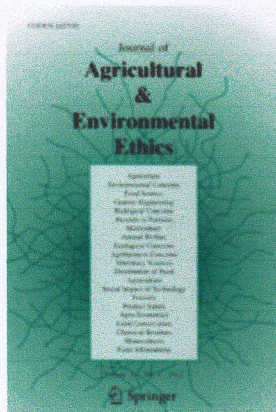


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### In this issue (13 articles)

#### 1. EditorialNotes

##### **Modern Biotechnology, Agriculture, and Ethics**

Per Sandin, Payam Moula Pages 803-806

#### 2.

Articles

##### **Is Genetically Modified Food Unnatural?**

Helena Siipi Pages 807-816

#### 3.

Articles

##### **Pragmatist Philosophical Reflections on GMOs**

Lisa Heldke Pages 817-836

#### 4.

Articles

##### **Freedom of Cropping and the Good Life: Political Philosophy and the Conflict Between the Organic Movement and the Biotech Industry Over Cross-Contamination**

Dane Scott Pages 837-852

#### 5.

Articles

##### **Empirical Methods in Animal Ethics**

Kirsten Persson, David Shaw Pages 853-866

#### 6.

Articles

##### **Of Mice and Men: European Precautionary Standards Challenged by Uncertainty**

Aur lie Roussary, Bruno Bouet, Denis Salles Pages 867-883





7.

Articles

**Are Farmers in Alternative Food Networks Social Entrepreneurs?  
Evidence from a Behavioral Approach**

Giuseppina Migliore, Giorgio Schifani... Pages 885-902



8.

Articles

**Ethics of Dissent: A Plea for Restraint in the Scientific Debate About the  
Safety of GM Crops**

Ruth Mampuy, Frans W. A. Brom Pages 903-924

9. Articles

**The Human Glance, the Experience of Environmental Distress and the  
“Affordance” of Nature: Toward a Phenomenology of the Ecological Crisis**

Vincent Blok Pages 925-938

10. Articles

**Moral “Lock-In” in Responsible Innovation: The Ethical and Social  
Aspects of Killing Day-Old Chicks and Its Alternatives**

M. R. N. Bruijnis, V. Blok, E. N. Stassen... Pages 939-960



11.

Articles

**Citizens, Consumers and Animals: What Role do Experts Assign to Public  
Values in Establishing Animal Welfare Standards?**

Chris Degeling, Jane Johnson Pages 961-976



12.

Articles

**A Means-End Chain Approach to Explaining the Adoption of Good  
Agricultural Practices Certification Schemes: The Case of Malaysian  
Vegetable Farmers**

Yeong Sheng Tey, Poppy Arsil, Mark Brindal... Pages 977-990



13.

Articles

**Public Perceptions of the Ethics of In-vitro Meat: Determining an  
Appropriate Course of Action**

Linnea I. Laestadius Pages 991-1009

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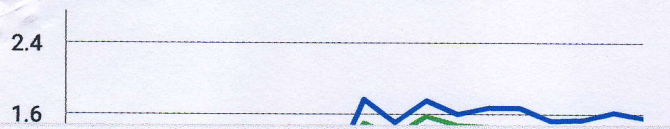
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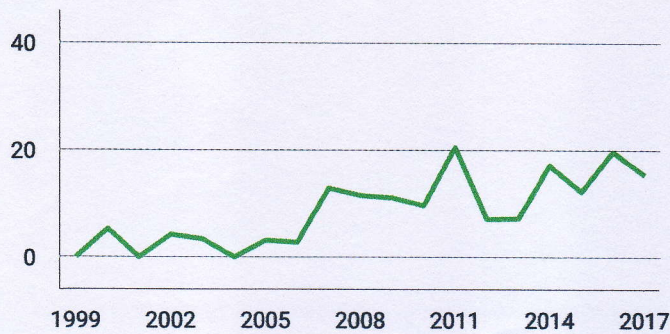
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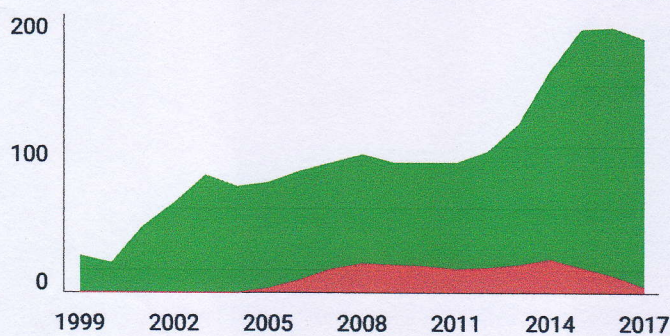


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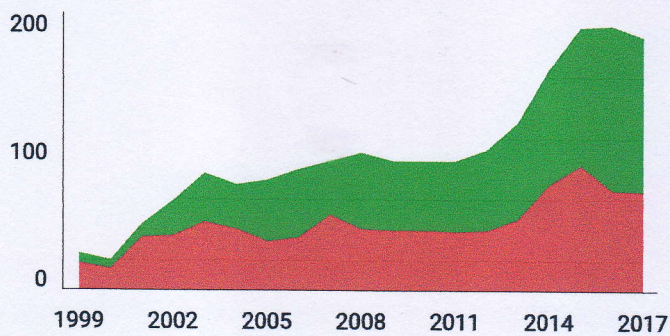
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# A Means-End Chain Approach to Explaining the Adoption of Good Agricultural Practices Certification Schemes: The Case of Malaysian Vegetable Farmers

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**Abstract** Good agricultural practices (GAP) certification schemes have been promoted to enhance agricultural sustainability. This study seeks to explain the adoption of GAP certification schemes through an analysis of the role of personal values in guiding such choice. It is a departure from approaches taken in previous studies in the area. Through the laddering interview technique of means-end chain analysis, a hierarchical value map was systematically schematized to illustrate the relationship between adoption of GAP (attributes), outcomes (consequences), and personal values driving the choice. The personal values identified in this study cluster under the headings of “better life”, “religious responsibility”, “healthy life”, and “responsible farmer”. Amongst these, the main evidence (pathways) pointed to the desire to have “better life” through the enhanced financial position that is perceived to arise as a consequence of GAP adoption as being of primary importance. These findings suggest that, while profit is not the sole end driver of adoptive behavior, GAP certification schemes have to be seen as lucrative and to enhance the goals of achieving core personal values. Other empirical information in this study also has significant policy implications. It is a key finding of this paper that effective promotions of GAP should be tailored and targeted at specific segments of the farmer population.

**Keywords** Good agricultural practices · Certification scheme · Vegetable farmers · Personal values · Means-end chain

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## Introduction

There is increasing demand for sustainable food production. This trend has at least partly resulted from a growing concern over agricultural sustainability issues. It includes farm workers' health, the environment, and social responsibility. Such demand is also an attributed consequence of a greater awareness of, and better access to, information on food safety and food quality. According to Nielsen's (2013) wide-scale survey, 50 % of global consumers are willing to pay higher prices for sustainable food. Specific demand for vegetables as reviewed by Moser et al. (2011) summarized empirical evidence that consumers as a whole are seeking safe, high quality, socially responsible, and environmentally friendly produce.

In general, the standards of sustainable fresh produce are regulated through good agricultural practices (GAP) certification schemes. GAPs are "practices that address environmental, economic and social sustainability for on-farm processes, and result in safe and quality food and non-food agricultural products" (Food and Agriculture Organization of the United Nations 2003). Most of these regulatory standards are conceptually based on four foundations: (1) food safety and quality, (2) environmental sustainability, (3) social acceptability, and (4) economic viability.

The safety and the quality of food are improved through the appropriate use of inputs and through process monitoring. Such controls improve natural resource quality, create a safe working environment, and protect public health. When a stipulated standard is met, farmers can realize economic advantages by exploiting both local markets and by exporting to foreign markets.

Sustainability is a core concept in the reasoned ascription of human values from both economic and psychological perspectives. In the economic literature, utility maximization is seen as a main goal in farm decision making (Feder and Umali 1993). Underpinning that notion, farmers have the ability to make their development sustainable. Farm management decisions ultimately determine the use and maintenance of farm resources or farm quality as a whole. These, in turn, affect agricultural productivity (Conway 1990). Those farmers, who are concerned about sustainability, may relinquish short-run profits for longevity (Chouinard et al. 2008). Therefore, compliance with GAP standards, or improvement beyond the minimum standards, becomes dependent on personal values (priorities) as one facet of any individual farmers' motivations. In the psychology literature, personal values have long been regarded as a main guide in agricultural decision making. These values were alluded to in a study by Wilkening (1950) 75 years ago and are still relevant today (i.e. Chen et al. 2009; Migliore et al. 2014; Lombardi et al. 2015). Personal values reflect individual preference concerning appropriate courses of action or outcomes (Lagerkvist et al. 2011; Gocsik et al. 2014). They provide a rationale for making a decision according to his/her sense of right and wrong or what ought to be, especially in cases where information relevant to a question is limited (Ilbery 1978; Horlings 2015). It therefore follows, from both economic and psychological perspectives, that understanding the formation of farmers' personal values is of particular relevance in the promulgation of GAP.

The recent literature contains two important streams of interest in GAP certification schemes. The first body of research has examined the impact of investment in GAP



standards (e.g., Subervie and Vagneron 2013; Kleemann et al. 2014; Chiputwa et al. 2015). These empirical works conclude that adopters are better off in one or more ways, i.e. producing a better quality of sustainable produce, marketing sustainable produce at higher prices and/or selling greater volumes of sustainable produce. These outcomes lead to higher revenues and profits. In some cases, certification (because of these economic consequences) has been linked to reduction in the prevalence and depth of poverty (Chiputwa et al. 2015). This also leads to an improvement in social and environmental conditions (Ochieng et al. 2013). The second stream of research has attempted to explain variation in compliance with GAP standards as a consequence of resource availability (e.g., Souza Monteiro and Caswell 2009; Kersting and Wollni 2012; Lemeilleur 2013). In such studies, material resources and constraints have been found to affect the farmers' capacity to produce sustainable crops by following GAP principles. In some instances, however, the monetary support of sponsors (i.e. donors and exporters) has enabled small-scale farmers to initiate and then apply for GAP certification scheme through third-parties.

Notwithstanding these things, little is currently known about the role and function of personal values in guiding farm decision making with respect to the adoption of GAP certification schemes. Since personal values are important human qualities underpinning most decisions and actions, agricultural policy will be more successful in congruent with the personal values of farmers (Schoon and Te Grotenhuis 2000). Uncovering inherent value orientations would logically provide a vital bridge in our understanding of what motivates behavioral change (Fleming and Vanclay 2010). Such understanding is essential to policymakers and extension agents when developing and advocating GAP principles. The same knowledge is also relevant to agri-food industries, especially in their communications promoting the wholesomeness of certified sustainable food products.

To uncover the personal values guiding to the adoption of GAP certification scheme, a means-end chain (MEC) model is used. This model has hitherto been used in consumer studies which elicit personal values behind buyer preference for sustainable food products (e.g., Zanolli and Naspetti 2002; Baker et al. 2004; De Ferran and Grunert 2007). It has also recently been applied to three farm studies: Lagerkvist et al. (2012) and Okello et al. (2013) investigated the personal values driving the applications of pesticides and fertilizers; Hansson and Lagerkvist (2015) identified personal values inherent to the care taken in respect to farm animal welfare. These studies have demonstrated that the step-wise interview technique of the MEC approach is useful in leading respondents to reveal increasingly higher cognitive structures (contents) and, ultimately, personal values. Such technique of cognitive science is useful to explain why farmers favor certain decisions (Gladwin 1989). Therefore, it is hoped that this study will, by using the MEC approach, make a useful contribution to the literature as it examines why Malaysian vegetable farmers have adopted GAP certification schemes.

Since the certification process is tedious and spreads over a relatively long timeframe, farmers have plenty of time to stop the processes and/or withdraw their application. As a consequence in this study, the focus is on GAP adopters who have been certified and who remain active in the scheme.

## Methodology

### Conceptual Framework

According to Gutman's (1982) seminal work, MEC theory posits that consumption choices are made according to the perceived attributes of a product or service, the consequences associated with these attributes, and how these consequences can lead to the fulfilment of desired end states. In this notion, consumption decision-making consists of a hierarchical structure: linking the attributes (A) of the product or service with particular consequences (C) to satisfy personal values (V). In other words, the product or service is chosen for those attributes which can help to achieve a personal value.

Adapted towards the purpose of this study, the MEC model can facilitate our investigation of the cognitive hierarchy within the conscious intelligence of GAP adopters. It seeks to explain why vegetable farmers made a particular choice from amongst various other options. It seeks to do so by uncovering the hierarchical links between the attributes that can be ascribed to GAP, their resultant consequences, and those personal values that are thought to be fulfilled by those consequences.

Clearly, the desire to achieve certain values drives farmers' decision making processes. The final choice is realized as a conscious decision: aiming to maximize utility albeit being constrained by exogenous factors (i.e. legislation and prices). Consequently, we posit that the MEC model is a plausible framework for uncovering the personal values driving the adoption of GAP certification schemes among vegetable farmers.

In this study, GAP certification schemes are conceptualized as objects. A GAP certification scheme commends a bundle of good agricultural practices and advocates myriad facets of sustainable development. The MEC model assumes that, in thinking about the series of production-related methodologies and practices to be undertaken, the attributes of that GAP are instrumental in achieving those desired consequences.

We posit that the importance of those perceived consequences determines their significance to the farmer when cross referenced with their personal values (Gutman 1997). Thus, when the attributes or associated consequences are most favorably perceived and are seen as congruent with personal values, farmers are more likely to adopt GAP principles and, subsequently, to apply for certification. Understanding of such drivers is, therefore, vital for the development of measures to improve agricultural sustainability.

### Empirical Methods and Data

To elicit the link between the attributes (A) of any GAP certification scheme with their particular consequences (C) and to satisfy vegetable farmers' personal values (V), our MEC work was divided into two stages in this study.

The first stage was to elicit the cognitive structure of GAP adopters through the use of laddering interviews. This interview technique has been popular in agribusiness research to yield MEC with respect to consumers' preference for



sustainable food products e.g. (De Ferran and Grunert 2007; Arsil et al. 2014). It has also been used to explain environmentally friendly behavior (e.g., Bagozzi and Dabholkar 1994; Lopez-Mosquera and Sanchez 2012) and specific farm decision-making processes (e.g., Lagerkvist et al. 2012; Hansson and Lagerkvist 2015). However, this is the first study using the laddering technique to identify farmers' MEC with respect to GAP certification schemes.

The interview technique can build on either 'hard' or 'soft' laddering. In the 'hard' laddering regime, by using a priori list of potential ACVs, respondents are required to identify the sequential associations between A–C–V. Confined as it is to the listed ACVs, such 'hard' laddering entails a risk of missing associations and, thus, generating a restrictive outcome and reducing the predictive power of the resultant MEC model (Jonas and Beckmann 1998). In contrast, 'soft' laddering overcomes the weaknesses of 'hard' laddering by allowing an exploratory possibility. A set of "why is that important to you?" questions prompt the respondents to 'climb' their cognitive hierarchy until arriving at a point where the question can no longer be further answered (Grunert and Grunert 1995). Such an end point is taken as the value underlying a particular behavior. Given its relative flexibility, the 'soft' laddering is useful in uncovering more complex links between A–C–V, producing higher frequency and more linkages between levels of abstraction. This interview technique is particularly appropriate when previous knowledge about the cognitive structures in relation to a particular object is low and the sample size is small (Grunert and Grunert 1995). After taking all these factors into consideration, 'soft' laddering was applied in this study.

Following the methodology of Hansson and Lagerkvist (2015) in this study, 'soft' laddering interviews were conducted over the telephone between May and July 2014. This method allowed the authors to collect primary information from vegetable farmers from a wide range of geographical areas, who had participated in the Malaysian good agricultural practices certification scheme. The interviews were carried out by three trained agricultural students. From the national register of local GAP participants held by the Malaysian Department of Agriculture, a total of 95 vegetable farmers representing diverse farm sizes were randomly selected. Of that sample size, ten (10.5 %) respondents were interviewed in person to get the interviewers acquainted with the study sample and to enable them to master the laddering technique. A statistical summary of the respondent backgrounds is shown in Table 1.

The 'soft' laddering interviews were carried out in two stages. Firstly, an initial call was made to identify farmers, aiming to get their agreement in respect to participation, set up an appointment for the relatively long interview, and to encourage them to prepare for the interview by considering why it is/was important

**Table 1** Descriptive statistics on the 95 farmers interviewed

	Means	SD
Age (year)	49.37	12.03
Gender (1 if male; 0 if female)	0.94	0.24
Farm size (acres)	19.57	40.09
Land tenure (1 if self-owned; 0 if otherwise)	0.30	0.43

for them to adopt the GAP certification scheme. We also emphasized that we are not connected to the Malaysian Department of Agriculture and their information will be utilized while respecting the highest levels of confidentiality. All these preliminary measures help the respondents to feel comfortable in sharing their views about the subject. In the second call, respondents were asked to share with us significant aspects that led to the adoption of GAP certification scheme. These answers were taken to be the attributes of GAP certification scheme and used as the starting point for the ‘soft’ laddering interviews.

The second stage was to transcribe and analyze all audio-recorded laddering interviews. Guided by the work of Reynolds and Gutman (1988), content analysis was conducted to identify the master codes of the MEC (attributes—A, consequences—C, and values—V) and to synthesize similar responses under common headings. As this is a subjective analytical process, the work of each co-researcher was compared. Given that the coded outputs proved consistent, the processed information became the input from which to construct a summary implication matrix (SIM) into a hierarchical value map (HVM) (Reynolds and Gutman 1988).

A computer program (MECanalyst) was used to produce the HVM. Its output is a tree-link network, depicting a matrix with three hierarchical levels of cognitive structure: A–C–V. The total frequency of the A–C linkages and C–V linkages (in which the respondents think about the local GAP certification scheme) are recorded in a tabulated SIM (Reynolds and Gutman 1988).

In addition, the MEC analysis also produces an abstractness ratio and a centrality measure which help to identify the hierarchical level of each element in the HVM. Ranging from 0 to 1, the abstractness ratio is used to examine which element serves as the means or ends in the A–C–V. A high abstractness ratio indicates that an element is at the predominant end—representing the major “stop point” vis-à-vis other elements. In complementing that, the centrality measure shows the proportion of linkages which run through the particular element (Pieters et al. 1995; Bagozzi and Dabholkar 2000).

Since any original HVM is complex, a cut-off value needs to be made in respect to multiple linkages within the cognitive structure. Reynolds and Gutman (1988) recommend a cut-off value of between 3 and 5 for a small sample size while Leppard et al. (2004) suggest that researchers should try multiple cut-off levels and choose the HVM that provides an ease of interpretation. Other important papers in this area (e.g., Reynolds and Gutman 1988; Pieters et al. 1995; Bagozzi and Dabholkar 2000) suggest that an ideal cut-off level should represent 60–70 % of active linkages. Given these differing views, HVMs were produced using different cut-off values (3–5) in this study.

## Findings

The abstractness ratio and the centrality index (CI) for the 22 meaningful MEC elements are presented in Table 2. The qualified elements are extracted from the original pool of 77 elements as recorded during the 95 laddering interviews.

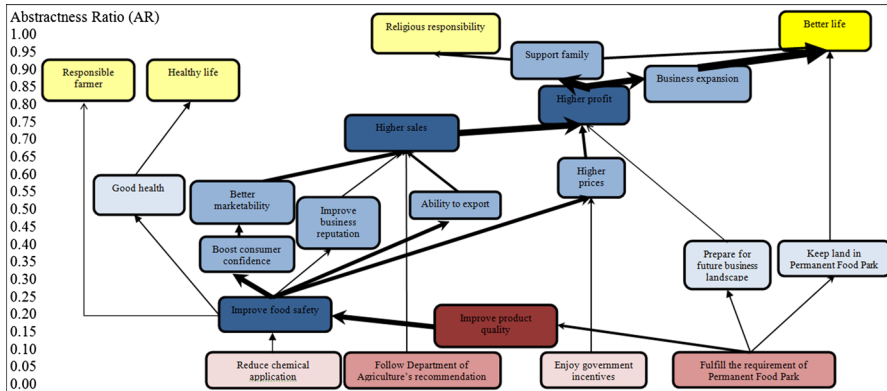


**Table 2** Abstractness ratio (AR) and centrality index (CI) for the 22 elements

Content codes	AR	CI
<i>Attributes</i>		
Follow Department of Agriculture's recommendation	0.00	0.03
Reduce chemical inputs	0.00	0.01
Enjoy government incentives	0.00	0.01
Improve product quality	0.12	0.06
Fulfil the requirement of Permanent Food Park Scheme	0.03	0.04
<i>Consequences</i>		
Improve food safety	0.19	0.08
Ready for future business landscape	0.27	0.02
Keep land in Permanent Food Park	0.29	0.02
Boost consumer confidence	0.33	0.04
Improve consumer satisfaction level	0.40	0.01
Better marketability	0.45	0.03
Ability to export	0.46	0.03
Good health	0.51	0.02
Higher prices	0.55	0.03
Higher sales	0.66	0.06
Higher profit	0.67	0.07
Business expansion	0.79	0.04
Support family	0.84	0.04
<i>Values</i>		
Responsible farmer	0.83	0.01
Healthy life	0.83	0.02
Religious responsibility	0.94	0.02
Better life	0.94	0.07

Based on the abstractness ratio, five (5) obvious attributes were perceived by Malaysian vegetable farmers: “follow Department of Agriculture’s recommendation”, “reduce chemical inputs”, “enjoy government incentives”, “improve product quality, and “fulfil the requirement of Permanent Food Park Scheme”. Amongst these attributes, as indicated by the centrality measure, “improve produce quality” (CI 0.06) is predominant.

There are 13 consequences linked to the adoption of GAP. Among them, “improve food safety” was viewed at different levels of abstraction. Some farmers regarded this element as a description of what GAP certification scheme is to them. Most importantly, however, a majority of the respondents perceived this element as a consequence that was generated from a precedent attribute. Because of this, the element “improve food safety” was recoded as a consequence. This element, according to its highest ranking on the centrality index (0.08), is the central element to the vegetable farmers’ cognitive structure. Indeed, it was mentioned by 39 out of 95 respondents. The next most commonly mentioned consequences were “higher sales” (CI 0.06) and “higher profits” (CI 0.07).



**Fig. 1** Hierarchical value matrix for the adoption of good agricultural practices certification scheme at cut-off 4. *Notes:* centrality index: light color <0.03, medium color: 0.03 and <0.06, dark color:  $\geq 0.06$ . Color : Attributes: brown, consequences: blue, values: yellow. (COLOR figure online)

Four (4) personal values emerged from the 22 meaningful MEC elements. They are “responsible farmer”, “healthy life”, “religious responsibility”, and “better life”. However, their importance is not equal. The predominant personal value is “better life” (CI 0.07).

As mentioned in the previous section, we modelled the HVM with various cut-off levels between 3 and 5. It transpired that a cut-off level of 4 was the most appropriate, yielding, as it did, a plausible HVM for clear interpretation while retaining almost 60 % of active linkages among the elements in the analysis. The resulting HVM is presented in Fig. 1.

In general, all perceived attributes of GAP certification scheme, according to the cognitive structure of the respondents, were perceived to lead to business-like consequences. In turn these were seen to lead to the one central consequence viz. “higher profit”. Nevertheless, some of them are worthy of more analysis. We have highlighted these through the use of bolder arrows (greater importance).

The three main pathways in the HVM are:

- Pathway (1): “Fulfil the requirement of Permanent Food Park Scheme” → “improve product quality” → “improve food safety” → “higher prices” → “higher profit” → “support family” and “business expansion” → “better life”,
- Pathway (2): “Fulfil the requirement of Permanent Food Park Scheme” → “improve product quality” → “improve food safety” → “ability to export” → “higher profit” → “support family” and “business expansion” → “better life”, and
- Pathway (3): “Fulfil the requirement of Permanent Food Park Scheme” → “improve product quality” → “improve food safety” → “boost consumers’ confidence” → “better marketability” → “higher sales” → “higher profit” → “support family” and “business expansion” → “better life”.

It is obvious that there are many similarities between the three (3) main pathways above; the difference between first and second pathway is one element placed

identically within the matrix (Pathway 1 identifies “higher prices” while Pathway 2 identifies “ability to export”). It could be argued that both of these terms have almost identical consequences. Pathway three differs only in so far as it identifies three additional steps which it interposes between “improve food safety” and “higher profit”

In term of attributes, GAP compliance was important to vegetable farmers so as to “fulfil the requirement of Permanent Food Park Scheme”, and consequently to “improve product quality”. Quality enhancement was considered to result in “improve(d) food safety”. After this low-end consequence, the pathways diverge to three (3) different lower mid-end consequences (“higher prices”, “ability to export”, and “boost consumers’ confidence”–“better marketability”–“higher sales”). They all converge in parallel trajectories subsequently.

They converge at the higher mid-end consequence “higher profit”. Lucrative returns from GAP investment were seen as enabling high-end consequences: “support family” and “business expansion”. Through these achievements, vegetable farmers were unanimous in their opinion that they could realize the personal value: “better life”.

Only a small proportion of the respondents regarded the GAP certification scheme as a means to realize the personal values of “religious responsibility”, “healthy life”, and “responsible farmer”. The actualization of “religious responsibility” was seen as being plausibly achieved through “support family”, which was itself enabled by “higher profit” achieved as a consequence of GAP adoption.

Adherents to the personal values of “healthy life” and “responsible farmer” viewed GAP as food safety tool. The farming practices being promoted were seen as “reduc(ing) chemical application” and “improv(ing) food safety”. Safe vegetables were thought to promulgate “good health” and to realize the personal value “healthy life”. Improved food safety levels were also considered indispensable to actualizing the end state of the personal value “responsible farmer”.

## Conclusions and Policy Implications

In this study, we have uncovered the personal values underlying vegetable farmers’ decision-making with respect to the Malaysian GAP certification scheme. This work departed from previous studies, which focused on farmers’ perceptions toward GAP (e.g., Darroch 2010; Kersting and Wollni 2012), challenges to its adoption (e.g., Kleinwechter and Grethe 2006; Zoss and Pletzigier 2007; Lee et al. 2012), factors facilitating its adoption (e.g., Souza Monteiro and Caswell 2009; Kersting and Wollni 2012; Lemeilleur 2013), and the impacts of GAP (e.g., Asfaw et al. 2009, 2010; Belton et al. 2011).

Our application of MEC theory is novel, involving interviews to determine the laddering of the personal values those farmers consider in their decisions to comply with GAP. It also addresses how they perceive that compliance can lead to the actualization of respective values. The findings help understand intrinsic farmer motivation towards conformity with GAP principles.



This study finds that the adoption of GAP certification scheme by Malaysian vegetable farmers was driven by four personal values: “better life”, “religious responsibility”, “healthy life”, and “responsible farmer”.

However, the GAP certification scheme was overwhelmingly seen, by farmers as a means to achieve the core personal value of a “better life”. Participation in this scheme was regarded as a strategic investment, particularly to those vegetable farmers taking part in the Permanent Food Park Scheme.

Compliance with GAP principles was seen beneficial in improving the quality of their farm produce, leading them to enjoy various business advantages. Key amongst these were improved food safety, higher selling prices, enhanced ability to export, boosted consumers’ confidence, better marketability, and higher sales. All these business advantages were considered to generate more farm profits. This enhanced financial position was seen as necessary to support family and business expansion, thus improving the state of living.

This study supports the hypothesis that the process of adoptive decision-making with respect to GAP certification schemes is complex. The considerations involved have important implications to policymakers.

As identified by this study, a key (initial) factor leading to the adoption of GAP certification scheme was to meet the obligation underlying the operation in the Permanent Food Park. Non-compliance is likely to see failure in the renewal of the annual permit. This has direct and adverse economic consequences such that enforcement/sanctions on participants in the Permanent Food Park scheme thus indicate a most effective strategy for the recruitment of more potential GAP adopters.

However, since such an incentive does not apply to vegetable farmers operating outside of the Permanent Food Park, the application of GAP principles remains a voluntary exercise. To encourage a greater uptake of the GAP certification scheme, our findings on various business-like consequences suggest that the scheme needs to be clearly perceived as yielding relative economic advantage. Not only are such considerations built upon rationality, they also fulfil the universal objective of profit maximization in farming. This explains the prevalent application of utility maximization theories in many adoptive studies, such as those inventoried in review studies (e.g., Pannell et al. 2006; Knowler and Bradshaw 2007; Prokopy et al. 2008; Baumgart-Getz et al. 2012; Tey and Brindal 2012; Tey et al. 2014).

Since farming is undertaken as a business activity, profit maximization, rather than environmental stewardship, is the basic motivation. Consensus on this assertion is shared by Okello et al. (2013). It is important to note that there is a high probability that farmers may switch to other (sustainable or unsustainable) farming practices as they prove more lucrative. This situation is thought to become especially relevant in the absence of government incentives, and/or when certified produce is not valued with commensurate pricing signals. It is, therefore, necessary to incentivize GAP farmers for their environmental stewardship.

While farm profitability remains the central consideration for farm business enterprise, in this study, deeper motivational reasons to adopt GAP certification schemes were identified. These are summarized by four personal values: “better life”, “religious responsibility”, “healthy life”, and “responsible farmer”. Arguably then, financial reward is not an end, but rather it becomes a central means to achieve

more altruistic end states. Similar conclusions have also been promulgated in recent studies (Lagerkvist et al. 2012; Okello et al. 2013; Hansson and Lagerkvist 2015). These papers recently used MEC as a tool to understand farmer behavior in relation to farming practices. Their work also illuminates farm decision-making process through which financial motivation is the enabling mechanism whereby personal values guide farmers' choice in farming practice.

Such underlying personal values offer useful insights into the design of future promotions of GAP certification schemes. While a demonstration of the relative economic advantages of GAP principles is intrinsic, attempts should also be made to link the selective attributes and advantageous impacts of GAP principles to the respective end states which this paper has identified as of value to farmers. As an example, the Malaysian government could promote its GAP certification scheme, through financial rewards, as a way to enhance farmers' standard of living. Local promotions could also be complemented by relevant religious channels (i.e. engaging with religious leaders) and the natural synergies between farming and social responsibility as well as farming and healthy living.

The findings of this study also give rise to a number of philosophical/policy implications which, while beyond the scope of this study, could provide a valuable pathways for future investigation. GAP certification schemes are invariably centrally promulgated and, while developed by experts and based on the best available science and management methodologies at that time, as human constructs, they often contain levels of subjectivity and a "lowest common denominator" factor in order to render them as universally applicable as possible. Farms and farmers are, however, unique, being both spatially and temporarily based. Therefore, there is a possibility that to receive GAP certification, some farmers might be required to undertake processes or to achieve results which, while fulfilling the perceived objectives of the program, fall short of what would be considered *best* agricultural practice for that enterprise.

In such situations, if the farmer is aware that better techniques could result in improved production but would also result in the loss of certification, he is placed in an untenable dilemma. Indeed, unnecessary rigidity with the certification requirements will stifle that innovation which has always been central to our progress and development. It must therefore be concluded that certification requirements need to be sensitive towards such considerations and to be issued through a process which contains flexibility and which encourages rather than stifles innovation and best practice for any enterprise.

Additionally, in respect to the long term needs of a nation, policy makers would benefit by considering the implications of our findings that "better life", "religious responsibility", "healthy life", and "responsible farmer" are drivers of farmer motivation. Since each of these is a learned cultural value, the significance of a national education focus and the development of a relevant and focused curriculum in respect to the responsibilities of environmental stewardship should not be overlooked as a means to encourage the longer term adoption of GAP certification schemes.

Such appeals, while diverse, are tailored and clearly targeted towards specific segments of the farmer population. As a consequence, the authors consider that the uptake of and perseverance with GAP certification schemes would be enhanced.

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