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Cambodia Horticulture Advancing Income and Nutrition CHAIN 2014-2022

Evaluation Results Summary



DECEMBER 2022



Market Systems Development

CHAIN followed a *market systems development* (MSD) approach to improve farmers income from vegetables in an inclusive manner and develop the subsector in the provinces. The key element of this approach was a facilitation process for involving private and public partners as well as civil society organizations in the delivery of goods and services on the input and output side of the horticulture value chains (e.g. extension, inputs, marketing and market information) to meet the needs of poor farmers and processors.

CHAIN started to intervene on the production side, first to boost production volumes, and introduced new production technologies. In the second phase of the project CHAIN put much more effort into streamlining the market linkages and matched supply with demand through cluster formation and production planning. In the third phase there was scope to upgrade the created value chains and improve productivity, quality, standards, year-round production, and climate resilience. SNV implemented CHAIN over a period of 8 years in partnership with the provincial and national government(s), local NGOs, and with backstopping from SwissContact, the World Vegetable Center and MetaMeta.



A Courageous Choice

The focus on vegetable production was a courageous choice on the part of donor, although not the most intuitive one at the time. When the project started in the target provinces, the main source of income of the population was quite different from vegetable production. Most farmers got their income from cassava, rice, logging, and other activity, particularly border trade. When CHAIN began, fruit and vegetable farmers in most areas of Cambodia faced significant challenges to improve their productivity, income, and wellbeing. In the remote provinces where CHAIN operated, these challenges were particularly acute and included limited access to modern technology and inputs, weak technical skills and inadequate extension services, unreliable access to year-round water resources, limited cooperation among producers, and distrust between value chain actors. With its market systems approach, CHAIN made significant improvements to incomes through innovative changes, especially the development of local farmer clusters as a hub to coordinate market linkages, capacity building for lead farmers and their demonstration farms, the introduction of smart water management, and business development support for local input suppliers and vegetable traders.

As the demand for locally grown vegetables in Cambodia steadily increased, so did the need for more efficient, safe vegetable production and market systems. CHAIN boosted production and strengthened market linkages through technical transfer, input access, and water access. Through this support, farmers could grow vegetables safely for commercial market-oriented production, ensuring consistent year-round vegetable supplies to markets and earning higher priced sales.

Evaluation of this experience revealed important programming lessons for development practitioners and partners amongst producers, the private sector, local and national governments, and the donor community. Over its eight years of implementation, CHAIN transformed local vegetable markets and improved productivity, climate resilience, and the income of thousands of farmers. An end of project evaluation assessed that there is a high potential that the market can continue to develop, and the linkages established will continue to professionalise the sector, improving quality and food safety for consumers.



Impact Highlights

Before CHAIN	After CHAIN
Little commercial vegetable production, with most vegetables imported from outside the province	Local supply of vegetables in the four target provinces increased from 30% to 70%. Yield of vegetables increased, local production more than doubled and growing periods lengthened.
Few farmers involved in commercial horticulture	The project reached 10,000 households in 400 farmer groups. Over 65% of the farmers reached were women. About 6000 farmers transitioned from household subsistence farming (homesteads) to semi-commercial or commercial operations. Due to COVID market disruptions about 1500 farmers exited horticultural production again.
Weak market linkages	14 business clusters were created and incubated with improved public-private collaboration and market linkages. 65 traders across the target provinces increased local sourcing.
Very few horticultural inputs (seeds, fertilizer, pesticides, drip irrigation, pumps, greenhouses) locally available	25 input retailers (most of them women) across the target provinces increased their sales, offering new climate smart technologies.
Limited extension services	80 lead farmers provided services to their peers in the farmer groups through micro-businesses (vegetable collection, input selling, compost making, drip installation, net house repairs, etc.). Input companies provide technical support. Locally produced videos on integrated pest management and yellow watermelon cultivation. Farmers share their experience via participatory video on Telegram groups.
No year-round production, limited resilience to climate change	Farmers adopted climate resilient technologies such as smart water management, and greenhouses. 20 smart water service and product providers linked to potential clients and marketed more climate smart water technologies.
Weak support services	Market services provided by public and private service operators improved, ranging from extension by the government, technical assistance by seed and pesticide companies, and embedded information and credit within the value chain.
Hampered enabling environment	4 provincial agricultural extension departments (PD AFF) and 4 local NGOs gained experience and capacity in facilitating a series of practical interventions to stimulate market systems development. Provincial and national governments created strategies for horticultural development and contributed to a national horticultural policy.

Interventions for Market Transformation

CHAIN used a hybrid approach to building capacity among its target beneficiaries, including farm production skills, market linkages and value chain strengthening, and product quality assurances. It employed group and individualized approaches in the field and classroom, all built on a Market systems development conceptual foundation.

At its peak CHAIN covered 24 districts comprising 259 villages within 103 communes (municipalities). In the first three years, CHAIN directly targeted 6,000 farmers and 200 processing households with the sideline target of 24,000 household members with increased dietary diversity. During the next three years the project increased the number of direct beneficiaries to 8,550 farmers, and the sideline target to 25,000 household members with increased nutrition. In the final phase, it scaled down the number of its direct beneficiaries to 6,000 farmers.



CHAIN applied successful cornerstone interventions for market transformation.

- A production push approach to stimulate use of production technologies through demo-plots, including growing nets, drip irrigation, quality seeds, plastic mulch, shaded greenhouses, and mechanised land preparation. Demo-plots were carried out with co-investment from the farmer-owners and the private sector.
- Improved delivery of practical extension services provided by the sector actors, including enhancements to government extension services, training of input supply companies, and the establishment of a cadre of lead farmers, who also provide a range of other services, including grafting, aggregation, trading, and input sales.
- Cluster Approach supporting market linkages and B2B relationships. CHAIN worked with clustered farmer groups, bringing them and private sector actors together to plan production in response to predicted demand and build better business linkages and long-term relationships.
- Lead Farmer Incubator supporting lead farmers with business skills to start a micro business for vegetable aggregation, grafting, greenhouse installation and input sales to group members.
- Rural Business Accelerators supporting SMEs, vegetable collectors, traders, market sellers and input retailers with improved business skills to expand their business.
- A social behaviour communication approach targeting households for nutrition improvement through the SuperMom campaign.
- Consumer promotion including using market stalls to sell and promote safe local vegetables of good quality in a hygienic way. The programme also organized a Facebook campaign called “Planted by Khmer” to promote Cambodian vegetables and rolled out quality standards and control systems for GAP and Organic (CAMGAP and CAMORG).
- Smart water solutions and water resource enhancement through promotion of year-round production technologies such as farm ponds, boreholes, elevated water tanks and drip systems. Pilots of water resource management such as communal reservoirs.
- Policy development by supporting the development of the national horticultural policy of Cambodia and Provincial Horticultural Strategies.



Evaluation: Most Significant Change

The CHAIN programme had two external evaluations, one in 2020 by iDE and one in 2022 by Agrifood Consulting. Late in 2020, IDE Cambodia's Innovation Lab conducted a Most Significant Change analysis, focused on the most significant changes of various horticulture sector stakeholders involved in the CHAIN project and the types of change that have been most valuable to them. IDE used an ethnographic approach, aiming to understand latent needs, perceptions, and desires, to gain deep insights into the "whys" behind behaviour.

Observed Change	Explanation
All actors exhibit increased confidence, knowledge and abilities	All actors show a significant shift in mindset. CHAIN achieved this by empowering entrepreneurs through knowledge, skills, access to technology, and establishing market linkages. Actors at community and cluster level have more confidence and an increased ambition to keep improving, growing, and expanding businesses. Farmers developed a more commercial mindset and a hunger for learning, taking the initiative to try new ideas and invest in them. For some actors, the changes were life changing. Some went from the edge of destitution to being self-supporting respected members of their communities. These positive changes also led to wellbeing changes for farmers who were able to have a better lifestyle. After joining CHAIN, many reduced the hours of hard labour they needed to invest in the farm and were able to stay at home with families. Previously they had travel away from home for alternative income sources.
Women experienced increased economic empowerment	4 provincial agricultural extension departments (PDAFF) and 4 local NGOs gained experience and capacity in facilitating a series of practical interventions to stimulate market systems development. Provincial and national governments created strategies for horticultural development and contributed to a national horticultural policy.



CHAIN's 'cluster' formation and multi-actor meetings enhanced trust and collaboration between actors.

Through the clusters, actors created connections and developed a more collaborative approach to vegetable production, problem solving, and improved market access.

This contributed to an overall increase in resources and better social dynamics. By working together as teams, many farmers started contacting each other, finding information about market conditions, and successfully negotiating better prices for their produce. In turn, traders found more suppliers of marketable produce, which reduced their need to import from abroad and facilitated their business expansion. A previously fragmented value chain became more streamlined through regular cluster meetings.

CHAIN changed perceptions of vegetable farming in the community and beyond

CHAIN farmers inspired others to farm and share knowledge with those around them, creating a ripple effect in the wider community. More youth picked up "modern" farming because of its potential for the Cambodia market and used new technology to enhance their farming.

On a provincial level it became easier to source safe locally grown vegetables for traders, with more farmers, increased production, and the potential to reach more premium buyers in bigger cities. The CHAIN project established a replicable model for the country promoting locally grown vegetables and reducing the importation of vegetables.



Final Evaluation

A final Programme Evaluation was conducted by Agrifood Consulting International, according to the OECD-DAC criteria of relevance, coherence, effectiveness, efficiency, achievements, and impact¹. The evaluation assessed progress towards the achievement of the project objectives and outcomes as specified in the Project Documents of all three project phases.

The objectives of this evaluation were:

1. To evaluate the results achieved, assess the relevance, coherence, effectiveness, efficiency, impact, and sustainability of the project implementation.
2. To assess the extent that project results achieved are sustainable and can be sustained once the project ends.
3. To document some key lessons learned from the project, which can be used in scaling up, and replicated for future project design.
4. To capture some key success stories.
5. To conduct project's Cost-Benefit Analysis (CBA) in line with SDC's guidelines, comparing the financial inputs with the economic outcomes amongst market chain participants.

The Evaluation Team used qualitative methodologies to answer the evaluation questions, except for the cost-benefit analysis which was based on SDC's guidelines².



1 <https://www.oecd.org/dac/evaluation/daccriteriaforevaluatingdevelopmentassistance.htm>

2 SDC How-to-Note, (2015), "Financial and Economic Analysis of Project with a focus on Cost Benefit Analysis and Cost Effectiveness Analysis"

Final Evaluation Results

According to the DAC criteria, the project achieved an overall *very satisfactory* score of 1.7, where one is the highest possible score and three the lowest score.

	Highly Satisfactory	Satisfactory	Moderate satisfactory	Unsatisfactory
Relevance		X		
Coherence	X			
Effectiveness	X	X		
Efficiency		X		
Impact		X		
Sustainability			X	

The authors of the final evaluation provided a capsule summary of achievements.

Strong improvement
Technology adoption. Mulching, drip irrigation, solar pumps, greenhouse, seed selection, GAP/ non-conventional farming. Smart water management.
Local production. Larger production volumes to supply local markets. Particularly among semicommercial and commercial farmers where volumes more than doubled.
Income of local producers and local traders. Income of farmers increased considerably, and similar increase affected both input and output local traders.
Gender equity results. Good results in women's economic empowerment of female farmers and female led micro and small enterprises, increasing incomes, improving joint household decision making and sharing of household tasks, and introducing labour reducing vegetable production technologies.

Moderate improvement

Production Planning. Many farmer clusters have the capacity to plan and coordinate their production by seasonal variability of demand and various shocks to the market.

Capacity of PDAFF. Young and recently graduated staff of PDAFF were actively involved in the training, both on the receiving side and as active trainers of farmers. Their capacity remains limited, but they want to learn.

Awareness and adoption of Food Safety practices and standards. Increased awareness of moderate use of chemicals and reduced residues among some producers, traders, and consumers but compliance remains limited.

Linkages to local Value Chain Actors. Local traders and farmers had the chance to meet and each other better and to form mutually beneficial commercial trust relationships.

Provincial Strategy. Some target provinces elaborated clear horticulture subsector strategies. Others progressed only to the point of initial concept notes, a good start requiring further effort.

No appreciable improvement

Adoption of GAP Standards. Only a few farmers were able to apply for the certification and a very small number of them have been certified.

Food Safety Awareness among consumers. Very limited success in introducing food safety awareness among producers and consumers. Local markets exhibit poor hygiene standards.

Linkages to National buyers. Linkages between farmers and some national input suppliers established, but lasting contract farming or off-take arrangements with national level buyers such as supermarkets remains inaccessible.

National Policy. CHAIN supported GDA in the process of formulation of the National Horticultural Policy, which remains a work in progress.

Nutrition results. The Supermom campaign resulted in higher household consumption of vegetables but did not change dietary diversity.



Calculation of Cost Benefit

CHAIN initially targeted the poorest smallholder farmers, which they called homestead farmers, and these farmers benefited significantly from that initial focus. By the second and third phases of the project it was clear that the most significant gains in terms of system development and overall economic growth, would be amongst those farmers who employed a commercial approach (either from the outset or by graduating from semi-commercial to commercial).



A cost-benefit analysis (CBA) was conducted using data on the farmers and traders from CHAIN. The data included the annual change in the number of these actors, their revenue, and costs, and margins for specific years. The CBA analysis computed the return to project investment by comparing the margins obtained by farmers and traders to the expenditure of the project.

The project, in its entirety, got positive returns. Higher than the prevailing financial interest rate in Cambodia. The Internal Rate of Return (IRR) was above 24%. Investment in horticulture is an opportunity for increasing the income of smallholder farmers, at least those willing to become professional horticulture farmers. Those professionalized farmers received on average an additional US\$474 per year per farm.

However, the choice of beneficiaries matters and working with homestead farmers, while impactful, was not cost effective for the project rate of return.





Summary Insights

Both evaluation reports identified lessons from CHAIN that are broadly applicable to development initiatives in Cambodia, especially those in horticulture.

Sustainability

Project impacts are expected to remain, especially the technology introductions, the social capital vested in the cluster groups, the rise of local input supply enterprises especially amongst women entrepreneurs, and the rise in share of local produce in local wet markets. For other project impacts to significantly outlast the life of the project, they would require further investment. This includes the work on compliance with standards and cheaper forms of certification, integration with national actors (high end buyers), and increased competitiveness and quality of vegetable production. Development of the logistics, especially cold chain components (grading and packing facilities, refrigerated transport) would be needed to help establish stable nationally competitive supply chains.

Target Group Selection

The early inclusion of homestead farmers was not fully consistent with a value chain approach, as by definition those farmers were producing almost entirely for home consumption, with occasional surpluses sold to neighbours or sent to family in urban areas. As noted earlier, the effort in reaching homestead farmers was not cost effective and the outcomes could have been reached in other ways. Quickly understanding which households can step up through commercialising strategies would enable better targeting. While poverty reduction is of course the overall goal, a market systems approach must be focused on those households that are participating in the market, or at least to some degree show potential for moving into the market economy. Direct poverty reduction is more cost effectively done using different approaches.

The participation and success of women entrepreneurs, especially young women entrepreneurs, was an important achievement. The demographics and employment opportunities in rural Cambodia are such that horticulture is a significant opportunity for women while men tend to be employed in other occupations. “Decent jobs for women close to home” remains an important strategic principle for social and economic development in Cambodia, gendered but strategic in its own right. Women are positioned socially to be successful in this market system and respond quickly to training and access to resources.

In early phases CHAIN targeted a very large number of households, perhaps in response to the understandable requirement of donors to see substantial impact numbers. In the final phase, attention was focused more intensively on market actors and a smaller geographic distribution. The system changes highlighted earlier are seen as being more durable in the more concentrated focus group, a benefit of this more concentrated approach. The initial project design could have perhaps better addressed this balance early on, focusing more on depth of impact versus breadth.

CHAIN was not particularly successful in working with the formal agricultural cooperatives promoted by the government. CHAIN’s cluster groups were much more successful, apparently because of the trust issues associated with the formal shared financing structures required in the agricultural cooperatives. Stakeholder dialogues and B2B facilitation were among the most powerful interventions to achieve systemic market change. Bringing actors together and letting them communicate, learn, and search for common solutions was incredibly powerful for establishing renewed trust. Business incubation support for input dealers, aggregators, and other service providers, especially for women entrepreneurs, was also a valuable intervention to promote social, and eventually business, cohesion.



Technology Uptake

CHAIN was successful in promoting myriad horticulture technologies, especially smart water management tools, drip irrigation, plastic mulching, net houses, and some nonchemical pest control measures, biological control agents and sticky traps. More attention could have been paid to soil health and organic matter content, a fundamental aspect of smart water management and a driver of plant health, pest reduction, and overall profitability. Carbon sequestration and soil water retention, which can be significant contributors to climate change resilience, might also have been considered.

Attention to soil health is consistent with the requirements for GAP and other certification regimes. In the end, and despite some project-level support, it was noted that certification is more effectively implemented by private sector actors, with governments important role focused on regulatory aspects.

Smart water technologies received significant promotion; nevertheless, piloting and support of service providers should have been earlier in the programme life to have a truly sustainable impact. Some of the water reservoir and canal infrastructure work was delayed by COVID but clear checks on cost effective and technically sound designs would have been beneficial. Co-investments with districts was a successful approach.

Most of the successful horticulture entrepreneurs delivered their products almost exclusively to local wet markets. More attention to the cold chain aspects of the market system would have increased contractual wholesale linkages to larger buyers serving urban areas.

Finally, information technology uptake amongst horticulture producers was emerging rapidly during the years of project implementation. Future work should prioritize both the biotechnical opportunities and the market information potential.





Conclusions

With the right interventions CHAIN increased horticultural production and trade, generated substantial incomes for farmers and traders, was inclusive and contributed to women's economic empowerment. The horticulture sector can be effective for building climate resilience when combined with the use of solar drip irrigation, greenhouses, mulching and water storage. This market systems development approach transformed the local market systems, built the capacity of local service providers and facilitators, and has the potential for sustainability and replication.



Project Terminology

Homestead Farmers – Farmers who grow vegetables on a small piece of land mainly for family consumption and take a small portion of the produce to sell to their neighbours or nearby market. They usually have another larger income source aside from growing vegetables.

Semi-Commercial Farmers - Farmers who grow vegetables on medium sized plot of land and sell their produce to vegetable traders. They may also sell some vegetables by themselves to the market.

Commercial Farmers - Farmers who grow vegetables on a medium to large sized plot of land and keep expanding. Their main career and source of income is through growing and selling vegetables. They sell their produce to vegetable traders and can include premium national buyers.

Clusters - A few farmer groups clustered within the same geographical area assigned by CHAIN who coordinate together to produce vegetables and establish market linkages. One group or 'cluster' can include farmers who are also traders or input retailers.

Lead Farmers – contact farmers of groups/clusters assigned by CHAIN who have exemplary production and social skills and are informal leaders of these groups. These farmers get business training in addition to technical training.

"Inactive" Farmers - Farmers who have had some engagement with CHAIN but have stopped working with CHAIN or have less activity with them and/or other partners. However, this status does not always define the level of their success. Many have other businesses, may continue farming by themselves, or experience challenges that constrain them from working closely with CHAIN.

Traders (wholesale) - Traders who purchase vegetables and sell them to provincial market retailers. They purchase imported vegetables and local vegetables, mostly CHAIN farmers' produce. Some CHAIN farmers also work as vegetable traders.

Traders (retail) - Traders who purchase imported and local vegetables from wholesalers or from farmers and sell it at market stalls in the province. Some CHAIN farmers also work as vegetable retailers.

Input Suppliers - Input suppliers, both wholesalers and retailers, provide agricultural inputs to farmers ranging from seeds to machinery.





SNV: Impact that matters

#120 Street 51 (corner 228), 5th Floor, Phum 4
Sangkat Chaktomuk | Khan Daun Penh
Phnom Penh | Cambodia