Reflections on 50+ Years Assisting Smallholder Farming Communities

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Introduction

My entire 50+ year professional career, starting with my dissertation field work in Viet Nam in 1971, has been devoted to assisting smallholder farmers and their communities. This includes residential assignments in eight countries plus additional short-term assignments in 16 countries (Table 1). Most of this was through USAID contracts, including some 15 volunteer assignments with the Farmer-to-Farmers program. Over the course of my career, I am satisfied with the effort I have made but not with the overall impact on enhancing smallholder farmer production and economic wellbeing. As such I have become concerned about how effective the smallholder farmers poverty alleviation efforts have been. It seems we have invested substantial fund, over several decades with little acceptance of technical agronomic recommendations or enduring impact in economic wellbeing. Thus, I wonder if we have overlooked some important concerns or overemphasized some approaches. This presentation reviews of my thoughts on the history of the poverty alleviation for smallholder farmers synthesized over the various countries I have visited and worked in, and ideas on how future poverty alleviations efforts could be more effective. This from the perspective of an agronomist/soil scientist with an initial liberal arts degree, encouraging a more holistic assessment on the plight of smallholder producers. Thus, the presentation will be less on agronomy/crop husbandry and more on what hinders agronomy and may need priority in addressing before there can be a major impact on improved crop

Table 1. Countries Worked In

Long Term (Residential)		Short Term			
Country	Dates	Country	Dates	Country	Dates
Viet Nam	1971 – 72 Dissertation	Egypt	1990	Bolivia	2008*
Viet Nam	1974 – 75 Evacuation	Iraq	1992, 2006	Malawi	2009*
Philippines	1975 - 77	Russian Fed.	1993, 94	Nigeria	2009, 2011*, 2012*
Sri Lanka	1977 - 79	Uzbekistan	1994	Ghana	2009*, 2010*
Egypt	1980 – 84 1991 – 94	Kazakhstan	1994	Ethiopia	2013*, 2014*
Pakistan	1985 - 86	Ukraine	1994	Angola	2017*
Malawi	1986 - 90	Zambia	2001, 2005*	Madagascar	2018*
Thailand	1995 - 98	Uganda	2005*, 2008*		
Tanzania	1998 - 2001	Tajikistan	2006*		

*Farmer to Farmer Volunteer Assignment

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management. The presentation will focus more on factual accuracy than politically correctness. Hopefully, the presentation will provide insight into overlooked or underappreciated issues.

The presentation will review:

1. The overall economic environment of most host countries, how this impacts government revenue to provide civil services supporting agriculture, encourages informal income opportunities by civil officers, and limits profit margins for private traders working in the agriculture value chain.
2. The upfront time and cost for project development prior to the implementing contract signing but with limited involvement of intended beneficiaries, resulting in too detailed contract specification which discourages innovation and reinforces programs with limited historic effectiveness.
3. Limits of small plot agronomic research techniques that does an excellent job of determining the physical potential of an area but fails to address the operational feasibility to extend small plot agronomic research results across a smallholder community.
4. The disconnect between smallholder producers and researchers/extension/development professionals, with the farmers more interested in return to labor and professionals interested in return to land.
5. Different roles and perspectives of research/extension vs. Development professionals, associated with distance or closeness to beneficiaries and opportunity to interact.
6. How limited available calories can severely limit manual labor, hinder farm operations, acceptance of research innovations, crop/animal yields, family food security, and acceptance of most diet diversification initiatives.
7. The critical need to facilitate smallholder access to contract mechanization to expedite farm operations, particularly initial crop establishment, that will allow greater acceptance of recommended innovations, other indirect forms of drudgery relief, and how to adjust credit programs to accommodate this need.
8. Over reliance on producer organizations to provide business services to smallholders, as their excessively cumbersome administrative procedures results in high overhead costs to often renders them non-competitive with the competing private service providers in the agriculture value chain to the extent relying on them will potentially push smallholders deeper into poverty.
9. The very limited actual success of producer organizations in terms of percent participation of smallholder beneficiaries, excessive side-selling or side-buying, convenience, and inconsistence with their overall financial management strategy of smallholder producers that emphasis retaining produce in-kind while only marketing what is necessary to meet immediate needs but requiring cash transactions.
10. The need to appease donors in reporting the success of producer organizations using some questionable accounting and reporting methods. How this may be necessary to assure contract extensions and future contracts, but doing little to assist the smallholders.
11. The need for Monitoring & Evaluation to set clear targets of key business parameters separating success from failure. Failure to have targets can result M&E activities being

more a propaganda tool capable of covering up what by all normal criteria including taxpayers' expectations would be a complete failure, then a mechanism to guide future projects to better serve the beneficiaries, and

12. Enhance the family enterprise system to provide the business services more effectively to smallholder communities as they already handle the bulk of the business in direct contact with the smallholder producers in the value chain.

Financially Suppressed Economic Environment[2]

The common features of most countries relying on Smallholder Producers for of their subsistence production is the overall economic environment. This might best be expressed as a "Financially Suppressed Economy"[3], that serves an impoverished population in which most of the population spend up to 80% of their income or farm production for immediate family food needs. This leaves very little funds to obtain other essential needs like some used clothes, fuel oil for lights or cooking, cooking oil, school fees, etc. or surplus production to move up the value chain to earn some cash to make the purchases mentioned above. Even with this percent spending for food, the diet obtain could be marginal, as will be discussed later. It often will not meet the caloric needs to optimize economic opportunities, particularly when relying on heavy manual labor such as agronomic field work, requiring nearly 4000 kcal/day. Since optimizing economic opportunity could take priority, the wages or produce could easily be exhausted before obtaining a healthy well-balanced diet for a family including providing each child an egg a day, as promoted by a World Bank Webinar[4] to minimize malnutrition induced stunting.

In contrast in the USA and other developed countries food consumes from 5 to 15% of income, for which the population can, if they choose, afford a well balance diet, and still squander money on poor quality junk food resulting in a major problem of obesity.

The Financially Suppressed Economy, common to most host countries, has a couple major ramifications impacting the poverty alleviations effort for smallholder farmers or other impoverished beneficiaries. Most critical of which is a limited tax base to provide civil services as often recommended in development projects, and a highly efficient food value chain that would be very difficult for the highly promoted producer organizations to compete with.

Financially Stalled Governments

With this percent of income devoted to essential food needs but providing only a marginal quality diet that may not allow people to optimize their economic opportunities relying on manual labor, and the rest taken by essential non-food items, there is very little if any discretionary income to pay taxes that will support governments to provide essential civil services, including agriculture research & extension services or other agricultural stimulus activities such as certified seed programs or soil testing programs. **No taxes no services!** The

[2] https://agsci.colostate.edu/smallholderagriculture/financially-suppressed-economy-2/

[3] This is my term stepping out of my normal discipline. Economists may have a better term to describe the condition. I think the term is useful in synthesizing across different host countries.

[4] Secure *Nutrition Seminar, 26 Nov. 2017, Cracking the Egg's Potential to Improved Child Growth and Development Global Forum on Food Security & Nutrition*

resulted is most tax revenue is consumed by personal obligations to civil officers, including salary, pensions, insurance, healthcare, and often housing. This leaves very little, if any, funds for operating costs to allow civil officers to effectively undertake their assigned tasks, leaving civil officers often sitting at their desk drinking prestigious quantities of tea, etc. Just not enough transport funds for field visits to meet and discuss the needs of smallholder farmers, or laboratory supplies to make germination test on certified seed samples. Even with this, civil officers are usually poorly paid with some expectation they will earn some informal supplemental income based on services provided, or opportunities integrated into their official duties. This informal income being virtually essential to provide a reasonable standard of living, consistent with their colleagues in other countries. In most countries it can be a very gray area between gratuities freely provided to underpaid civil officers for services rendered and pure corruption demanded to obtained services.

Certified Seed Nigeria: Example would be only one seed testing team to manage the seed certification in Kano State, Nigeria[5,6]. They have the herculean task of making three field visits to a multitude of small, often 0.25 ha, seed plots. The three visits are to:

1. Early in the season to assure proper spacing between varieties to prevent cross-contamination,
2. Middle of the season to assure uniformity of the variety during the growing season with no off-types visible, and
3. At harvest to collect a sample for germination testing.

Thus, the whole seed certification program can only be managed on the honor/gratuity system after the seed producers provided transport to bring the team to visit the field. Not certain I would trust the certified seed quality, wonder how much of the program was for show. Also, what percent of the seed requirements for major staple crops like maize or rice could be certified? Would it be more than a very small percent?

Madibira, Tanzania: Another case is the Madibira Agriculture Development Project, an African Development Bank financed 3,000-ha rice irrigation project in Mbeya District of Southern, Tanzania. In Madibira, the intention was to allocate one-hectare plots of irrigated rice to individuals from five neighboring villages. However, the seconded staff kept up to 10 ha for individual cultivation and concentrated their time and effort in managing their personal plots at the expense of project management. They also solicited TSh 100,000 (US$100.00) per hectare in share capital that had nothing to do with the financial management of the scheme. The money was expected to quietly disappear. Even one seconded project engineer mentioned the seconded staff expected to manage the scheme for personal benefit for 10 years after which it would be in such disrepair it would have to be totally renovated with additional donor funding. Such is the typical governance in many host countries.

[5] https://agsci.colostate.edu/smallholderagriculture/impact-of-financially-stalled-government-limited-variety-improvement-seed-certification/

[6] https://agsci.colostate.edu/smallholderagriculture/informal-income-opportunities-seed-fertilizer-voucher-program-of-afghanistan/

Limited Expectations from Host Governments: The underlying concern is to be careful in relying on host governments to increase support services for smallholder communities as often development project proposes, expecting the host government has ability to respond as to needs in a manner like what donor governments are capable of. Before asking the government to undertake more responsibility the proposing development effort should undertake a financial analysis to determine the government has the operating budget to undertake the responsibility, both in terms of personnel benefits for the civil officers plus operating funds. If not, what are the prospects of providing an informal income opportunity for civil officers to exploit the situation at the expense of the beneficiaries. If this happens, will it become a disservice to the beneficiaries with the donor program clearly identified as the source, and presumed willingly endorsing the supplemental income opportunity! With all the emphasis on micro-finance what are the prospects that implementing civil officers are requiring some gratuities to approve their loan applications or get approval for scarce resources like fertilizer!! Perhaps the enthusiasm for under paid civil officers to assist with such loan and input distribution programs should be an indication of some informal income opportunities are available. Perhaps the "progressive farmers" with the higher yields are those contributing the biggest gratuities to the civil officers in exchange for access to intentionally scarce inputs like fertilizer, as may have been observed in Ethiopia. The justification for having a limited supply of fertilizer instead of it being openly available is to assure the foreign exchange used to purchase it is not wasted. Please have more faith in the farmers to quickly sort out appropriate fertilizer applications.

It should be noted that host civil officers are more experienced in foreseeing informal income opportunities in planned projects than external advisors are at anticipating them. They are also skilled at discreetly pursuing informal income opportunities so outside observers would be unaware of such activities.

Exceptionally Efficient Private Agricultural Value Chain

In a financial suppressed economy, as defined above, where most of the population spends the bulk of their income or food production to feed their family with an insufficient diet, retailers must keep consumer food prices low enough so people can purchase at least a meager diet. If not, the food will go unsold in the retail stalls and people will starve. This places substantial downward pressure on consumer prices, and lead to a highly efficient value chain for domestically produced and marketed produce, with very thin profit margins. Perhaps for export marketed produce there might be more opportunity for exploitive marketing.

Being impoverished also means paying higher consumer prices. Instead of getting discount for buying in bulk, the impoverished must buy in smaller, more affordable, volumes resulting in increased repackaging costs to accommodate the smaller sale volume. This is often in unmarked plastic bags, old newspaper rolled into funnels for dry good, or reused glass and plastic bottles for fluids. It also requires additional handling time for retailers to undertake the repackaging. While these may be small costs, they do add up. More important could be the lost time by consumers as they will have to make additional trips to the market. The extra marketing trips

distracting from contributing to enhancing family's economic opportunities. "It is expensive to be poor!"[7]

Consumer Price Comparison: Typically, consumer retail prices for domestically produced foods, staple grains, fresh vegetable, meats, including the extra costs mentioned above, in the private open-air village and town markets will be only 1/3rd to 1/5th the consumer price in the USA and most likely the EU (Table 2). Meanwhile imported foods, most noticeable wheat flour and pasta, are more expensive than the USA. This with fertilizer, crop protection chemicals, diesel fuel for transport obtained on the international market at international prices. Thus, while smallholder and large farmers universally complain about low prices they receive for their produce, rarely can you find a detailed total value chain cost analysis of the marketing costs being incurred by private traders in getting produce from farmers in rural villages to consumers in towns and cities in host countries relying on smallholder producers.

Value Chain Costs: Thus, even if the nominal price of tomatoes in Nepal can triple between the Tari and Katmandu in what appears to be an exploitive value chain, how much of these costs are consumed by packaging,

Table 2. Comparative Consumer Prices to USA Prices (% USA Price)

	Host Countries						
	Viet Nam	Thailand	Philippines	Kenya	Tanzania	Malawi	Bolivia
Condiments							
Salt	12	27	47	32	22	74	6
Coffee	7		66	197		48	4
Tea				43		13	
Sugar	54	107	62	136	61	61	42
Dry Goods							
Flour	188	251	121	103	102		147
Pasta		271	107	144		103	24
Rice	39	53	64	74	60	104	97
Maize Meal				63	11	43	
Dry Beans	47	47		29	39	140	112
Veg.Oil	73	93	122	160	91	98	120
Dairy							
Eggs	87	82	110	101	136	201	78
Milk (UHT)	1		143	242	33	189	71
Yogurt	67	105	174	71	11	141	47
Meat							
Beef	60	44	39	37	18	67	24
Chicken	57	67	79	126	114	150	68
Duck	34	40					
Pork	68	115	87		42	268	81
Goat/Lamb				44	24	45	
Fish	13	24	21	23	16	17	9
Canned Fish	3	41	31	151			
Roots & Tubers							
Cassava	11			44	18	46	11
Sweet Potatoes	11		26	9	24	38	
White Potatoes	23	160	40	99	36	52	20
Plantains				11	5		18
Vegetables							
Tomatoes	4	6	12	6	9	22	12
Onions	21	42	53	45	80	211	23
Eggplant	7	15		23	33	48	
Cabbage	14	43	50	42	90	23	8
Beans	11		49	35	21	61	53
Peas	18	6		12	6		
Carrots	48	42		83	120	186	181
Cucumbers	11	20	47	31	18	40	18
Fruits							
Bananas	11	27	62	182	5	44	75
Pineapples	7	136	82	131	82	75	
Mango	33	23	37	22	30	183	
Papaya				96	18		33
Fuel							
Gas	254	155	153	203	178	293	88
Diesel	96	112	112	149	145	229	78

This data was collected over several years during which the USA prices as the base varied, so the most stable measure was percent of USA price at the time data was collected.

[7] Quote from Fr. Joe Maier, An American Redemptorist Catholic Priest who has served the slums of Bangkok for over 50 years.

spoilage, transport, market access fee, informal road fees & "overweight fines" etc.?[8] Couldn't this cover most of the price tripling mark-up, leaving the traders only modest incomes considering the risk they are undertaking? Isn't this justification for the need, usually omitted, in the promotion and reliance on Producer Organizations to provide essential business service to smallholder communities to undertake a detailed cost accounting between the promoted producer organization and the competing private service providers? How often has the private value chain for agriculture produce been analyzed in detail and not just slanderously contemned? If done, might it show a highly fragmented, family based, business model that is highly efficient and accounts for most of the total national agricultural value chain, particularly for the more perishable products like fruits, fresh vegetable, and meats. With the low consumer prices isn't it likely the private value chain is highly efficient, and the Producer Organization model highly promoted by development projects could be detrimental to the producers, as will be reviewed in depth later.

Project Development Process[9]

If much of the development effort to assist in the poverty alleviation of smallholder producers is ineffectively focused, the question is how did this come about and continue after a half century of development assistance? Much of this is the result of a prolonged, expensive project development and reporting process that reinforces established commitments and hinders innovation. Typically, we think of a project beginning when a contract is signed and an implementing advisory team is fielded, finally providing a time for detailed interaction with the beneficiaries to determine their real needs, be this smallholder producers or other impoverished groups. However, by contract implementation a project is normally two or more years from inception with over US$1,000,000 invested in upfront design and approval costs. Also, at implementation all the key decisions have been made and implementing staff hired based on their professional committed to predetermined innovations. With that much upfront time, effort, staffing, personnel commitment, and costs, no one wants to hear the project is poorly designed and the intended beneficiaries are not interested or wisely avoiding major participation.

Typically projects development follows a six-step process, which by necessity must be mostly top down, following the development hierarchy[10] in which the beneficiaries are four levels removed from the basic decision makers. The process involves:

1. **Project identification**: Project identification is normally done between the donor and host government usually at some sub-ministry level. However, since the donors have the money, they get the most say. Projects are often identified to meet some international Strategic Objective following what is socially desirable by the donors' standards and can easily be marketed to the underwriting taxpayers. However, the International Strategic

[8] https://agsci.colostate.edu/smallholderagriculture/private-service-providers-family-oriented-fragmented-business-environment/
[9] https://agsci.colostate.edu/smallholderagriculture/project-development-process-who-represents-the-smallholders/
[10] https://agsci.colostate.edu/smallholderagriculture/development-hierarchy-four-layers-of-isolation/

Objective are sufficiently vaguely stated to easily allow a wide variety of projects. Also, considered could be how easily the presumed success can be documented.

2. **Project Design:** The project design is done mostly by the donor with some input from host country senior officers but not at a local level simply because location is determined during this phase, which is precursor to getting local involvement. During the design stage the basic innovation is decided, location, staffing, staff qualifications, line-item budgeting, etc. The largest budgeting line items frequently going for direct support of the advisory team and training.

3. **Project Appraisal**: The project appraisal represents the initial field visit and opportunity for the donor, accompanied by host country officers, to talk with beneficiaries. It is designed to fine-tune the project design, assure it is appropriate, and will be appreciated by the beneficiaries. However, this is usually only a brief site visit, perhaps a couple days per project location, and can be highly orchestrated by the host country officers guiding most of the discussions with any, possible pre-selected and prepped beneficiaries, or even answering questions on behalf of the beneficiaries without even asking them. This can hinder getting an in-depth understanding of the beneficiaries' needs and interest in the project, while reinforcing most of the initial project design. The purpose is more to fine-tune the project design than make any major modifications. There is just not enough time for in-depth interaction with beneficiaries.

4. **Request for Proposal (RFP):** The request for proposal is now prepared based on any fine-tuning of the project designed resulting from the appraisal. It is usually done in considerable detail thus allowing little innovation on part of the proposal writing team. It clearly specifies the implementing team, their professional qualifications, and total line-item budget.

5. **Project Proposals:** Project proposals are now prepared by a short list of potential implementing organization who expressed an interest in the project and received a copy of the RFP. This is overseen by the donor with a lot of emphasis on the individual qualifications of the proposed advisors. Often the people preparing the proposals are home office staff, with limited field experience and normally would not be part of the implementing team.

6. **Project Implementation:** The proposals are then carefully reviewed by the donor with some input from the host. After careful review the Project Implementing Contract is finally rewarded, staff formally hired but not necessarily the individuals specified in the proposal, fielded and finally an opportunity for in-depth meetings with broad selection of beneficiaries, unincumbered by civil officers, to ascertain their real needs and interest. However, everything has been decided so any participatory involvement, as often widely proclaimed, can only be leveraged to support whatever innovation is being impose, then making the best of the situation. There is little alternative, except to close the project and

go home. Ultimately projects are more imposed than collaboratively developed. Given the commitments already made it would be very difficult to avoid this, short of closing the project and writing off the extensive advance costs.

Beneficiary Representation: The question is: During this extensive, prolonged, and expensive project development process, who is representing the beneficiaries and how well are they being represented? The only representation available is host government officers assisting in the project development. As mentioned earlier they primarily come for sub-ministry level officers from headquarters with some assistance from more local officers after the project location has been identified. However, as mentioned at the beginning of this article, host governments are largely financially stalled with minimum salaries, some expectation of projects supplementing the low salary, and even more limited operating funds. Thus, it is unlikely that officers representing the beneficiaries have had extensive opportunity to meet with and obtain an in-depth understand for their development needs but will proclaim they have total in-depth understanding of their plight. Also, it very possible that any previous interaction with the beneficiaries has been more downward educational directives approaching supervision. Afterall the civil officers are better educated and knowledgeable of what the government expects of the beneficiaries. It is also possible the officers assisting in project development have a personal agenda looking for supplemental income for themselves or more junior civil officers assisting with the project implementation once the contract is signed. And it should be noted as mentioned above most host officers are more experienced at identifying informal income opportunities than donors are at anticipating such opportunities. Not really the best representation for the beneficiaries, but no realistic alternatives.

Having little input into the design of a project, the only voice the beneficiaries have is their personal decisions to participate or not-participate. Thus, it is an essential task of the Monitoring and Evaluation process to be the voice of the beneficiaries and clearly document the extent they are participating or avoiding any project.

While the process is basically sound and there is little potential to modify the process, it is essential for the donors working on project development be very aware that the beneficiaries may not be as well represented in the process as desired, as well as some personal agenda by host officers. Thus, there may be a need to make some substantial adjustment on implementation and provisions provided to encourage substantial adjustments as identified, to minimize major waste of development investments. However, by this time too much as already be committed and such adjustments are nearly impossible to make even when identified.

The Operational Feasibility Oversight

There are two main concerns with the poverty alleviation effort for smallholder producers. The first is the limits of agronomy research that overlooks the operational feasibility of extending research results across a smallholder community. Agronomy research is primarily based on replicated small plot trials. These do an excellent job of determining the physical potential of innovations, be it fertilizer recommendations, chemical applications, time of planting, or improved variety. What small plot research cannot do, is evaluate the operational needs to extent

the small plot results across the rest of the field, farm, or smallholder community, with the unfortunate default assumption that it is not a problem, and farmers only need to be taught, perhaps repeatedly taught, the innovative research results, and they will eventually adopt the innovations. Who within a poverty alleviation project determines:

1. The labor or labor substitutes needed to extend the results across the community,
2. The availability of that labor within the community,
3. The rational compromises in the research innovation farmers should undertake when the labor is not available, and
4. How close do those compromises come to the current practices?

Administrative Void: This appears to fall into an administrative void between the agronomists, as applied biological scientists, and social scientists. Both being uncomfortable working outside their discipline mental walls. Agronomists are uncomfortable with any in-depth social science analysist, consider labor to be an economic and social science concern. Occasionally economists will estimate the labor requirements as part of a cost benefit analysis, but that would be all. The availability of the labor will be assumed, and the degree that unless there is a landless population or migratory labor pool, which is rare, the laborers would be other smallholder farmers opting for a day of casual labor at the expense of working their own fields in what might at best be a "robbing Peter to pay Paul" scenario resulting in a net zero impact across the community. This can make for great demonstrations for the receiving farmer, but limited acceptance across the whole community, which is the objective of any project as they are specified as serving a community and not just cooperating farmers. It is an example of how collaborating interdisciplinary efforts just miss making a major analysis that could have impacted the way critical issues are addressed and lead to more effective programs.

How Essential Extension/Education?: Underlying this oversight is a somewhat supremacist mentality toward our host countries best described by Rudyard Kipling over 100 years ago in his poem "White Man's Burden"[11]. We tend to claim we are the ultimate source of farming knowledge and great extension teachers of that knowledge. We make a somewhat arrogant assumption that lack of acceptance is strictly a lack of knowledge and once the smallholder producers have the knowledge, they will readily adopt the recommendations. Thus, we concentrate on technical capacity building of our host officers to enhance their capacity to convey the educational message to the smallholder farmers with such approaches as the T&V (Training & Visit, aka Talk & Vanish) or Farmer Field Schools. Both of which concentrate on the physical potential without looking beyond it to any operational constraints.

Unfortunately, lack of knowledge may be the least concern as most smallholder producers, may have limited formal education but, are still skilled in the art of farming making the best of their limited operational capacity. Perhaps extension/education is the easiest one to address and propagandize success by claiming the number of farmers trained, and avoiding the more difficult task of measuring percent of area adopting. We are less able to listen and make critical observations determining if recommendations are appropriate or even feasible, and what is

[11] The White Man's Burden - Wikipedia

needed to make it more feasible. Likewise, we are weak at synthesis information across different disciplines and programs. How often is the spread in crop establishment reported and analyzed to evaluate if it is involuntary because of lack of operational capacity or deliberate as means of risk management? The latter is the historic assumption. Typically, initial crop establishment for manual smallholder operations takes eight weeks or more, against an expectation on only two weeks. This usually can be easily observed from any convenient overview of a community fields (Fig. 1) and quantified through a good set of farm records. Something I have done in Philippines, Sri Lanka and Egypt. Overlooked would be that manual crop establishment with a hoe takes 300 diligent person hours exerting some 300 kcal/hr. If you only have access to 2500 kcal/day with 2000 kcal/day required for basic metabolism, how many diligent hours of work can you undertake a day? Does this make the eight-week crop establishment time reasonable? Under these circumstances badgering smallholders about importance of early planting won't be helpful. They are most likely aware of this and can quickly state the decline in potential yield associated with delayed planting. Better to facilitate providing access to enhance operational resources.

Fig. 1. Rice production area showing over eight-week spread in crop management. Note uncultivated paddies, cultivation, nurseries, transplanting, and post-transplanting growing. Which is more likely: this represents and educational need on importance of early planting or a resource limitation needing additional operational resources.

Disconnect Between Farmers and Research/Extension/Development Professionals

Overlooked is a substantial disconnect between the research/extension/development professionals, both host officers and expatriate advisors, and the farmer beneficiaries. This disconnect can be represented by:

1. While the research/development professionals operating for their more physical potential perspective tends to concentrate of **returns to land**, the smallholder producers operating from a more economic perspective are more interested in **returns to their labor**.
2. Farmers are thus not interested in maximizing yields from all farm enterprises but interested in **maximizing total returns from all farm enterprises**, including both crops[12] and animals, sacrifice maximum yield on one enterprise to enhance the yield on another. They are highly skilled at integrating their limited labor across all-farm

[12] In considering crop enterprises it might be better to consider the parcel of land as the enterprise instead of the crop being produced. Often farmers will grow the same crop, such as the staple rice and maize, on several parcels with very different management on the different parcels reflecting time of planting, or varieties, etc.

enterprises. As such smallholder farmers should be considered as **maxed-out** managing their lands to the maximum extent their limited operational resources will allow.

Research/Extension vs. Development[13]

Perhaps it would be appropriate to distinguish between research/extension programs and development programs. Research/extension programs working primarily from experiment stations and central administrative offices are somewhat isolated from the smallholder beneficiaries. Thus, while they can do an excellent job of determining the most ideal recommendations and educate the smallholder producers on them, they do not have sufficient direct contact with producers to effectively sort out any difficulties producers might have in accepting the recommendations developed and promoted for their benefit. This may not be by desire as much from limited operational funds limiting field visits and opportunity to discuss needs and constraints with individual smallholder farmers.

Development programs are in more locally based serving specific communities and thus in closer contact with the farmers providing more opportunity for direct discussion and observation of field work. Thus, they can sort out and address any obstacles farmers may face. The task of development programs should be to assume the basic extension has been accomplished and focus on the more critical need to integrate the research results into the total farm enterprise system, until there is large scale adoption. They are in a position to identify the delayed crop establishment, limited available labor and then facilitate access to any additional resources that would enhance adoption or recognize solid reasons for non-adoption. Unfortunately, too often development projects continue to focus on promoting recommendations as stated, and not look for possible resource adjustments that would enhance adoption. This would have been an appropriate task for the Farming Systems on-farm research effort undertaken several decades ago. However, the program rarely got beyond just repeating on-station research on farmers' fields, without integrating the on-farm plots into the rest of the field and farm that would have picked up the operational problems so they could be effectively addressed.

Dietary Energy Balance[14]

A major part of the operational feasibility oversight is the Dietary Energy Balance of smallholder farm families. We tend to acknowledge that smallholder producers are poor and hungry but fail to appreciate this as a major hinderance to farm operations and production. Even as acknowledging they are hungry, there is little hard data on their available calories, let alone compare this to what is needed to undertake the full day of extensive manual labor agronomic recommendations compel them to do. What little data is available centers around a diet between 2,000 and 2,500 kcal/day (Table 3). This is consistent with farmers in Malawi mentioning their retained food stock of maize was 200 kg/adult/year and provide some 1900 kcal/day. Of the calories available 2,000 kcal/day is considered basic metabolism that would be required of an office worker using a computer in a nice climate-controlled office. This then leave very little

[13] https://agsci.colostate.edu/smallholderagriculture/integration-an-under-appreciated-component-of-technology-transfer/

[14] https://agsci.colostate.edu/smallholderagriculture/calorie-energy-balance-risk-averse-or-hunger-exhasution/

caloric energy to undertake manual agronomic field work. Against this limited number of available calories, manual agronomic field work, particularly the heavy initial hoeing for crop establishment requires 300 kcal/hr. or 220 kcal/hr. above basic metabolism. Thus, a diligent full 8 hr. day of intensive field work will require 2,000 kcal for basic metabolism plus 8 x 220 = 1,760 for a rounded total of 4,000 kcal/day. That is a lot of calories and requires consuming 1.1 kg of uncooked rice or maize or other high calorie food (Fig. 2).

Table 3. Typical Kcal/Day for Smallholder Producers

Location*	Kcal/ day*	Diligent Workable Hours**
Ghana	2,930	4.2
Bangladesh	2,480	2.1
Tanzania	2,140	0.5
Zambia	1,880	No Work
Kerala, India	1,010	0.0
Source: www.odi.org.uk/sites/files/odi-assests/publications-opinions-files/8376.pdf		
Hours of work = (Kcal – 2000)/220		

If this is all the dietary energy farmers have, they cannot be expected to work very hard. Perhaps a couple hours of diligent effort per day, or maybe paced out to 3 or 4 hours. In Kenya the agricultural workday is defined as only 5 hours. This would open the possibility of working a double shift. However, this is rarely done, as when undertaking a double shift, workers are totally wasted the following day. The impact of the limited diet is for major delays in most crop management activities, resulting in recommendations being severely compromised and declining potential yields.

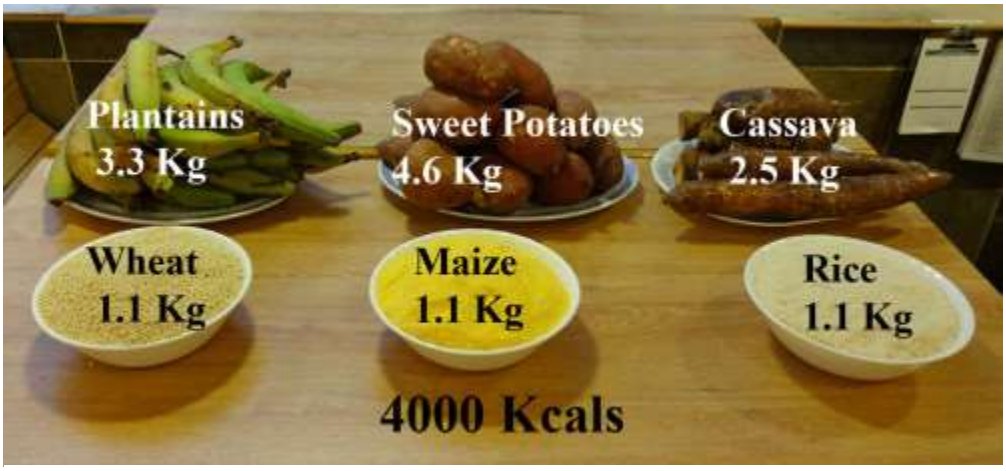

Fig. 2. 4,000 Kcals from various sources of staple foods consumed by smallholder producers and their families.

Also, how would this impact on the major effort to improve diet diversity with an emphasis on women, particularly nursing women, and children. Can they really afford the highly promoted improved diet, or will it be compromised to provide more calories to allow better farm enterprise management either crop or animal? In a highly manual farm management environment, won't providing the promoted improved diet require someone in the family to undertake additional manual labor, or diverting some of the labor from high energy food production, limiting the available calories and eventually the number of hours they can work? Does this lead to some tough choices by smallholder farm families, or other families working in high manual labor jobs with minimal wages?[15, 16] An example of tough choices would follow-up on a World Bank Webinar promoting an egg a day for children to minimize potential malnutrition induced

[15] https://agsci.colostate.edu/smallholderagriculture/1028-2/

[16] https://agsci.colostate.edu/smallholderagriculture/affordability-of-improved-nutrition-while-optimizing-economic-opportunities/

stunting[17]. The egg provides a nice, concentrated source of nutrition for easy discussion. However, if you are struggling to manage your crops, and have a few chickens scrounging around the homestead producing a few eggs a day, are you and your family better off giving the egg to a child or selling the egg to purchase 300 g of maize flour, that will provide enough caloric energy for three additional hours of diligent field work? Which with some good weather will contribute more to your family's food security? Which is the higher priority? Until our smallholder beneficiaries can meet their food security needs by providing 4000 kcal/day that will optimize economic opportunities, shouldn't they concentrate on meeting caloric requirements over diversifying the diet?

With these limited calories to fuel the labor for manual farming, does this explain the 8-week spread in crop establishment, with the accompanying yield lose preventing farmers from producing enough to meet domestic food security? Thus, is it possible for smallholder farmers to hoe their way out of poverty? Is there time to till enough land before the potential yields are too low to meet family dietary requirements. It is doubtful, but how often do reports still highlight the plight of smallholder farmers with photos of groups hoeing (Fig. 3)! Perhaps a more picturesque photo but also out of touch with reality. Is continuing to encourage relying on hoes for heavy manual labor poverty entrapment?

Fig. 3. Sri Lanka manually cultivating thier paddy with hoes. Will they ever be able to hoe their way out of poverty.

Having recognized that smallholder farmers were poor and hungry four decades ago, why has this analysis not been done? If it was done would our poverty alleviation effort be considerable different and more effective today? Would we have concentrated more on facilitating smallholder access to drudgery relief rather than badgering farmers with overly ideal recommendations that they already had a reasonable knowledge of but lack the operational capacity to comply with? If we are compelling farmers to exert more calories than they have access how close are we to crossing the line to conspiring for and promoting the genocide of smallholders??!! I doubt if that is our intention! Should this be referred to the International Criminal Court in The Hague?

Importance of Mechanization to Poverty Alleviation of Smallholder Farmers

If smallholder farmers don't have the operational capacity to adopt research/extension recommendations easily and completely, what can be done to enhance their ability to expedite initial crop establishment to better comply with recommendations. The solution is to look carefully at mechanization, particularly for basic land preparation with its highest labor exertion

[17] https://agrilinks.org/event/cracking-eggs-potential-improve-child-growth-and-development

requirements. This is often overlooked by development programs, so most of the mechanization for smallholder farmers is taking place through private sources outside the development effort and represents a lost opportunity to have a major positive impact. The best example of the importance of mechanization to smallholder production is the shift from water buffalo to power tillers that facilitated the success of the "green revolutions" in paddy production of Asia[18]. This could be the primary reason for the widespread success of the "green revolution" in Asia, as concurrent with IRRI[19] developing the high yielding varieties that substantially increased they potential yields of rice some 40 years ago, the smallholder paddy farmers started selling their water buffalo and buying small 12-15 hp power tillers (Fig. 4). Since the development effort was not involved it is largely overlooked, giving full credit for the success of the Green Revolution to IRRI's developing high yielding short stature, pest, and lodge resistant varieties. Thus, while IRRI did an excellent job of improving the yield potential for rice, it did not get the crop established in sufficient timely manner to take full advantage of the improved varieties. This was left to the farmers.

Fig. 4. Rice Power tiller now in common use throughout Asia for rice cultivation replacing the water buffalo some 30 years ago. How much did this shift contribute to the success of the Green Revolution in Asia.

Impact Of Mechanization of Rice: The impact of shift to power tillers was to reduce paddy establishment by half. This improved and stabilized yields, allowed for some double cropping in the rainfed areas, made for easy double cropping in irrigated areas, increased the area a family could manage, and reduced the level of poverty. Once the small combines (Fig. 5) were added in fully irrigated Thailand that could harvest a rai (1/6th ha.)/hr. the

Fig. 5. Small rice combine used in Thailand that will harves 1 rai (1/6th ha.) in a hour and allow further crop intensification to 5 paddy crops in 2 years.

[18] https://agsci.colostate.edu/smallholderagriculture/promoting-the-green-revolution-in-asia-as-solely-technology-driven-a-major-disservice-to-africa/

[19] IRRI is International Rice Research Institute

manual 60-day crop conversion period was halved, making it possible to grow 5 crops in 2 years. Since the shift to the power tillers is now *fait accompli* with nearly a full generation of paddy farmers coming of age after the power tiller introduction and many farmers now on their third or fourth power tiller, very few active farmers are old enough to recall relying on water buffalo for draft. Thus, it is no longer possible to accurately estimate of the economic impact of the shift in terms of timing of crop establishment, total paddy yield, amount of paddy lands a farm family can manage, and enhanced economic well-being.

Implication for Africa: The problem is, having overlooked the contribution of mechanization to paddy production to the success of the green revolution in Asia and attributing the success solely on improved varieties, could this be a major disservice to duplicating the Asia's success in Africa. Doesn't the phrase "Knowledge Based Development" clearly imply mechanization is a low priority and Africa's success will be solely achieved by technical developments. However, won't Africa, more dependent on manual labor than animal assisted Asia, also have toas enhance the mechanization of smallholder production to reduce the drudgery and expedite the crop establishment? Here instead of individual ownership, which is possible with small power tillers under paddy cultivation, the need is for contract access to 4-wheel tractors, such as Massy 165 or 265. They can do most of the high drudgery associated with initial land preparation. However, tractors this size are too expensive and inefficient for individual smallholder farmers, thus the need for contract services as is very commonly used for most land preparation throughout North Africa and the Middle East extending all the way to Pakistan and Afghanistan. These are all private individually owned and operated tractors. Many of the owners have drifted out of direct farming to concentrate on being service providers. In fully irrigated double cropped sub-tropical Egypt a tractor contractor can have a full 220-day work year[20], just doing contract tillage, with extra opportunities for basic haulage. The owner/operators are also often individuals who took a guest worker job for a few years in some middle eastern country to get the seed money to buy a tractor and go into contract tillage business. Contract tractor services is slowly growing in Sub-Sahara Africa again as a private sector activity with little involvement of international development effort, and again represents an important missed opportunity for the development effort to provide a much-needed service that could be a major stimulates to smallholder production, poverty alleviation, and improved diet (Fig 6). There are a couple exceptions. The Soybean Innovation Lab has a major component working on multi-crop threshers, and some smaller NGOs, such as Hello Tractor Incorporated are doing basic tillage work.

Necessity of Private Owner/Operators: The importance of private individual owner/operator needs to be emphasized as any form of group ownership, either through government tractor units or cooperatives leads to massive maintenance problems with tractor being surveyed out of use after working for only 1/3rd of their 10,000-hr. designed operating hours. Just note the line of out of service tractors at any Nigerian State Agriculture Development Project (Fig. 7). Often lacking very minor repairs.

[20] Typical work year in developed countries would be 365 days in the year – 104 days for weekends – 20 days for national holidays – 20 days for personal vacations and illnesses = 221 days.

Paddy vs, Upland Mechanization: It might be good to note the difference between paddy mechanization and upland crop mechanization. Paddy mechanization centers around the individually owned power tillers equipped with rotovators. They are ideal for paddy as the wet conditions provide some lubrication to the tines, that in upland conditions would quickly wear out. Four-wheel tractors, even when equipped with steel cage-wheels, are less suitable for paddy as the front wheel bearing quickly get full of paddy grit that wear them out, costing approximately $0.50 per operational hour additional maintenance expense. Upland areas are better suited for 4-wheel tractor equipped with three-bottom disc plows or tine harrows.

Fig. 6. Massy 265 tractor slowly becoming available via private means for contract tillage in Sub-Saharan Africa. Is this a major missed opportunity for the development effort.

Fig. 7. Line of government owned and operated tractor at Nigerian Agriculture Development Project, surveyed out of use with well less than the 10,000 hours designed work live, often with the odometer vandalized.

Threshing Also Important: While mechanization of basic land preparation maybe the highest priority, mechanical threshing may be a close second. While there are threshers small enough for individual farmer ownership, contract services are the more common means of providing threshing services to smallholders with larger units using a 12 hp power source (Fig 8.). In addition to saving time and energy, threshing services could have a positive cost benefit from the additional grain recovered, and improved grain quality more than offsetting the cost of the contract service. Typically, mechanical threshing of rice with a good axile-flow thresher will often provide a 10% increase in grain recovery, with considerably less contamination from chaff and mud etc. This would provide a clean bag of grain as the first value added, with the possibility of negotiating a 10% primum price on the marketed bag[21]. Thus, a 10% in-kind charge for grain

[21] https://agsci.colostate.edu/smallholderagriculture/1st-value-added-clean-bag-of-grain/

threshing could easily be recovered in additional grain recovery and primum price. As this is at harvest the in-kind percent charge would be more convenient and appropriate then an area harvest, time required, or bags harvested charge as appears common. The in-kind charge places a common vested interest in both the farmer and contractor to take the time and effort for a high-quality threshing with full recovery and minimum trash, while avoiding the urge to turn out the maximum number of bags regardless of the trash contamination that has to be removed as was noted and farmers complained about with good Claas combines as part of a government sponsored service in Ethiopia, or do a quick job to move on to the next field regardless of how complete the recovery (Fig. 9). Some of the threshers can effectively work with very fine-grained Teff crop of Ethiopia (Fig. 10).

Fig. 8. Thresher being manufactured for private contract servicers assisting smallholder farmers in Ethiopia.

Fig. 9. Back End of Class Combine with Screen Missing to Allow Additional Chaff be Included with Grain, Inflating the Number of Bags Harvested to Increase Income but burdening Farmers with Extra Winnowing Work.

Facilitating Smallholder Access to Mechanization: Proving smallholder farmers access to mechanization, either 4-wheel tractors, power tillers or threshers, can be a challenge. The only effective means to provide this service is through private service providers as all forms of multiple ownership via cooperatives or government mechanization units have been unable to maintain the equipment and ultimately failed as mentioned and illustrate previously. Also, the service providers should not be active farmers as that would result in a conflict-of-interest between managing their land and providing the essential contract service. The relationship between these private contract service and the smallholder farmers they serve should be considered as symbiotic rather than predator/prey as private service providers are often considered. In addition, the equipment is expensive and those shifting from farming to contract mechanization will need financial assistance to facilitate both

the purchase of the machinery and initial year of operation, that would allow them to offer the service on credit for an in-kind payment at harvest. Perhaps a two-tier loan needs to be considered. First a capital loan to purchase the equipment with the equipment serving as the security. Second an operating loan to allow the initial service on credit. This is well beyond the normal forms of institutional credit available to smallholder communities by development projects but could have a major impact on enhancing farm production, food security and improved economic well-being. It is another area where traditional assistance to smallholder communities could have had a major impact by adjusting to the needs of the community, instead of looking at individual farmers. Can these credit adjustments be made?

Fig. 10. Axile-Flow thresher being used to thresh ultra-small grain Teff in Ethiopia

Community Variable: also needs to be considered as a community variable rather than individual farmer variable, and independent of crops as it will stimulate production of all crops not just the staple crops most programs concentrate on. A consideration difficult to appreciate by those used to working with individual crops. Finally, it might be possible to avoid the cost of new tractors by concentrating on reconditioned used tractor, either obtained locally from the large farm operations or imported from developed countries[22].

Indirect Means of Drudgery Relief

Village Grain Mills: Access to farm mechanization is not the only means of drudgery relief that should positively impact smallholder farming. The first from of mechanization in much of rural Africa was grain mills eliminating the need for pounding maize (Fig 12) and addressing the massive amount of time and energy women must devote to domestic chores. This is also now *fait accompli* throughout most of Sub-Saharan Africa so you very rarely see women pounding maize. Perhaps occasionally pounding other crops such as yams, but not maize. While this substantially decreases the drudgery of women undertaking domestic chores, it should have an economic impact on farm operations by allowing women more time to assist their husbands with field work or attend to some personal cropping around the homestead. Like the rest of rural mechanization this was mostly done privately, although some development efforts have introduced maize mills as part of income generating activities for women groups. How effective and sustainable these are once the development facilitating efforts ends needs to be carefully reviewed given the

[22] https://agsci.colostate.edu/smallholderagriculture/most-effective-project-enhancing-access-to-contract-mechanization-via-reconditioned-used-tractors/

difficulties of communal operations, particularly when mechanical equipment is involved. Unfortunately, as there is now so little maize pounding it might be impossible to get an accurate measure of the economic impact of grain mills on individual farms or smallholder community in total.

Fig. 12. Maize mill providing an in-direct drudgery relief to smallholder farm communities reducing domestic chore time to allow pursuit of other activities.

Improved Domestic Water Supply: example would be improving access Another to domestic water supplies (Fig. 13). This again would largely decrease women domestic drudgery. In parts of Uganda women could spend up to 20% of daylight hours just getting a WHO minimum recommended 50 l/person/day of water from turbid springs up to a kilometer away and perhaps a couple hundred meter lower. Thus, when possible, village water pumps could reduce the time and effort to obtain water, freeing women to undertake other activities including assisting in family economic activities. While enhancing access to domestic water is a major development involvement, it is usually undertaken for health and sanitary reasons. This is good and important, but it should also have considerable economic impact that should be worth analyzing for impact on farm management, yields and food security.

Fig. 13. In addition to the health and sanitation impact of village water pumps, what is the economic impact on reduced domestic drudgery.

Return to Madibira

While the poverty alleviation development effort may not be overly interested in drudgery relief and mechanization the farmers and smallholder communities are as shown by a private return visit to Madibira some five years after the external advisory efforted ended. Madibira is a new 3000 ha rice irrigation scheme developed by the African Development Bank in Southern Tanzania. It is located some 70 km off the tarmac and power grid. Returning while enroute from Zambia to Uganda I was surprised to see what the

community members had invested in. There were some 50 Asian paddy tillers[23] (Fig 14), several 4-wheel tractors for the surrounding maize areas (Fig. 15), several new grain mills (Fig. 16) and most innovative of all someone invested in a small generator to charge old car and truck batteries so community members had some electricity to light there houses, run some boom boxes, or even watch TV from the collection of VCRs now available at village kiosks (Fig. 17). All of these were individual proprietors, having drifted out of farming to these commercial enterprises support services to the community. None were cooperatives or other communal enterprises reflecting the preference and importance of individual proprietors in supporting smallholder communities.

Fig. 14. One of 50 Asian rice power tillers privately obtained by Madibira farmers during 5 years after advisor effort ended.

Fig. 15. In addition to the rice power tillers several 4-wheel tractors were obtained, mostly to manage the neighboring upland maize areas.

Ultimately it must be appreciated that the best way to enhance smallholder production may be to put less emphasis on extension/education of the finer details of crop management of targeted crops such as the staple crops of maize and rice, while placing more effort on facilitating smallholder access to the means that reduce drudgery, expedite crop establish, and other farm management practice. Then have confidence that despite limited formal education most smallholder farmers are experienced farmers that can make rational adjustments to their crop management practices maximizing their total farm returns. It should also be noted that the operational limitations and enhancements are more a community

[23] The emphasis is on Asian paddy tillers as the advisory component purchased all their equipment from Europe including 30 Italian power tillers. However, the flywheel on these tillers only had 17 cm of clearance, and thus totally unsuitable for working in paddy where the ideal condition is 10 cm of water and 30 cm of puddled soil. The Asian tillers had 70 cm of clearance.

variable than an individual farm variable and poverty alleviation programs are designated by the communities they serve even while focusing activities on individual farms.

Fig. 16. Also, individuals invested in additional grain mills like this 2-stage rice mill.

They are often accompanied by a promotional pitch that sounds like the greatest business model ever created, leading to the expectation that people would be queued out the door and around the corner to sign-up to join. However, overlooked is the overall economic suppress environment, mentioned at the beginning, places substantial downward pressure on consumer prices and minimizes private traders' profits.

Administratively Cumbersome: Thus, while producer organizations might be socially desirable and heavily promoted by academia and the development community, they still need to be competitive within the suppressed economic environment they are operating in. However, particularly when initiated as part of a development project with substantial external support, the need to process individual

Over Reliance of Producer Organizations

For the last three plus decades the poverty alleviations effort for smallholder communities has been funneled through producer organizations. This done in the belief that private service providers are predatory to smallholder farmers. This is usually put forth with vilifying slanderous comments but without any detailed cost analysis to compare the two business models that would justify the claim. It is just assumed that since producer organizations are owned and presumed managed by the producers, they will provide the best returns for the members. They are often centered around providing institutional credit for production inputs such as certified seed, fertilizer but usually not contract tractor hire as mentioned above as urgently needed.

Fig. 17. Perhaps most innovative of all, investing in a generator to charge old car & truck batteries for neighbors to use in lighting home, listen to music or even watching videos on TV.

members' accounts, hold coordination meetings, mitigate any conflicts, rent, and maintain warehouse space, employ warehouse staff, vehicle operation & maintenance, etc. makes them administratively very cumbersome[24,25]. This adds to the overhead management costs which, if not carefully controlled, can and often does exceed the profit margins of private traders making them non-competitive. In the end relying on producer organizations could easily force smallholder producers deeper into poverty. Thus, the smallholder producers are skeptical and wisely avoid them. This often after most smallholder farmers had poor experience with government-imposed cooperatives that were more for supervisory control than supporting service providers. Development projects often site this for the low smallholder participation in development sponsored organizations. However, are they really providing a beneficial alternative.

Value Chain Pull: In addition, it was thought that if you could improve the marketing value chain so the farmers could get a better price for the produce, it would encourage an increase in production. Unfortunately, that assume a surplus in operational capacity, which as reviewed in the previous section may not be possible as labor shortage and dietary energy to fuel that labor too often are in extreme short supply, often not providing family food security with a good, diversified diet. Before improving the agriculture value chain, it might be best to address some of the operational constraints to crop management as discussed previously.

Financial Management Strategy: Furthermore, producer organizations are incompatible with a reasonable overall financial management strategy in areas with limited banking capacity as occurs frequently in smallholder communities. The strategy emphasis retaining produce in-kind and only marketing what is needed for immediate cash needs such as cooking oil, lamp oil, used clothes, school fees, etc., but needing immediate cash when marketed[26]. It is not uncommon to see piles of rice covering most of the floor space in some small homes for months after harvest (Fig. 18). While some of this might be anticipating regular price rises with time after harvest, it lso, could be security. Apparently, post-harvest losses are lesser concern than sticky fingers in the

Fig. 18. Rice being stored at home in Madibira, Tanzania instead of being consigned to cooperative a specified in by-laws, waiting to be marketed to meet immediate case needs both in anticipation of seasonal price increases and security to avoid sticky fingers.

[24] https://agsci.colostate.edu/smallholderagriculture/farmers-organizations-and-cooperatives-is-there-a-competitive-adantage/
[25] https://agsci.colostate.edu/smallholderagriculture/envisioned-competitive-advantage-for-cooperatives/
[26] https://agsci.colostate.edu/smallholderagriculture/financial-management-strategy-retain-assets-in-kind/

"cookie jar". If the "cookie jar" is a 100 kg bag of maize or paddy, it is more difficult for sticky fingers to access than a can of cash in the cupboard. Private buyers in Nigeria report they can easily buy rice up to 10 months after harvest and well after the next crop has been planted (Fig 19).

USA Cooperatives: Ultimately producer organizations maybe fundamentally flawed when applied to smallholder communities as part of a development poverty alleviation efforts. It should also be noted that the cooperative model in the USA, which made some major contributions to rural farming a century ago, has decline until it handles only a small percent of agricultural value chain. The decline has resulted in the USDA no longer keeping track of cooperative membership and market share with the most recent data over 20 years old.[27] The only major cooperative names appearing in USA supermarkets are Land O Lakes, Florida Natural, and Ocean Spray and occupying less than one percent of shelf space. The reason for the decline is the same, too much overhead costs.

Fig. 19. Village grain trader easily purchasing grain up to 10 months after harvest in Nigeria.

Basic Business Parameters: Since producer organizations are intended to provide reliable business services for obtaining input or marketing produce, they need to be evaluated on solid business terms. However, this is rarely done. How often have producer organizations initiated by development projects been evaluated in terms of:[28]

- **Percent** of potential beneficiaries actively participating in the producer organization,
- **Percent** of marketed produced being consigned to the producer organization,
- **Percent** of produced marketed through the producer organization allocated to loan repayment,
- **Percentage** market share of the producer organization within the community served,
- **Sustainable overhead** [29] as a percent markup on inputs sold or percent deduction on produced marketed incurred by the producer organization to cover costs incurred in providing their services.
- **Percent** of inputs purchased or produced sold by members through private service provider contrary to organization by-laws,
- **Percent** additional income members obtain from relying on the producer organization for services offered, vs. side-selling to competing private service providers. And

[27] https://webdoc.agsci.colostate.edu/smallholderagriculture/USA-Cooperatives.pdf
[28] https://agsci.colostate.edu/smallholderagriculture/request-for-information-basic-business-parameters/
[29] Sustainable overhead refers to the cost of managing a producer organization after any external assistance has ended. Basically, the local host country costs that ultimately would have to be paid for from the organization's income. To include the advisory facilitation cost would be prohibitive for expatriate advisors. Separating the sustainable overhead costs from a total project budget should a simple accounting exercise.

- **Percent** of producer organizations surviving for two years equal to two agricultural cycles after all external facilitation ends.

If these are appropriate business parameters to evaluate if a producer organization is providing valued services and relied upon by its members and community, why are they not included in the periodic reporting other than the results would be embarrassing? If your program was serving 70% of potential beneficiaries, would it be highlighted in the reporting, while if only 10% would it be embarrassing and better to report only the number of active participants. Can anyone provide a report clearly reporting these parameters as requested? I have been seeking this information for over a decade with no results.

Questionable Reporting: Instead of the above parameters that would measure effectiveness of producer organizations to serve its members, there is a tendency to rely on some deceptive, bordering on dishonest, reporting[30]. This can provide some impressive propaganda values allowing claims of success but, be totally meaningless in evaluating the effectiveness of the producer organizations. Typically, reports show aggregate numbers, that can be substantial but when divided by what the potential numbers should be can become trivial as is the Ethiopian Coffee Cooperative reported in the referenced webpage. This article mentions having 21,891 members and marketing some 181 tons of coffee. That comes to only 8.3 kg/member or about 4% of total membership's coffee production and perhaps a financial benefit of $4.00/member. Even for smallholder farmers growing a cash crop that would be trivial.

Alternatively, they stop the accounting at the producer organization's facility, implying delivery to the organization is the equivalent of delivering to the producers. This effectively claims the producer organization incurs no costs, which is impossible. Thus, the costs incurred by the producer organization for whatever handling they undertake is attributed as profit to the producers that they will never receive as illustrated by the Fair-Trade bag of coffee (Fig. 20).

Fig. 20. Bag of Sustainable Harvest's Fair-Trade Coffee, but where is the overhead cost incurred by the mandatory cooperative? Are they included in the Growers Portion? The $0.15 is not going to cover the costs incurred!

Ultimately, producer organizations require continuous external facilitation and quickly collapse when the external support ends. The example would be the four different NGO supporting the Haiti coffee cooperative in the referenced webpage.

Income Generation Groups

In addition to the larger farmer-based producer organizations in this article I include small rural income generating groups, mostly to benefit women. These are usually deliberately small groups organized for village craft activity to

[30] https://agsci.colostate.edu/smallholderagriculture/perpetuating-cooperatives-deceptivedishonest-spin-reporting/ Note all the articles in this webpage were provided by students as supportive of cooperatives, but with some quick simple computation demonstrated the opposite.

generate income that will empower women independent of their husbands. They largely following the producer organization business model and having the same problems of long-term sustainability.

There are a couple questions concerning this approach to poverty alleviation.

1. The apparent assumption behind the approach is that women are mostly in an adversarial relationship with their partners. That makes for unpleasant living; thus the question is what present of women are in an adversarial relationship in need of "empowerment" vs. what percent are in congenial collaborative relationships. I would think most are in the later, and
2. More consistent with the main theme of this presentation, given the limited caloric energy available in most rural communities, the extensive energy needed for women to complete their daily domestic chores, I wonder how many women and what the demographic are of those able to participate in women income generating activities. How are they completing or avoiding daily domestic chores? Are they single women? Women who can afford to hire someone or have adolescent daughters to handle the domestic work?
3. What is the impact of women joining an income generation program, on the main family enterprise of farming, and will joining an income generating group shift a congenial relationship to an adversarial one?

Ultimately, I feel very few survive for long after the external facilitation and subsidizes end. This would be particularly true if involving mechanical activity such as grain milling or gari production as observed in the FAO initiative in Nigeria. Here the FAO facility appears to have been abandoned for some time, while directly across the highway is a small family operated women manage gari enterprise going working at full capacity Fig, 21, 22). How many of the income generating projects, if surviving, have been taken over by one individual to become a sole proprietor enterprise? In this case the women entrepreneur has drifted out of farming to concentrate on gari processing using both her own cassava and cassava purchased from neighboring farmers. She has scaled the business to what her family can manage and is assisted by her husband.

Fig. 21. FAO sponsored women's income generate facility to produce gari that appears completely abandoned.

Appeasement Reporting[31]

Fig. 22. Immediately across the street from the Fig. 17. abandoned FAO sponsored gari production.is individual women owned and managed gari production enterprise operating at full capacity.

Despite the shortcoming of the producer organizations to provide effective business services the questions remain, why does the development community continue to promote them? The primary reason is producer organizations benefit from what can best be called appeasement reporting. This is virtually mandated by donors and can be essential to obtain project extension and future projects. As mentioned at the beginning there is just too much upfront time, money, and commitment to both the project innovations and supporting staff before there is an opportunity for extensive interaction with the beneficiaries. Realistically, there is no effective means to change direction once the implementing contract is signed, just make the best of the situation. Donors virtually demanding to hear only success stories are mandating the misrepresentation of the effectiveness of projects. However, while Appeasement Reporting can make the donors happy, assure project extensions and future projects, they really do nothing for the beneficiaries. Instead, it reenforce ineffective programs encouraging them to be continued in future projects. It is difficult comprehend that those project leaders undertaking appeasement reporting, even when effectively directed to do so, are not fully aware of the programs' shortcoming. Similarly, donor project managers are equally happy to get the biased reports, happy to see the appearance of success, but not having the time to carefully scrutinize the information with a few simple computations, no rocket science needed, that would quickly show the limited effectiveness of the producer organizations in serving their beneficiaries. Thus, the reliance on consumer organizations, despite limited acceptance by the beneficiaries, brings into question the sincerity of the whole smallholder poverty alleviation effort. It appears there is very little commitment in assisting smallholder producers. Instead, the commitment is totally on imposing the socially desirable but non-competitive business model on them. The best that can be said is they may be an expression of the donors' good intentions. There might be some serious personal liabilities here[32].

[31] https://agsci.colostate.edu/smallholderagriculture/appeasement-reporting-in-development-projects-satisfying-donors-at-the-expense-of-beneficiaries/

[32] https://agsci.colostate.edu/smallholderagriculture/vulnerability-for-class-action-litigation-a-whistleblowers-brief/

Monitoring & Evaluation (~~Learning~~): Failure & Liability?[33]

How the smallholder poverty alleviation effort by the development community failed to quickly identify and address the operational limitations of smallholder farmers, as well as persisting for over three decades in relying on producer organizations the beneficiaries shy away from can be attributed to the failure of the Monitoring & Evaluation process. While the M&E process can measure a project's progress in meeting the project's strategic objectives, it most important task is to guide future projects to better serve the needs of the beneficiaries. In the process the M&E also serves as the primary voice of the beneficiaries[34]. Recall the beneficiaries had little input into the design and implementation of the project, leaving their only voice the degree to which they rely on or avoid the projects' activities. This must clearly be identified in the M&E analysis for it to be meaningful and provide valid guidance for future programs.

The problem comes when the M&E analysis become a propaganda tool promoting the perceived accomplishments rather than critical analysis of success or failure that can guide future programs. The effectiveness of the M&E in providing the essential guidance for future projects depends on the criteria being monitored as well as how they are analyzed. If you don't observe and document the eight plus week spread in crop establishment with accompanying decline in potential yields until food security is fully compromised, it will be difficult to identify the operational limitations smallholders face and need to facilitate access to contract mechanization to expedite crop establishment so farmers can more easily comply with recommendations. Similarly, if you don't evaluate the calories available to smallholder farmers you won't appreciate their limited ability to undertake manual agronomic field work, prolonging the time to complete different task and limited quality of crop husbandry, most noticeable initial crop establishment. Thus, the problem continues to be overlooked and unaddressed.

Likewise, if you simply aggregate values of M&E categories, particularly if you do it across projects and countries, you can generate some very impressive number, measuring 100,000s of beneficiaries. However, since there is no reference point as to the total potential beneficiaries, the aggregate number could be totally meaningless in guiding future programs. If aggregated across several countries it is easy to claim 100,000s beneficiaries, but this could still be only 10% of potential participants leaving 900,000 avoiding the projects, perhaps wisely so. Thus, aggregation is more a propaganda tool than analytical tool. It only shows how massive the project is and, if ineffective, the extend of wasted funds. A better analytical analysis is percent. Also, there is a need to establish clear percent definition of what percent would separate success from failure.

Using the business parameters mentioned earlier and surveys of what my students suggested as minimum acceptable values for each business parameter as the target, and best value I was able to synthesis from what sources were available in over a decade of quiet searching, without the

[33] https://agsci.colostate.edu/smallholderagriculture/mel-impressive-numbers-but-of-what-purpose-deceiving-the-tax-paying-public/

[34] https://agsci.colostate.edu/smallholderagriculture/monitoring-evaluation-the-voice-of-the-beneficiaries/

advantage of information being included in periodically published project reports, how do the producer organizations fair[35].

- Percent of potential beneficiaries actively participating in the organization's services. Expectation a minimum of 50% with preference for 70%. Actual closer to 10% no more than 15%.,
- Percent marketed produce members consign to a producer organization as mandated by organization by-laws. Expectation is 85 – 90%, Actual is closer to 10 – 15%
- Percent of produce consigned to producer organization allocated to loan repayments. Expectation: 25% or less, but actual most likely 90% or more. Note the cavate that according to by-laws all loans must be repaid before "dividends" are paid. This allows the organization to confiscate consigned produce of productive members to pay off loans of defaulting members, strongly discourages members consigning more than the estimate needed for loan repayment.
- Total percent market shares the producer organization has in the community being served. Expectation: Not available, but with 50% minimum desired individual participation and 85% minimum marketed produce would be 42%. Actual: >5%
- Overhead costs incurred by the producer organizations, Expectation: 10%. Actual: 30% Administrative overhead is always greatly underestimated.
- Extent members are side-buying inputs or side-selling produce contrary to organization by-laws. Expected: 10 – 15% Actual: 70 – 90%
- Additional income members obtain by relying on the producer organizations for the service offered, vs side selling to private service providers. Expected: 10 – 20% Actual: Minus 10 – 20%. Relying on the cooperative would be a financial disadvantage as mentioned previously.
- Percent of organizations surviving for two years, representing two complete agricultural cycles, after all external facilitation end. Expectation: 50% Actual: 0% Although getting this data would be difficult as rarely are funds available to revisit a program site after financing ends and all accounts closed.

Can anyone provide alternative values for these business parameters more comparable to expectation? I think the suggested expected values are realistic and make for good performance targets, reflecting what interested underwriting taxpayers are expecting from their poverty alleviation tax investments. The one exception being the highly underestimated administrative overhead cost. That just reflecting typical underestimation of administrative costs by the public. If the failure to meet these targets was public know, would there be substantial public outcry for miss use of taxes. The magnitude of the differenced note above would constitute a major concern, possible a legislature investigation. The magnitude of the difference also leads one to consider this a major deliberate cover-up to deceive the underwriting taxpayer being USA or other donor countries. The ease at which a well-designed M&E analysis could, with a few simple computation, no-rocket science, have identified the failure of producer organizations and guide future programs to consider other mechanism for assisting smallholder producers is appalling.

[35] https://agsci.colostate.edu/smallholderagriculture/request-for-information-basic-business-parameters/

Likewise, it difficult to see how those promoting them were not aware that they were a misfit to smallholder communities yet continued to insist on their imposition. How many millions, if not billions, of development funds, dollars, Euros, or other currency, have been squandered for this oversight over the past three plus decades. Again, it supports my earlier contention that there is not a sincere interest in assisting smallholder farmers out of poverty, but a determination to impose on them, at all costs, a socially desired but totally inappropriate highly flawed business model that if rely upon would force them deeper into poverty. Fortunately, they are not gullible enough to fall for this and wisely divert their business to more reliable business enterprises.

Please note that the word "Learning" was crossed out in the sections title. This reflects my concern with the term as the only learning in the current M&E procedures and analysis I see is how to deceive the underwriting taxpayers and cover up what by any business standard would be total failure.

The Family Enterprise System

If the producer organization model, at least as initiated through poverty alleviation programs, are ineffective in serving smallholder communities, would it be appropriate to carefully look at the family enterprise system and how to enhance its capacity to assist smallholder farm communities with essential business services. The family enterprise system are small or micro businesses centered around one family, with some serious concerns in expanding beyond individual family[36,37]. They are usually locally based within the villages they serve, relying more on repeat business from their neighbors then one-time transactions. Thus, they need to protect their reputation and avoid being exploitive to their customers. The relationship to the communities they serve should be considered symbiotic and not predator/prey. They are in direct contact with smallholder farmers and provide most of the business services in the agriculture value chain. It would include small input suppliers often combined with grain purchasing (Fig 23), grain mills, gari processing, village fresh food markets (Fig. 243), contract mechanization, etc. They also form the initial link in the value chain between producer and consumer or final link between input supplies and producers. At the municipal level they manage most of the stalls

Fig. 22. Private shop involved in selling inputs and purchasing grain in Malawi. His wife is the actual owner manager with him assisting.

[36] https://agsci.colostate.edu/smallholderagriculture/private-service-providers-family-oriented-fragmented-business-environment/

[37] https://webdoc.agsci.colostate.edu/smallholderagriculture/ECHO-Private.pdf

in the open markets. They tend to be highly efficient in keeping their overhead to a minimum, often by minimizing the physical facilities they need to maintain. This allows them to make a profit providing the same service producer organizations lose money with. Producer organizations might learn a great deal on how to minimize overhead costs from these enterprises.

Fig. 23. Village vegetable in Tanzania as typical family enterprise serving smallholder communities.

An exceptionally large example of family enterprises dominating the agriculture value chain is the massive Talid Thai wholesale market located some 40 km north of Bangkok and directly across the highway from the Asian Institute of Technology. It is the wholesale agriculture distribution center for the greater Bangkok area. It is spread over a couple square kilometers with some massive warehouses. However, on close examination the warehouse's floors are blocked off into a multitude of individual family enterprises spaces. The business are usually lead by women, holding the purse with husbands provide support services processing the producer. The only hiring piece meal porters to move produce from producers' pickup to floor area and back to purchasers' pickup.

Summary

Reflecting over my 50-year effort to assist smallholder producers in developing countries I take pleasure in my effort, but do not feel it was as effective as it should have been as too many smallholders remain deeply entrenched in poverty. Thus, there is a need to take a very careful look at why so little has been successful and what can be done to increase the success rate. To improve on the impact for future programs there is a need to:

1. While not specifically address by titled section, but a thread throughout the presentation is that smallholder farmers, may of limited formal education but this is more lack of opportunity than lack of intelligence. Thus, they should be considered as intelligent, skilled in the art of farming, maximizing the total returns to all farm enterprises, and dynamic is continuing to make adjustments in their farming practices as conditions and opportunities allow. However, this may not be what observers expect or intend, but a reflection of the limited operational capacity they operate with.
    a. Thus, less effort should be placed on extension/education of information they most likely have a good basic understanding of but not the means to take advantage of. Instead, more effort should be placed facilitating access to

enhancing their operational capacity so they can take fuller advantage of their knowledge.

2. Consider the overall economic environment in most host countries in which most people spend up to 80% of their income on production just to feed their families a meager diet.
    a. This limits the tax base to fund government assistance program to support agriculture, forces civil officers to seek informal income opportunities, that limits the prospects for additional involvement in assisting or regulating government inputs to facilitate development projects, and could discretely interfere project activities.
    b. It also places substantial downward pressure on consumer prices, substantially curtailing profit margins of private traders in the agriculture value chain and make a major challenge for producer organizations to compete with.
2. The extensive 2+ years and million dollars required to bring a development project from conception to contract implementation making it very difficult to make major adjustments once the implementation contract is signed and finally providing the opportunity for extensive interaction with the intended beneficiaries. During this period beneficiaries are represented by government officials who are financially constrained from prior extensive interaction with the beneficiaries and may of alternative personal agendas. Projects ultimately are more imposed than collaboratively developed.
3. The shortcomings in agronomic small plot research that does an excellent job in determining the potential of an innovation but says nothing about the operational needs to expend the small plot research across a smallholder community, with a default assumption it is not a problem just a need for good extension/education. This operational constrain falls into an administrative void between the agronomists and social scientists assisting smallholder development.
    a. A major part of the problem is dietary energy balance of the farmers who have access to only 2500 kcal/day when then need 4000 kcal/day to undertake a full day of agronomic field work. This results in limited daily work effort and extensive time required to complete different activities such as taking over eight weeks for initial crop establishment, voiding most details of published crop management recommendations.
    b. Thus, there is a need, normally overlooked, to facilitate access to contract mechanization to expedite farm operations of which the most critical is to reduce basic crop establishment so farmer can comply more easily with published recommendations.
    c. Facilitate access to mechanization would be more effective than repeatedly badgering farmers on details of specific crops for which they do not have the means to accept. This is also a community variable and independent of crops.
4. Avoid imposing producer organizations on smallholder communities as their excessive overhead costs will often force them deeper into poverty. Something that could be easily demonstrated by reviewing the basic business parameter and comparing them to private traders.

5. Overhaul the M&E process to be more a guide to future programs and not just propaganda tool supporting program the beneficiaries avoid like the plague. That would be to minimize aggregate analysis that can produce massive impressive but totally meaningless numbers and rely more on percent analysis that can easily and quickly reduce the massive, aggregated numbers to trivial impact on the community served.
6. Rely more on private service providers particularly the family enterprises that are in most direct contact with smallholder producers at the villages and towns where they conduct most of their business.

I recognize this presentation is well outside the accepted politically correct party line of how to assist smallholder producers, pure heresy. However, I am confident it is factually correct could withstand any courtroom scrutiny, thus no need to repent. I do hope it stimulates some serious thought on the overall program of smallholder assistance and lead to some improved, more effective, approaches to poverty alleviation.

Thank you.