

Article

Agrifood Chains as Complex Systems and the Role of Informality in Their Sustainability in Small Scale Societies

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Abstract: Agrifood chains are complex systems; they encompass biological, economic, social, health and political variables at different scales (e.g., on-farm, local, regional, national and global). Consequently, what enables a food system to achieve ‘sustainability’ is also complex. This is particularly the case in small-scale societies in developing nations which are socially constituted. In this paper we posit that a *habitus of informality* underpins food systems’ sustainability in these societies. We argue that conventional applications of approaches like the Triple Bottom Line (TBL) and Circles of Sustainability (CoS) frameworks fail to assist understanding of sustainability in informal socio-economic systems because they either place too much emphasis on economic growth (TBL) or underplay the strength of socio-cultural obligations and responsibilities (CoS). This is seen in international aid programs that encourage economic growth in the agrifood sector, which is challenging for villages in such societies. We review data from two Pacific Island countries—Tonga and Solomon Islands—to demonstrate the need for a more holistic way to think about sustainability in informal agrifood systems in small-scale developing nations. We demonstrate the value of employing a Hybrid Value Chain Framework for collecting information necessary to understanding how sustainability is constituted in the food systems of small-scale societies.

Keywords: small scale societies; complex agrifood systems; triple bottom line; habitus of informality; socio-cultural obligations

1. Introduction

In 2014, the FAO [1] produced a report entitled “Developing Sustainable Food Value Chains: Guiding Principles”. In the first paragraph of the Foreword, Eugenia Serrova (Director, Rural Infrastructure and Agro-Industries Division, FAO) says:

*“The development of sustainable food value chains can offer important pathways out of poverty for the millions of poor households in developing countries. **Food value chains are complex systems.** The real causes for their observed underperformance may not always be obvious. Typically, multiple challenges have to be tackled simultaneously in order to truly break poverty cycles. This in turn implies the need for collaboration among the various stakeholders in a value chain, including farmers, agribusinesses, governments and civil society. Further compounding the challenge, improvements to the value chain must be economically, socially and environmentally sustainable: the so-called triple bottom line of profit, people and planet” (emphasis added).*

This is a valuable statement that links sustainability and food system dynamics to the alleviation of poverty in many developing countries. However, it also raises important questions: what does the

word ‘sustainable’ really mean? What is a sustainable food chain? What creates a sustainable food chain? Are there differences between sustainable food chains in developed and developing countries?

In order to gain an insight into sustainability in food chains in small-scale societies, we briefly review the literature on: food chains as complex systems; sustainability; sustainable development and sustainability of communities; the use of the Triple Bottom Line (TBL) and Circles of Sustainability (CoS) approaches to sustainability. We go on to argue that there is a gap in the literature between the theory and the practice of understanding what actually creates a sustainable food system in small-scale societies. In particular, we demonstrate that the literature, in general, tends to focus on the economic aspects of sustainability with only partial attention to the environment and even more limited recognition of the social aspects of sustainability, although in the recent literature this is seen to be changing. In this paper, therefore, we address the knowledge gap in understanding social complexity as it contributes to the sustainability of small-scale communities, and entwined with this, the overarching food systems that sustain those communities. Based on data collected in Tonga and Solomon Islands over the last 10 years, we posit that a habitus of informality, rather than economic growth, underpins food systems’ sustainability in these developing nations. We use a model based on a Hybrid Value Chain Framework to demonstrate the central role of social sustainability in agrifood production in small-scale societies. The implications for the delivery of Foreign Aid to developing nations, where agriculture is still based on a socially weighted economy, is discussed in the light of this.

1.1. Agrifood Chains as Complex Systems

A complex system is one with multiple elements adapting or reacting to the pattern these elements create; they are systems in processes that constantly evolve and unfold over time [2]. Such systems arise naturally in the economy and in the supply and value chains that underpin the economies of advanced societies, which have long been regarded as complicated systems [3–6]. Recently, Surana et al. [7] have argued that such advanced systems involve both strategic and operational issues along with complex social and functional behaviours. In economic terms, Arthur [2] identified that economic agents, be they banks, consumers, firms, or investors, adjust their market moves (e.g., buying decisions, price setting, etc.), and make forecasts that create new, or at least changed, economic situations, for a range of reasons. They react with strategy and foresight by considering outcomes that might arise as the result of behaviours undertaken by sophisticated economic actors. In other words, no business is an island and decisions by one actor will affect others in the chain in complex ways.

All of this is very familiar to the modern agrifood sector which is a large, complex, multifaceted industry that exists worldwide, and involves a range of businesses that create industry-specific (grains, sugar cane, timber, dairy, red meat, poultry, fish, fruit and vegetables, etc.) agri-industry chains and networks that often exist across international boundaries [8–12]. Further, in the developed world, agrifood chains are themselves complex systems involving multiple multidimensional firms usually working together within their specific industry sectors to satisfy increasingly globalised market demands for high-value food products [13,14]. Such chains involve activities that require multilayered inter-organisational and cross-organisational decision-making in the process of adding value to a raw commodity product through the production, manufacturing and distribution stages of the chain [15,16].

In more recent literature [17–19], the agrifood sector is referred to as a ‘food system’ that encompasses biological, economic, social, health and political systems at different scales (e.g., on-farm, local, regional, national and global). This introduces yet more complexity. In adding ‘sustainability’ into this mix as well, a further layer of complexity is introduced with an ever-widening circle of potentially unintended outcomes [20].

1.2. Sustainability and Approaches to Sustainability

Sustainability has always been difficult to define [21] and as a result has many different meanings to many different people. Additionally, the terminology has been caught up in the concept of sustainable development [22], which is defined as “[economic] development that meets the needs of the present without

compromising the ability of future generations to meet their own needs". This has created confusion—in fact so much so that McKenzie [23] said: *"‘sustainability’ is now a broad multi-focal agenda, and terms such as ‘triple bottom line’ and ‘sustainable development’ are being used interchangeably. As a result, ‘sustainability’ is in danger of carrying so many implications and nuances that in order for it to be properly understood it must be defined whenever it is used"*—and so we do this below.

At face value, the word ‘sustainability’, as a noun, means *"a process or state [that has] the ability to continue or be continued for a long time"* [24]. In an effort to be more precise, variants on this definition have been developed and argued over for many years: environmentalists see sustainability as a way of using natural products and energy without harming the environment, especially by replacing what has been used [25]; businesses see sustainability primarily from a financial perspective, namely a business’s financial ability to continue to make a profit and provide services over time with minimum risk [26]; social scientists regard sustainability as primarily about human-based activities—this is the least clearly defined of the sustainability definitions. It includes a mix of human well-being and equity, access to basic needs, fair distribution of income, good working conditions and decent wages, equality of rights, inter- and intra-generational justice, access to social and health services and to education, social cohesion and inclusion, empowerment and participation in policy-making [27].

As well as these baseline definitions, there are several other recognised approaches to sustainability. From an agriculture and food production perspective, one approach to sustainability is to look at sustainable, inclusive food systems through the lens of a complex thinking approach, which in medium to large modern organisations tends to lead to an emphasis being placed on corporate metrics that may or may not adequately describe ‘sustainability’, rather more addressing corporate social responsibility goals [28,29]. A second approach is the Triple Bottom Line (TBL) approach to sustainability. The TBL is an accounting system that includes three components of organisational performance: social, environmental and financial, or people, planet and profits [30,31]. Savitz, in 2014 [32], expanded on this definition as follows: *"[TBL] captures the essence of sustainability by measuring the impact of an organisation’s activities on the world—including both its profitability and shareholders’ values and its social, human and environmental capital"*.

The problem, however, is not simply in defining TBL (and sustainability) but in measuring it—the more complex the situation, the less useful it is to assess it across the different domains of economics, ecology, politics and culture [33]. Moreover, in this corporate approach, the social aspect runs third to economics and environmental issues where quantitative metrics are easy to obtain and employ, to the organisation’s benefit. Interestingly, Elkington in 2018 [34] talks about how TBL has been used (and abused) over the years since he coined the phrase and requested a ‘recall’ of the concept to do some ‘fine tuning’ to bring it up to what he had intended—a more whole-of-system approach rather than simply an accounting tool.

A third and more recent approach to sustainability is the ‘Circles of Sustainability’ model. With this approach, Scerri and James [35,36] suggest that all of the domains of sustainability are social: including ecological, economic, political and cultural sustainability. Indeed, James et al. [37] state *"These domains of social sustainability are all dependent upon the relationship between the social and the natural, with the ‘ecological domain’ defined as human embeddedness in the environment"*. In these terms, social sustainability encompasses all human activities [37]. CoS was developed to respond to the problem that most indicator approaches, such as TBL, have downplayed environmental and social tranches of the definition in their application to large corporate organisations with easily definable legal and economic boundaries. In reality, most ‘sustainability’ situations are too complex for these approaches to be useful [38]—particularly when working with communities or small-scale, rurally based societies.

1.3. Sustainable Food Systems and Chain Management

If the term ‘sustainability’ has multiple meanings and approaches, what then are sustainable food systems/chains and how do they differ between developed and developing nations?

The reality is that food systems are at the centre of debates over sustainability [39–41] and how a reader thinks about food systems and their sustainability very much depends on what part of the food system the reader considers to be important. A generic definition is given by Story et al. [41], who state that a sustainable food system is one that “*provides healthy food to meet current food needs while maintaining healthy ecosystems that can also provide food for generations to come, with minimal negative impacts on the environment*”. Allen and Prosperi [42] further opine that “*the processes underlying environmental, economic and social unsustainability derive in part from the global food system*”.

Managing the processes involved in supply and value chains of food systems is key to delivering a holistic version of sustainability [20,43] where social aspects of doing business across the food system come to the fore. For example, Morais and Sylvestre [44], while using relatively sophisticated Brazilian agrifood supply chains as case studies, indicate that the concept of ‘social relationships’ (amongst suppliers, consumers and society in general) are essential to the operationalising of social initiatives in the supply chain and that intrinsically motivated social relationships tend to be more successful than extrinsically motivated ones [44] (p. 228). Bubicz et al. [45] undertook a very thorough review of 621 articles that revealed that social sustainability concerns have been increasingly addressed over the years, but argue that further research still needs to be performed to achieve more inclusive social supply chains. In particular, they conclude, amongst other things, that a higher contribution to the literature has been made from researchers working in developed nations and in large-sized organisations [45] (pp. 30–31) than in developing countries and small-scale environments. Clearly, there are many gaps in research into sustainable agrifood systems, with the majority of such gaps relating to small-scale communities in developing nations.

In this paper, we seek to address this research and knowledge gap by looking at sustainability in small, local, largely subsistence-based agrifood chains in developing country societies. In such countries, ‘informality’ is embedded at the core of socio-cultural mores, rather than as a lifestyle choice, or as a variant of the mainstream economy in which it resides. To understand the role of informality in these communities, Bryceson and Ross [46] coined the term ‘Habitus of Informality’ to describe the implications of social informality when Foreign Aid is proffered on the proviso that nations develop new markets or “*export opportunities for food products*” [47,48]. Developing such new or sophisticated markets is virtually impossible, or at best extremely challenging, for those at the grass roots levels in informal social systems.

1.4. Agrifood Systems and the Habitus of Informality

Bourdieu [49] (p. 214) describes ‘habitus’ as “*a way of being, a habitual state and in particular a predisposition, tendency, propensity or inclination*”. He argues that through habitus, systems of social practice are regulated via a range of cultural and symbolic actions that guide behaviour and thinking; habitus is thus a “*system of structured and structuring dispositions which is constituted by practice and constantly aimed at practical—as opposed to cognitive—function*” [50] (p. 42).

Because habitus is informed by a range of social practices, the habitus of informality that exists in small-scale societies is built around social phenomena such as religious affiliation, kinship relationships, local economic activity, and community structures generally, all of which inform the basic structures upon which the society is constructed, including economics, political systems, and social relationships. According to La Porta and Schleifer [51], informality occurs at many levels in business, from self-employed peddlers to large-scale commercial enterprises, and tends to be unproductive and inefficient, but in small-scale societies based entirely on an informal platform, informality can have other outcomes—some positive, others negative. This is seen clearly in an assessment of market inputs and outputs in informal economies.

Informal markets struggle to become formal for a host of reasons [46]. However, informality does not necessarily mean a loosely structured economic system, nor is it necessarily controlled purely by government regulation, which encourages a formal market structure. Vorley [52], Elayah [53], Susomrith and Suseno [54], and Ram et al. [55] all point out that market informality in small-scale

societies is strongly framed in structured social, cultural and economic relationships that need to be properly understood to ensure sustainable local communities in the long term.

There are a few works that have studied the role of informality in sustainability and most of these are related to sustainable development in societies aiming to join mainstream global market systems [52]. However, La Porta and Shleifer [51] discuss the role of informality in developing country situations as being both positive and negative in terms of the sustainability of the organisation. Additionally, Ruzek [56] identifies informality as being a catalyst for sustainability; and Dreifuss-Serrano [57] finds that people's sense of belonging to a community became a significant factor in taking care of the local environment.

Following earlier work in Tonga and Solomon Islands where our research demonstrated that a habitus of informality underpins the development and management of food systems and the internal agrifood chains in these countries [46,58], we now posit that sustainability in the short but complex agrifood chains in these developing nations is also constituted in this habitus of informality. We use two case studies to illustrate our argument, demonstrating the need for a more holistic approach to looking at sustainability in small-scale societies.

2. Case Studies—Tonga and Solomon Islands

The Case Study approach of Yin [59] was used to investigate the question: "How does a modus operandi of informality 'fit' within the context of sustainability in small-scale local agrifood chains?"

Horticultural product chains in two South Pacific nations (Tonga and Solomon Islands) were studied to address the informal/formal dichotomy associated with 'doing business' in small-scale societies, and to investigate the issue of how sustainability is constituted in such societies.

2.1. Tonga

The Kingdom of Tonga is situated approximately 3000 km east of Brisbane, Australia. The nation comprises 36 inhabited islands in three main island groupings: Tongatapu (including nearby 'Eua), Ha'apai, and Vava'u (Figure 1).

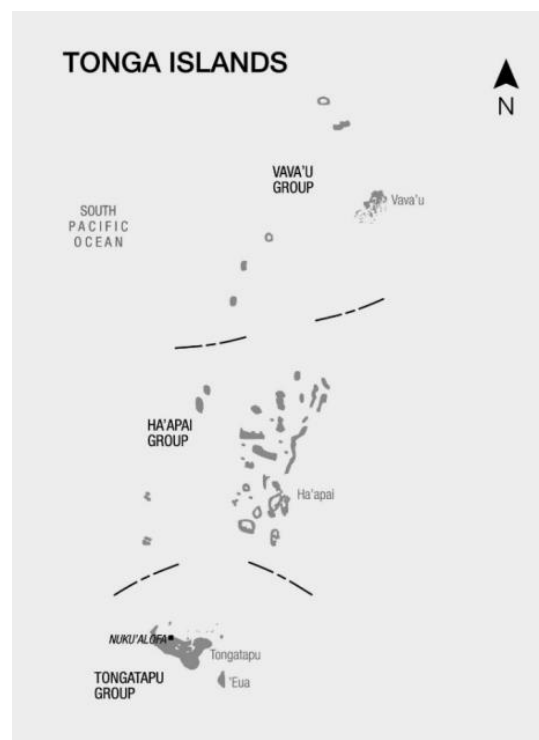


Figure 1. The Kingdom of Tonga, showing the three main island groupings.

The majority of Tonga's population lives off the land, growing subsistence produce in rural villages where livelihood is based on subsistence agriculture [60–62]. The staple horticultural foods grown are: taro, cassava, coconuts, various fruits and vegetables, particularly pineapples, bananas, paw paws and melons, and an increasing quantity of salad vegetables, grown mainly for restaurant and resort markets. Plant foods are primarily grown in home gardens, although increasingly people are travelling to local and regional markets to both buy and sell garden produce. Any surplus agricultural production is first shared with family members, or is used for gift exchange and ceremony, in accordance with long-held customs, and more recently church obligations (e.g., tithing and support for the poor—P. Foliaki, pers. comm. 2011), all of which reinforce social relations [61,63].

Local markets are generally held in a village once a week; villagers sell surplus subsistence garden produce to neighbours and visitors. There are also inter-village markets that occur more occasionally, and these markets attract more sellers and buyers, but they are still based on the sale of subsistence garden surplus. At both the village and inter-village markets, there is a limited range of produce traded because of the similarity in garden foods grown across the islands in each season. Value-adding is rare, with most vendors selling raw fruit and vegetables rather than cooked foods [60,61] (personal observation), although occasionally cooked fish is offered for sale. While there is a greater range of produce sold at the large, central city markets including salad foods for restaurant and ex-pat tables, in general these main markets sell similar produce to that sold in village markets; just a lot more of it.

For the current project, interviewees were selected using a gatekeeper in each village and a subsequent snowballing technique to identify further respondents. For Tonga, 74 people from 12 villages across Tongatapu, 'Eua and Vava'u were identified and interviewed using a semi-structured questionnaire to determine the nature of their agricultural production and market participation and to understand villagers' perceptions of production and market sustainability. Traders and buyers at the central and roadside markets in the towns of Nuku'alofa (Tongatapu) and Neiafu (Vava'u) were also interviewed to determine the sustainable market strategies of these larger market users. The full interview protocol was published by Bryceson and Ross [46] and included translating the questionnaire into the Tongan language to facilitate interviewee understanding.

2.2. Solomon Islands

Solomon Islands (SI) consists of 992 islands divided into nine provinces: Choiseul, Santa Isabel, Guadalcanal, Malaita, Makira, San Cristobal, Belonna and Rennell, Western Province, and Temotu (Figure 2). These mountainous islands and low-lying coral atolls cover approximately two million square kilometres of the Pacific.

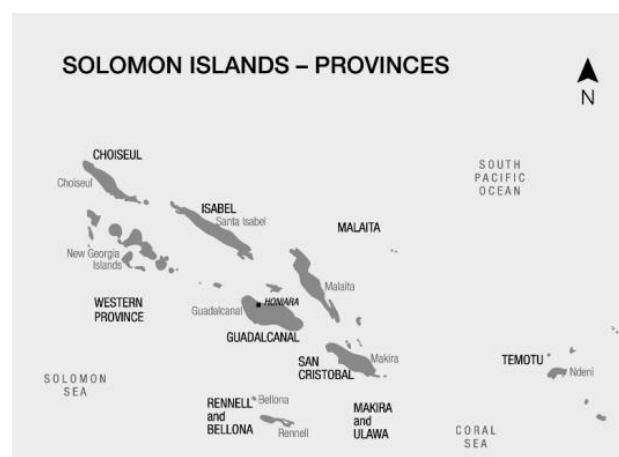


Figure 2. Solomon Islands provinces.

The main foods produced in Solomon Islands are sweet potato, cassava, several varieties of nuts, bananas, pineapples, pawpaws and melons, and vegetables, particularly eggplant, beans and ‘slippery cabbage’ (a species of *Hibiscus* that looks and tastes like spinach). There is a limited production of salad vegetables, such as tomatoes, ginger and spring onions, for local consumption.

There has been considerable anthropological and agribusiness research undertaken in Solomon Islands as part of previous large-scale research projects [46,58,64–71]. In our focus areas of Marovo Lagoon, Western Province, and the villages around the capital of Honiara on Guadalcanal, households are critically dependent on raw products obtained from the sea and forests (particularly fish and crustaceans, but also seaweed, ferns and mangrove shoots), and from crops grown in gardens, both for subsistence use (such as food and shelter) and for the generation of income, which in turn is spent on goods and services such as: imported food stuffs, especially rice and tinned fish [70,72]; material goods including fishing gear; school fees; meeting church obligations [65,69,70,73].

Bayliss-Smith [64], Hviding and Bayliss-Smith [67], Cohen and Ross [65] and Pitman [70] have detailed the changes to the food systems in Marovo Lagoon over the past 30 years in relation to the commercialisation of local resources, especially through logging and fishing, but also in relation to inter- and intra-village marketing of raw or value-added goods. They report on: declining crop diversity; increased dependence on imported foodstuffs; decreased soil fertility, which is related to reduced fallow periods and increased commercial logging; declines in fishing (largely due to the massive increase in commercial fisheries); increased meat-food restrictions due to church teachings (especially the Seventh Day Adventist church [70,73]); and the intensification of local gardens to produce a surplus for sale in local markets. The intersection of these factors has shaped the food future for many villagers throughout Solomon Islands [68], including in the capital, Honiara [72].

In the research presented here, based on the same interviewee selection processes and protocols we employed in Tonga, 80 people from five villages on Guadalcanal and seven villages in Marovo Lagoon (Western Province) were interviewed to determine the nature of their agricultural production and market participation; interviews were also undertaken with traders and buyers at the central and roadside markets in the capital of Honiara (Guadalcanal), and in the regional market centers of Seghe and Batuna, and in the resort complex at Uepi (Marovo Lagoon) to determine the market strategies of these larger market users. These data were compared with similar data from Tonga.

3. Case Study Protocol

A Mixed Methods approach was used featuring the Hybrid Value Chain Framework (HVCF) (Table 1) to collect information on the agrifood systems of each country, and a series of ethnographic techniques outlined below.

The HVCF was shown to be a very useful investigative and explanatory tool for understanding the way in which small-scale societies operate at the economic and socio-cultural levels. The bulk of the data collected for this earlier research were linked to studies of villagers’ involvement in the market economy (example shown in Table 2), with results published elsewhere [46,58]. Those articles demonstrated that a habitus of informality exists in small-scale economies such as those in Pacific communities, particularly in the governance aspect of the chain (Table 3). It is this informality of economy that ensures that social relationships dominate economic production, thus providing the essential framework of sustainability.

Table 1. The Hybrid Value Chain Framework (HVCF). Source: Bryceson and Ross [46].

Aspect	Definition	What to Find Out	
		Standard Market Value Chain Approach (Column 3)	Community/Livelihood Value Chain Approach (Column 4)
Business Enabling Environment	The main internal and external business issues that impact on a business	Social, Economic and Political Strategies (corporate, business unit), People (capabilities, practices), and Processes (enterprise management, technology, infrastructure)	Social, Economic and Political Worldview (community, cultural and spiritual norms)
1. Industry Stakeholders and Activities	The set of processes or activities that create the attributes or products that will be demanded or used by the end user or consumer.	Who are the Stakeholders or groups involved in the chain? <ul style="list-style-type: none"> Inputs (i.e., suppliers) Production Processing Distributors Retailing Consumer (demand) 	Who are the Stakeholders or groups involved in the chain? <ul style="list-style-type: none"> Community Non-market transactions and stakeholders involved? Social-cultural relationships between the stakeholders?
2. Product Creation & Delivery	The product flow features of the chain.	Product/s? <ul style="list-style-type: none"> Production Regime Transport and logistics Flow scheduling Quality attributes Plant and equipment use Managing supply chain flexibility 	Product/s? <ul style="list-style-type: none"> Availability (local/seasonality) Attitude to quality attributes Intrinsic value of the product to community/culture End Market outlets (e.g., local, village, roadside) Management/SC knowledge
3. Financial Conditions	Finance or cash flow across the participants & processes.	Where are costs and value accumulated? <ul style="list-style-type: none"> Money transfers across chain Financial performance across the chain Credit availability 	Where are costs and value accumulated? <ul style="list-style-type: none"> End Value Community value Systems of exchange Microfinance availability
4. Information Conditions	The information flow across the chain.	What are the information flows and risks across chain? <ul style="list-style-type: none"> Openness to sharing critical business information Accuracy of messages Strength of messages Cost of messaging Speed of transmitting and receiving messages Business Risks/Risk Dynamics 	What are the information flows and risks across chain? <ul style="list-style-type: none"> Information sharing between individuals/communities How is info shared Sense of time/urgency Business risks in relation to local business environment Effect of traditional cultural mores on communication
5. Incentives, Motivators and Drivers	The incentive systems that are in place to drive and reward performance and share risk.	What systems? <ul style="list-style-type: none"> Price premiums Profit sharing Minimum pricing arrangements Window contracts Loan guarantees Cost sharing arrangement Long term commitments 	What systems? <ul style="list-style-type: none"> Market incentives Community/livelihood incentives Psyche of business innovators
6. Governance Conditions	The chain governance system significantly influences who has power and control in chain and how risks and rewards are shared.	Who has power and control in chain? <ul style="list-style-type: none"> Open market access Contracts Strategic alliances Joint ventures Franchising arrangements Networks and co-operatives 	Who has power and control in chain? <ul style="list-style-type: none"> Gender/community power dynamics Social norms and impact on the chain Local expectations

Table 2. An example of the application of the HVCF for analysis of marketing choices comparing a developed (Column 3) and developing (Column 4) economy value chain analysis to highlight the underpinning role of socio-cultural decision-making in doing business in small-scale societies.

Mapping Chain Aspect	Definition	Tasks	
		Standard Market Value Chain Analysis (Column 3)	Community/Livelihood Value Chain Analysis (Hybrid Economy) (Column 4)
Industry Stakeholders and Activities	The Set of Processes or Activities that Create the Attributes or Products that will be Demanded or Used by the End User or Consumer.	<p>Who are the Stakeholders or groups involved?</p> <ul style="list-style-type: none"> Inputs (i.e., suppliers) <ul style="list-style-type: none"> Limited to one or two companies in Tonga, none in SI. Production <ul style="list-style-type: none"> Subsistence production drives the livelihood and the market process at the village level in both countries Some specialized production for export from Tonga exists (e.g., taro, cassava, squash and vanilla). Processing Whole village <ul style="list-style-type: none"> None at the village/local level. Distributors <ul style="list-style-type: none"> None at the village/local level. Retailing <ul style="list-style-type: none"> Small village and local roadside markets Trade stores (up to 50% mark up on processed produce) One Central Market in capital city Shops and Cafes in main towns and cities Resorts and Eco-Lodges Defence Force and Hospital in Tonga Limited supermarket outlets. Consumer (demand) <ul style="list-style-type: none"> Local individuals according to need; retailers/resorts/cafes in the towns and cities according to need. 	<p>Who are the stakeholders/groups/community involved?</p> <ul style="list-style-type: none"> Informal economy <ul style="list-style-type: none"> Domestic and locally based non-registered businesses. What are the non-market transactions and associated stakeholders involved? <ul style="list-style-type: none"> Land tenure-hereditary and genealogical governance issues Responsibilities to family, church (tithing and imposts on ability to work on Sabbath), and often inter-village obligations Sleeping at markets to avoid transport costs in SI Lack of health and sanitary infrastructure at markets (particularly problematic at larger town/city markets); time needed for a range of weekly (even daily) community activities. What are the relationships between the stakeholders? <ul style="list-style-type: none"> Social relationships largely kin-based; cultural activities often based around church Tensions between church participants and ‘backsliders’ impacts on markets and work at resorts in SI Tension between Chinese producers and market stall holders in Tonga. Who are the consumers? <ul style="list-style-type: none"> Local buyers buy what is available at market No concept of demand amongst either producers or consumers In main towns and cities, consumers include shop owners, hotel managers, who access markets for specific product, may issue requests over radio (Tonga).

Table 3. An example of the application of the HVCF for analysis of Governance issues in local agrifood.

Mapping Chain Aspect	Definition	Tasks	
		Standard Market Value Chain Analysis (Column 3)	Community/Livelihood Value Chain Analysis (<i>Hybrid Economy</i>) (Column 4)
6. Governance Conditions	The chain governance/coordination system. Power and control, risks & rewards	Who has power and control in the chain? <ul style="list-style-type: none"> • Open market access <ul style="list-style-type: none"> - Every seller sells the same product for the same price when in season. • Contracts <ul style="list-style-type: none"> - None. • Strategic alliances <ul style="list-style-type: none"> - Not at the village/local level. • Joint ventures <ul style="list-style-type: none"> - Not at the village/local level. • Franchising arrangements <ul style="list-style-type: none"> - Not at the village/local level. • Networks and cooperatives <ul style="list-style-type: none"> - Not at the village/local level. 	Who organises the chain? <ul style="list-style-type: none"> - There is no chain in the classic sense - “God knows”. In both countries the church is powerful and dominant in daily life. - In Tonga, the king and the nobles are revered as community leaders - Hereditary genealogical governance issues play a part in both countries. • What are the power dynamics (gender/community) <ul style="list-style-type: none"> - Whoever controls the market place (church, city, community elders, school principal) controls the sales process. - Individuals in both countries go to markets if they have something to sell or need to buy - It is mainly women who go to the markets. • What social norms impact on the chain <ul style="list-style-type: none"> - There is no chain - Looking after children, sick, elderly and widowed members of community - School fees are a major financial burden - Participating in church activities and all of the above are prioritised over market activity. • What are the local expectations <ul style="list-style-type: none"> - Current situation seen as ‘normal’—no need for change.

In this paper, we expand on our earlier work and focus on evidence of socio-cultural underpinnings of sustainable food production and marketing choices in developing nations using Tonga and Solomon Islands as examples of small-scale societies. Data were collected from a number of actors in the agrifood chain, many of whom fulfilled a range of overlapping roles, for example most of our participants were local subsistence farmers *and* market growers *and* food purchasers at the village level. Interviewees were selected from a number of villages in different geographic locations to provide insight into variations in responses between interviewees in the different villages in relation to their proximity to the main markets. We included villages in:

- ‘Rural and remote’ areas, which we defined as being more than 20 km, or more than an hour’s travel, from the main markets;
- ‘Peri-urban’ villages, defined as those within 10 km of main markets or less than one hour’s travel from the market; and
- ‘Urban’ villages and towns, situated within 5 km of the main markets.

It is beyond the scope of this paper to provide a detailed comparison between these various village types. For further information, see Bryceson and Ross [46] and Ross and Bryceson [58].

The principal methods used to obtain the qualitative data upon which our research findings are based were participant observation, particularly with respect to people's activities at markets, but also in village life generally; semi-structured interviews with agrifood growers and sellers to document their needs and aspirations for their livelihoods and economic well-being now and into the future, particularly with respect to potential improvements to market opportunities; and free-listing exercises in villages to allow community participants to provide answers to open-ended questions about food production, income needs, market opportunities, livelihoods, etc. These data provide robust information, particularly on community concerns, variation in views, attitudes and needs.

Our research demonstrated that food chains seem short and superficially simple (Figure 3) but are in fact governed by a complex integration of traditional kinship networks, land access laws and social and church obligations [46,58]. Such food chains need to be flexible enough to meet the ever-changing requirements of social life, yet sophisticated enough to maintain food requirements of family, community and marketplace. The informality of these village societies belies the complexity of the economic and social structure of the entire system. Informality is very strongly informed by the church which has, at least in part, replaced much of the traditional social structure of daily life and now has an omnipotent impact on social systems and thus economic and environmental choices that lead to sustainable agrifood systems.

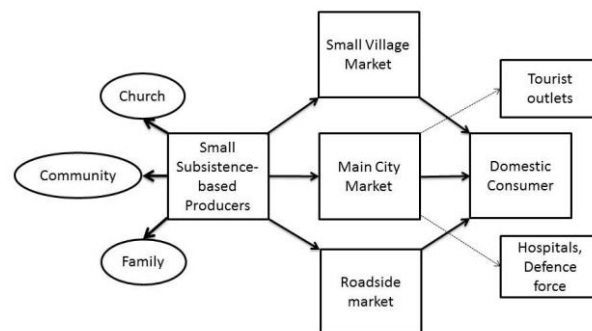


Figure 3. Diagram showing key structural components of the main agrifood product chains in Tonga and Solomon Islands (sourced from Bryceson and Ross [46]).

3.1. Sustainable Church, Sustainable Food Production

Tongan society is highly stratified, with the Tu'i Tonga (or King) at the apex of a social elite. This hierarchical structure dominates all aspects of Tongan life, from politics to production and from village life to church institutions [74,75]. According to Numeitolu [74], the church plays a central role in bolstering state actions in Tonga, but is also a central focus of village life and livelihoods. This, Numeitolu [74:258] argues, is because of the strength of the Chiefly influence of Tongan society and the associated worldview that has always placed the chief at the head of a village's spirituality and its social traditions.

Although the arrival of the Christian church initially challenged the power of the chiefs [75], Numeitolu [74] demonstrates that the strength of the church today resides in its connections to Tongan social traditions, which continue to dominate Tongan life. The core value of Tongan life, Numeitolu [74] (p. 263) argues:

“... is the binding force that is claimed to have maintained unity and stability of the country for centuries. It is at the heart of one's identity as a Tongan. Because it is so deeply engraved there, one is easily persuaded that Tonga would not be Tonga without the subordination of the majority to the chiefs in sacred and secular matters”.

For Tongans, therefore, there is no 'sacred-secular' divide. Wealth and social status underpin the entire structure of Tongan society, down to the village level. The consequences of this for the

local village economy are that every family enacts obligations to family, church and village ahead of economic or environmental considerations. Thus, this social/spiritual/religious context, which exists at all layers of Tongan society, plays a vital role in people's paradigms that see the long-term sustainability of land production being a gift of the ancestors, and of God.

As in Tonga, the church has played a significant role in Solomon Islands society and especially in village life and livelihoods. The two main churches operating in the regions we studied are the Seventh Day Adventist Church and the United Church (akin to the Western Methodist Christian sect). Unlike Tonga, where the church quickly assimilated into Tongan elitist hierarchical structures, in Solomon Islands the church has dominated village life and severely altered many traditional practices, including food practices [70,72,73,76]. This is seen most clearly in Adventist villages where adherents to this religious sect no longer eat any shellfish species (a dominant part of subsistence in Solomon Islands communities for thousands of years) nor do they consume pig (still popular in villages adhering to other faiths); additionally, all forms of stimulants (alcohol, tea, coffee, and betel nut) are forbidden (again, unlike villages that adhere to other faiths).

The major effects of church and other external influences on Solomon Islands life is the loss of local ecological knowledge that has occurred in the last two to three decades. Aswani et al. [76] have documented a significant decline in the marine resources knowledge held by people of Roviana Lagoon—geographically adjacent to Marovo Lagoon—since 1994. Not only have people forgotten the traditional names of many fish and other marine taxa, the knowledge of marine habitats and management rules for ecological systems has also declined, particularly in villages close to markets. In these villages, the reliance on local resources is not so strong because of the availability of store-bought foods that now replace once-staple fare.

Nevertheless, despite the change in food consumption brought about by church and market influences, garden production continues to be a vital part of local livelihoods throughout rural Solomon Islands, including in Marovo Lagoon [66,70]. Villagers maintain a large garden on 'puava' (land) assigned to families in accordance with 'butubutu' (tribal) law and kinship relationships [66,70]. On Guadalcanal, similar laws and kinship frameworks operate [72], with this social setting for land inheritance and subsequent use being common throughout Solomon Islands [76].

As outlined above, the Christian religion plays a vital role in the lives of the people of the villages we researched. Our participant observation aligns with the research of others (see especially Pitman [70]) in demonstrating that church influences have infiltrated many of the social frameworks of these societies.

Much food sharing within the village community occurs on the Sabbath itself, with most villages we visited holding elaborate lunch-feasts on the Sabbath-day. Church feasts almost always feature traditional foods—'kastom' foods [70]. Families bring food harvested from their gardens and from the sea to be consumed at a communal gathering following prayers of thanks, with left-over meals being given to those in the village who have no gardens or land, or who are too old or infirm to cultivate their own plots.

Because of the power of the church in maintaining social control in the studied villages, and especially because of the importance of food at church gatherings, a small survey of 35 villagers from five communities in Marovo Lagoon was undertaken to determine people's understanding of church teachings relevant to the sustainable management of food resources.

Respondents were asked to comment on three specific verses of the Bible (Genesis 1:26 and 28; Ezra 9:12 and Proverbs 13:22) that relate to ensuring the long-term sustainability of resources and biodiversity, to answer questions about concepts of sustainability and conservation of resources, and to indicate agreement with a range of statements about the role of humans in sustaining God's creations. The Biblical verses used are generally recognised in academic scripture analysis [77,78] to mean that God called upon Adam and his descendants to have stewardship over the earth as created by God—to care for God's creation, replenish the earth and ensure a sustainable harvest of resources. It was found

that most of the survey respondents understood the verses to mean that God's children should 'share', 'keep' and 'sustain' the resources of the earth, and teach children to do the same.

3.1.1. Understanding the Language of Sustainability

Interviewees were also asked if they could define terms regularly used in the sustainability literature: environment, stewardship, conservation, sustainability, habitat and biodiversity. All interviewees could provide good, meaningful definitions of 'environment' (usually using definitions such as 'everything in the sea and land') and 'stewardship' ('looking after God's resources'); and most knew that 'conservation' meant 'taking care of the environment'. None knew the word 'sustainability', with the range of guesses including 'maintain activity', 'harvest resources', and 'sustain life'. Most simply said 'I don't know'. There were similar results for the terms 'habitat' and 'biodiversity'.

3.1.2. Responding to Trigger Statements

To end the interview, each respondent was asked to agree or disagree with 11 statements about human responses to resources management, in the context of Biblical teachings. These statements can be grouped into three categories:

- An understanding of the role of humans in caring for the earth, based on various admonitions by God that his human creations have a stewardship responsibility for all other creations of God;
- An assessment of God's role in providing for people, as established in Genesis, in such a way that people did not need to ensure sustainable production because God had promised he would do this;
- A consideration of the statement in Revelations 11:18 that God would destroy the earth 'at the end of days' (a vitally important concept in the Adventist church) and the consequences of this for the role of humans in caring for something that was going to be destroyed anyway.

The vast majority of interviewees (30 of the 35) agreed with all statements relating to the important role God had given to humans to care for the earth. Many gave responses such as 'God gave us the responsibility to take care of the earth', and 'Even though God said He would care for the earth He gave us the responsibility to care for the earth's resources' and 'It is important that we leave enough for our children'.

Interestingly, people also agreed with the statement that 'God provides all the food we need so we can take as much as we like'. However, although this finding would appear to contradict the strong agreement with statements about the role of people in the stewardship of resources, many qualified their response to the Biblical verses about God's role in providing food, even following over-exploitation, by saying things such as 'but you mustn't take too much' and 'you can only take as much as you can eat' and 'we must conserve, but we may take as well'.

The final statements in the survey related to the verses in Revelations indicating that God would eventually destroy the earth. These verses are, in fact, unlikely to have the blunt meaning as set up in this notion [79], but it is widely accepted in Marovo Lagoon, and especially amongst adherents of the Seventh Day Adventist faith, that God will indeed destroy the entire earth at the end of days. It is therefore interesting that all respondents felt strongly that, whatever the future outcome for a wicked earth, we all still have a responsibility to ensure that the earth and its resources are cared for now so that food may be continued into the future.

The consequences of this survey—albeit small and covering only a few villages, and only those in Marovo Lagoon—are profound. When taken in conjunction with our wider observations of the strong sense of social responsibility held by all the people with whom we met and communicated [46,58], these results suggest that, even if people do not know the term 'sustainability', almost all understand the concept. All demonstrated a strong sense of social responsibility to ensure that resources are cared for and used wisely, so that there will be enough food to go around in the future.

In many ways, the results of this small survey aid in the interpretations of much wider interviews and surveys undertaken as part of our research into market selling and purchasing [46,58]. It is beyond the scope of this paper to reiterate these previously reported results in detail, but two aspects of this previous research are particularly germane to our current arguments.

The first relates to villagers' determinations of what to grow in their gardens and how to distribute garden production. As indicated above, a subsistence economy is the basis of all the communities we studied and, in fact, underpins the basic economy of all peoples in Tonga and Solomon Islands. Garden production is essential to the survival of everyone in these two nations, even most of those who live in cities and towns and do not have access to their own traditional lands. Central city markets supply garden produce and marine resources in the form of fish and shellfish to townsfolk; regional markets supply the same resources to local communities; and village markets provide resources to those who are distracted by other duties and cannot get to their own gardens or fishing grounds. However, markets are not the only source of food supply, especially in villages. There is a requirement, based on kinship relationships and church dictates, that all land owners/food producers must first provide for their immediate family, then to those in the village who do not have land or are too old/infirm to tend their own gardens, and then to meet special occasions in the village—especially church feasts. All this distribution must be provided without any expectation of reward or other reciprocity. Figure 4 demonstrates this point. Although most respondents in both Tonga and Solomon Islands said that they would sell their surplus produce to the markets, this could only occur after other obligations had been satisfied.

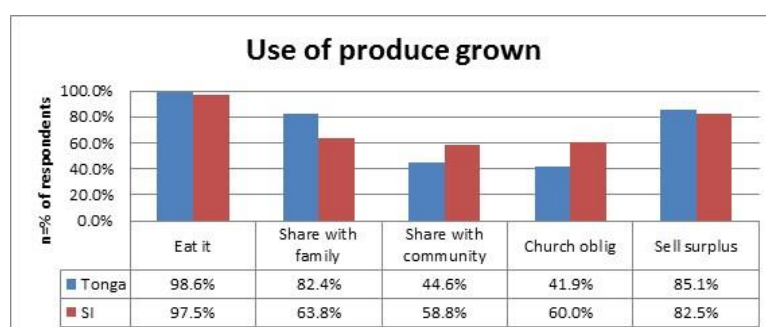


Figure 4. Use of Product Grown in Tonga and Solomon Islands.

This emphasis on local supply determining market selling also influences what is grown in gardens. Of the 154 people interviewed for the market survey, only one grew food expressly for sale in the market. Everyone else grew traditional foods to meet the needs of family and community. As a consequence, everyone's surplus was similar. If sweet potato, say, was abundant in Moloka's garden, it was also abundant in Louisa's, and everyone else's. As a consequence, if Moloka wanted to sell his excess sweet potato in the village or regional market, he had to compete with Louisa and everyone else. Excess sweet potato would, therefore, generally go to waste, especially in Seventh Day Adventist villages where pigs (who eat surplus sweet potato in United Church villages) are forbidden.

The disadvantage of this informal planning for surplus disposal is that agricultural production is, seemingly, economically unsustainable. However, such 'unsustainability' is only 'unsustainable' in a western market sense. From a village perspective, there will always be plenty of sweet potato. The only downside is that desires for a short-term financial windfall will not be met from sweet potato, but at least everyone has food, and socio-cultural obligations have reinforced important kinship and religious ties.

The corollary of this observation is that there is little understanding of the concept of demand amongst village-based subsistence agrifood producers. When asked in interview 'how do you know what to take to market? How do you know what will sell?', almost all respondents either had no real idea or indicated that they 'just know' what people will want (Figure 5). Some indicated that they do

some market research, such as travelling to the marketplace to see what is on sale in bulk and then bring something else. However, the reality is that this hardly ever happened. People simply took their surplus to the market, resulting in a glut of (say) sweet potato for sale, and very little of other goods that no one had in their garden, simply because no one had anything else in their gardens.

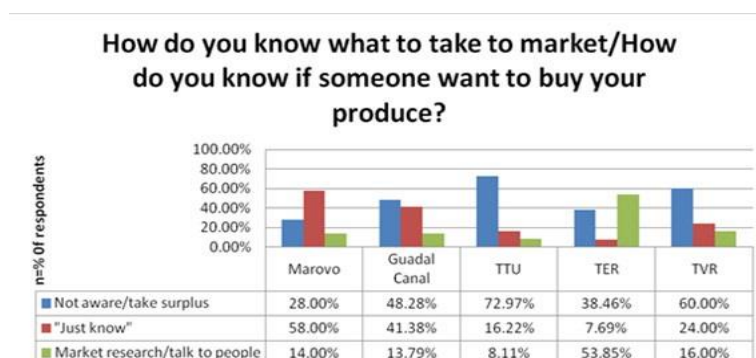


Figure 5. Demand management statistics (Source Bryceson and Ross [46]).

The upshot of these data is that the informal subsistence economy is not particularly economically sustainable. However, economic sustainability is not the primary focus of production. Supplying local needs and meeting social obligations, while ensuring the garden soil is well managed to ensure long-term viability of the garden, lies at the heart of the village value chain. Clearly, the agrifood system that exists in small-scale, subsistence-based societies is not driven by an economic engine. Rather, it is utterly dependent on its social framework.

4. Discussion: The Social Side of Sustainability

We argued earlier that many studies of the sustainability of agrifood chains ignore, or at best pay little heed to, the social aspects of sustainability. The results of the research presented here demonstrate that a failure to recognise the important role of informality, and the Church and its social dictates, leads to a failure by ‘outsiders’ to understand some of the production choices and market decisions made in small-scale, informally structured agrifood chains in villages such as those we studied.

In our previous publications on value chains and local market economies in Tonga and Solomon Islands [46,58], we found that the dominant feature of the agrifood systems in these communities was informality. Economic considerations, however desirable to individuals, are secondary to social responsibilities. Although people need cash to meet school fees, petrol purchases, and purchases of imported staples like rice and noodles, the generation of cash plays a limited role in decision-making about food supply and market sales. As a result, we proposed that a ‘habitus of informality’ underpins agrifood development and maintenance.

The research detailed in this paper enables us to confirm that the Church dominates this habitus of informality in a very formal way—in fact, it is a form of governance in these communities. In taking on this role, its teachings are of paramount importance in understanding how sustainability is constituted in these societies and agrifood systems. Moreover, it is clear that environmental management has little impact on the sustainability of the agrifood chain in these societies. Although all people we met recognised that good land was important for food production, and our survey demonstrated an understanding of the need to manage ‘God’s resources’, land access itself is utterly determined by social rules and kinship relationships both in Tonga [60,61,63] and in Solomon Islands [66,67,69,70,72,76]. In both countries, land degradation is met with movement to new kinship-based lands rather than improvements to current plots.

How do these findings allow us to define sustainability in small-scale, subsistence-based yet socio-culturally complex agrifood chains, given our review of sustainability definitions and approaches at the start of this paper? We believe the complex systems approach is useful for large organisations

in that it enables modelling of multifaceted organisational issues. However, this approach does not adequately address the key social constituents that drive the small-scale agrifood chains with which we are dealing. Specifically, the TBL approach is too economically and environmentally biased to withstand close scrutiny in the social domain. Conversely, the Circles of Sustainability approach—which does consider the combination of economics and socio-cultural variables—does not specifically address the role of the church, which in the cases we outline, is omnipotent and must be included in any discussion on sustainability.

5. Conclusions

Our results demonstrate that what is needed is an approach or framework that acknowledges the complex interplay between a range of factors—from economics and governance to environment and subsistence agriculture through to social and cultural mores, all framed around kinship and belief. In this, we have found that the Hybrid Value Chain Framework is ideal. This framework recognises the intersections of all these variables and allows for socio-cultural aspects to be captured during investigations that would otherwise not be recognised in a ‘standard’ agrifood value chain analysis. As a result of its use in our Tonga and Solomon Islands work, we have come to the conclusion that investigating sustainability in these small-scale complex agrifood chains can be best illustrated as shown in Figure 6, which emphasises that the social component actually underpins all.

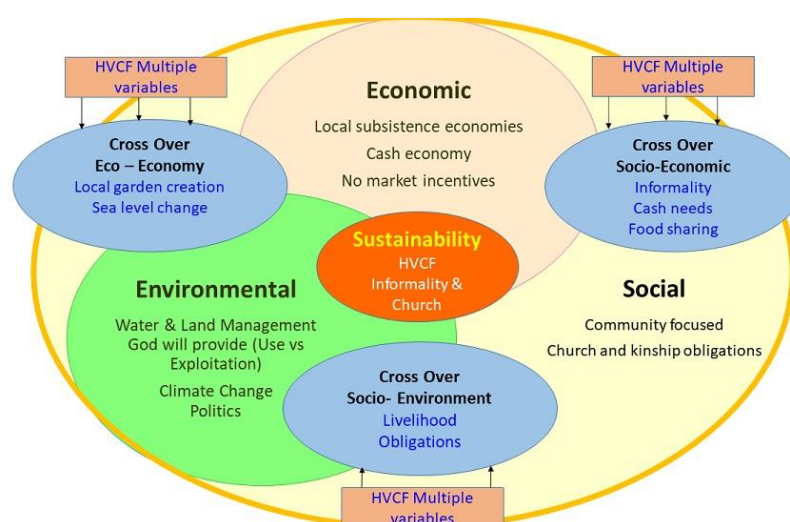


Figure 6. Diagrammatic representation of agrifood systems in small-scale societies dominated by social structures of governance and community organisation.

Our paper does not examine Foreign Aid policy with respect to donor funding for market development in small-scale economies, as this was beyond the scope of the project. However, we do provide a framework that could be used by policy makers to review existing policies and procedures relating to aid donation to informal societies in developing nations. International donor aid efforts that aim to bring agrifood market developments to small-scale societies in an effort to promote change and growth, tend to be based on neoliberal business models of supply chain management, with a focus on long-term planning, western value chain practice, and well-co-ordinated activity [58,80–82]. This paradigm counters the paradigm of informality that exists in small-scale subsistence agriculture societies, and as a result, inadvertently has a potentially negative impact on sustainability. Our conclusions indicate that international aid needs to be delivered with a strong understanding of the socio-cultural mores that underpin sustainability in small-scale developing nations.

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