EVERYDAY THRESHOLD CONCEPTS: IMPLICATIONS FOR SUSTAINABLE AGRICULTURE EDUCATION IN VIETNAM'S MEKONG DELTA

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Abstract

Within shifting development paradigms, in the Mekong Delta, the largest and most productive agriculture region in Vietnam, integrated pest management has for decades been introduced to help farmers more effectively manage their farms and natural resources, and recently a participatory approach has been promoted in agricultural extension work. Using those two cases that illustrate liminal states local knowledge users inhabit, this paper investigates knowledge acquisition and adoption for sustainable agriculture under the threshold concept research. Based on qualitative data analysis from a one-year field-research in the Mekong Delta centered around the results of a two-round Delphi survey with the participation of local researchers to identify threshold concepts, our findings highlight that localised threshold concepts developed from everyday practice, which we coin everyday threshold concepts, should be emphasised to address the stuckness in learning and practising participatory and sustainable development and that threshold concept discovery needs to be a joint journey of global-local, trainer-trainee and science-everyday knowledges. The paper thus contributes to the growing research body of threshold concepts by integrating the ontological dimension - the level of social interaction in knowledge creation - into the current framework that primarily concentrates on epistemological discussions – a direction that invites further research.

Keywords: everyday threshold concepts, agricultural extension, pest management, Mekong Delta, Vietnam.

1 INTRODUCTION

Development research and practice have been transformed along shifting paradigms since modenisation critisised by the orientation of unidirectionally Westernised and economised development. Several alternative development frameworks have turned focuses on issues relating to grassroots participation and sustainability [34]. Within grassroots development, participatory approaches and methods have under various labels and names been applied across disciplines and sectors aiming at advancing local knowledge, local diversity and learning process. Sustainable development has been promoted with the argument that economic growth, environmental protection and social change can be harmonised. Since their inception, participatory and sustainability approaches have evolved through reflective successful and failed stories in both conceptual and practical terms. Central criticisms on the alternatives are presently not directed to the methods or models themselves, but spirally to the ontological positions they presume. Chambers (1994) argues that the ignorance and inabilities of local people are the artifact of outsider professionals who believe that their knowledge is superior and the knowledge of local people is inferior, thus to utilise participatory approaches as a philosophy and practice, the outsider's participatory attitudes and worldviews become more critical than the methods they use [3]. In the same manner, Escobar (2011) discusses sustainability in pluriverse other than one unified universe ontology and suggests that a new design about human practice should include plural worlds and knowledges [12].

Under the influence of shifting development paradigms, agricultural and rural development in many countries including Vietnam has undergone critical transformations particularly within the umbrella of participation and sustainability. This research analyses the diffusion and adoption of alternative development knowledge within the context of the Mekong Delta, the largest, most modernised and productive agriculture region in Vietnam. The analysis focuses on the two cases: participatory agricultural extension and integrated pest management. Delving into liminal states local knowledge users inhabit as revealed in our preliminary outcomes of field-research analysis, and taking a focus on discipline knowledge construction, this paper investigates knowledge acquisition and practice for sustainable agriculture in the research of threshold concepts, the concept which is described as akin

to a 'portal', opening up the learner's internally transformed way of thinking and practising within disciplines [27].

The next two sessions will introduce and explain the rationales of the research site, research issues and threshold concept theory and its application. After the methodological part describing the survey design and implementation, the main findings will be presented. Finally, the paper will provide implications for sustainable agriculture education in the delta and elsewhere applicable. The data used in this analysis were collected during a one-year field research project in the Mekong Delta within the period April 2010-11.

2 THE MEKONG DELTA: "STUCKNESS" IN PARTICIPATORY AND SUSTAINABLE DEVELOPMENT ADOPTION

Located in the south of Vietnam over an area of around four million hectares, the Mekong Delta is the greatest agricultural region of the country. In a general view, improved water control systems, advanced technology application and appropriately changed economic institutions have led to a rapidly modernised and highly productive agricultural industry in the delta [35]. To date, the delta is known as the national "rice basket", "rice granary", or even "cradle" of the country's agricultural production, occupying on the total national proportion approximately 50% of rice (80% of rice export) and food production, 80% of fruit production and 60% of aquacultural production [30, 33].

However the delta is confronting chronic and emerging problems and challenges in order to develop more sustainable agriculture and rural life. The most visible and discussed challenge is post-Green Revolution impacts, mainly insecticide over- and misuse under the pressing pursuit of higher yields. Environmental degradation and natural resource mis-management are getting severe by rapid urbanisation and the pressure of modernisation of the sector in response to the national food security. More specifically, climate change effects and regional water management are challenging development achievements of the entire delta residents and especially the marginal communities. Intensified access to the global market and higher demands of domestic consumers stipulate better product quality control by local agricultural producers who are largely accustomed to traditional cultivation and small-scaled production.

New issues and questions for sustainable agriculture and rural development of the delta have required and actuated the change of the local knowledge system. The local agricultural knowledge system including research, education and extension sub-systems has performed a number of knowledge-related functions that connect and translate global knowledge and scientific research into applied technology that informs locally-specified conditions. In such processes of knowledge generation and facilitation of learning for change has the local knowledge systems evolved.

Participatory agricultural extension: The agricultural extension system in the Mekong Delta, as in Vietnam nationally was officially established in 1993 with the state extension as the nucleus. The system has so far developed a broad network from the central level to the provincial, district and communal levels. In many areas, extension volunteers have operated at hamlets and villages. Agricultural extension work has been largely reported by government agencies to have brought significant changes in local farmers' livelihoods by increased economic efficiency of resource use through advanced technology transfers. However, public extension has been criticised in recent research that its services are unable to reach wider rural population in need because of the solid maintenance of a top-down extension mechanism, sole reliance on technical staff and thus the prominent practice of the one-way techno-scientific knowledge transfer [36]. Thin extension coverage with lowered-qualified extension workers weakened by increasing brain drains is defying efforts to further expand and extent extension services to agricultural producers who are progressively more diverse and demanding in updated and modern knowledge and technology. Without penetrating structural changes, public agricultural extension cannot lead but more or less "chase after farmers" (Interview 149, senior researcher, male, 05.10.2010).

PAE is an alternative approach introduced principally to promote participation and agency of farmers in agricultural extension and education, enhance learning and practising in the local fields and encourage learning among and between farmers and extension workers [41]. Since around 2000, PAE has been enunciated and developed in Vietnam under PAEM (Participatory Agricultural Extension Methodology) projects in selective Northern and Central provinces and PAEX (Participative Extension) program with the adoption of Participatory Technology Development (PTD) in Southern and Mekong Delta areas. Aiming to build up an extension system that is demand satisfied and based on the

assessment that extension workers are quite well trained in terms of technically agricultural knowledge but lacking competent extension skills, PAEX focuses on solidifying participatory extension methods [45]. PAEX's participants include provincial and district extension staff who learn and practise four main participatory processes with farmers from extension clubs: identification of local problems and needs, proposal of solutions, implementation of experiments and dissemination of positive results [19]. At best, via PTD, locally-tailored knowledge and technology are generated and diffused by local farmer's experiments with the assistance of extensionists and researchers. By end of 2009, 57 extension clubs were founded with more than 1400 participating farmers and 60 experiments invested [46].

In evaluating PAEX, extensionists tend to agree that participatory extension is an effectively interactive method with farmers but can hardly be operationalised without sufficient time and financial allocation (Interview 306, provincial extensionist, male, 07.03.2011) whereas many extension club members are unable to tell what participatory steps are meant or participatory experiments are only conducted in sizable farms and with better-off farmers [23, 38]. Thus to improve PAEX, it is widely suggested: "more project resources should be allocated and attempted to form many more extension clubs. These clubs should include more industrious and learning-motivated farmers" (Interview 308, district extensionist, male, 07.03.2011). We would argue that even when further external financial and human resources are truly needed for the success of PAEX application and institutionalisation, it is important to enhance local knowledge use and break the "dead" learning space between professional experts and farmers in doing PAEX together, otherwise it would just renew bureaucratisation and outsider's top-down decision making under the guise of participation. The practice of participatory agricultural extension needs a change right in the extension organisational culture that extension agents learn from farmers because of the fact that farmers are agents who generate and develop new knowledge. Such a change is not always accepted or known to be accepted by extension agents [43]. For this reason, local extensionists are stuck in understanding and practising participatory agricultural extension as no more than a means or a method to get to know more about farmers.

Integrated pest management (IPM): Since its usage nearly 25 years ago, IPM has become a household term, generally understood, frequently used, but just as often misused by professionals and laypersons alike, often without much thought given to the subtleties and implications of the expression nor its impact on modern agriculture [21]. According to Kogan (1998), IPM connotes multiple meanings: "(a) the appropriate selection of pest control methods, used singly or in combination, (b) the economic benefits to growers and to society, (c) the benefits to the environment, (d) the decision rules that guide the selection of the control action; and (e) the need to consider impacts of multiple pests" [21].

Since 1990, IPM has been introduced to Vietnam and the Mekong Delta as a solution to change pesticide abuse habits of local farmers and better protect environmental and farmer's health via FAO's and IRRI's groups of projects. FAO-led program has taken a participatory training approach called farmer field schools (FFS) to empower rice farmers in making decisions [11, 18]. Over the last decade, many IPM programs have been consolidated and spread through other crops like vegetable and groundnut [31]. A number of IPM rice-fish models, IPM clubs, IPM communities, golden snail management, rat management, rice disease management and seed rehabilitation have been promoted. Over the past two decades, it is estimated approximately eighteen percent of farmers from the Mekong Delta have been FFS-trained [11]. Meanwhile, IRRI-initiated IPM has focused on "no early spray" campaigns and made use of cost-effective well-developed multi-media [11, 15]. The campaigns motivating that insecticide application in the first 30 days after transplanting or 40 days after sowing is unnecessary were instigated in two remote districts in 1994 and three years later, eighteen provinces in the South of Vietnam have applied this model from local funding, leading to the adoption by 550,000 farmers over millions of hectares of rice, while the media campaign was estimated to reach ninety percent of farmer households in the Mekong Delta [15, 31].

In 2002, *three reductions and three gains* (3R3G) as a locally modified and improved IPM was developed and applied in the Mekong Delta to further encourage local farmers to reduce pesticide by submitting reduced seed and fertiliser application so as to gain higher yields, better rice quality and increased profits [16, 42, 44]. Since 2008, the model has been further extended to be called *one must and five reductions* (1M5R) with two supplemented reduction elements: reduced water use and reduced post-harvest loss, and certified seed use added as a must do thing. The reported results of the first 1M5R crop in An Giang province have proved considerable advantages of the model which is currently promoted to spread out all over the Mekong Delta [24]. The latest IPM-oriented program is *ecological engineering* launched early 2011 aiming to both restore biodiversity and ecosystem

services and reduce the use of insecticide that destroys biodiversity [10]. An Giang is pioneering implementation to design a ecological engineering ten-year (2011-2020) program called *rice fields with flower bunds* (*ruong lua bo hoa*). These IPM-localised campaigns have adopted the same communication strategies: participatory consultation and design with farmers, presentation and evaluation of pilot sites, and finally multimedia-based upscaling.

Previous research revealed that farmers who had accessed IPM trainings or media campaigns largely reduced their insecticide use, especially those in campaign-launched areas and some years right after the campaigns [25, 32]. What should be noted from a 1992-2007 monitoring survey data analysis by Escalada et al. (2009) is that from 2005 onward, there is however an increasing trend in farmers' insecticide use and by 2007 farmers' insecticide sprays have returned to the levels of pre-campaign years [11]. The authors highlight the need for repeated trainings and campaigns as reminders to reinforce farmer's judgments and spray decisions particularly in circumstances of pest outbreaks and conflicting messages by pesticide advertisement [11].

Our focus group discussions (FGD) carried out with farmers from different backgrounds and locations in Can Tho City agree that IPM discontinuance may bring local farmers back to old pesticide-reliant habits: "We did participate in IPM courses, more than 10 years ago or so. We now almost forget about it. There is no longer IPM training in our area. We occasionally watch IPM programmes on television, but they are just to watch" (Farmer FGD, Phong Dien, 20.11.2010). However, we noticed that the farmer's conceptual acquisition of IPM is a crucial determinant of their practice:

> "Application of IPM is very useful for farmers. We can reduce production costs and increase our income. IMP also helps protect the environment and the health of farmers. IPM appliers are persuaded to plant healthy rice, protect predators and visit their field frequently. However IPM has not been widely adopted in our areas because our fields are small-sized and raggedly-distributed." (Farmer FGD, Binh Thuy, 20.11.2010)

> "Water reduction in agricultural production is intriguing but farmers tend to be reluctant to follow this practice. Fields here are not even and water has to be kept at a certain level to protect rice from rats and weed invasion. Further, water is abundant around and pumping machine is available, thus we easily pump more water into the field, just cannot wait until it gets dry. We know and understand IPM and 1M5R, but the techniques become inapplicable to our current conditions." (Farmer FGD, Phong Dien, 23.11.2010)

> Farmers now can better access different sources of new and advanced technology and knowledge. But realising such knowledge in their field is limited as old habits learnt within families and neigbours are still prominent. I know many farmers have learned IPM, seed reduction, seed sowing by rowing machines, 3R3G and they can clearly and distinctly tell you what these techniques are - yet they keep unchanged traditional way of cultivation in reality. (Farmer FGD, Cai Rang, 03.12.2010)

The citations show farmer's in-mind struggling states of applying new methods and technologies over their traditional ways of doing farming. Learning new things merely as methods and without understanding concept-underlying assumptions and philosophy can hardy persuade farmers, rationally and practically, to apply what they have learnt.

It is evident that applying new knowledge into the local practice is dependent to a number of factors including knowledge sources, knowledge receivers, learning processes, as well as application-enabling conditions. What is accentuated here greatly relates to the issue of conceptual understanding that can transform the local knowledge users' way of thinking and practice. For this reason, this paper investigates into knowledge diffusion and adoption barriers using the threshold concept research, concepts that are central to the mastery of knowledge in a subject area or discipline.

3 THRESHOLD CONCEPTS: FROM STUCKNESS TO TRANSFORMATION

The ideas of threshold concepts have recently emerged from and widely used in education and more specifically curriculum design. Threshold concepts are defined as akin to conceptual portals or gateways that open up a transformative internal view of the subject matter or part thereof, subject landscape, or even world view within and across disciplines [22, 27, 28, 29]. Different from "core" or "key" concepts, Meyer and Land (2003) identify five characteristics of threshold concepts [27]:

- Transformative: Threshold concepts change the way learners think and practise in their disciplines. The conceptual shift in understanding a subject marks an initiation into any subject culture as "we are what we know" [4].

- Probably irreversible: Threshold concepts are unlikely for learners to be forgotten or unlearned. This does not however exclude the possibility of concept modification or rejection for a more refined mental model.
- Integrative: Threshold concepts allow learners make connections and see interrelatedness of phenomena that are previously hidden.
- Possibly often bounded: Threshold concepts indicate the boundaries of conceptual space or subject areas.
- Troublesome: Threshold concepts are conceptually difficult, counter-intuitive, alien, or seemingly incoherent.

Since its inception, threshold concept research has attracted growing interest and discussion within specified disciplines as diverse as education, nursing, computing, economics, geology and politics because of its explanatory and practical potentials from both cognitive and social learning perspectives [4, 6]. It is reviewed that threshold concepts are often proposed within disciplinary settings as either differentiated concepts or overarching concepts within a hierarchy of concepts [1]. Based on the conceptual change theory and focusing on disciplinary knowledge transformation, Davies and Mangan (2005) offered a more fine-grained distinction of thresholds: basic thresholds (relating the transformation of everyday experience understanding through an integration of personal experience and discipline ideas), discipline thresholds (relating the transformation of understanding of discipline ideas through acquisition of theoretical perspectives), and modelling thresholds (relating the transformation of ability to construct discipline arguments through acquisition of organising ideas) [7]. A web of threshold concepts therefore helps to construct the overall structure of the discipline, which in turn can establish the disciplinary continuity in the punctuated learning [20]. The usefulness of threshold concepts is also discussed in the provision of a transformed way towards cross- and inter-disciplinary discourses [2, 40].

Understanding threshold concepts involves in learning and knowledge acquisition processes through overcoming misconceptions, troublesomeness or liminality, which leads to thinking and practising transformation in disciplines [9]. The threshold concept theory is often criticised in arguing that concepts cannot be reducible to capacities [39]. More constructively, Rowbottom (2007) emphasises that “it is that so-called ‘threshold concepts’ are not as easy to spot as anyone has previously thought, even if there are such things” [39]. Thus, helping learners to understand and grasp threshold concepts is not less important than identifying threshold concepts and including them into the curriculum design.

The threshold concept framework provides an alternative approach towards learning difficulties that goes beyond normal phenomenographic research by strategising the social construction of disciplines [2]. As such, adopting threshold concept research can facilitate the creation of partnership research between educational developers, learners and subject specialists [5].

4 THE SURVEY DESIGN

A two-round internet-based Delphi survey was carried out to identify and rank threshold concepts in two selective discipline clusters: agricultural extension and pest management. Based on previous contacts with agricultural experts in the Mekong Delta for interviewing data collection within a broader research, experts and researchers from academic, governmental and industrial organisations were invited, with the final sixteen respondents (thirteen males and three females) participating in the survey. Approximate two-thirds of the participants are over 40 years old and hold a doctoral degree with working experience of more than ten years. Participants’ specialisations include agronomy, agriculture system, plant protection and biotechnology, aquaculture, and agricultural extension and rural development. Some of them took a leading position in their professional field. A striking feature is that most of the respondents maintain the dual-profession of knowledge creators (academic, governmental or corporate researchers) and knowledge disseminators (for the rural community development).

In the first round, the respondents were asked to propose threshold concepts relevant in their fields of agricultural extension and pest management. A threshold concept literature summary in English and its Vietnamese translation version were provided to all participants. To ensure the respondents’ sufficient and accurate understanding of threshold concept, examples were given and face-to-face discussion were encouraged and conducted. The first-round results were synthesised and presented as a list of identified threshold concepts with feature descriptions and illustrations. Respondents in the second round were requested to indicate their agreement or disagreement towards threshold concepts proposed in the first round and rank their importance on a five-point Likert scale (1 = very unimportant,

5 = very important). Given the fact that Delphi technique enables the researcher to better understand issues of concern by consulting opinions of experts whose anonymity is maintained, it is highly appreciated for encouraging free and true opinions from experts based on their personal knowledge and experience and minimising influences and biases caused by dominant individuals [14, 17]. Survey respondents found threshold concepts both novel and provoking, thus some of them inquired direct talks for hours with the researcher to further share their opinions and ideas about threshold concepts.

5 IDENTIFICATION OF THRESHOLD CONCEPTS: SCIENTIFIC AND EVERYDAY KNOWLEDGES

Within the two selective discipline clusters, there are a number of proposed concepts that meet the features of threshold concepts. The ranking exercise is aimed to prioritise and network those concepts. For the purpose of the analysis, we will focus on discussion on scientifically-developed concepts in relation to proposed concepts which are generated from practical involvement and reflection of local experts into the field, that we call everyday threshold concepts.

Agricultural extension: The respondents agreed that *participatory agricultural extension* is a threshold concept. As earlier discussed, in the common thinking of agricultural extension experts and practitioners, knowledge and technology are produced and transferred by scientists and agriculture educators towards local communities in need to promote the social and economic development. Such practice has been consolidated by the hierarchical and bureaucratic system of extension services in Vietnam. Respondents agreed that the introduction and adoption of PAE can potentially satisfy local demands of knowledge from an integrated bottom-up and civic learning approach. The most difficulty in understanding and applying the concept, as respondents figured out, which is similar to the above argument made in section 2, is the transformation of extensionists' thinking and doing so that farmers' needs and knowledge are responded and used.

The survey indicates also that *farmers are experts* (*nong dan la chuyen gia*) is recognised as a threshold concept. It is explained that once farmers are regarded as experts, development professionals as outsiders not only encourage farmers' participation but also recognise farmers as partners in designing and implementing development projects. The following extractions from the survey further explain respondents' recommendation:

> "Upon grasping this concept, all fundamental concepts of PAE are there and connected. The concept helps me deeply understand why we implement this and that PAE methods. I now can explicate to myself why we need to obtain opinions and ideas from farmers in assessing and evaluating development projects. We do such phases not because we are required to but we need advice and knowledge from farmers who are real experts on their farms and in their farming communities"

> "When thinking *farmers are experts*, separate pieces of PAE knowledge are linked into chains, which makes me understand PAE in a quicker and deeper manner."

> "At first, I found it challenging to understand, believe and practise within the notion "farmers are experts". Normally, experts are those who transfer new knowledge and techniques to farmers. Whether farmers actually understand and explain their work is very hard to say."

As such, farmers are experts shares several underlying participation and learning principles with PAE. In fact, *farmers are experts* in the definition of local expert inherits and sheds light on PAE contents and methods, without which the concept might loose its power in a vacuum. What makes *farmers are experts* compelling perhaps it is expressed in the local language that can explicitly convey meanings less expressed in foreign abbreviations such as PAE, PAEX, PAEM or PTD which are more often used as a method. One of the leading experts in PAE in the Mekong Delta asserts:

> "We regard farmers as experts. From such attitude towards farmers do we respect farmers. Considering farmers as experts transforms the way we behave and communicate with farmers. Once our attitude, behaviour and communication are changed, farmers grow close to us and become our fellow-travellers in the learning journey. Farmers' opinions and ideas are listened to and respected and thus they are actively engaged into agricultural extension projects that promotes the effectiveness and efficiency of agricultural extension" (Interview 285, senior researcher, Can Tho, 10.12.2010)

Pest management: The survey reports a hierarchy of threshold concepts proposed. *Integrated pest management* (IPM) is identified as a discipline threshold. *Economic threshold*, which is defined as "the pest population density at which control measures should be adopted to prevent an increasing pest population reaching the economic injury level" [8] is the antecedent to IPM. IPM in turn is claimed to

be under the higher order concept of *sustainable agriculture production*. This finding is relevant to what Davies and Mangan (2005) suggested as discipline and modelling threshold concepts.

A group of respondents supported the idea that *caring* is a threshold concept in pest management. They argued *caring* would transform the way farmers think about and treat their plants, animals and environment. Farmers very often do not care or lack basic knowledge to appropriately care for their crops over growing phases. Such taken-for-grantedness seems to be much truer with farmers from the Mekong Delta where land and weather conditions are more favourable than other regions in the country. However, *caring* is not restricted to hard-workingness or industriousness, rather it connects to smart crop management, individually and collectively. The following citations extracted from the survey further illustrate such views:

> "Normally, farmers here lack care about growth and development processes of plants and domestic animals. In the conditions of temperate climate and fertile soil, farmers sow their rice seeds and wait for harvesting. Rice seeds are often selected from their previous crops. Now that most farmers pursue intensive farming, farmers really have to care from verified seed selection, land preparation, to crop growth over various phases, frequent field visits and appropriate decisions of pest management. Farmers need to treat their crops with knowledge-based caring that goes beyond the customary perception that anything you stick in the ground will grow. "

> "The rice growth cycle is similar to that of human-beings. They both requires right interventions and care. Healthy rice first grows up from healthy seeds. Next, seeds like children need to be placed in a favourable environment to develop well and strongly. This requires farmers to invest in deep plowing and careful harrowing, which is quite absent in farmers' traditional thoughts, but now becomes crucial to prevent organic toxicity in triple-crop and intensive-farming systems. Pests and diseases should be frequently observed and checked to provide proper treatment. Here come principles of "4 right things" in using pesticide, no early spray, 3R3G, 1M5R and also ecological engineering. In the same way as human obesity, redundant nitrogenous fertilizer brings negative effects for rice."

> "Mekong Delta farmers need acquire basic knowledge about their plants and animals in order to apply appropriate care."

Caring as a suggested threshold concept comprehends the above-cited connotation of IPM. More than a technical and moral call, *caring* paves a potential epistemological transition to change farmer's minds and practice in pest and crop management. Again, defining *caring* takes an IPM integrative approach. Though not bounded by IPM, *caring* might become nebulous with no reference to IPM-based methodological developments.

What has been discussed in this section illustrates the relationship and interactiveness of scientific and everyday worlds and knowledges. It is the local researcher's peripheral position between knowledge generators and knowledge practitioners that instigates the development of everyday threshold concepts based on their daily practical experience and reflections. Despite their foundation on everyday experience, everyday thresholds are basically not basic thresholds as typologised by Davies and Mangan (2005). Everyday thresholds can be under basic, discipline (area of practice) or modelling categories largely dependent on the concept's connotation and connection with a stock of scientific knowledge. In this sense, everyday threshold concepts foster scientific evidence links as well as ignite local imagination for change.

6 IMPLICATIONS OF EVERYDAY THRESHOLD CONCEPTS

The identification of scientific and everyday threshold concepts provides significant implications for sustainable agriculture education and practice in the Mekong Delta. It requires turning the focus to the essence of learning process that breaks the single-loop learning [37]. Understanding technical dimensions of concepts such as *PAE* and *farmers are experts* and their premises, assumptions or frameworks of reference allows learners to perform active learning and knowledge construction, which potentially help them overcome the "stuckness".

Everyday threshold concepts are more distinctive in providing implications related to situated knowledge (re)construction. First, everyday threshold concepts are consolidated and developed from expert's knowledge engaged in day-by-day local contexts, practices and cultures. This localised knowledge is externalised in a dialectical form and tone. As such, local knowledge users can be easier to learn, acquire and interpret everyday thresholds in their practical activities. For example, our interview data with local farmers who make progress in IPM application largely back up the importance and comprehensibility of an everyday threshold concept like *caring* rather than science-reliant IPM

though the two are believed to share and complement meanings that can create changes in farmer's pest management.

Second, such scientific concepts as PAE and IPM themselves evolve and include new meanings over time once diffused on local communities. Localised threshold concepts thus can best capture and integrate these conceptual changes in practice. At best, learner's imaginative capacity and local learning spaces can be promoted when local learners interact and reconstruct the concepts. In such circumstances, interactions can lead to the construction of the sense of knowledge (generation) ownership, which is crucial to form beliefs and inform action taking of learners. As McDonell (1997) states, "individual human beings must rest their actions on judged beliefs rather than on warranted knowledge" [26].

As knowledge is continuously created and constructed, threshold concepts continue to be reinvented. Proposing threshold concepts however is only a commencement step on a learning passageway of no shortcut, as Cousin (2006) describes, "mastery of a threshold concept often involves messy journeys back, forth and across conceptual terrain" [4]. Learning threshold concepts by rote without reflections and re-imagination is in the end captive to ritualistic refrains.

7 CONCLUSION

Adoption of alternative development involves in both epistemological and ontological transitions. Sustainable agricultural and rural development has to strategise knowledge generation and learning, including overcoming learning barriers, to transform knowledge users' understanding of subjects, disciplines, areas of practice and/or their worldviews. Using the threshold concept framework, this paper has elucidated that localised threshold concepts developed from everyday practice, which we coin everyday threshold concepts, should be emphasised to address the stuckness in learning and practising participatory and sustainable development. Further, threshold concept discovery should be a joint-journey of global-local, trainer-trainee and science-everyday knowledges [13].

The present paper contributes to the growing research body of threshold concepts by integrating the ontological dimension - the level of social interaction in knowledge creation - into the current framework that primarily concentrates on epistemological transitions. In this direction is further research invited.

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