RURAL ECONOMY

The Effects of Alternative Agriculture and Fair Trade on the Development of Producer Groups and Their Members: Case Studies from Northern Thailand

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ABSTRACT

This study examines the economic, social and environmental effects of alternative agricultural methods, traded through fair trade mechanisms, on producers in northern Thailand. These effects are compared with those of conventional agriculture and mixed agriculture (where alternative agriculture and conventional agriculture are practised on the same farm).

The chosen research projects and areas in Chiang Mai province, Thailand were the government alternative agriculture project at Village Three in Pong Yang, and the non-governmental organisations alternative agriculture project at San Pay Yang and the neighbouring San Lueng. The government and non-governmental organisations involved in the extension and marketing of alternative agriculture are outlined and associated labelling and certification issues are addressed.

Economic comparisons found that alternative agriculture is a viable economic alternative to conventional agriculture and mixed agriculture when non-farm income and home consumption are included. However, the larger average size of alternative agriculture farms and the external funding of the organisations involved with alternative agriculture, must also be considered.

Social comparisons indicated that alternative agriculture results in educational and health benefits when compared to conventional agriculture. Environmental comparisons showed that on average alternative agriculture has the highest level of crop and livestock integration, the lowest number of artificial agricultural inputs used, and the highest number of alternatives to artificial inputs applied.

Introduction

This paper examines the private and social benefits and costs of adopting alternative agriculture in northern Thailand. Particular emphasis is placed on groups that also implement fair trade principles. The research focuses on the development of such producers.

Research Problem

Appraisals concerning the effects of alternative agricultural practices, using fair trade principles, on the development of the producers involved are carried out by many of the groups themselves and by many of the non-governmental organisations (NGOs), government organisations (GOs), and alternative trading organisations (ATOs) which work with them. However, an analysis that includes the economic, social and environmental effects of such production and trade practices on the chosen producer groups in northern Thailand is an academic expansion into this area.

A description of the extension and marketing approaches of the organisations involved in promoting AA is also included, to increase the understanding of the situation. The marketing approaches include important labelling and certification issues.

The Objectives and Scope of the Research

The main objectives of the research are:

(1) To describe some of the alternative agriculture and fair trade projects and extension and marketing initiatives that are currently underway in northern Thailand.

(2) To examine the effect of alternative agriculture, that uses fair trade principles, on the producers, in terms of economic, social and environmental changes to their lives.

The first objective was fulfilled with data collected from a literature review and informal interviews with people involved with alternative agriculture (AA) and fair trade organisations. The second objective used multidisciplinary questionnaire data which allowed quantitative and qualitative comparisons to be made between farmers practising AA and selling through fair trade mechanisms and those using other approaches.

Description of Fair Trade

Some people are likely to be disadvantaged through trade by the income effects associated with specialization and the gains (or, in this case, losses to certain sectors) from international trade. Trade barriers can cause further disadvantages. Alternative or fair trade is expected to be a more ethical form of trade than the present system. As such, it aims to help poor people. One of the main problems, from an economic point of view, is that many of the attributes of fair trade products are difficult to quantify in economic terms. Ethical problems also arise when trying to decide what a ‘fair’ price is, as this is a very locally determined, relative and subjective decision. Even so, the overall aim of fair trade appears to be associated with the development of small scale, and disadvantaged producer groups, predominantly in the Third World.

Fair trade allows consumers to help marginalised producers by buying their products through Alternative Trading Organisations (ATO). Consumers not only obtain the product; they also have the option to learn about the international trading situation (if they chose to read the labels and literature).

ATOs attempt to assure consumers that the producers are getting a 'fair deal'. This assurance can be achieved by a label, mark, or logo. The 'fair deal' is achieved through various policies. For example, ATOs usually pay a price, which is set above the market price, to the producers for their products, thereby increasing the producers' income. This higher producer price means that consumers must pay a price premium for fair trade products. Some other policies that many ATOs support include, safe and healthy working conditions (Thompson & Freundlich, 1994) and production methods that reinforce the producers' cultural identity. Producers also benefit from the increasing self-confidence and professionalism that ATO projects can bring (Brown, 1993). However, it should be noted that the mandates of different ATOs sometimes vary in their choice and emphasis of objectives and policies. Even so, fair trade hopes to help the producers to have the financial ability to develop, and to become less economically marginalised, by paying a higher price for the producers' products; as such, it is a form of altruism.

ATOs differ from normal commercial traders as they do not seek to make a profit, only to cover their costs. If profits are made they are ploughed back into the producer groups and/or used to further the work of the ATOs. ATOs aim to pay the maximum price possible to the producers, while still offering consumers quality and reasonable prices. They also want to enable producers to add more value to their produce through further processing. They are often willing to provide credit to small-scale producer groups to help in production, processing and packaging, and to enable them to be free from the need to rely on middle people to buy their products. ATOs further help producers with storage, processing, transportation, communication, market information, etc., on an open and fair basis (Brown, 1993).

ATOs and their trading partners are most successful if they have mutually compatible aims and principles. Alternative trading networks are used to exchange information and ideas among different producer and consumer groups. They are based on the ideals of equality, fair exchange, mutual respect, the avoidance of corruption and reciprocal benefits. They have no direct centre and aim to link groups of people horizontally rather than vertically, and for compatible and complementary reasons, one example is the International Federation for Alternative Trade (IFAT) (Brown, 1993). This approach differs from normal commercial trading companies who usually have vertical and hierarchical structures with a direct centre (Brown, 1993) and are orientated towards competition. However, it is also possible for commercial traders to be involved with fair trade if they practice the fair trade principles outlined above. If commercial traders do practice these principles they can be externally certified, and can then use the appropriate fair trade labels.

Alternative agricultural products are one example of the type of products that are sold by ATOs. For further examples and information on fair trade see Renner (1998).

Description of Conventional and Alternative Agriculture

Conventional agriculture (CA) is a type of agriculture that uses artificial chemical inputs, mechanisation, new seed varieties, and is often associated with monocropping and a reduction in the diversity of animals and crops on individual farms. In Thailand, CA was introduced during the green revolution, along with government supported forest clearance which increased the area of agricultural land (Phongpuichit and Baker, 1997).

CA often uses inputs which are produced outside of the farming unit. This means that CA is often capital intensive and reliant on factors external to the farm. In Thailand the increasing emphasis on cash crops and export-orientated farming, as opposed to crops for domestic consumption, has also decreased self-reliance. Although CA has led to an impressive increase in food supply, it has also had negative effects on both the environment and human health; and it's sustainability is being increasingly questioned (Setboonsarng, 1995). Human health problems not only concern the consumer (in terms of the quality and safety of the food that they consume), but also the health and safety of the producers who apply agricultural chemicals (Rola and Pingali, 1993). The environmental problems associated with CA include soil, air and water pollution, loss of biodiversity, soil degradation, etc.

The negative impacts on society resulting from CA in Thailand include the break down of the traditional family and village structures[1], increasing income inequality[2] and rising rural poverty.[3] Land right and land distribution inequalities are, in part, responsible for the widening rural income gaps. As the Thai population increases, the number of land hungry rises and environmental degradation worsens; farmers are increasingly encroaching on the forests, not only for forest products, but also in an attempt to obtain land.[4]

Poverty is often both a cause and an effect of environmental degradation (UNCED, 1993). Marginalised people, such as land hunger, rural Thais, are usually those most effected by these problems, but they have the least political and economic power with which to address them. AA attempt to overcome these problems through appropriate, human and sustainable development approaches that focus on environmental and human health issues. It is often associated with a focus on local wisdom, traditional farming practices and building on farmers' existing knowledge. The large array of different AA techniques include integrated farming, agroforestry, organic farming, natural farming, crop rotations and/or integrated pest management (IPM).[5] These techniques can help to overcome the problem of loss of biodiversity that is present in CA, while also increasing soil fertility and stability (Panyakul, 1996), reducing risk (through diversification) and decreasing pest and disease outbreaks, if properly practised.

[1] The breakdown of the traditional, rural, social structure is mainly due to urban migration (Ekachai, 1994).

[2] Although there has been an increase in the inequality of income distribution (Krongkaew, 1993), the proportion of people living below the poverty line has decreased (UNDP, 1997). However, Krongkaew (1993) argues that the poor remain clustered in rural areas.

[3] Rural poverty has mainly been a result of rising input costs (especially for imports, die to the recent Thai baht devaluation), falling incomes, rising farm debts and natural resource degradation.

[4] Many national parks and forest reserves are being illegally logged and/or farmed, and conflict between government, logging companies, agribusiness and local people is growing (Phongpaichit & Baker, 1997).

[5] See Renner, 1998 for definitions of these AA techniques.

There is increasing evidence that more and more farmers around the world are converting from CA to AA. In Thailand, although only 0.4 percent of the national farming population practised AA in 1992 (Levin & Panyakul, 1995), AA is becoming increasingly known. The speed at which farmers will adopt AA practices depends on economic opportunities, technology advances in AA, market demands for AA products and government policies (Setboonsarng, 1995). To justify a change from CA to AA profitability must be at least equal, or else there must be significant non-monetary benefits, including preservation of deteriorating soil resources (National Research Council, 1989).

The transition from CA to AA is often gradual. Some farmers convert a small area initially, and then increase the size of their AA area as they gain experience and competence in AA methods. After a farmer stops using artificial inputs on a piece of land it often takes two to three years until the balance[6] in the ecosystem is restored (Setboonsarng, 1995). During this transition AA production levels and incomes are likely to be at their lowest, and some farmers may therefore return to CA.

AA farmers often use natural alternatives to artificial chemicals. The cost of such natural alternatives can be lower than those of artificial chemicals, and can therefore lead to lower input costs for farmers, as well as a reduction in environmental and health risks. By lowering costs, the prospects of escalating debt may also be lowered. Natural alternatives may be locally available; this can reduce problems of reliance on outside markets, and thereby increase self-reliance (Chamarik, 1994). Problems of a lack of appropriate seeds[7], low yields associated with the transition to AA, etc., mean that AA products usually require higher prices, than CA products, to be economically successful.

The marketing of AA products focuses on consumer concerns for their health, and for the environment. Although few agricultural products have a higher chemical residue level than those permitted by the World Health Organisation for allowable daily intake, some consumers are still sufficiently concerned that they will purchase higher priced AA products. The demand for AA products is increasing (Nelson, 1991), although problems of seasonal supply, inconvenient retail outlets and limited choice occur (Tantemsapya, 1996). However, the AA market is still a niche market, dominated by educated middle and upper-income consumers. These consumers often rely on labels to notify them of which products are AA and fairly traded.

The Importance of Labelling and Certification

A label shows that a product or management process has been certified. Certification involves the act of certifying something with certainty and assurance (Thatcher & McQueen, 1980). In the case of fair trade certification, economic, social and environmental criteria are used. However, AA certification places a stronger emphasis on environmental criteria. Problems arise in both AA and fair trade certification schemes, due to different criteria being relevant to different settings. Certification schemes that stand up

[6] For example, pesticides used in CA may have disrupted the biota, including natural predators (National Research Council, 1989). While the balance of the biota is restored AA crops may initially be very susceptible to insects and diseases.

[7] A lack of AA research and AA seed availability means that most AA farmers use seeds from conventional sources, including high yielding varieties (HYVs), which do not perform well under AA conditions (Supawan, 1997).

to the rigors of many different situations, but which continue to provide the necessary assurances, are very hard to establish.

Fair trade and AA labelling and certification schemes are, in part, a response to the growing numbers of ethical and environmental consumers who want more detailed information regarding the effects that their purchasing behaviour has on people and the environment.[8] The current fair trade certification schemes all occur within the private sector. However, AA certification schemes occur in both the private and the public sector. One example of AA labelling is the Agriculture Certification in Thailand (ACT) (Lianjumrooh, 1996).

The use of fair trade and AA labels and certification schemes enables such products to move from specialist shops and/or catalogues, into mainstream retail outlets. The use of a recognised label and certification scheme also helps to create a more unified marketing and publicity approach.

The 'chain of custody' is an important aspect of both fair trade and AA labelling and certification schemes. It is the path, starting at the raw material, and following through the production, transportation, marketing and retailing activities, and finishing with the purchasing of the final product by the consumer. With the increasing globalisation of trade, and the rising complexity of the chain of custody, it becomes more difficult to follow a raw material, and then product, through the various companies and countries that it is likely to pass through. When a product or management practice is labelled or certified as having a different set of attributes compared to those of competing products or management practices, it is vital that the consumer be assured that such differences really do occur. This is especially true in the cases of fair trade and AA, when the differences are often neither visible nor testable at the consumer end of the chain of custody.

Consumers must be able to differentiate between labelled and certified products and non-labelled and non-certified items in a cost-effective manner. Certifiers must be honest and trusted by consumers, if the risk of miscertification (which is likely to lead to cynicism on the part of the consumers, and therefore to a fall in the sales of certified products) is to be reduced. For simplicity, promotion and customer convenience, it is likely that a limited number of different labelling and certification schemes would be more successful than a myriad of different schemes.

The possibility of product substitution, and dynamic consumer preferences that may be a result of awareness raising through labelling, certification and marketing complicate the prediction of consumer behaviour (Kiker and Putz, 1997). However, the price premium that is paid for fair trade and AA products by some consumers shows that they believe the labelling and certification claims, and adapt their purchasing behaviour correspondingly. For example, in Thailand the prices of organic products, sold through the fair trade market are 10-20% higher than those for CA products (Panyakul, 1995a).

[8] The 'ethical business' movement and ethical marketing focuses on integrity and idealism that often simplifies the complexity of business (Entine, 1995). It should not just involve idealistic claims and rhetoric, but also business transparency, a responsible approach towards the environment, an ethical and fair attitude towards employees, suppliers, consumers and the community, and the promotion of reasonably priced, quality products or services (Entine, 1995).

Many of the organisations involved with AA and particularly fair trade are non-profit; this changes the usual cost versus benefits, and dual optimisation. However, if the costs of labelling and/or certifying a product outweighs the benefits, it is unlikely that the number of fair trade and AA producers and products will increase. If the opposite scenario occurs, then the number of labelled and certified products is likely to increase, and there may be an associated risk of over supply. The price premium that arguably exists for fair trade and AA products also means the risk of arbitrage, copy-cat products, and misleading labelling and certification schemes by competitors is likely to arise.

The benefits from ethical certification, environmental certification, and labelling include acceptance by new clients and improved consumer confidence (Hopkins and Straughan, 1995). The costs associated with ethical and environmental certification and/or labelling involve the practicing and the policing of the necessary principles, production process and management practices. The cost of having the products and/or management practices independently verified, and the cost of labelling should be passed on to the consumer (Independent Monitoring Working Group, 1996).

Producers of different sizes and consumers who may have different levels of information on ethical and environmental products are likely to experience information asymmetry. Labelling and certifying a product can eliminate information asymmetry (Akerlof, 1970), and therefore allow consumers to decide whether they want to buy products from more ethical and environmental sources, or not. Accurate and efficient certification and labelling may also provide a means of including the non-market values of fair trade and AA within the market, even if they appear as a form of altruism. Whether these non-market values are under-internalised, optimised, or over-internalised remains to be seen. However, as Haener (1997) argues, if certification can internalise the inefficiencies that are the result of market failure, then a net welfare gain can be achieved.

The Research Methods

As was previously stated, fair trade and alternative agriculture appear to be predominantly concerned with their ability to enable small-scale, poor producers to develop. Therefore various approaches that have been used to measure development as well as the Social Auditing approach were used[9] to develop questionnaires to compare the economic, social and environmental effects of AA and fair trade versus other agriculture and trade practices.

Development Measures

Gross Domestic Product (GDP)[10] and Gross National Product (GNP)[11] were devised to measure flows of money, but they have been assigned a second role as a measure of the total development and progress of a nation.

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[9] Other background sources were also drawn on include Niessen (1996), Selfhelp (1990), Bridge (1996/97), National Research Council (1989), Weinsang (1996) and The Caracas Report on Alternative Development Indicators (1989).

[10] GDP is 'the total value in money terms of all the production in a country in one year' (Anderson, 1991, p 19).

[11] GNP is GDP plus rents, interest, profits, and dividends flowing into a country from abroad, minus rents, interest, profits, and dividends flowing out to other countries (Anderson, 1991, p 19).

GNP has many faults as an indicator of development. Unpaid domestic labour, such as housework, child-care, and in many developing countries agricultural labour, are excluded (Waring, 1988). GNP often understates the contribution of women, while overstating the rate of growth that occurs during industrialization. This is because industrialization is associated with a move from domestic production and subsistence agriculture to non-domestic production, and from bartering to monetary transactions. The existing stocks of human capital, human investment and human depreciation remain unmeasured. Unless GNP is appropriately adjusted, environmental assets and their depreciation are not accounted for. Further social and equity problems include the diminishing marginal utility of money, problems of distributions, comparisons and averaging.

The criticisms of GNP that are outlined above can be partially corrected by the appropriate additions and subtractions to GNP. However theoretical, ideological and empirical problems are likely to arise.

The Human Development Indicator (HDI) attempts to overcome some of the problems of GNP and GDP by including a longevity variable and a knowledge variable, as well as an income variable adjusted by purchasing power parities and measured in US dollars (PPP$). GDP (PPP$) is discounted using formulas for the utility of income and the discounted value of the maximum income.

Problems with the HDI as a measure of development include the use of arbitrary weights and an arbitrary choice of variables (Streeten, 1995). The choice of dimensions has also been criticized as political freedom, cultural values, gender, distributional and environmental sustainability dimensions are excluded. The problems associated with the use of a single indicator to analyze such a complex problem is also apparent, because human development is much wider, deeper and richer than a single measure can ever be (Streeten, 1995).

The ‘quality of life’ indices are more multidisciplinary and encompassing in their approaches when compared to GNP and the HDI. They are a set of indices that can be used to measure development. They can be approached from different levels. Modestly ambitious quality of life indices may include concepts such as leisure and security, but can become increasingly ambitious as socio-cultural and political indicators are added (Hall, 1983). The aims of fair trade and AA often include quality of life factors.

Social Auditing

Since the 1960s, the growing role and power of business in society have been realised. Consumers, investors, and the general public have become increasingly aware of the potential failings of businesses, which range from ecological disasters, to unfair dismissal. The majority of businesses are starting to respond to this growing concern.

Some businesses have gone as far as adding social and environmental auditing to the legally required financial audit. The New Economic Foundation and Traidcraft (an ATO) developed the methodology of Social Auditing (SA). SA is a process which defines, observes and reports measures concerning the ethical behaviour and social

impacts of businesses in terms of a company's own aims, and those of its "stakeholders"[12] (Zadek, 1994), usually on an annual basis. These reports are published and validated by external institutions. SA not only provides a benchmark, it also allows comparisons to be made between organisations (Hopkins and Straughan, 1995). Although SA is not currently used to certify or label an organisation as being ethical, or socially responsible, they do provide a certain degree of social responsible input and transparency to the stakeholders, and other concerned individuals. SA can therefore be used not only as a marketing tool. It can also provide a means of improving a company's social responsible performance by highlighting a company's strengths, weaknesses, opportunities and threats, in a similar way to financial and environmental auditing.

Social Auditing is not only valuable for marketing and managing individual companies, it may also have a wider role; namely that of helping auditors and consumers to encourage companies to be socially responsible. This is because the public sectors' actions in diminishing and alleviating social problems, are arguably decreasing. As the move towards less interventionist government policies continues, the role of the private sector in this area correspondingly increases (Hopkins and Straughan, 1995).

The Questionnaires and Data Collection

Using the different development measures and the Social Auditing approaches mentioned the finalised questionnaires were developed. Three groups of questions were asked in these questionnaires: namely economic, social, and environmental. These three groups are obviously very inter-linked.[13] The classification into the three groups was intended to help focus on the three dimensions chosen. Demographic questions were asked and additional questions helped to provide a more general picture.

The questionnaires were translated from English to Thai by the author's Thai supervisor, Dr. V. Punyawadee, after undergoing various drafts. The Thai version was then pre-tested. Staff from both government and non-government organisations and academics who are involved with AA and fair trade made further suggestions (see Renner, 1998 for the English version of the finalised questionnaires).

Informal interviews with farmers, government organisations and non-governmental organisations who work with the farmers, and other relevant people were also conducted by the author. Some of these interviews were conducted in English, but when appropriate a Thai language translator from Maejo University assisted.

The Data, Results and Discussions **-** *The Producer Groups*

The two chosen producer groups are the government extension project at Village Three in Pong Yang sub-district, and the NGO project at San Pay Yang sub-district and neighbouring Sa Lueng sub-district. Both sites are located in the highland area of Chiang Mai province in Northern Thailand.

[12] A business's stakeholders include its customer, employees, suppliers, investors, the surrounding community, in fact anyone who is affected by its activities.

[13] For example, the reduction in the use of artificial agricultural chemicals not only has economic dimensions (in terms of possible reductions in costs), but also social dimensions (in terms of possible improvements in health) and environmental dimensions (in terms of possible decreases in environmental pollution).

The socioeconomic profiles of the questionnaire respondents are provided in Table 1. The larger average area of AA farms, followed by mixed agriculture (MA) and then conventional agriculture (CA) farms is the most interesting socioeconomic factor[14].

Village Three, Pong Yang

Village Three, Pong Yang, in Mae Rim district, is a model village for government agricultural extension work, under the government-funded, Mae Rim Agricultural Extension Office. Therefore most farmers have moved away from self-sufficient food production towards market orientated farming.

The focus of the AA project in this village involves vegetable production, with the provision of nylon netting, some alternatives to agricultural chemicals, as well as marketing and extension advice. These AA vegetables are sold using a 'chemical safe' label. The government has also advised farmers to switch from the more traditional farming of rice and soybean to more intensive and supposedly higher income cash crops of Integrated Pest Management (IPM) flower farming and IPM strawberry production, due to land pressures[15]. Although IPM is supposed to minimise agricultural chemical use, both strawberry farming and flower production for conventional markets requires that the products be free from insect damage and disease. For this to be achieved high levels of artificial agricultural chemicals are applied. For this reason, it was decided to classify IPM strawberry production and IPM flower production as types of CA. A further justification for this classification was the fact that these crops are not marketed, certified or labelled with any alternative agriculture, or 'chemical safe' claims.

San Pay Yang and San Lueng

San Pay Yang and San Lueng are neighbouring sub-districts in Mae Taeng and Mae Rim districts, respectively. In these areas the MA and AA farmers have been provided with extension advice, resources and market outlets from Thai NGOs, predominantly from FEDRA, but Imboon also provides advice and market opportunities. The NGO's promote integrated farming, chemical-free vegetable production and agroforestry, using outside funding from Thai and international donations. FEDRA and Imboon are part of the northern Alternative Agriculture Network which aims to work collaboratively with producer, consumer, marketing and policy initiatives (Panyakul, 1995b). Government involvement in the area has been minimal, with the provision of nylon netting for AA vegetable production for a small number of farmers.

[14] Although the means were not found to have significantly different means when a t-statistic was calculated at the 1% level. These results can be largely explained by the relatively large standard deviation values.

[15] Land pressure are due to the National Park designation around the village, increasing population pressure and the increasing demand for holiday homes and tourist resorts in the area. The author observed obvious violation of the National Park rules.

San Pay Yang and San Lueng do not have the same land shortages as Village Three, Pong Yang, so agricultural methods are usually less intensive, and the CA farmers are more traditional than their Village Three, Pong Yang counterparts.

FEDRA aims to promote self-help, and to leave groups when they become self-reliant, although no group has yet achieved self-reliance (Prompunya, 1997). Tangtrongbenjasil and Tanakilkosert (1992) go on to explain that some of the villagers expect to be given funding for projects, and that they do not always follow these projects through. This financial dependence on FEDRA is unlikely to lead to self-reliance.

FEDRA promotes home consumption first. The small level of excess production is mainly sold locally to reduce the transport costs and the problems of perishable produce (Prompunya, 1997). For example, Wat Pa-Darapirom provides a stall for the farmers to sell their excess chemical-free products, where the AA farmers set their own prices. Renner (1998) observed that these prices were set at very low levels which appeared to undervalue the produce and especially the labour costs involved. The Imboon Center alos sells labelled AA products from San Pay Yang and San Lueng, at prices usually set above their conventional equivalents (Chumchuan, 1997). Unfortunately the Imboon Center has been running at a loss, particularly in the vegetable and fruit sector (Bontuyan, et al., 1996).

Economic Comparisons

Economic comparisons between MA, AA and CA farmers, and between the farmers from the different AA project areas focus on three economic hypotheses.

Net Farm Income & Home Consumption of Household Farm Products[16]

The first economic hypothesis examines whether AA leads to a higher net farm income[17] plus home consumption of household farm products than MA and CA. This comparison is an attempt to examine whether AA does increase the financial well-being of AA farmers, when compared to MA and CA farmers.

Table 2 shows that on a whole farm basis the net farm income and home consumption of household farm products[18] for Village Three, Pong Yang is lowest for MA farmers, followed by AA farmers and highest for CA farmers, and at San Pay Yang and San Lueng AA is lowest followed by CA, then MA. On an area basis (Table 3) AA net farm income and home consumption of household farm products is the lowest, followed by MA and CA is the highest at both research sites.

When the MA farms are divided into AA plots and CA plots, on a per rai basis, (Table 4) the AA plots have the lowest net farm income and home consumption of

[16] Although the average net farm income and home consumption of household agricultural product figures and the average net total income plus household consumption figure vary at each of the research sites, they were not found to have significantly different means when a t-statistic was calculated at the 1% level. However in most cases some of the variation for the whole farm data can be explained by the differences in farm size.

[17] Net farm income = gross farm income - total costs.

[18] Home consumption of household farm products is an approximate value of each farm household's consumption of their own crop and livestock production.

household farm products and the CA plots have the highest at Village Three, Pong Yang; the opposite is true at San Pay Yang and San Lueng.

Therefore the first economic hypothesis cannot be supported using the collected data for net farm income and household consumption of home farm products. However, the whole farm net total income plus household consumption figures for AA are the highest in each of the research sites, indicating that AA appears to be a viable economic alternative to CA and MA[19] when the income from forest products, household consumption of forest products and non-farm income are included.

MA net total income plus household consumption figures are the lowest per farm figures in both cases. This may be partly explained by the fact that the MA farmers have the lowest levels of non-farm income, and they also have high cost levels.

Figure 1: A Summary of the Socioeconomic Profiles and Economic Results

Research Site	**Village Three, Pong Yang**			**San Pay Yang, San Lueng**		
Agricultural Type	**AA**	**MA**	**CA**	**AA**	**MA**	**CA**
Number of respondents	2	19	20	16	10	12
Average farm area (rai)	4.50	2.81	2.45	14.76	10.49	5.64
Total costs*	16615	31832	36010	4795	7673	4331
Home consumption of h/h farm goods	23839	1256	530	11898	15383	13946
Net farm income & h/h consumption	87540	62414	114058	28323	43142	33909
Net farm income & consumption	87990	62419	114258	29877	43454	34192
Net total income & consumption	126990	64893	124158	59814	55709	58163
Total costs/rai*	3692	12723	14697	325	1149	768
Home consumption of h/h farm goods/rai	5297	682	216	806	3160	2473
Net farm income & h/h consumption/rai	19453	22830	46555	1919	7302	6012
Net farm income & consumption/rai	19553	22832	46636	2024	7330	6062
Net total income & consumption/rai	28220	23712	50677	4052	8523	10312

* Total costs exclude labour costs.

Total Costs Excluding Labour[20]

The second economic hypothesis is concerned with whether costs are lower for AA than MA and CA, as would be expected by the lower input use associated with AA. Unfortunately labour costs had to be excluded from total costs due to difficulties and complexities in the collecting of such data; the implications of this include possible biases in total cost data as well as omitting an important measure of well-being.

The total cost data for Village Three, Pong Yang conform to the second economic hypothesis, with AA costs being the lowest, followed by MA and CA (Tables 2 & 3). The

[19] Only five of the farmers who grew AA produce sold the same AA product to fair trade and conventional organisations. Four of the five farmers stated that they received higher prices from the fair trade organisations, while the remaining farmer stated that a higher price was obtained from selling direct to the consumer.

[20] The standard deviation of the total costs excluding labour data are relatively high, but usually fall when the variation associated with the differing farm sizes is included. When t-statistics were calculated for each research site, the total costs excluding labour were not found to have significantly different means at the 1% level.

cost data for San Pay Yang and San Lueng are not as clear. When the AA and CA data are calculated on a per rai basis the AA costs are the lowest (Table 3), as expected, but on a whole farm basis the opposite result is found (Table 2), due to the larger size of AA farms compared to CA farms. The MA cost data (on a whole farm and area basis) for San Pay Yang and San Lueng is the highest (Tables 2 & 3). When the MA costs are divided into AA plots and CA plots the AA plots have the lower costs, at both research sites, as expected (Table 4).

Data from Other Studies

Table 5 provides examples of AA and CA income and cost data from other studies in northern Thailand. Two data sets (AAa and AAc) appear to be comparable to AA data from San Pay Yang and San Lueng on a per farm basis (Table 2) especially when the exclusion of labour costs from the latter are considered. The AAa per rai data seem to be more comparable with AA data from Village Three, Pong Yang (Table 3). The data for AAb seem very high. The government average northern farm data (Ad) usually falls between the Village Three, Pong Yang and the San Pay Yang and San Lueng data. This indicates that the majority of farmers at Village Three, Pong Yang have above average levels of farm income, and total costs excluding labour and net farm income, whereas the San Pay Yang and San Lueng farmers are below average. Renner (1998) felt that this was likely to be the case from her own observations. No pattern emerges for non-farm income. Unfortunately home consumption of household farm products data were unavailable from the other studies.

Home Consumption of Household Farm Products[21]

This final economic hypothesis examines whether the AA farmers are the most self-sufficient in the production and consumption of farm products, especially food, followed by MA and CA farmers. This is thought to be of relevance, because higher levels of home consumption may help to lead to greater self-sufficiency.

The home consumption of household farm products for Village Three, Pong Yang conforms to the third economic hypothesis (being highest for AA followed by CA and MA, see Tables 2 & 3). This may be because the CA production in Village Three, Pong Yang focuses on strawberry and flower production, both of which are sold as cash crops. The flowers are not consumed as a food, and so they do not help the farmer achieve household self-sufficiency in food. The level of self-sufficiency from the strawberries is limited by their single harvest, non-traditional nature and perishability. The AA vegetable production in Village Three, Pong Yang differs from the IPM strawberry and flower production. The AA vegetable production usually includes many types of vegetables, most of which are familiar to the villagers and the vegetables are harvested over a longer time period than the IPM strawberries. These factors may account for the higher home consumption of AA household products in Village Three, Pong Yang.

The situation at San Pay Yang and San Lueng is very different from that in Village Three, Pong Yang. The San Pay Yang and San Lueng data do not conform to the third economic hypothesis, as the MA level of home consumption of household farm products is the highest followed by CA and AA (on a per rai and an area basis, see Tables 2 & 3, respectively). This may be explained by the more traditional CA farmers in San Pay Yang and San Lueng who usually grow rice and soybeans. The rice is usually grown for household consumption, with any excess being sold. The AA products, and especially the

[21] The standard deviation of the household consumption data is relatively high on a whole farm basis, but it is reduced when calculated on a per rai basis, due to the differing farm sizes. T-statistics at both research sites indicate that the means are not significantly different at the 1% level.

vegetables and fruits appear, in some cases, to be more like cash crops than their Village Three, Pong Yang equivalents. However, the AA plots of the MA farmers are associated with a higher level of home consumption of household farm products than the CA plots (Table 4).

Farmers' Economic Comments

The AA and MA farmers mentioned further economic benefits and economic problems. In Village Three, Pong Yang farmers mentioned the benefits of an output price guarantee and reduced household expenditure on food, because of increased home consumption of household farm products. On the negative side they stated that the output prices were low, that the use of nylon netting meant that the investment costs were high and that AA products are risky to grow. Further comments included the feeling that supply might be greater than demand, and that the output purchased by buyers was variable.

Some of the AA and MA farmers in San Pay Yang and San Lueng felt that AA led to higher income levels and that the investment requirements are lower than those of CA. However, others felt that income and output prices are unstable, that the market is uncertain and profit levels are low. Farmers also mentioned the problem of customers not liking the aesthetics of AA produce. Further problems stated included a shortage of capital and the transportation problems associated with their mountainous location.

The CA and MA farmers mentioned that CA methods result in low and fluctuating output prices, increasing chemical prices and high investment costs. The villagers at Village Three, Pong Yang also added that high land prices were problematic and that CA farming was not risky. The villagers in San Pay Yang and San Lueng disagreed on the differences in income and output levels of CA compared to AA.

Economic problems on a village level included the cost of consumer goods being too high, due to the recent Thai baht devaluation. Village Three, Pong Yang farmers mentioned insufficient labour as another problem, with some labourers already having agreements to work for other farmers. Some farmers in San Pay Yang and San Lueng mentioned a lack of land titles and high levels of debt as further economic problems.

Social Comparisons

The social *a priori* beliefs focused on education and health issues. Both of these issues are often priorities for improvement within fair trade and AA projects.

Extension Information and New Skills

The first social *a priori* belief is that AA will result in new extension information and new skills for AA and MA farmers. All of the AA farmers and 93.30% of the MA farmers responded that this was the case. Table 6 shows the specific new skills and knowledge that the MA and AA farmers learnt. The highest percentage was for new farming skills from AA followed by quality control skills, marketing, field visits, management, and finally networking.

Table 7 shows the sources of AA extension information and new skills for MA and AA farmers. In Village Three, Pong Yang the government is seen to be the main source, followed by self-teaching, other farmers and other.[22] In San Pay Yang and San Lueng FEDRA was the main source, followed by self-teaching, Imboon, the government, other farmers and other.

Table 8 shows the sources of CA extension information and new skills for MA and CA farmers. The averages show that self-teaching is the main source, followed by other farmers, the government and other.

The difference in outside extension advice and skill teaching between CA and AA is apparent, with greater levels of support from organisations involved in AA farming compared to CA farming. This result was expected due to the emphasis on AA extension at the research sites.

Health, Safety and Working Conditions

The second social *a priori* belief associated with the social effects of AA is that the health, safety and working conditions of AA are better than those of CA. The majority of MA and AA farmers (93.62%) felt that their health and safety were better since they had become involved with AA, 2.13% believed it had remained the same and 4.25% did not know. 95.74% of the MA farmers and all the AA farmers said that they had changed from CA to AA for health reasons. The majority of the MA and AA farmers (91.50%) also felt that their working conditions were better since they had become involved with AA, 4.25% thought they had remained the same, 2.13% did not know and 2.13% thought they had worsened.

All the farmers were asked if they personally knew anyone who has become ill from using agricultural chemicals. Fifty per cent said that they did know such people, 46.25% said that they did not, and 3.75% were unsure.

Farmers' Social Comments

72.34% of the MA farmers and 61.11% of the AA farmers stated that AA farming had improved their lives and health, the lives and health of their families and/or the lives and health of the villagers. Some stated that their health was better, not only in physical terms, but also mentally, with less quarrelling, less tension, more freedom and better moods. Some villagers also mentioned the health benefits associated with eating AA vegetables that they had produced, and being able to supply AA vegetables to consumers.

In contrast, 82.98% of the MA farmers and 84.37% of the CA farmers stated that CA farming had led to a worsening in their lives and health, the lives and health of their families and/or the lives and health of the villagers. Some of the CA farmers mentioned that they felt weak and suffered from headaches, vomiting, itches, dizziness and allergic reactions as a result of using artificial agricultural chemicals. Mental health problems were also stated. These included anger, bad moods, worry and not feeling satisfied. Villagers from San Pay Yang and San Lueng also risk health problems from malaria and drug abuse.

[22] The other category includes sources such as farming magazines.

Farmers in Village Three, Pong Yang felt that AA methods were easy to practice. However, the Village Three, Pong Yang AA vegetable group restricted the farmers' freedom to decide which crops they would grow, as the group had to first reach agreement on this issue. The San Pay Yang and San Lueng interviewees also mentioned group problems, with some people having disagreements as to the techniques of AA. These interviewees also disagreed as to whether AA meant that they had more time to spend with their family.

Another social problem that was mentioned at both the research sites was stealing. A social problem that was specific to Village Three, Pong Yang was artificial agricultural chemical use causing a bad smell, which had led to complaints from some villagers. In San Pay Yang and San Lueng interviewees mentioned a further problem; that many of the young people in the area had not been able to find jobs, so they had migrated to the cities to work, but at the same time some people stated that there was not enough farm labour. However the stigma associated with manual work, may explain this discrepancy. On the positive side, the San Pay Yang and San Lueng villagers mentioned that the area was being more developed because of the AA project.

Environmental Comparisons

The environmental *a priori* beliefs were used to examine whether AA had resulted in environmental improvements, when compared to MA and CA.

Biodiveristy of Farming

The first environmental *a priori* belief concerning the effects of AA on the environment is that AA is more integrated than MA, followed by CA. It is assumed that an increase in the degree of integration of different crop and livestock types on each farm, will improve overall biodiversity (the third environmental *a prior* belief) as well as creating additional benefits, such as improved soil structure and composition.

Table 9 confirms that AA is more integrated than MA, which in turn is more integrated than CA.[23] However the diversity of livestock production does not always conform to this *a priori* belief. This unexpected result could be accounted for by the fact that the extension organisations involved are focusing on AA crop production rather than AA animal production. There may also be managerial constraints and economies of scale that limit the number of different types of livestock and crops that can be farmed.

Use of Artificial Agricultural Inputs and Their Alternatives

The second environmental *a priori* belief is that the use of artificial agricultural chemicals and artificial fertilisers in AA is lower than MA, which will be lower than CA and that the opposite case is true for their alternatives.[24] It is assumed that the application

[23] The farmers at San Pay yang and San Lueng were found to be more diverse that those at Village Three, Pong Yang.

[24] Unfortunately data concerning the amount of agricultural inputs applied per rai were too difficult to collect, due to factors including differing brand names that did not indicate active ingredients, and farmers not knowing the quantity of inputs they had applied.

of most artificial agricultural chemicals may clause negative environmental impacts (Chantalakhana, 1995) and that the larger the number of different artificial products applied the greater are the associated environmental and health risks. Alternatives to artificial agricultural chemicals and artificial fertilisers are thought to be less environmentally damaging and less dangerous in terms of risks to human health, than their artificial equivalents, although data concerning the different levels of toxicity are unavailable.

The AA farmers, especially those at San Pay Yang and San Lueng, were not supposed to use any artificial agricultural chemicals or artificial fertilisers, but this was not the case (Table 10). Even so, the AA farmers were found to use fewer types of artificial agricultural chemicals and fewer AA farmers applied artificial fertiliser than the MA and CA farmers, as expected by the second environmental *a priori* belief. The opposite pattern emerged when the use of AA products and alternative fertilisers was analysed (Table 11), again, as predicted.

The farmers from San Pay Yang and San Lueng use a lower number of artificial agricultural chemical and artificial fertiliser products and their alternatives than the Village Three, Pong Yang farmers. This indicates that the Village Three, Pong Yang farmers are farming in a more intensive manner, as would be expected due to their smaller average farm size (Table 1).

Renner (1998) suggests that some farmers were unaware of the purpose, application rates, correct storage and danger of some of the artificial agricultural chemicals that they were applying. This means that unnecessary health and environmental risks, as well as unnecessary costs will inevitably occur (see Jungbluth, 1996 for further details).

Wildlife Quantity and Variety

The final environmental *a priori* belief is that wildlife quantity and variety increases with AA practices, and decreases with CA methods. When all the farmers were asked whether they had noticed any changes in the total amount of wildlife within their village boundary since the introduction of artificial agricultural chemicals 65.82% of farmers said that the total amount had decreased. 16.45% of farmers said that the total amount had stayed the same, 5.06% said that the total amount had increased, 7.59% did not know and 5.06% did not answer the question. When asked if the variety of wildlife within the village boundary had changed almost identical answers were given. 63.29% believed there was a decrease, 17.72% felt it had remained the same, 5.06% said there had been an increase, 8.86% did not know and 5.06% did not answer the question.

AA and MA farmers were asked about the total amount and variety of wildlife within the village boundary since the introduction of AA methods. 51.06% of farmers indicated that they thought that the total quantity of wildlife had increased, 38.29% felt it had stayed the same, 8.51% did not know and 2.13% did not answer the question. Again, the answers concerning the variety of wildlife were very similar – 48.94% saw an increase, 40.42% saw no change, 2.13% did not know and 8.51% did not answer the question.

These wildlife variety and quantity results are as expected. However, the fact that more interviewees believed that CA farming had reduced the wildlife quantity and variety, than that AA had increased the wildlife quantity and variety, may be explained by the

number of years that each farming method has been practised. CA at Village Three, Pong Yang has been practised for an average of 10.63 years, and at San Pay Yang and San Lueng for an average of 11.91 years. Whereas AA has been practised for an average of 2.36 years by MA farmers and for an average of 7.50 years by the AA farmers at Village Three, Pong Yang. At San Pay Yang and San Lueng MA farming has been present for an average of 4.16 years and AA farming has been practised far an average of 6.125 years. Therefore the effect of AA farming on the quantity and variety of wildlife may not have been adequately observed and/or completed.

Farmers' Environmental Comments

The interviewees who practice CA methods frequently stated that the use of artificial agricultural chemicals resulted in pollution of the water, air and soil, with disease and death in fish and a loss of birds and plants. The problem of insects gaining increasing immunity to the artificial agricultural chemicals was also mentioned. None of the farmers mentioned any environmental benefits of CA farming.

Farmers practising AA frequently mentioned the insect problems associated with AA. In Village Three, Pong Yang fungus was also mentioned as a problem, and in San Pay Yang and San Lueng poor seed quality was cited. However, the environment was said to be better, with more birds and plants, an improved biological balance and better soil, when compared to CA.

Village environmental problems stated included garbage, insufficient water and noise pollution from vehicles. Environmental problems that were specific to Village Three, Pong Yang were cold weather, forest degradation and air pollution from the burning of the forest and garbage.

Choice of Farming Methods

Among the comments which farmers made, was the reasoning behind their choice of farming methods. Some MA and CA farmers stated that they had not converted their whole farm to AA because the market is dynamic, and by growing both AA and CA products risk can be reduced through diversification. AA market, price and income uncertainty, lower AA output, poor quality AA produce (due to damage from insects and disease) and the slower growth rate of AA crops were also mentioned. One MA farmer explained that the AA orders were small and that only enough AA products to fulfil the orders were grown.

The problem of not being able to grow strawberries and flowers (the main CA crops in Village Three, Pong Yang) under nylon netting, and the fact that the government seemed to have run out of subsidised nylon netting were further limitations cited. Some farmers believe that if artificial agricultural chemicals are used by their neighbours they too had to use these products, if they did not want their crops to be destroyed by insects.

The lack of information, extension advice and experience, as well as the time involved in being a part of the Village Three, Pong Yang AA vegetable group were other reasons for the CA farmer's choice.

These comments point to some issues that the extension and marketing organisations may be able to address. For example, further AA extension training could be given to CA farmers who have so far received no information.

Findings of the Study

There are a number of different organisations involved with AA, which use fair trade principles, in northern Thailand and throughout the whole country. The non-governmental organisations (NGOs) were found to be more established than their government counterparts. These NGOs also appeared to be more involved in networking (both in Thailand, and internationally), than the government organisations. However, the number of farmers who actually practice AA is still minimal, but appears to be growing.

None of the extension and marketing organisations involved in the AA projects are financially self-sufficient, as they all receive funding from government revenue and/or charitable donations. This indicates that, depending on the level of support that these organisations provide to the farmers, the future of fairly traded AA may be placed in jeopardy if the outside funding sources become inadequate, and the loss of the Imboon Center is not rectified.

The NGOs are stricter in their definitions and approaches to AA when compared to the government organisations involved. However, the NGOs may possibly be too idealistic if the MA farmers they are involved with are growing AA and CA crops on the same plots, in different seasons, even though they should not be, according to the NGO criteria. The NGOs may need to rethink some of their approaches, and further consult with farmers as to how these problems can be resolved. The development approach of FEDRA may also be inappropriate, as there are indications that it may be leading to dependency rather than self-reliance.

AA was found to be an economically viable alternative to CA and MA, on a whole farm basis, when non-farm income and household consumption were included, for both the government and NGO projects. However non-farm income and average farm size were highest for AA farmers, and outside funding of the organisations involved with AA must also be considered.

The larger average farm size associated with AA raises the question of whether there is a minimum farm size at which AA can be practised, since AA has the lowest average level of net farm income plus home consumption of household farm products on a per rai basis. If a minimum farm size is required for the AA techniques then the problems of land shortages, at Village Three, Pong Yang in particular, may indicate that AA will not have a viable long-term future unless population pressure and land hunger do not continue to increase. The smaller CA farms may need to be more intensive and use artificial agricultural chemicals to earn a sufficient level of whole farm income, and therefore a higher income level on a per rai basis than MA and AA farmers (as was found to be the case in the Village Three, Pong Yang data). CA farmers who have small farms may be economically unable to convert to AA.

The total cost data, excluding labour, and household consumption figures for Village Three, Pong Yang conformed to expectations. (AA has the lowest cost level, followed by MA and then CA. Household consumption figures were highest for AA, then

MA and finally CA). The San Pay Yang and San Lueng data were not as expected. This was partly due to the more traditional and self-sufficient nature of the CA farmers at San Pay Yang and San Lueng, compared to those from Village Three, Pong Yang. However, none of the means for AA, MA and CA were found to be significantly different at the different research sites.

The majority of respondents indicated that the extension information, new skills, health, safety and working conditions of AA techniques are better than those of CA methods. Even so, it should be remembered that the health risks from the artificial agricultural chemicals associated with CA methods are relatively minor when compared to the other health risks in the area, which include AIDS and road accidents.

AA was found to have beneficial impacts on farm biodiversity, as well as using fewer types of artificial agricultural inputs and more types of alternative products than MA and CA. Although the AA farmers at San Pay Yang and San Lueng were found to apply artificial agricultural products, even though they were not supposed to.

AA provides farmers with an opportunity to improve their economic, social and environmental situations. However, the number of farmers who practice AA are few. This anomaly may be partly explained by the changes that modernisation is bringing to the research sites. As farmers are increasingly bombarded with advertising for consumer products, their patterns of demand and consumption change. In order to be able to fulfil these changing wants and needs farmers require increasing levels of cash income. The temptations, and often necessity, of high short-term earnings from CA cash crops and contract farming remain. Farmers often do not have accurate information concerning the potential profits and risks associated with different crops and agricultural methods and so they may be unable to make informed profit maximisation decisions.

The promotion of a move away from the market economy by some NGOs may prove to be unsuccessful in promoting AA to the majority of farmers if the farmers continue to increase their consumer demand, thereby requiring higher income levels. Modernisation and population growth are occurring rapidly in Thailand, whether AA will provide farmers with enough incentives and income remains to be seen. However, the effect of the devaluation of the Thai baht, will also affect the choices that Thai farmers make. For example, imported artificial agricultural chemicals may become too expensive for farmers, and their local AA alternatives may become more appealing.

Recommendations

The many different definitions of AA and ‘chemical safe’ products in Thailand are likely to confuse many consumers. Therefore, clearer and more consistent definitions of AA are likely to be advantageous to consumers, producers and traders. The government may need to address some of the uncertainty surrounding its choice of ‘chemical safe’ production and labelling, and to clarify what ‘chemical safe’ means. The NGO sector needs a more unified and national approach to labelling and certification. Fair trade was found to be rarely mentioned on the labels of AA products, and this could be changed. However, the concept of fair trade may be alien to the majority of Thais, and the appropriateness of such an approach must first be assessed.

Although there appears to be a lot of co-operation among the different NGOs involved with AA in the north of Thailand, the co-operation between the NGOs and the government sector could be improved upon. Co-operation amongst different government departments could also be increased.

There is a need for better understanding of how the appliers of chemicals can adequately protect themselves, their environment and the consumers of their products. Health and environmental problems could be addressed through education, the use of protective clothing, stricter artificial agricultural chemical labelling requirements, and improvements in artificial agricultural chemical application techniques.

The problems of National Park and forest encroachment are important issues for both of the research sites, and especially for Village Three, Pong Yang where land is very limited. The use of approaches, such as community forests (Puntasen, 1997), could enable villagers to gain empowerment with which to utilise and value their surrounding forest areas without having to resort to deforestation. The forest preservation and overall environmental situation of the areas would then be likely to improve.

Limitations

Problems of small sample size and development arising from variables other than the imposition of the AA and fair trade projects may have led to biases in the interpretation and conclusions. For example, there were not as many AA farmers as expected so it was very difficult to find a sufficient sample number, especially in Village Three, Pong Yang. Classification of some farms was challenging, as was data collection from very complicated farming systems.

Cultural, translation and language limitations are likely to have effected the research. The use of different interviewers may have resulted in biases. The fact that the interviewees may not have answered the interviewers' questions correctly, as they may not have known them adequately (Prompunya, 1997) may also have caused biases.

The problems of lower yields and incomes associated with the transitional period of changing from AA to CA may have skewed the results if some of the AA farmers were in this transitional stage during data collection. The fact that the strawberry and flower production at Village Three, Pong Yang was supposedly Integrated Pest Management (IPM) may also have distorted the results.

Many of the farmers are likely to have had problems estimating their income and cost levels, especially as they do not usually record their farm accounts. Their estimations are unlikely to be accurate (Prompunya, 1997). Valuation of items such as home consumption of household farm production and forest products were also difficult.

The exclusion of barter and exchange data is likely to have distorted the data as they are particularly important in San Pay Yang and San Lueng (Prompunya, 1997). The exclusion of labour from total cost may also have distorted the data and excluded a very important aspect of well-being.

Lack of time, equipment and expertise in the collection of the environmental data in particular, meant that some measurements were not as scientific as they could have been.

Implications for Future Research

Larger, long-term studies comparing AA, MA and CA are needed to increase the understanding of their economic feasibility, social impacts and environmental effects. The collection of accurate labour cost information, yield differences, the importance of bartering and exchange economies, and the exact levels of direct and indirect subsidies and costs from organisations involved would help to provide a more accurate analysis. Future studies should also include levels of home consumption of household farm products, non-farm income, farm size and whole farm data compared to per rai data, as these factors were found to be important. Further data concerning the length and problems of the transitional period of moving from CA to AA may help to limit the negative effects of reduced yields and lower income levels.

Comparisons of different AA approaches in different regions of the country would provide useful information to policy makers, extension officers and farmers. There is also a need for further research and development into the quantities of different artificial and alternative agricultural inputs applied and their costs (both market and non-market) on producers' and consumers' health and on the environment. Appliers of artificial agricultural inputs are often hired labour, and this group (which is usually more marginalised than the farmers who employ them) should not be ignored. Suggestions as to how AA and CA methods can be less damaging to the environment and to health, and which innovative alternative agricultural techniques and inputs are efficient and appropriate for Thailand are also required.

Further research examining whether there are inappropriate applications of artificial agricultural inputs to AA land, and whether there are inaccurate labelling and certification claims and practices would be valuable in assessing the effectiveness of AA and fair trade labelling and certification in Thailand. Market research into the demand for AA products that are traded through fair trade would be likely to help farmers, traders and marketers to improve their planning, production and supply.

The issues involved in AA and fair trade in northern Thailand are complicated. Researchers, policy makers and extension workers must be careful to ensure that they provide accurate advice to help improve overall welfare levels, without placing farmers and consumers at greater levels of economic and social risk, whilst working towards environmental sustainability.

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Table 1: Socioeconomic Profile of Questionnaire Respondents

Research Site	All	Village Three, Pong Yang			San Pay Yang, San Lueng		
Agricultural Type	All	AA	MA	CA	AA	MA	CA
N	79	2	19	20	16	10	12
Average age	42.13	35.00	42.37	34.45	44.75	49.30	46.25
Number of males	51	2	15	12	10	4	8
Number of females	28	0	4	8	6	6	4
Average family size	4.11	4.00	3.89	5.10	3.62	3.80	3.75
Average education (years)	4.24	7.50	4.53	4.50	4.37	3.27	3.50
Average farm area (rai)	6.58	4.50	2.81	2.45	14.76	10.49	5.64
Area - low (rai)	0.50	2.00	0.50	0.50	2.00	4.00	0.50
Area - high (rai)	54.50	7.00	7.00	7.00	54.50	29.50	12.00
Area s. d.	8.12	3.53	1.96	1.65	12.67	7.07	3.86

s. d. = standard deviation.

Table 2: Collected Data for Income, Consumption and Costs (baht/farm) from 1 May 1996 to 30 April 1997

Research site	Village Three in Pong Yang			San Pay Yang, San Lueng		
Agricultural type	AA	MA	CA	AA	MA	CA
Gross farm income	80316 (42873)	92990 (63604)	149538 (155289)	21220 (26327)	35432 (25292)	24294 (19381)
Total costs*	**16615 (4787)**	**31832 (23682)**	**36010 (26220)**	**4795 (7806)**	**7673 (7929)**	**4331 (4866)**
Net farm income	63701	61158	113528	16425	27759	19963
Home consumption of H/H farm products	**23839 (33360)**	**1256 (873)**	**530 (1165)**	**11898 (16686)**	**15383 (24704)**	**13946 (20056)**
Net farm income & home consumption **	**87540 (81020)**	**62414 (48148)**	**114058 (141234)**	**28323 (29714)**	**43142 (44004)**	**33909 (29653)**
Forest income	445	0	200	547	30	25
Forest consumption	5	5	0	1006	282	258
Net farm income & consumption	87990 (81650)	62419 (48150)	114258 (141155)	29877 (30346)	43454 (43906)	34192 (29532)
Non-farm income	39000 (46669)	2474 (7198)	9900 (24706)	29937 (47463)	12255 (15745)	23971 (21736)
Net total income & consumption	**126990 (128326)**	**64893 (49978)**	**124158 (140339)**	**59814 (66833)**	**55709 (48427)**	**58163 (34508)**

* = total costs excluding labour. Standard deviation is in parentheses. ** = net farm income & home consumption of household farm products.

Table 3: Collected Income, Consumption and Cost Data (baht/rai) from 1 May 1996 to 30 April 1997[1]

Research site	Village Three in Pong Yang			San Pay Yang, San Lueng		
Agricultural type	AA	MA	CA	AA	MA	CA
Gross farm income	17848 (6502)	34871 (24568)	61036 (53926)	1438 (7191)	5291 (4250)	4307 (1922)
Total costs*	**3692 (5735)**	**12723 (12775)**	**14697 (30067)**	**325 (332)**	**1149 (1083)**	**768 (529)**
Home consumption of H/H farm products	**5297 (4703)**	**682 (756)**	**216 (1289)**	**806 (2723)**	**3160 (4602)**	**2473 (2770)**
Net farm income & home consumption **	**19453 (3935)**	**22830 (13829)**	**46555 (44100)**	**1919 (9113)**	**7302 (8466)**	**6012 (3187)**
Forest income	99	0	81	37	2	4
Forest consumption	1	2	0	68	26	46
Net farm income & consumption	**19553**	**22832**	**46636**	**2024**	**7330**	**6062**
Non-farm income	8667	880	4041	2028	1193	4250
Net total income & consumption	**28220 (9118)**	**23712 (14958)**	**50677 (43953)**	**4052 (11330)**	**8523 (8615)**	**10312 (15724)**

[1] These figures are from the same sources, and calculated using the same formulas as those in Table 2, but first each interviewees data are divided by the total area of their farm (rai) so that the data can be calculated on a per rai basis.

* = total costs excluding labour. Standard deviation is in parentheses. ** Net farm income & home consumption of household farm products.

Table 4: MA Data for Income, Consumption and Costs Divided into AA and CA plots (baht/rai) from 1 May 1996 to 30 April 1997[1]

Research site	Village Three, Pong Yang		San Pay Yang, San Lueng	
Agricultural type	MA*	MA+	MA*	MA+
Gross farm income	14406 (12172)	60204 (51160)	6384 (8710)	4198 (4920)
Total costs (excluding labour)	**3012 (4516)**	**24198 (26154)**	**1056 (1584)**	**1243 (1280)**
Home consumption of household farm products	**1019 (1241)**	**348 (831)**	**4441 (8459)**	**1880 (3455)**
Net farm income + home consumption of H/H products	**12413 (9279)**	**36354 (30679)**	**9769 (15729)**	**4834 (4530)**

1 These values are from the same sources, and calculated using the same formulas as those in Table 2. However, the figures are on a per rai basis with the data from each AA or CA plot being divided by the area (rai) of that AA or CA plot, respectively.

* = AA plots on MA farms. + = CA plots on MA farms. Standard deviation is in parentheses.

Table 5: Other Studies' Data for Income and Costs (baht/farm, unless otherwise stated)

Agriculture	AAa	AAa (baht/rai)	AAb	AAc	Ad
Gross farm income	25200	11200	160000	30000	33267
Total costs*	3000	1333	85000	11000	12259
Net farm income	22200	9867	75000	19000	21008
Non-farm income	-	-	-	-	17277

a = Thowakulphanich, W (1996, pp. 107-121). Case study of organic vegetable and fruit production.
b = Bontuyan, S., et al. (1996, p 22). Case study of integrated vegetable production.
c = Bontuyan, S., et al. (1996, p 22). Case study of organic strawberry farming, not including income from organic vegetables and from organic strawberries that are processed into jam.
d = Office of Agricultural Economics (1997). Table 151: Farm cash income and farm expenses per farm by type and region (Northern), crop year 1991/92. To be directly comparable with the collected data, labour costs were excluded.

Table 6: New AA skills learnt by AA and MA farmers (percentage of farmers reporting that they have learnt the following new skills and knowledge by being involved with AA)

Site	Village Three in Pong Yang		San Pay Yang, San Lueng		All
Type	MA	AA	MA	AA	**Average**
Farming	73.68	50.00	80.00	87.50	**78.72**
Quality Control	42.10	100.00	70.00	75.00	**61.70**
Marketing	36.84	50.00	30.00	62.50	**44.68**
Field visits	21.05	100.00	30.00	68.75	**42.55**
Management	26.32	50.00	20.00	25.00	**25.53**
Networking	5.26	50.00	0	18.75	**10.64**

* The averages were weighted by the number of farmers practising MA and AA at each location.

Table 7: Source of AA extension information and new skills (percentage of farmers reporting that they learnt their AA techniques from the following sources)

Site	Village Three in Pong Yang			San Pay Yang, San Lueng		
Type	MA	AA	**Average***	MA	AA	**Average***
Self-taught	36.84	0	**33.33**	40.00	50.00	**46.15**
Government	63.16	50.00	**61.91**	30.00	25.00	**26.92**
FEDRA	0	0	**0**	50.00	81.25	**69.23**
Imboon	0	0	**0**	40.00	43.75	**42.31**
Other farmers	26.32	50.00	**28.57**	30.00	6.25	**15.38**
Other	15.79	0	**14.29**	20.00	0	**7.69**

* The averages were weighted by the number of farmers practising MA and AA at each location.

Table 8: Source of CA extension information and new skills (percentage of farmers reporting that they learnt their CA techniques from the following sources)

Site	Village Three in Pong Yang		San Pay Yang, San Lueng		All
All	MA	CA	MA	CA	Average
Self-taught	73.68	80.00	70.00	91.66	78.68
Other farmers	15.79	30.00	30.00	50.00	29.51
Government	21.05	20.00	30.00	41.66	26.23
Other	21.05	15.00	20.00	16.67	18.03

Table 9: Average number of different crops grown and different livestock reared by the questionnaire respondents from 1 May 1996 to 30 April 1997

Site	Village Three in Pong Yang					San Pay Yang, San Lueng				
Type	AA	MA*	MA+	MA	CA	AA	MA*	MA+	MA	CA
Vegetable[1]	5.50	3.79	0.05	3.84	0.05	5.31	2.70	0.70	3.40	0.50
Fruit[2]	1.00	0	0.32	0.32	0.70	2.37	0.60	0.50	1.10	0.08
Rice	0	0	0.05	0.05	0.05	0.69	0.30	0.50	0.80	0.67
Soybean	0	0	0	0	0	0.19	0	0.90	0.90	0.82
Corn	0	0	0	0	0	0.06	0.10	0	0.10	0
Holland Beans	0	0	0	0	0.05	0	0	0	0	0
Groundnut	0	0	0	0	0	0.06	0	0	0	0
Flowers[3]	0	0	2.00	2.00	1.25	0	0	0	0	0
Tea	0	0	0	0	0	0	0	0	0	0.08
Tobacco	0	0	0	0	0	0	0	0.10	0.10	0
All Crops	**6.50**	**3.79**	**2.42**	**6.21**	**2.10**	**8.68**	**3.70**	**2.70**	**6.40**	**2.15**
Chicken	0	0	0.10	0.10	0.10	0.62	0.20	0.30	0.50	0.33
Pigs	0	0	0	0	0	0.25	0	0.50	0.50	0.08
Buffalo	0	0	0	0	0	0.06	0	0	0	0
Cattle	0	0	0	0	0	0.12	0	0.10	0.10	0
Fish	0	0	0.05	0.05	0	0.37	0	0	0	0.27
All Animals	**0**	**0**	**0.15**	**0.15**	**0.10**	**1.42**	**0.20**	**0.90**	**1.10**	**0.68**
Total	**6.50**	**3.79**	**2.57**	**6.36**	**2.20**	**10.1**	**3.90**	**3.60**	**7.50**	**4.98**

[1] The types of vegetables that the farmers grew included traditional Thai vegetables, Chinese vegetables and temperate vegetables.

[2] The AA farmers and the CA farmers from San Pay Yang and San Lueng mainly grew traditional fruits, such as mangoes, banana and papaya, whereas the CA farmers in Village Three, Pong Yang mainly grew temperate strawberries.

[3] The CA farmers in Village Three, Pong Yang grew temperate flowers such as roses, lilies and chrysanthemums.

* = AA plots on MA farms. + = CA plots on MA farms.

Table 10: Average number of artificial chemical and fertiliser products used by farmers from 1 May 1996 to 30 April 1997

Site	Village Three in Pong Yang				San Pay Yang, San Lueng			
Type	AA	MA*	MA+	CA	AA	MA*	MA+	CA
Fertiliser	1.50	1.00	1.73	1.90	0	0.40	1.00	1.08
Insecticide	1.00	0.05	1.68	1.75	0.06	0	0.30	0.33
Herbicide	0	0	2.21	2.00	0	0	1.00	1.17
Growth hormone	0	0	0.26	0.20	0	0	0.10	0
Fungicide	0.50	0.32	1.21	1.60	0	0	0.60	1.17
Rodenticide	0	0.05	0.05	0.10	0	0	0	0
Mollusicide	0	0	0.05	0.10	0	0	0	0
Unknown	0	0	0.05	0.10	0	0	0.10	0
Total	**3.00**	**1.42**	**7.24**	**7.75**	**0.06**	**0.40**	**3.10**	**3.75**

* = AA plots on MA farms. + = CA plots on MA farms.

Table 11: Average number of AA products and alternative fertilisers used by farmers from 1 May 1996 to 30 April 1997

Site	Village Three in Pong Yang				San Pay Yang, San Lueng			
Type	AA	MA*	MA+	CA	AA	MA*	MA+	CA
Manure	1.50	0.84	0.36	0.75	0.69	1.00	1.00	0.42
Compost	0.50	0.05	0	0.10	0.56	0.30	0	0.08
Neem	0.50	0.37	0	0.05	0.12	0.20	0.10	0
Soya shell	0	0	0	0	0.06	0	0	0.17
Sticky glue	0	0.05	0	0	0	0	0	0
Bacteria	0	0.05	0	0	0	0	0	0
AA G.H.	0	0.05	0	0	0	0	0	0
Total	**2.00**	**1.41**	**0.36**	**0.80**	**1.43**	**1.50**	**1.10**	**0.67**

* = AA plots on MA farms. + = CA plots on MA farms. G.H. = growth hormone.