interface between agriculture, environment, health and social change. Current global rhetoric is increasingly focusing on “system transformations” in the agricultural sector. This conceptualization of action implies an instant end product - a technical solution or an established value chain. There are, however, tensions between this vision of agrarian “transformation” and the description of more incremental practice change. Systems transformation alone will not be sufficient to address the inter-linkages and dependencies of power and governance (Friend et al 2019) – and that multidisciplinary approaches will be needed. There is a need to reframe how we view agricultural development and extension, particularly in relation to smallholding farmers, and structured responses that recognize both political and moral elements. This will require an explicit ethical engagement, dynamic learning approaches and broader governance engagement at a scale and timeframe that acknowledges the realities and practice of smallholder farming.

In conclusion, this report has outlined a unique practice change framework that can be used to assist different stakeholders in improving their project planning approach. By making explicit the various components of practice change and their varying modalities across the spectrum of science, action and learning, the framework may help to address major shortcomings and improve practice change in agricultural extension research for development.

9.2 Recommendations

This project developed a diagnostic framework as a tool for project teams to improve practice change in both project design and funding decisions. Initial discussions with ACIAR Project Leaders show an interest in the framework. We recommend that:

- ACIAR supports the dissemination and use of the framework internally within its various research units. This should include integrating the framework within existing ACIAR project funding proposal evaluations and other avenues.
- ACIAR supports the dissemination of the framework to the wider community of practice, especially in the Mekong region. This could include integrating the framework within existing ACIAR projects to assist with project design, monitoring and evaluation.

10 References

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10.2 List of publications produced by project

Bardosh K, Johnson, M, Colgrave L, Touch V, The Practice Change Framework: An Integrated Project-Centric Tool to Guide Improvements in Agricultural Extension and Public Health Research for Development (submitted to Journal of Rural Studies).

11 Appendixes

11.1 Appendix 1: Practice Change Framework Questions

The Practice Change Framework Questions are a guide to help users apply the framework. These are not yes/no questions but should be used to facilitate group brainstorming.

<p>Sub-domain 1. Problem definition from individual to structural determinants</p>	<ol style="list-style-type: none"> 1. How has the research problem been framed and understood? 2. Has theory been incorporated into the process of the research design? 3. To what extent, and who has been involved, in researching the question/problem? 4. Have assumptions been identified and described in the project design? 5. Have potential biases been identified and described? 6. How has the overall scientific approach shaped epistemological assumptions?
<p>Sub-domain 2. Scientific approach</p>	<ol style="list-style-type: none"> 1. Does the problem encompass more than one discipline? 2. Describe inter-disciplinary dialogues relating to the research problem? 3. What are the specific aims of the research, transformational, practice change or otherwise? 4. Are new conceptual theories likely to emerge from the research? 5. Has the research design been defined using a flexible systems framework that identifies the multiple requirements, operating conditions, and stakeholders needed to address the problem?
<p>Sub-domain 3. The Process of Scaling: From Pilots to Policy</p>	<ol style="list-style-type: none"> 1. At what scale is this research? 2. Is the scale fixed or moves between micro, meso and/or macro levels? 3. What broader governance/structural contexts have been considered in scaling up of the research?
<p>Sub-domain 4. Partnership Approach</p>	<ol style="list-style-type: none"> 1. What sort of partnerships are required for the research? 2. Has the research been designed with little or no input from in-country

	<p>stakeholders?</p> <p>3. Have researchers, beneficiary's policy makers, and practitioners co-created all aspects of the project?</p>
Sub-domain 5. The Level of Localization	<p>1. What sort of research activities will research beneficiaries be engaged in and for how long?</p> <p>2. Are there clear social movements that your research seeks to engage with?</p>
Sub-domain 6. Intervention action, from the singular to the integrated	<p>1. Is the intervention action singular, integrated, or a combination of both?</p>
Sub-domain 7. Institutional strengthening	<p>1. At what scale is the research operating, and does it require focused or expansive institutional strengthening?</p>
Sub-domain 8. The Governance Environment	<p>1. What political commitment, and at what level, will be required for the research to be addressed?</p> <p>2. At what scale does the research require engagement with the governance environment?</p> <p>3. What form of engagement is predetermined in the research given scale of the governance environment?</p>
Sub-domain 9. Learning: From a Linear to Dynamic Approach	<p>1. Does the research design enable flexibility in the M&E review process?</p> <p>2. Is the research about predefined quantitative M&E indicators, or does it seek transformative practice change?</p>
Sub-domain 10. Ethical Engagement	<p>1. Will certain social groups be harmed or affected negatively?</p> <p>2. Who wins and who loses from the project?</p> <p>3. Has a risk management strategy been designed that considers outcome impacts?</p>

11.2 Appendix 2: Journal Paper

The journal paper is being submitted as a double anonymised manuscript which means the identities of the authors are concealed from the reviewers. The paper will be attached as Appendix 2 once accepted and in print.

11.3 Appendix 3: Summary of ASEM/2016/17: Review of agricultural extension

The purpose of this paper is to review and summarise findings from the Australian Centre for International Agricultural Research (ACIAR) project ASEM/2016/17 *Review of agricultural extension* (the Review). The Review is a discussion of the role and practices of Agricultural Extension (AE) and a key output of a research project (the project) undertaken for ACIAR.

This summary informs ACIAR research project SSS/2019/186 *A framework for assessing agricultural extension approaches and an analysis of transferrable public health approaches* which aims to generate practical insights into actionable recommendations for integrated agricultural practice change and community engagement practice outcomes.

Agricultural Extension (AE) is the dissemination of research, innovation, and practical ways to improve production. In Australia it has focussed on the dissemination of both research and its practical applications, and improved farming and management practices. Knowledge gleaned has application in other countries in the Asia Pacific. ACIAR has long promoted technical research to identify means of improving production in the Asia Pacific. In recent times it has evinced a wish to strengthen the transfer and implementation of knowledge through AE.

The traditional focus of AE has been Transfer of Technology (TOT) in which research and new understanding (including new management and other practices) are developed by scientists and relayed to farmers and others in the production chain. The Review refers to many critiques of this traditional view of extension and calls for the development of new models which counter the critiques. It takes particular note of activities of the international development community carried out by organisations like the UN, World Bank, and including A4D (Agriculture for Development) and other work under the rubric of sustainable development.

It's also worth noting that there are likely to be considerable differences in the way AE is pursued between countries. Examples can be seen between Mekong countries that are relatively poor with largely rural populations, low levels of literacy, different value systems and different government structures.

Summarising the Review of agricultural extension

The following section identifies and interprets matters of interest from the Review, interspersed with commentary. The matters are grouped under Review headings.

Executive summary

The objectives of the project were (i) to identify the assumptions, challenges and practices of AE and (ii) identify needs and opportunities for improving the theory and practice of AE. The project obtained data from workshops in Australia and Cambodia attended by a diversity of stakeholders and extension practitioners who presented a comprehensive analysis of current trends in AE. In addition, data was obtained from 50 interviews with ACIAR researchers and other key informants and from an extensive cross- disciplinary

literature review. The project developed an analytic framework to interpret these multiple sources of information. The framework used broad post- structural, postcolonial, and feminist theoretical geography. The theoretical lens employed six strands: governmentality, social practice theory, reflexive modernisation, coproduction, worldviews and feminist philosophy.

The Review infers that the extant form of AE, state based, top down & technology focussed, has been discredited and largely dismantled. But there remains a need for practices that engage farmers and generate, disseminate and scale appropriate innovation. The challenge for ACIAR is to redefine and reimagine AE (perhaps utilising models such as Landcare).

The project found AE practices are critically important to the challenges facing agriculture. Insights from the *project* can be used to support strategic planning at ACIAR; and the development of training tools, such as a social science manual for agricultural researchers. More specifically ACIAR could expand its research to include:

- The shifting context of agricultural transformations,
- Critical reviews of innovation systems incorporating how research is embedded in social- ecological systems including climate,
- Agriculture's multiple roles in socially just sustainability transition¹,
- Lessons from Landcare based participatory extension models,
- Long-term case studies of regionally based innovation processes

There is some tension between increased production and having sustainable systems. Population growth can increase pressure on the natural environment. There may be less scope for reaching a sustainable balance in countries where food security is a more compelling goal. Furthermore, there are trade-offs to achieving economic, social and environmental goals where dominant market driven mechanisms are prioritised over social or environmental goals. Nonetheless, examples where production, environment and social imperatives co-exist can be highlighted, for example ACIAR project ASEM 2012-063.

Background

The Review notes that changes in context such as concerns about climate change, food security and the integrity of waterways have led to increasing discussion about the need for transformation in the role and practices of agricultural research and development, and by implication for AE. The project takes up this challenge in relation to agricultural research for development (AR4D), and in particular by highlighting salient aspects of social and political dimensions of agricultural development.²

¹ The United Nation's Sustainable Development Goals (SDG) will be important in the achievement of transformational change. This is consistent the ACIARs goal of achieving 'more productive and sustainable agricultural systems, for the benefit of developing countries and Australia, through international agricultural research partnerships.

² The discussion of transformation suggests there is a search for a replacement AE which would provide a new platform for agricultural growth, environmental sustainability, and social harmony. It would be useful to look for general solutions to problems which may be multidimensional and situation specific. That is there may not be single approach but a variety of approaches in which agricultural and social objectives can be achieved in different situations. This is particularly the case where social objectives (food security and wealth distribution rather than improved technology) are paramount.

The project also notes that debates about the limitations of existing approaches to AR4D are part of a larger argument about human society. In this view colonisation, nation-building, international development and agricultural revolutions are experiments that have generated some unexpected and undesirable outcomes.

The UN has issued an agenda for transformational international action. It proposes a systemic approach in which investments are needed include the cooperative provision of rural infrastructure, technology and agricultural research and extension services³.

There may be situations where the main drivers of change will remain ToT although most situations will require a co-production approach. In other words, the sensible approach is 'horses for courses'. Don't look for a one size fits all because there probably isn't one.

The discussion suggests that the way to go is to devise a series of checks which may be applied to a particular project to ascertain its nature. The response to the checks will suggest an approach that fits the problem being addressed. In some cases, this may be ToT, more likely it will be a much more interactive co-production where even the nature of the proposed intervention may not be discovered until after a conversation (or more likely an extensive period of consultation) has been undertaken with all stakeholders.

Methodology

AE is interpreted through six lenses: Governmentality, Social practice theory, Reflexive modernisation, Co-production, Worldviews and Feminist philosophy. The *Review* states that the lenses provide different perspectives and are complementary.

1. Governmentality

The central idea is that governmentality is a way government can indirectly impose⁴ its norms through its practices such as reporting, expectations, structures and practices around accountability, innovation, competition and progress.

Governmentality may be manifest in problematisation wherein accepted truths are challenged. Agriculture is represented as in need of development (improvement).

If this interpretation is correct ACIAR could attempt to document or quantify how susceptible particular projects are to governmentality e.g., will a particular project entrench or critique existing norms?

2. Social practices

Are the repeated purposeful interactions between people and other elements of the world. Social practice theory gives priority to the practices of communities or societies rather than individuals and recognizes these practices evolve over time.

Practices are made up of meaning, knowledge norms or beliefs; the material or physical conditions; and embodied competences or skills.

Social practice theory may be applied to prospective ACIAR projects by requiring proposals to indicate the effects the project is likely to have on social practices (broadly defined).

3. Reflexive modernisation

Refers to the ills arising from modernity requiring either further progress for treatment, or it can mean considering amelioration of potential adverse outcomes through better design.

³ But further investment may be ineffectual if there are exogenous factors which hinder the achievement of benefits such as transport blockages, conflict or poor distribution.

⁴ In addition to more direct exercise of power

Problematization is a tool that can lead to reappraisals of first order reflexive modernisation.

4. Coproduction

Coproduction is a straightforward concept in regard to AE. The subject matter of extension should be developed with relevant target stakeholders, rather than being imposed by government or bureaucrats. Stakeholders may include farmers but also other relevant persons such as suppliers, families, and other interested parties. For some projects, such as those with significant externalities like climate change, stakeholders will include policy makers.

In terms of ACIARs needs, potential research projects should be required to indicate the extent to which stakeholders have been consulted, including conceptually, during planning and in implementation.

5. Worldviews

Are a broad categorization of how, given our experience, circumstances, and education, we believe the world to work, our role and options within it and how things should be.

Using worldviews to evaluate projects would involve establishing the worldview underpinning the project. This could be aided using a two-dimensional framework measuring grid, how regulated or prescriptive individuals think social life should be, on one axis and group, how loyally or ethically bound individuals are to each other, on the other axis. This framework generates four main worldviews.

6. Feminist philosophy

The authors show how aspects of agricultural development can be seen as masculine or feminine. AE theory and practice reflect dominant and embedded values and approaches. The use of feminist philosophies enables the development of critiques that reveal bias and explain the privileging of production and the higher status accorded to the “hard”, experimental sciences relative to the “soft”, qualitative ones.

A feminist philosophy can help with understanding the ‘gendering of the interlocking cultural, social, economic and political ideals that shape all aspects of social life, including research, innovation and agriculture and international development’. The challenge is to apply these understandings in a meaningful, relevant and useful way to AE.

The Review suggests that all or some of the six lenses could be employed to provide a broader understanding to researchers. However, it is not clear which ones are relevant and what is their order of importance. While this treatment is comprehensive, important questions remain which may limit its use in the current form. For instance, a key idea may be to consider a proposed project in its broader context. Who gains from a successful project? What impact does the project have on inequality, poverty, etc.

Achievements against activities and outputs

The historical rationales for AE are enhancing food security, reducing poverty and sustaining natural resources. These justifications endure in spite of three persistent critiques: colonial characteristics, limited use of systems thinking, and questions of efficacy and performance. AE has responded emphasising participatory approaches, social learning and innovation rather than simply technology transfer. Nevertheless, the field remains hotly contested.

Key results and discussion

The project is about *problematization*. There are three aspects, research and innovation, international development and agricultural extension.

Problematization of research and innovation. Rapid transformational change is required to shift from linear to systems approaches to make development genuinely sustainable

(noting that prioritisation of capitalist markets and economic growth can have opposite effect). Concomitantly is a general turn towards innovation.

Problematization of international development. This space is highly contested. The Review notes that uncritical adoption of ToT often fails to deliver desired public good outcomes. Nevertheless, much research on agriculture remains depoliticised focussing on operationalising urgent agendas. Yet there is a need for research on the trajectory of the whole development endeavour.

Post-colonial development arose from Western narratives about improvement, and stages of growth. Development is considered to be natural but uneven. Immanent development or modernity involves trade-offs which were not necessarily appropriately appreciated. Government can undertake welfare policies to recompense those who may suffer from the imposition of policies which raise average incomes.

Problematization of AE. There are three major critiques of AE: ethics and justice; the need for systems thinking; and efficacy and cost effectiveness.

Ethics and justice: The most far-reaching critique focuses on AE as post-colonial development in which local knowledge and ways of life were sometimes willingly and other times violently, replaced. The critique contests the political – economic characteristics of top-down AE, pointing to the dominance of powerful interests.

The second main critique stems from the lack of systems thinking. Influences on farming that need to be considered include families, rural communities and social networks; local, unofficial or tacit sources of knowledge; property rights, governance and institutional dimensions; and powerful intangible factors.

The third critique concerns performance. Concern has been voiced about the impact, outcome and value that AE generates. It needs to be more productive and adaptive, more efficient and cost effective while also managing increasingly complex economic, social and environmental trade-offs.

The Review has made a strong case that there is greater scope for the use and application of social science research that informs:

- Understanding of the broad context of A4D
- Progressive, critical self-reflexion to improve knowledge production, adoption and adaptation
- Adoption of specific techniques and tools
- R&D projects designed to have embedded extension via co-production.

Recommendations

The Review advocates further use of open ended, relationally oriented approaches for AE to link its future to broader socio- technical transitions that are about collective, social experiments oriented to social learning and coproduction. Accordingly, there is a need to critically revise and renegotiate relationships between science and society. Socially informed AE needs to be embedded as part of project design enabling coproduction of results.

Implications for the ACIAR

The Review has offered insights about how AE may be revitalised, particularly embodying critical social science. These insights will enable ACIAR to develop and implement more collaborative, innovative and participatory processes. The processes are of two types; general actions by ACIAR; and by the application of diagnostic tools in the evaluation of specific projects being considered by ACIAR.

General actions by ACIAR

- ACIAR generates opportunities for researchers to learn about:

- the insights of this project; and
- critical social science methods.
- A discrete project is funded to develop a crash course in social science for agricultural researchers.
- ACIAR expands its program of social science research about
 - identification of transformative techniques for scaling innovation
 - critical reviews of innovation systems
 - agriculture's multiple roles in sustainability transitions
 - lessons from Landcare- based participatory extension models
 - long- term case studies of regionally based innovation processes

Informing the Diagnostic tool

The diagnostic tool⁵ will enable ACIAR to assess proposals. Listed below are additional questions drawn from the Review. This is not a comprehensive list rather prompts that contribute to the development of a framework for assessing agriculture extension approaches.

Check project proposals against social science practice criteria:

- Does the proposal consider the interests of all potential stakeholders?
- Does the proposal consider long term outcomes (benefits and costs)?
- Are benefits transferable?

Scope the interests of stakeholders:

- Identify all stakeholders not just a specific target group such as farmers in a particular area but also families, communities, suppliers, downstream agents, geopolitical interests etc.
- Note that some stakeholders may be interested parties in other sectors/jurisdictions who may also benefit from learnings gained through a project.
- Elucidate their interactions and their interests.

Identify long term outcomes:

- Are net benefits positive?
- Are there broader (non-quantifiable) benefits for Australia and its international partners? For instance, ACIAR projects contribute to science, knowledge and soft power diplomacy. Concomitantly poorly targeted projects can be a lost opportunity.

The transferability of outcomes

- What implications does the project have for other jurisdictions? Can learnings be employed elsewhere?

⁵ Bardosh, K, Johnson, M and Colgrave L. *A framework for assessing agricultural extension approaches and an analysis of transferrable public health approaches* SSS-2019-186