# Understanding how the Tongan idea of *fakalakalaka* relates to the Western idea of sustainable design when building houses in Tonga

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## ABSTRACT

*Fakalakalaka is a term often used by Tongan people to describe how they have moved forward or 'how to do development' (Horan, 2002, p. 216; Thaman, 2002, p. 234). As an under researched concept, fakalakalaka is mentioned briefly in literature regarding Tongan development studies, education, and social anthropology. To date, it is the ethnographic work of Ruth Faleolo, an educator and researcher in development studies and education, who established an in-depth analysis of this concept (2012; nee 'Ilaiu, 1997). This paper particularly builds upon Faleolo's anaylsis, and significantly presents an ethnographic dimension of fakalakalaka as it relates to architecture, house building and building materials.*

*Through participant research, fieldwork observation with photography and drawings, the paper discusses recent findings from a remote and urban Tongan village. Three intangible and five more tangible senses of fakalakalaka as applied to building houses in Tonga are presented. Moreover, this paper begins to examine how this Tongan concept of fakalakalaka in house building compares to Western ideas about sustainable design and the juxtaposition raises questions as to whether the Tongan impetuses of fakalakalaka are compatible with Western notions of sustainable development. Fakalakalaka is certainly a momentum to be reckoned with, however as this paper shows, an understanding of fakalakalaka is imperative and learning how to guide it towards a more sustainable form of development would be most progressive.*

**Key words:** *Tonga, development, built environment, architecture, house building, sustainable design and building materials.*

## 1. INTRODUCTION

In contributing to the discussion of sustainable development in the Pacific Islands and Rim, this paper seeks to understand how the Tongan concept of fakalakalaka relates to the Western idea of sustainable design. This is a significant query because as the author's recent fieldwork findings highlight, fakalakalaka is an impetus for many of Tonga's house constructions covering issues about building material selection, choice of construction method, layout of the house, planning of the home including ancillary services and the ongoing maintenance of the dwelling. This paper argues that implementation of sustainable design principles initially requires an understanding of the Tongan concepts implicit in fakalakalaka. For this reason, the paper first explains this word fakalakalaka with reference to the wider notion of sustainable design, before discussing the senses of fakalakalaka as applied to building houses in Tonga.

## 2. FAKALAKALAKA ACCORDING TO LITERATURE

Tongan academic and renown poet Konai H. Thaman (2002, p. 234) defines fakalakalaka as 'literally to move or step forward'. C. Maxwell Churchward's (1959) Tongan dictionary, based on Tonga's early vocabulary lists collected by nineteenth century missionaries, defines the English word 'develop' (vt) as *fakalaka*. In Tongan, this word literally means to pass over or across, to cause to move forward, to promote or advance and has similar sense to *fakatupu*, or 'to grow'. There is a spatial sense of moving up and forward, a process of getting better than the previous stage. A more modern use of the word fakalakalaka encompasses the word "development", as used by aid development schemes in Tonga in the 1980s (Small, 1987, p. 377), or to describe 'how to develop' in more recent times (Horan, 2002, p. 216). Studies about fakalakalaka in this context of development studies (Herlin, 2007; Horan, 2002) refer to the ethnographic research of educator and researcher Ruth Faleolo (nee 'Ilaiu, 1997, p. 2, 48) who carried out research in Tonga during 1996 with 24 Tongan women participants. Her recent analysis of fakalakalaka based on interviews with 15 higher educated Tongan women living in the New Zealand diaspora, builds upon her previous ethnographic research but within new contexts of development and well-being (Faleolo, 2012, p. 35). Faleolo's work is a useful starting point to extend an understanding about fakalakalaka as it relates to domestic Tongan architecture.

Faleolo explains that the original meaning of fakalakalaka once referred to 'material', 'technological' and 'economic' development; however her ethnographic findings show that fakalakalaka as expressed by contemporary Tongan women in Tonga and New Zealand has a more encompassing concept consisting of three facets of their lives—material, mental and spiritual—as she explains (Faleolo,2012,p.7)

> *true fakalakalaka extends to all areas of life...encompassing the three realms of their individual and familial well-being: laumalie (spiritual sphere including values and beliefs that guide well-being), 'atamai (mind sphere including emotions and frame of mind that determine well-being), and sino (body sphere including health status and living standards that influence physical well-being)*

There is an evident transition of the meaning of fakalakalaka from a definition of development to include concepts, which are found in the well-being and livelihoods discourse (Sirgy, 2011, p. 13).

Furthermore, according to Faleolo's analysis, fakalakalaka exceeds '...hard tangible outcomes (e.g employment and material wealth) to include the 'soft' non-tangible benefits (e.g. insight and motivation) of progress' (Faleolo, 2012, p. 16). Certainly these tangible and non-tangible elements of development are also applicable to fakalakalaka in building houses in Tonga. My preliminary research shows how fakalakalaka in architecture easily traverses these boundaries, reinforcing this notion that fakalakalaka, even in architecture, can be accomplished holistically.

## 3. SUSTAINABILITY AND SUSTAINABLE DESIGN

Sustainability as a formalised concept has a relatively recent history and has been a topic of global international forums for the last 25 years (Becker, 2012, p. 1). Several political documents began defining the concept of sustainability, starting with the World Council of Churches during its 1975 Assembly in Nairobi which in essence reviewed '...the distribution and uses of depleting resources' (ibid). Furthermore, the UN Bruntland definition in 1987 impressed the need to review how the present generations' use of resources could affect the next generation (Edwards, 2010, p. 25). This definition led to several agreements, such as the UN Earth Summit in Rio de Janeiro in 1992, that '...formalised the need to jointly address the imperatives of the 'three E's'—energy, environment and ecology' (ibid, p. 29). Ten years on, the Johannesburg World Summit on Sustainable Development agreements began to shift towards a strategy to spur human integration by focussing on sustainable consumption and production (ibid, p. 28). In 2009 there were Copenhagen Climate Change discussions, which historically stem from the 1997 Kyoto Protocol and the United Nations Framework Convention on Climate Change, focussed on issues of climate change (Todorov & Marinova, 2011, p. 1397). More recently, the 2012 Rio +20 discussions presented objectives to reduce poverty, to promote social equity and protect the environment amidst increasing human populations. From these global discussions a common critique is that the concept of sustainability is neither fully defined nor fully encompassing. Sustainability is often used as a broad sweeping term that is interpreted in many different ways according to the primary issues that are at stake (Becker, 2012, p. 1). Certainly the term sustainability in itself is a concept that needs to be refined.

The clear distinction of sustainability and sustainable design is that the former is the process and the latter is a goal, particularly for built environments. Sustainable design, like the discourse of sustainability, has limitations. By nature their prescriptive principles are challenged when a type of development can never quite agree with all principles, meeting some and yet failing others. This is revealed later in a comparison betweeen fakalakalaka and sustainable design, where gaps between the Tongan concept of development against this Western idea of 'best' progress are highlighted, which questions the suitability of the sustainable design framework. But firstly, the following fieldwork findings presents the senses of fakalakalaka.

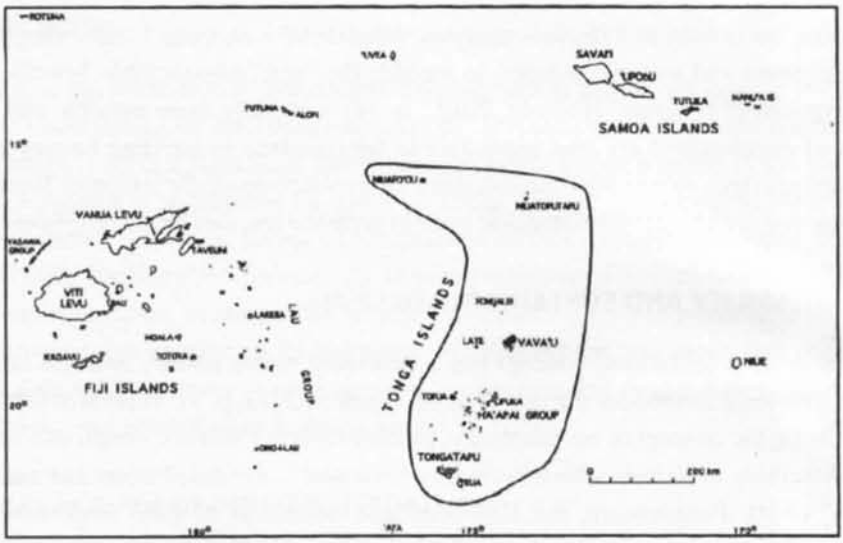


***Figure 1:*** *Solid line shows Kingdom of Tonga and fieldwork locations in red, after Clark et al, 2008,p995*

## 4. METHODS IN THE FIELD

Using data from recent fieldwork, this paper analyses different senses of fakalakalaka that apply to the built environment. Fieldwork was conducted in two villages in Tonga during 2013, one a remote village, Fangale'ounga in the Ha'apai group, and the other, an urban village located on the main island Tongatapu, called Tatakamōtonga (Fig.1). According to the 2011 Tongan census, the number of private households of Fangale'ounga village is 30 compared to Tatakamōtonga, which has 301 households (Statistics Department Tonga, 2011, Table 2). Some 29 participants from each village were interviewed regarding how they build today: what construction styles and building materials they currently use or would like to use to build their houses and what motivates these choices. At the end of the questionnaire, I asked participants three directly related fakalakalaka questions that help to form the main findings of this paper:

*Question 17: What is your understanding of fakalakalaka?*

*Question 18: How have you applied fakalakalaka to the current house you live in?*

*Question 19: How will you apply fakalakalaka to a house you may build in the future?*

By thematically analysing their qualitative answers, five senses of fakalakalaka have emerged as strongly relating to building houses, and thus according to Faleolo's analysis is more tangible or can physically manifest itself in a house. Contrastingly, three themes contribute to the non-tangible outcomes of fakalakalaka beyond the physical architecture. The aim of this paper is to present the emic nature of these senses, by characterising how Tongans apply fakalakalaka to their houses. Also, the paper critiques the senses from an etic position and by evaluating fakalakalaka and its tenuous relationship to sustainable development. It is also important to state that the gathered senses of fakalakalaka are not homogenous and universal across all Tongan communities, and most likely the senses of fakalakalaka is an evolving definition depending

on the context of participants. I begin with these latter non-tangible senses, as they highlight a perception, the essence and state of fakalakalaka.

## 5. PERCEPTION, ESSENCE AND STATE OF FAKALAKALAKA

There is a perception amongst a few, perhaps more discerning participants, that fakalakalaka has a negative and positive facet, especially when confronted with social and moral issues. For example, the advancement of phone technology has provided mobile phones that are useful for delivering messages more quickly than earlier forms of communication. However, in Tatakamōtonga there was a strong consensus that theft is on the rise (S. V. Moala and S. L. Lao, personal communication, February 13, 2013), and some were of the view that mobile phones were to blame as they allowed thieves to conspire more efficiently when owners were not at home (M. Vatuvei and Haitini, personal communication, February 27, 2013). This technological example of fakalakalaka highlights its perceived dimensions that could simultaneously benefit and demoralise society.

Fakalakalaka is also in essence a locally constructed view, as my findings highlight. As part of the interview, I showed participants images of what is considered sustainable, modern, contemporary in the West; images which are typically found in any University's School of Architecture library. It was astonishing to receive commentary that belittled examples of designed buildings, which could be considered by architectural professionals as contemporary, appropriate for the Tongan climate and making good use of local building materials. One particular image was of the 'Ridge House' designed by architects Olson Sundaberg Kundig Allen Architects, in the Eastern Washington, United States 2011. It is a beautifully sustainable designed luxury house clad in expensive hardwood timbers in a remote wooded area. Several respondents thought that this was a 'building', not a house, in which 'dirty' work was carried out (E. Tuiono, A. Lea'aetoa & S. Lo'amanu, personal communications, 28,19, and 18 February 2013). Generally what is considered modern and contemporary in the West does not always translate as such in Tonga but rather, strange looks and questions like 'Is it a factory?' are returned (S. T. Niulala, personal communication, 16 February 2013). This visual anthropological exercise immediately reinforced that fakalakalaka in Tongan architecture is locally inspired by translations of what was once a foreign design but now locally adapted to become a Tongan architectural ideal.

***Figure 2:*** *Fale Tonga made from coconut leaves, after D. Gerstle, 1974*

***Figure 3:****Rendered Concrete blockhouse owned by Finau family in Tatakamotonga village, February 2013, photograph by author.*

We have a dialectical situation in Tonga where there appears to be conflicting ideas of what is progressive, modern and fakalakalaka. The tension between modernity and the nostalgic past which is evident when some participants mention fakalakalaka. It was common to hear participants begin their interviews, explaining that they would happily build a modest *fale*, similar to an early *fale Tonga*[1] with no '*seti*', or interior fittings around, with just an open plan (E. Taufa, personal communication, February 25, 2013). One participant even said she would happily live in an early fale Tonga made from woven coconut leaves and local wood (K. Finau, personal communication, 3 March 2013, (Fig. 2)). However, at the end of their interviews when questions

pertaining to fakalakalaka were asked, they quickly shrugged off their earlier preference of a modest fale Tonga and said harmoniously that they would build according to the current modes that use Western types of construction and materials (ibid; E. Taufa, personal communication, February 25, 2013). For example Kelela Finau replied as follows:

***Q17. What is your understanding of fakalakalaka?***

***Kelela's Answer:***
*Fakalakalaka, I know is the coming of economy with this and that, so fakalakalaka of life should go up, not the life of the family goes down. So then people will try to build something better for when the kids are older or the elders are old or die [to host a funeral], there is a house.*
*But in terms of living and staying, a fale pola [coconut thatched house] is still better.*
*The fale Tonga is better.*

***Q18. How have you applied fakalakalaka to the current house you live in?***
***Kelela's Answer:***
*Fakalakalaka has come to Tonga and we need to put aside the pola [woven coconut fronds used as thatching] to bring up your life up to that standard. The fale Tonga has finished today. But in your heart you still want to stay in a fale Tonga.*

Kelela Finau highlights that there is an awareness of an overarching fakalakalaka and that personal nostalgic preferences are put aside for that greater standard. She highlights that her children are the reason for the concrete blockhouse they live in, even though she would prefer to live in a fale Tonga (Fig. 3). It becomes clear that there is a divergence of fakalakalaka from purely a development understanding, and stems across to this tension between nostalgia for past lifestyles and the movement towards modernity with Western architectural acculturation. The origins of this strand of fakalakalaka arise from Tonga's perception of the West since the beginning of Tonga's contact period with the West from 1616 onwards. At the turn of the century, in 1919 Queen Salote advocated for Western public systems of education and health care (Eustis 1997, p. 71), as she saw Western experience and education was 'necessary for the advancement of her kingdom' (ibid, p. 76). These early good intentions by such Tongan leaders has driven the fakalakalaka expressed in this theme, where materials and objects of Western or foreign origin, different from the familiar local, is considered better and of greater standard than what is naturally and commonly Tongan. Unfortunately, that sense of fakalakalaka has moved along unquestioned for more than a century. What is required now is a reconsideration of such 'globalising' attitudes by understanding the mis-matches of fakalakalaka against what is defined to be sustainable, as this paper attempts to do.

### 5.1 FAKALAKALAKA COSTS MONEY

The first of the five more tangible themes is fakalakalaka's relationship with money, and it is becoming quickly recognised that fakalakalaka is dependent on money. People use money to purchase current building materials, or hire an experienced builder, and in this way extend and advance themselves through building. Although many want fakalakalaka, the reality of their

aspirations is reliant on the question of how much does it cost? Participants complained that fakalakalaka is 'expensive', and they are limited in their '*ivi*' (strength, ability) to achieve a house with a fakalakalaka status (S. Vatu & P. S. Papani, personal communication, 20 and 19 February 2013). Thus, real fakalakalaka needs to consider the feasibility of economics and resources. The fifth and last sense of fakalakalaka, described soon, best resolves this money dependency, with a requirement to be disciplined, gather resources and save towards such costly goals.

### 5.2 FAKALAKALAKA: MORE TECHNOLOGICALLY ADVANCED, MORE PERMANENT AND EFFICIENT BUILDING STRUCTURES AND MATERIALS

Associated with how much you can afford, fakalakalaka is deemed technologically progressive, more advanced as a building fabric and form, more permanent, and durable. Such fakalakalaka building materials require less maintenance, in other words a 'convenient' architecture, unlike the early fale Tonga's thatching which required annual repair. However, arguably both early and more recent fale are laboursome. The earlier house required a community to weave thatching, prepare flooring, harvest wood and build the structure. The more recent fale requires one to work for money to afford a house that is considered fakalakalaka.

This theme also shows that fakalakalaka architecture is not stagnant but follows trends of building materials. At the time of writing, concrete block was considered most fakalakalaka by many of my participants because it was durable, strong, and had the added benefit of being fairly affordable: the current price range in year 2013 was TOP$1.50 to TOP$3.00[2] per block. Thus making it more affordable than imported structural materials because it is manufactured locally and largely from local natural resources. Furthermore, local tufunga, or builders are now very familiar with concrete block and concrete slab construction, meaning a relatively efficient build. My findings emphasise homeowners are highly receptive to new materials and are learning by following peers who have pioneered the use of such new materials in their respective communities. This sense of fakalakalaka can be used to steer people towards sustainability by promoting a sustainable technology that is packaged in a modern or progressive way and appeals to the needs of the consumer.

### 5.3 FAKALAKALAKA HELPS TO FULFIL NEW FAMILY NEEDS

A few participants explained that they abandoned early fale Tonga in order to build a new house that incorporated more bedrooms, so the family could sleep together in a modern and also 'Western' type of arrangement. In addition, internalising the bathroom and kitchen became another important fakalakalaka step, particularly for aging members of the family who required these amenities to be at closer distances than the earlier dispersed house layouts. For illustration, a sketch by Similone 'Ilaiu showed a number of thatched fale dispersed on his family land prior to the early 1970s (Fig. 4). At the time of writing, all these living spaces were under one roof of a timber framed house. Clearly, internalising the bathroom and kitchen and incorporating more family members under the same roof in Tonga is considered an application of fakalakalaka. Consequently, kinship relations have had to readapt to suit such new living layouts. In particular, maintaining the avoidance behaviour[3] between brothers and sisters who are sleeping under the same roof by allocating them different rooms that still provide a respectful distance from each other.

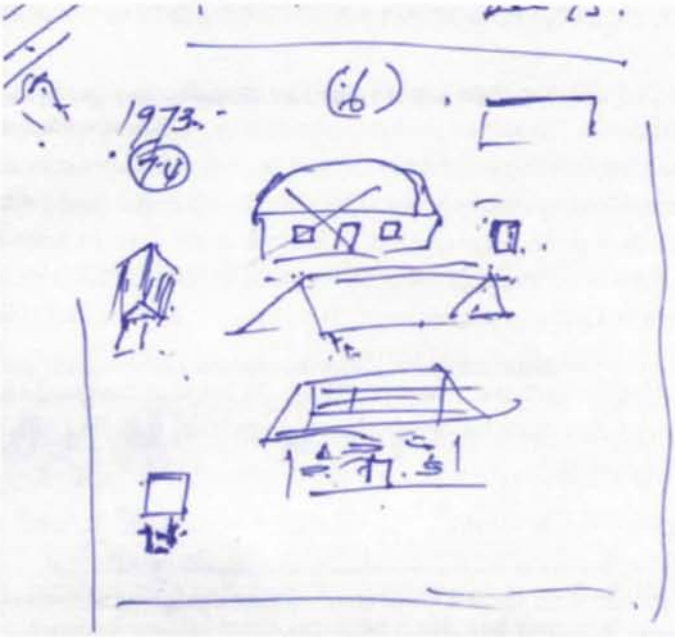


***Figure 4:*** *Sketch by Similoni 'Ilaiu, fale buildings on 'Ilaiu land prior to 1973, February 2013*

## 5.4 FAKALAKALAKA: THE CONTINUAL MAINTENANCE OF THE HOUSE

Predominantly women contributed to this theme and in slight conflict to the aforementioned sense that fakalakalaka buildings use more advanced and permanent building materials. They believe fakalakalaka should show through the maintenance of one's home. This theme highlights that fakalakalaka is a continual process and not just a one-time event of building a house. Maintenance includes regularly painting the roof and walls, doing the gardening and general cleaning. Fakalakalaka therefore is maintained throughout post-construction. This is reminiscent of the beginnings of Tropical architecture which later became Green architecture. It developed through the hygienist discourse 'circulated through colonial hygiene manuals' from the late nineteenth century to early twentieth century (Baweja, 2008, p. 16, 107). From the late eighteenth and throughout the nineteenth century Tonga experienced several epidemics such as measles, influenza and whooping cough where many died, (Campbell, 1992, p. 94). The measle epidemic in 1893 was believed to have wiped out five percent of Tonga's population at that time and the influenza epidemic during 1918-1919 killed 1,800 people of Tonga, which was eight percent of the Tonga's population (ibid, p. 95). It was after this latter epidemic that The Department of Health was established in Tonga. Such catastrophic events refined living standards, particularly the desire to move away from unhygenic living conditions. The situation of toilet stalls and their waste pits away from living areas, the collection of rainwater and the availability of running water from piped sources were steps towards this sense of fakalakalaka.

### 5.5 FAKALAKALAKA: WORK ETHIC, DISCIPLINE AND ORGANISATION TO ACHIEVE IT.

It is often expressed by more mature participants that fakalakalaka is something that one must plan, 'withhold desires' or show discipline to save money, collect building materials and then build. Again highlighting that fakalakalaka is beyond the actual build, and in this case, it precedes the build with attitudes and decisions about the construction of the house. One participant said that one must carefully plan and organise his build so it is not done in haste and an incomplete way (S. T. Niulala, personal communication, 16 February 2013). Participants openly spoke about their personal beliefs in God and that through 'His strength' they can achieve fakalakalaka (U. Tuitupou, personal communication, 20 February 2013). This highlights a spiritual underpinning and mental motivation behind the tangible efforts to build a house. This attitude towards fakalakalaka is a major determinator of whether one achieves true fakalakalaka. It is the spirit behind the sense of the word.

My fieldwork findings begin to show the relationship between fakalakalaka and building houses in Tonga is agreeably a well-rounded holistic blend of material, mental and spiritual elements of development. This fakalakalaka tends to blur these two notions of development and modernisation, thus in Tonga, the meanings become inter-changeable. However, as seen in the Western world modernisation does not always mean sustainable development, and clearly it is useful to relate fakalakalaka to sustainability.

## 6. TONGAN LEGISLATION ABOUT SUSTAINABILITY

Tonga's current legislation embodies sustainable development by providing parameters that reduce damaging affects on the environment through planning, building and development Acts. These are the Environment Management Act 2010 and National Spatial Planning and Management Act 2012 and to a lesser degree the Town Regulations Act 1988. As implied in the Environment Management Act 2010, these legislations are closely reliant on other ministerial bodies to enforce such laws which provide specific guidelines and recommendations to achieve the aims of such Acts (Act No. 27 of 2010, p. 7). For example, although the National Spatial Planning and Management Act 2012 provides objectives such as 'create an appropriate urban structure and form for the development of the Kingdom...' (Act No. 7 of 2012, p. 10), it is unclear what is 'appropriate'. Furthermore section 27[4] titled 'Development Standards' of the same Act only outlines the development scope of which this leglislation has authority to approve (Act No. 7 of 2012, p. 17). However, supporting ministries such as the Ministry of Infrastructure (more commonly known as Ministry of Works) must specify what is an appropriate form of development. Such measures, like other countries, include the formation of a building code and standards. Although, the Ministry of Infrastructure has published a 'National Building Code of the Kingdom of Tonga' in both Tongan and English translations, it struggles to enforce its standards due to its limited task force, delaying the full achivement of the legislation for sustainable environments and developments (L. 'Aho, personal communications, 28 February 2013).

## 6.1 HOW DOES FAKALAKALAKA RELATE TO SUSTAINABLE DESIGN?

According to the book *Green Technology: An A-to-Z Guide* sustainable designs 'should (1) benefit the environment, (2) improve the lives of humans, and (3) be cost effective. In addition to such considerations, sustainable designs should adhere to the following principles (Lin, 2011, p.392). Commentaries based on fieldwork findings are discussed according to each principle.

*1.The primary principle involves the reduction of energy use: energy efficiency, carbon footprint and life-cycle assessment*

In Tonga, the current trend of fakalakalaka towards local materials like concrete block and local timber are great steps towards this direction. Currently, the popular concrete block is a mix of local aggregates and sand, except the cement portion which is often imported from Fiji or New Zealand. Similarly, the Tongan Government has a pine forestry industry and harvesting mill on the island of 'Eua which helps to supply local demand. Before such production, Tongans relied on imported timber from New Zealand, America Samoa, Fiji and even Canada. Such locally produced material intiatives help to reduce their carbon footprint. Certainly, more analysis of the embodied energy use of locally made concrete block and pine timber compared to similar imported material would help to determine specifically the significant reduction of energy use. Unfortunately at the time of writing, the majority of other modern building materials are still imported from overseas which clearly negates this sustainable design principle.

*2. Sustainable design should produce products, environments, and lifestyles that require fewer natural resources from the planet and produce less waste.*

Although the use of the building material concrete block is activating principle one, the natural resources it is made from are not easily renewable. For example, sand is in a vulnerable situation on the main island of Tonga and the government has put some measures to control and administer now how much sand is taken by companies and locals for consumption. A few local concrete companies, perhaps as a result of such costly restrictions, are producing blocks that eliminate the sand component and consist only of a cement and aggregate mix. This exclusion of sand supports this principle, however the quality of such bricks could also be undermined. The pine industry, on the other hand, is a renewable resource and is a positive move towards sustainable designed building materials.

*3. Minimise affects on the environment, example through waste or pollution*

Due to the scale of common domestic buildings, it could be fair to claim that waste on building sites are quite minimal because heavy machinery are rarely used, and it is more standard to use manual labour and power tools. Thus, less earth is moved and waterways are less contaminated. There is also a positive Tongan attitude towards building waste that helps to minimise unnecessary waste. It is a general perception that left over modern building materials have a potential purpose for another project or has another function altogether. This is obvious in the way Tongans build homes after a natural disaster, or in observing people's domestic structures like their outdoor kitchens, or even the recycled materials of a pig pen's fence or an outdoor bench.

*4. Sustainable design is in balance with the natural cycles and resources of the planet: biomimcry.*

There is still an opportunity here for architectural professionals to develop designs which incorporate natural ventilation and solar heating concepts through sustainable choices of materials, technologies and smarter designs. It is useful for designers to refer to earlier Tongan building traditions which provide sound and proven sustainable design ideas, such as the earlier aerodynamic curved end roof design of the Tongan fale that allowed strong winds to circulate its roof and reduce damaging uplift of materials during cyclone seasons. Although such measures could be significant contributions towards this goal, unfortunately what delays such architectural inputs is the Tongan governments loose enforcement of its building regulations.

*5. Minimise impact on the environment: 'tread lightly on the landscape'*

It is interesting that although fakalakalaka may have this close relationship with money, in some cases having less money does assist a more sustainable development. For example, due to limited funding, there have been instances where fewer surfaces around houses are made impervious and therefore left as bare soil or gravel. This is ideal for rainwater to infiltrate the ground and cool it down; providing an overall cooler living environment. The current draft of the building code does not regulate the ratio of impervious to pervious so in this case, money is the determining factor.

On the other hand having less money to build things properly can also impact the environment. Septic tanks, for example, if incorrectly installed due to lack of expertise or incomplete building materials and systems, can contaminate ground water. Correct installation should also be regulated with inspections by authorities. As implied earlier, such enforcement is yet to occur sufficiently.

*6.Good sustainable design contributes to healthy people, and at the very least, buildings and products should not be harmful to occupants and users.*

The fakalakalaka motivation to use corrugated metal roofing means Tongans can gather and harvest rainwater for consumption. This is a great step and relieves pressure off already stressed infrastructure. However, it is imperative to ensure metal roofing is of the best quality and remains that way so it does not corrode and contaminate drinking water. Again, fakalakalaka's relationship to money and its other sense of continual maintenance is key to ensuring there is potable rainwater from clean and maintained roofing materials.

Similarly, the fakalakalaka motivation to apply modern lining materials, can be detrimental to the occupants' health if short-cuts are made. I personally witnessed mould growth on ceiling linings in damp, unventilated houses due to no thermal linings. Water vapour rots out structural members and ceiling linings causing such mould spots. As commonly known, mould is clearly very harmful and can cause respiratory issues for occupants. In order for fakalakalaka houses to be healthy, the whole system of modern building must be applied and therefore requires a complete understanding of current building technology and have sufficient resources.

*7. Sustainable design should be appealing and desirable to a consumer.*

Fakalakalaka shows that a mix of development and modernity motivates current house construction. Having this two pronged motivation means that sustainable designs should have a modern interface and appeal visually and culturally to Tongans. This is perhaps the greatest challenge because all other principles rely on human integration; thus sustainable initiatives must appeal to the Tongan builder or house owner who currently control the application of sustainable design principles. Therefore, if the consumption and production aspects of sustainability are met by applying this sustainable design principle, the other six principles should potentially fall into place.

## 7. CONCLUSION

Fakalakalaka as it relates to house buildings practices is an important concept to understand because it epitomises the architectural motivations and building aspirations of Tongan people. This paper has attempted to reveal the senses of fakalakalaka, as explained by Tongans at the time of writing, to determine where there are diversions from and correlations with principles of sustainable design.

Generally, there are a few senses of fakalakalaka that are agreeable to sustainable design principles. In such situations, fakalakalaka can be used to promote principles sustainable design. However, better enforcement of relevant Tongan legislation is critical to establishing such important linkages.

It becomes evident through my analysis of fakalakalaka that it is almost impractical for Tongans to return to a way of living that is similar to their ancestral beginnings. My participants spoke of the durability issues of early fibrous building materials, which led them to choose building materials deemed more fakalakalaka. However this paper has attempted to draw out other elements of this earlier life that are useful for sustainable building, such as the use of "local" and accessible building materials. Again the participants of this study found local materials appealing due to its relative affordability. Within this opportunity, modern science and technology could combat technical challenges of historical Tongan building materials and practices; furthermore, revitalise an indigenous idea in a modern context, which can only benefit the sustainable future of such islands.

Fakalakalaka is clearly a holistic experience for Tongan domestic architecture. People are aspiring to develop themselves and their houses through modern constructions to satisfy amongst other reasons social and cultural motivations. Through appropriate house designs, and education around sustainable building materials and practices, it is possible to work with this momentum of fakalakalaka to ensure it is also a sustainable form of developing Tonga's domestic environment.

## ENDNOTES

[1] *The usage of fale in this paper means a house built by Tongans in a contemporary or early context. Fale Tonga is the common term that conflates all early structures into one type—gable or round roof—but is usually typified by the round roof oval floor plan type.*

[2] *This converts to a range from 86 Australian cents to AUD$1.70, at the time of writing.*

[3] *Avoidance behaviours is used here to describe the cultural custom of certain kin to avoid eachother in order to maintain respectful relations with eachother. In Tongan culture, this is very evident in the relationship between a brother and sister when they have reached puberty, which usually affects the spatial planning of houses.*

[4] *According to Tongan Government Gazette Supplement Extraordinary, Section 27 is yet to be enforced by His Majesty in Privy Council. Obtained from Tonga's Crown Law office, July 2014.*

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