

The Beautiful Community Network

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Abstract

Begging for funds from the 'International Community' is a strategy that Uganda, like other developing countries, has adopted to ensure a minimum of survival in a context of harsh economic realities. This paper will argue that the paradigm of sustainable development offers a viable possibility for turning the situation of the impoverished world from that of being perpetual beggars to self-sustaining conditions with fundamentally improved livelihoods.

The premise of this paper is that a core problem in developing countries such as Uganda is a mismatch between what people crave to consume, on one hand, and what the country can produce, on the other. The consequence is that the people consume more than they produce thereby creating a deficit between demand and supply. This deficit is then covered with imports financed by begged monies. Not surprisingly, the donor alms are barely sufficient with the result that the majority of the population has a bare existence at the margin of survival. This status quo will not change unless deliberate remedial measures are undertaken. Using architecture as an example, this paper argues that the approach of sustainable development can be an efficacious remedial measure in the context of Uganda just as in other developing countries.

While arguments abound that the problems of underdevelopment are externally generated by global forces and so require outward looking solutions, this paper will argue the case that *internally* generated solutions can provide the impetus needed to improve developing economies. The conceptual framework for these arguments will be open systems modelling. The existing situation will be presented as a systems model that becomes increasingly worse owing to positive feedback (the vicious cycle of poverty). Remedial interventions will be explained by open systems modelling whereby a minimum importation (of information, matter and energy) into a system can lead to a self-sustaining process of improvement through positive feedback mechanisms.

The remedial interventions will be explained within the context of the field of architecture. Architecture is uniquely placed as a sector in which the production of materiality must resonate with people needs, wishes and desires because it marries functional with aesthetic aspects using material means (the buildings). Architecture can be taken to be a microcosm of the entire country as it reflects the unsustainable national situation. For example, 80 percent of the population are living in traditional houses that are increasingly socially unacceptable while in the urban areas, over 60 percent of the inhabitants stay in problematic informal settlements. This paper will argue that the building material earth can, in a sustainable way, contribute to a process of change in the field of architecture and indeed the entire country.

Keywords: earth architecture, sustainable development, systems, feedback mechanisms, vicious cycle of poverty, globalisation, international demonstration effect

We can break the cycle

We can break the chain

We can start all over

In the new beginning

We can learn, we can teach

We can share the myths the dream the prayer

The notion that we can do better

Change our lives and paths

Create a new world and start all over

From **Tracy Chapman** in the song ***New Beginning***

Introduction

Flimsy, chaotic, aesthetically repugnant - these are all words that can be used to describe informal settlements. This also extends to their infrastructure as Southall and Gutkind noted many years ago of Kisenyi, arguably the genesis of informal settlements in Kampala:

The common services such as roads, drainage and water supply . . . are lacking. Such roads as are existing are deeply ravined stretches of ground with intervening hillocks, standing pools of water and trickling drains, across which a few lorries and cars bump crazily. . . . each [pit latrine] has usually to be shared by many families, and their siting in relation to dwelling houses causes constant offence to the nostril. There is no drainage system, and waste water of all kinds is left to trickle away towards the lowest ground causing morasses of mud (1957:22).

Leisinger estimates that

In [cities in] sub-saharan Africa 92 percent are living in shanty towns or slums (qtd. in Rusch, 2001:1)

In Uganda probably over 60 percent of the urban population lives in informal settlements (Sanya, 2002: 39). These housing conditions are inseparable from the general economic situation and indeed architecture is but just a microcosm of the general economic situation of indigence. According to the United Nations Development Programme (UNDP), Uganda had GDP per capita of a mere 236 US \$ in 2002 (compare to Norway's GDP per capita of 41,974 US \$ in the same year) and over 40 percent of the population were living below the national poverty line (2004: 148, 184-186). It would be expecting too much for such a person living on less than a dollar per day to make order of their living environment.

This paper takes the premise that developing countries like Uganda, that have lots of resources and manpower, only lack one key ingredient: knowledge. It is lack of knowledge to effectively use the resources and manpower that is responsible for perpetual underdevelopment in the South. Everything is sourced from nature. What turns nature into a something of utility to man is labour (manual and intellectual). You can have nature and labour in abundance but so long as they are not interacting effectively – you'll remain poor. This point is exemplified by Japan that, with a relative shortage of raw materials has managed to achieve lots of economic growth, while many developing countries abundantly blessed with natural resources are still afflicted by poverty. This paper, using Ugandan architecture for

elucidation, argues that the developing world has most of the ingredients for development and that with a minimum but well-targeted input of knowledge, conditions can be turned around.

A Systems Approach

The conceptual frame is systems theory whereby arguments will be founded on dynamic open systems modelling based on the feedback mechanism.

Feedback

Two types of feedback can be identified: negative feedback and positive feedback.

A system is said to be experiencing *negative feedback* when output is maintained around equilibrium.

In living bodies these processes [of negative feedback] are summed up under the name *homeostasis*, which is Greek for equilibrium (Boulding, 1985: 19)

An example is a thermostat and a heater whereby the temperature is not allowed to rise or fall below a certain values. When the temperature rises above equilibrium, the thermostat causes the heater to switch off thereby cooling the system. When the temperature falls, the thermostat causes the heater to switch on thereby rising the temperature. Equilibrium can be maintained at a high level or a low level (the thermostat can maintain temperature at a lower or warmer level)

A system is said to be experiencing *positive feedback* when increase in one element leads to increase in a second element which in turn increases the first.

In social systems we have things like arms races, where an increase in the arms of country **A** produces an increase in **B**, which produces a further increase in **A**, a further increase in **B**, and so on ... So, at the other end, is falling in love. **A** does something which makes **B** take an interest in **A**, **A** perceives this and becomes attracted to **B**, **B** perceives this and becomes more fond of **A**, and so on (Boulding, 1985: 20)

Positive feedback can serve to continually increase i.e. runaway growth or it can serve to continually reduce i.e. perpetual deprivation.

The unlikely case of the thermostat that encourages the heater to heat more each time it senses an increase in temperature is an example of positive feedback. The opposite example of the

thermostat signalling the fridge to reduce temperature as temperature falls is also a case of positive feedback.

Using the thermostat analogy to describe economic growth, the thermostat which encourages continuous increase in warmth is like a *virtuous circle of affluence* leading to runaway growth; and the one that encourages continuous increase in coldness is like a *vicious circle of poverty*. It is important to note that positive feedback can either lead to a continual reduction or to a continual increase.



Figure 1: Left: Virtuous Circle

Right: Vicious Circle

Economists have described the conditions under which the poor are trapped as *the vicious circle of poverty* whereby low income coupled with growing population leads to low savings and hence low investment thereby worsening the poverty and repeating the circle:

... this positive feedback loop [has] a strong influence on the behaviour of populations in poorer areas. They form a “system trap,” a “less success to the already unsuccessful” loop, that keeps the poor poor and the population growing. By drawing output away from investment and into consumption, population growth slows capital growth. Poverty in turn perpetuates population growth by keeping people in conditions where they have no education, no health care, no family planning, no choices, no power, no way to get ahead except to hope their children can bring income or help with family labor (Meadows et al, 2004: 45-46)

The challenge for the South is to turn the vicious circle into a virtuous circle to elevate growth (rise the temperature to comfortable level).

Architecture and the Vicious Circle

How is this vicious circle reflected in architecture? Like we said, architecture is a microcosm of the entire economy. And so in Ugandan architecture, the vicious circle resulting from positive feedback is at play making habitats increasingly worse. The case of the informal settlement will illustrate this point.

The Informal Settlement and the Vicious Circle

Informal settlements in Ugandan urban areas are very poor quality habitats. For this discussion to be clear, a description of what constitutes quality in architecture needs to be given.

The famously quoted tripartition of Vitruvius of *utilitas*, *venustas* and *firmitas* can help us to define quality. Van der Voordt (2004: 152) used this tripartition to come up with the following three categories¹ to evaluate buildings: functional aspects, aesthetic aspects, and technical aspects.

Taking Vitruvius and van der Voordt as a point of departure, it is sufficient for this paper to define architecture and the built environment as *man-made space and form with the characteristics of order, aesthetics, durability and social liveability*. And based on these characteristics, the quality of architecture can be described as good or poor to a lesser or greater extent.

Spaces and forms with the characteristics mentioned above come from the environment and are achieved by man. Nature will provide all materials but, short of a cave, man must appropriate and convert nature into an abode with those characteristics. The act of converting nature's resources requires labour and intellect. Knowledge plays a pivotal role. Given the same amount of environmental resources and manpower, knowledge can make a huge difference. For example, by just using design knowledge, a good architect can achieve high

¹ Van der Voordt expanded these categories with a fourth one: economical and judicial aspects.

aesthetic quality using a limited amount of manpower and environmental resources. Similarly, a highly skilled carpenter will make a fine product where an unskilled one will do a slipshod job even if the two were given the same quality of timber and tools. Hence, knowledge makes a world of difference.

Making Quality Forms and Spaces

Good quality architecture is constituted of forms and spaces with a high degree of order, aesthetics, durability and social liveability.

Realisation of order requires manpower and skills to get environmental inputs, to shape them, and to place them in definite places vis-à-vis each other for functionality. At the scale of urban spaces, order also requires knowledge about compatibility of uses and optimal relationships for functional efficiency.

Aesthetics partly arise out of order and hence too require the same kind of manpower and skills. But in addition, aesthetics require a design input by an architect. The kind of knowledge that the architect uses in design, though hard to define, is nevertheless indispensable for the realisation of aesthetics. Like the skills of writing a poem, the subjective skills of aesthetic design are knowledge for the one who possesses it.

Durability requires the knowledge that enables choosing the right material for the right place and using it in the correct way according to its inherent properties and to structural principles.

The quality of social liveability is achieved by application of knowledge of the effects of design decisions on people – how spaces bound by forms will affect social relations.

Thus we see that with the right application of knowledge, manpower can act on the environment to produce forms and spaces with the qualities of order, aesthetics, durability and social liveability. Knowledge also expands the environment (though absolutely fixed) by discovery of new resources or new combinations to yield new products.

In the Uganda, the environment is rich in resources and the manpower is in plenty (there are very many well-fed Ugandans). The causes of the flimsiness, low materiality, chaos and poor aesthetics in informal settlements is therefore attributable to lack of knowledge and skills. This will now be explained with a systems model.

Modeling Architecture

As in systems modelling, this model has three basic parts: inputs – process – outputs. To this is added depreciation and the fact that some of the outputs loop back to the process.

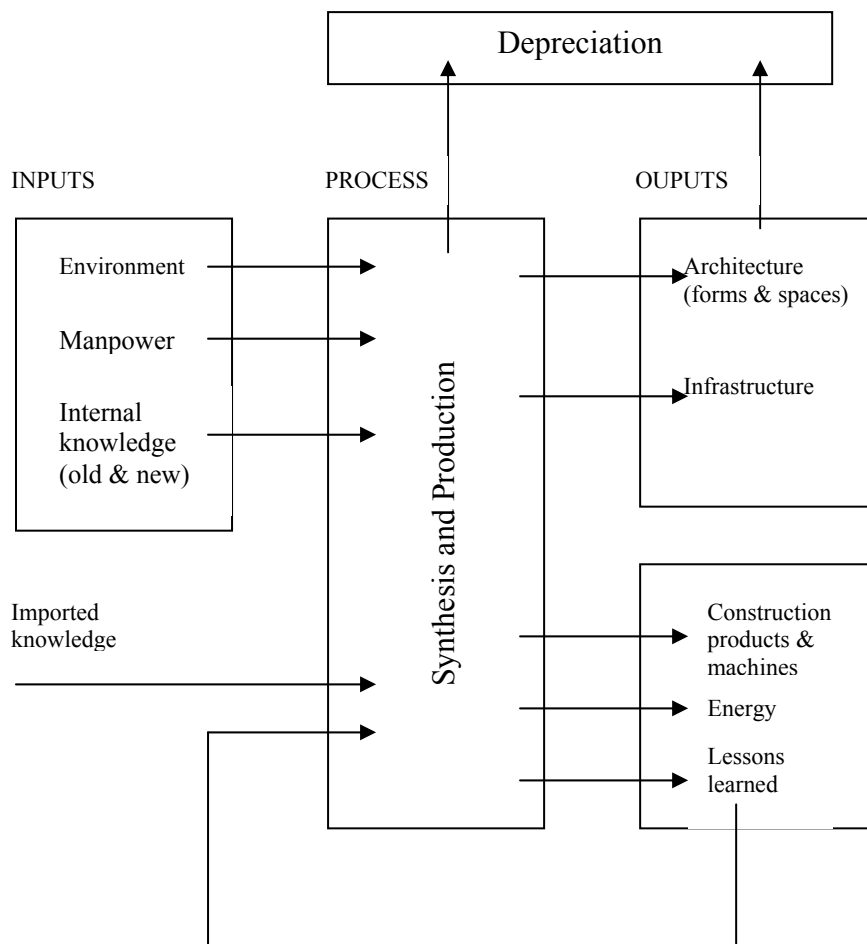


Figure 2: Systems Model for Architecture

Explaining the Model in Figure 2

Man, using manual labour and skills, transforms materials from the environment into Spaces and forms with the qualities of order, aesthetics, durability and social liveability. The

transformation is a process. Some of the process is towards making of tools and energy (which will make his subsequent work more efficient) and building products that loop back into the process (investment).

The *inputs* thus are: environmental resources, manual labour, knowledge and skills. Some of the new knowledge and skills are generated from within the system while some are imported. The inputs are combined together in a *process*. The *outputs* of the process are consumption items and investment items. The consumption items are a materiality of forms and spaces with a degree of order, aesthetics, durability and social liveability. The investment items are tools, energy and building products and lessons learned - these are ploughed back to further increase the quantity and quality of the forms and spaces. There is *depreciation* due to wear and tear in the process and due to use and aging of the forms and spaces. This depreciation is explained by the Second Law of Thermodynamics whereby systems tend to disorder:

Second Law: The entropy² of the world increases to a maximum (Bailey, 1994: 87)
According to this law, even if nothing is done to a system, it will become increasingly disorderly with time. This explains why informal settlements can even occur by default.

But in an open system, imports of information, energy and matter can offset the entropy. These imports are referred to as negentropy (refer to Bailey, 1994: 151 – 152). In the model, entropy is depreciation while negentropy is new knowledge input (information) plus investment. The difference between negentropy and entropy is a positive feedback mechanism. If the effects of new knowledge input and investment exceed depreciation, this positive feedback mechanism will lead to continual growth and improvement of the habitats. If, on the other hand, depreciation exceeds the effects of new knowledge and investment, the positive feedback mechanism will lead to continuous worsening of living conditions as happens in informal settlements.

² Entropy is the measure of disorder in a system

Explaining the Informal Settlement with the Model

Informal settlements are caused by a positive feedback mechanism that works in this way:

Little manpower and knowledge are used to extract materials from the environment and to convert the materials into habitats. This results in flimsy forms and spaces of poor aesthetics, disorder, low durability and poor social liveability. There is also low output of tools, building products, energy and lessons to invest back into the process. Concurrently there is depreciation due to wear and tear in the production process and higher demand on consumption (due to increasing population) making investment much more difficult. Ultimately, the effects of new knowledge and investment are much less than the effects of depreciation thus leading to a deterioration of conditions and the perpetuation of the circle.

Turning the Vicious Circle Round

A vicious circle is very pessimistic situation as it keeps getting worse and worse. But, with the right intervention, the positive feedback mechanism responsible for the continually deteriorating situation can be turned to the opposite direction to get a continually improving situation i.e. a virtuous circle

Of the inputs shown in the model in Figure 2, Uganda has environment and manpower in plenty. But what seems to be lacking is the knowledge to harness the manpower and environment into the kind of habitats we need. Therefore to break and turn the circle around, negentropy is needed in the form of new knowledge – knowledge to harness the manpower to convert resources into a forms and space with the attributes of order, aesthetics, durability and social liveability. Part of the new knowledge is directed to production of investment items to loop back into the process and improve the habitats further.

Improving Informal Settlements

Infusion of new knowledge and skills into informal settlements can lead to their improvement. With new knowledge, the existing manpower can be put to work to shape the existing

environment through a process into forms and spaces of adequate quantity and quality. Part of the new knowledge is used to make tools and products to invest back into the process to further improve the habitat and to produce more tools and products to invest again. So long as the effects of new knowledge and investment exceed the depreciation, the vicious circle will be stopped and a virtuous circle will take over. The virtuous circle will then continually improve the built environment. Slowly, incrementally, each infusion of new knowledge combined with each new investment loop adds to the value of the habitat. And so the quantity of forms and spaces will grow as the qualities of order, aesthetics, durability and social liveability improve. In the end, infusion of new knowledge and continual investment will lead to a process that will replace the informal settlements with high quality habitats.

What was initially responsible for changing the situation for the better was not money but negentropy in the form of new knowledge which in essence is information. Hence importation of information into the system has turned the situation round.

The New Knowledge

To understand what constitutes the new knowledge, this paper refers to two types of knowledge from the categories given by Kaiser (2002): know-what and know-how.

Know-what: what is your environment and what is contained in it, and what are the laws you can use to interact with it so as to produce objects of value.

Know-how: converting resources from the environment into forms and spaces with a degree of aesthetics, order, liveability and durability using brain and brawn.

To the two categories above we add organisational knowledge.

Organisational Knowledge: the knowledge to harness and focus manpower so as to realise the intentions of order, aesthetics, durability and social liveability. This is the realm of management and politics.

As seen from the model in Figure 2, the new knowledge is either internally generated or is sourced externally.

Internally Generated knowledge

- Reinterpreting tradition for modern needs
- New creative thinking from within (problem analysis and response)
- Putting existing theoretical knowledge to practice to learn through trial and error

Externally Sourced Knowledge

In a world where so much has already been discovered, why reinvent the wheel? It makes sense to get some of the required knowledge from external sources:

- By reading the books,
- copying existing things
- Interacting with the people with the knowledge in their heads

Another source of new knowledge consists of the lessons learned from habitats themselves (this appears as part of investment in the model).

Contextualising the Argument

It has been shown that it is possible to improve the informal settlement by using brain and brawn to utilise the environment. A common excuse for the underdevelopment of the South is lack of money. Yet clearly, as shown in the above argument for informal settlements, concentrating on money (or lack of it) is missing the point. Real value comes from the environment and the people. Money is just a mere reflection of value. Aristotle wrote:

... coined money is a mere sham, a thing not natural, but conventional only, because, if the users substitute another commodity for it, it is worthless, and because it is not useful as a means to any of the necessities of life, and, indeed, he who is rich in coin may often be in want of necessary food. But how can that be wealth of which a man may have a great abundance and yet perish with hunger, like Midas in the fable, whose insatiable prayer turned everything that was set before him into gold? (in McKeon (ed.), 2001: 1139)

And over 2000 years later, Adam Smith says the same thing with different words:

It was not by gold or by silver, but by labour, that all the wealth of the world was originally purchased; and its value, to those who possess it, and who want to exchange it for some new productions, is precisely equal to the quantity of labour which it can enable them to purchase or command (1776: 133).

To clarify the arguments of this paper, the façade of money will now be stripped away to show how a network of communities can produce all they need (including good architecture) in any given context.

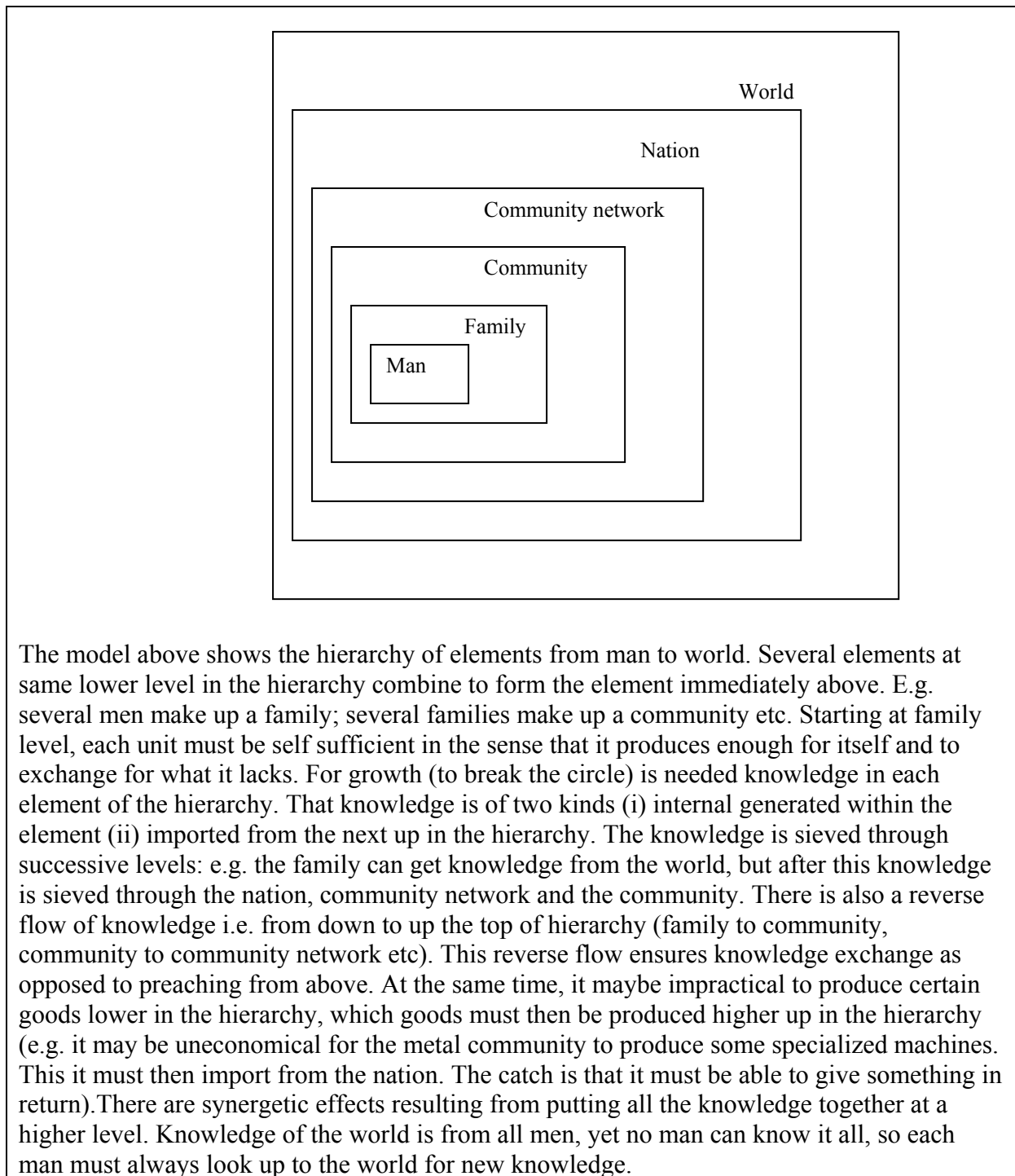


Figure 3: A Hierarchy of Systems

This discussion will be done with the aid of a network that consists of three communities: a farmer community, a clothier community and a blacksmith community. The three communities and their interactions will henceforth be referred to as ‘the Beautiful Community Network’.

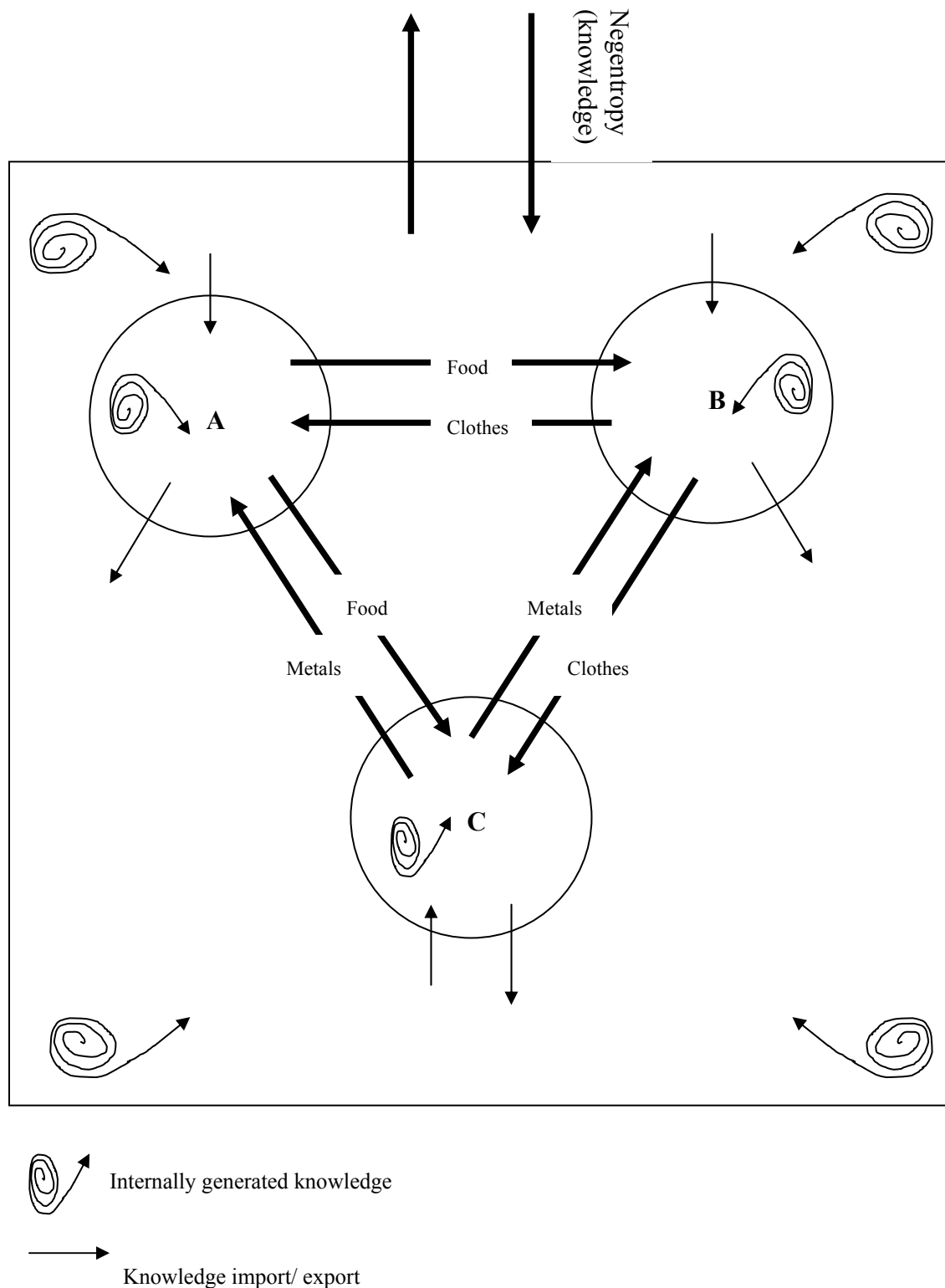


Figure 4: The Beautiful Community Network

The farmer community (A) grows food. The clothes community (B) that makes clothes (it grows cotton, yarns it, weaves and sews the clothes). The farmers exchange food for clothes.

Meanwhile there is a place, barren and rocky where nothing can grow. But underneath the rocks were discovered some minerals and based on these the community in this area has become the metal community (C) – adept at forging all sorts of metallic things – nails, hinges and even simple machines. So with their metal products they can exchange for adequate food and clothing.

The Basic Unit

Each of the communities is comprised of families, so the basic unit is the family. In this hypothetical situation we assume that each family needs only three goods: food (including medicine), shelter and clothing. It also needs two services: education and transport.

A family in the farmer community, on its piece of land, grows enough food to feed themselves and their children and even remain with a surplus.

For shelter, they want to move from their flimsy self-constructed house to one with higher qualities of order, aesthetics, durability and social liveability. No one in the family has the skills necessary to realise such a house. But fortunately there is a skilled builder-designer in the farmer community. The builder-designer has the knowledge that can help the family get a better house. Guided by him, they define their needs and tell him what kind of house they want. Then, through an interactive process, he designs an acceptable house for the family.

To realise the plan as a building, they need some inputs. The inputs required are: earth (available on their land), timber (also available on their land), nails and hinges (imported from the neighbouring blacksmith community), manpower (the farmer, his wife and the elder children), and esoteric building knowledge (possessed by the builder-designer).

First is sourcing the raw-materials. The builder-designer tells them which materials to bring, based on his knowledge – species of timber, type of earth etc. They use family labour to gather the required materials on the building site.

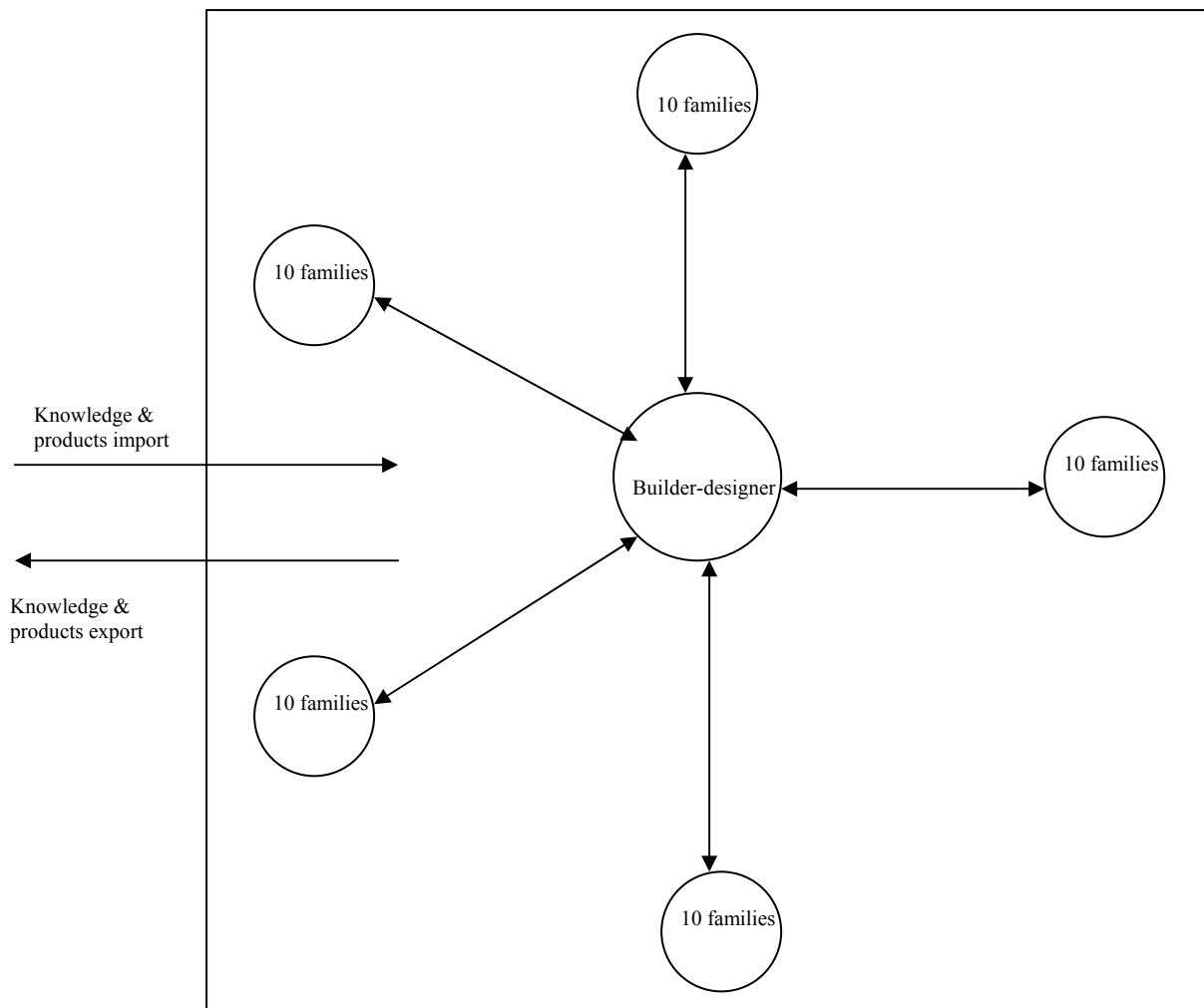


Figure 5: Exchange Between the Builder-Designer and Farmer Families (the farmer families exchange food for building expertise)

Then using his skills and helped by the manpower of the family, the builder-designer undertakes construction to realise the plan. In the end, the family gets a new house of higher quality.

Figure 6: An Adobe Building in Cuba. This can be achieved in a Ugandan rural beautiful community network



How does the builder designer survive? He's given food by the family (from their surplus) for the period he is working with them and even some more to last him until he gets the next job. Thus far, through this exchange, the family has acquired food and a high quality house in a self-sufficient manner.

For their clothing needs, the farmer family exchanges some more of the food surplus for clothes from the clothier family. While for their metal needs, they still exchange some of the food surplus with the blacksmith community. Thus with this exchange, the farmers get cloth and metallic objects while the clothiers and blacksmiths are assured of food – all in a self-sufficient manner.

These relations will now be clarified using a mathematical explanation below:

Beautiful Community Mathematics

The Beautiful Community of farmers consists of 50 households. Each household consists of two parents and five children (a household of seven people).

Assume a house lasts for fifty years and that each year the builder-designer can build two houses. The farmers pay the builder-designer family in food. As he takes 25 years to build all the houses required for the 50 families, it follows that a farmer family will be assured of a good house if it can feed the builder-designer and his family for half a year in 25years. In

other words, to get a good house, each farmer family must produce enough food surplus within 25 years to feed the builder-designer family for half a year.

Now, owing to the difficulty of storing food for 25 years, we assume that the community have agreed amongst themselves on a system whereby they all contribute to the builder-designer's family food needs every year, and yet only two of them receive a new house annually. This would mean that the half-year food quota of each farmer family is distributed over a period of 25 years which comes to about 8 days per year. Therefore each farmer family must feed the builder-designer family for 8 days each year. This assures that the builder-designer family has adequate food for 25 years. But as each house lasts for 50 years, the builder-designer needs twice as much food. Therefore, one half of the farmers should feed the builder-designer for 16 days annually for 25 years, and the other half feeds him also for 16 days annually for the next 25 years. After 50 years, the first building will need replacement and the cycle will be repeated.

By feeding the builder-designer for 16 days per year for 25 years, each family is assured of a house of good aesthetics, durability, and liveability. The surplus of food frees up the builder-designer's time to develop and apply high skills to buildings and the result is a general improvement in the state of architecture.

For clothes we assume that every seven years a person needs three clothes. Assume the demand for clothing is distributed evenly in the farmer family of seven so that every year only one family member would require 3 clothes from the weaver. If one clothier can satisfy the clothing needs of 10 families, then every year he must supply 30 clothes. For these thirty clothes he must get enough food from the 10 farmers to feed his family. 10 farmer families feed the clothier in one year (12 months). This means that each farmer family feeds the clothier for 1.2 months annually. Therefore, every year the farmer must produce enough food

surplus to feed the clothier family for 1.2 months. 1.2 months worth of food is the cost of the 3 clothes needed by each family annually.

Sums

Thus we see that he must produce his own food and a surplus. Using 50 years as a basis, we can sum up thus:

For the builder-designer a food surplus of 8 days (or 0.3 months) is required annually. For the clothier is required 1.2 months food surplus annually. Total so far is 1.5 months food surplus required annually. As the farmer family has other needs, we shall, for argument's sake, double this food surplus and say he needs a surplus of 3 months (0.25 years).

Thus to feed his family and also satisfy his other needs the farmer must grow 1.25 year's worth of food every year. And with the surplus he can get a good house and clothing for his family, as well as other necessities which cannot be produced himself.

From this example it is clear that if a food surplus can be created, a lot of the society's time is freed for other pursuits such as good architecture. The Beautiful Community Network is self-sufficient.

Other Sectors in the Beautiful Community Network

Education

There is also education where the children go to learn the community's trade and research to get new knowledge. The teachers are fed from the surplus of the family and the designer-mason builds them a house. The parents' labour, in the time freed up by surplus food, is harnessed through a political process to work hand in hand with the builder-designer to build the school using the resources from the local environment.

Transport and Commerce

Transport is required to move produce among the communities. In *Energy and Equity* Illich (1974) has written superbly on how transport based on a simple bicycle is both sufficient and

preferable for any society. With good planning therefore, it is conceivable that most of the transport needs (in terms of roads and vehicles) can be produced within the country. For example, it is possible for the metal community to manufacture bicycles and carts.

There is also a need for preservation of the food and storage, which, combined with transport would start some kind of commerce.

Self-Sufficiency

The key is self sufficiency, that is each of the communities must produce enough (not in the sense of everything for itself) but in the sense of enough to exchange. Similarly each element within the community (the family) must be self-sufficient and only gets other products/ services at expense which it can exchange. The same is true for the clothes community each member of which must see to it that what he produces is enough to cloth his family and leave plenty for exchange for adequate food – food to feed his family and some to pay the builder-designer in his community. There is symbiotic relationship between farmer community, the clothes community and the metals community.

Knowledge in the Beautiful Community

The beginning is the farmer who must be able to produce a food surplus. To do so he will require knowledge (from creative thinking of his own and from external sources) to increase the productivity of his labour and land. At the same time, the producers of his other necessities (the builder-designer, the clothier, and the metal people) must also have the requisite knowledge to carry on their respective trades. They too learn their trade through creative thinking and from external sources. Knowledge is the driving force. It increases productivity of the farmer leading to a surplus that frees up the time; and it also equips the skills necessary to use the time thus freed up to produce other necessities and so improve general welfare.

The same applies to knowledge of the clothiers. They must be capable of making the environment yield cotton (they must first know that cotton yields clothes), of yarning, weaving, designing and sewing. This requires knowledge and skills. Which then must initially be discovered internally or sourced externally.

The metal community also needs knowledge to make the metallic items and tools for making the items, for making simple machines. That knowledge must come in through a negentropy of information.

For the Beautiful community network, the external knowledge source is the rest of the nation. The same argument can be extended to the entire nation whereby internally and externally sourced knowledge leads to a food surplus that frees up labour to make other necessities which also will also need new knowledge. The external knowledge source for the nation is the region, continent, or world (South to South cooperation and North to South cooperation).

Hence we need new information for the farmer so as to increase food productivity and for the clothier so he can make clothes, the builder-designer so he can design and build, and the blacksmith so that he can forge. That information is knowledge. And leads to self-sufficiency in the end.

The Role of the University

The university is charged with knowledge, gathering production, dissemination. For example, the metal community may require the knowledge of how to make a new machine. This new knowledge can be sourced from the university where mechanical engineers using the laws of physics and aided by industrial designers have designed the machine, and translated the machine making process into a series of simple steps that can be mastered by the layman (this particular example also demonstrates the knowledge gap caused by the absence of an industrial design school in Uganda). Similarly the architecture school gathers, creates and disseminates knowledge to the builder-designers. However, true to the explanations given in

Figure 3, the university does not have a monopoly of knowledge production - a lot of the knowledge of the university will come from below (e.g. from the blacksmiths and builder-designer). For example most of the inventions of the Industrial Revolution were by artisans with no formal education. But it is quite clear that the ability to shift between strategic vision and tactical action can only be achieved by a well-trained person coming from a university. Such a university graduate has a strategic overview of how his decisions affect the overall community network and the entire nation.

Earth in the Equation

Röros, a Norwegian town dating back to the 18th Century has ancient buildings with earth roofs on which grass grows. Earth can not only be used for roofs as in Röros but is also good for walls based on many techniques such as mud and wattle, adobe, rammed earth, cob and many others. The majority of the building in Uganda are of the mud and wattle earth technique. But due to the vicious circle these buildings are not up to the satisfaction of modern needs. The result is that people run away from such building if they can afford to.

This need not be the case. With a ‘good hat’ and ‘good shoes’ earth building will last for hundreds of years, and using design means, earth can achieve the qualities of order, aesthetics and social liveability to any reasonable degree.



Figure 6: an 80 Year Old Earth Building in France. There is neither plaster nor stabilization on the earth walls

It is also a well-documented fact that earth makes pleasant interior conditions due to its humidity and temperature balancing properties (e.g. in Minke and Lindberg).

In the architecture systems model in Figure 2, we emphasised importation of only information and no importation of material. Earth is one material that can ensure that importation of material is avoided because it is cheaply available everywhere. Furthermore, building with earth requires less transport and energy input than most alternatives. Building with earth is therefore relatively resource efficient.

Given its resource-saving and habitat-enhancing qualities, earth is one building material that can help achieve the dream of *Factor Four*:

‘Factor Four’, in a nutshell, means that resource productivity can – and should – grow fourfold ... Thus we can live twice as well – yet use half as much (von Weizsaeker, xviii)

and that

Doing more with less is not the same as doing less, doing worse or doing without. Efficiency does not mean curtailment, discomfort or privation (von Weizsaeker, xxii).

From a life cycle analysis (LCA) view point, the architecture systems model in Figure 2 is incomplete as it does not address the question: what is done to the waste after obsolescence and demolition of buildings? Most modern materials will create non-biodegradable waste after demolition. But with earth, when the building is finally demolished, it will produce only biodegradable waste; or even better - the demolition waste can directly be looped back into the process to produce new forms and spaces. From a lifecycle analysis point of view, earth supersedes the requirements of cradle-to-grave by making it possible to achieve a cradle-to-cradle cycle.

Dealing with Informal Settlements

The informal settlement solution comes easy after this analysis. Referring to Figure 2, the systems model for an informal settlement needs input of information, manpower,

environmental resources and knowledge. Of these, the only lacking ingredient is knowledge. With infusion of new knowledge, all will be in place to lift the standards of informal settlements. With the right knowledge, it is just a matter of getting workers, ensuring that they have food, getting clothed and have a temporary place to stay. With sticks and earth they will make wonderful homes. If the builders (manual and skilled) are part of a beautiful community network, they can spend all their time transforming the informal settlements into high quality habitats and yet have all their needs (in terms of food, clothing etc) taken care of.

Money the Opium

This paper has deliberately used an economy based on barter exchange of commodities for the sake of building clear arguments. Value is derived by transformation of the environment with labour. Hence real value is environment and labour. However, in the present age, it is inconceivable to have a well-functioning economy without money. As a durable store of value, money transfers value to the future (transfers value in time). It can also bring future value to the present i.e. credit which is a claim of future value on the present. And because it is easy to move, money speeds up the movement of value in space (from place to place).

But its advantages aside, we should never lose sight of the fact that money is just a representation of wealth and that it has no utility in itself.

The danger with the market economy is that it gives pre-eminence to money accumulation. Karl Marx identifies the relation $M - C - M'$ as the basis of the capitalist economy whereby the capitalist with money (M) buys commodities (C) and sells them for money (M') to get a surplus value of $M' - M$. This he contrasts with an economy based on exchange for pure satisfaction of human needs with the relation $C - M - C$ whereby money (M) is only a means of exchange of commodities (C) and no more – the exchange starts with a commodity and ends with a commodity and all parties gain in terms of use-value with neither getting a surplus value (Marx, vol. 1, part 2, ch. 5)

With the relation $M - C - M'$ above comes the danger of accumulating money just for its own sake.

But when we see beyond the money to the real products it represents, the logic of self-sufficiency becomes clear. Count in terms of the commodities you give to get what you need. E.g. in the Beautiful Community Network, so long as he has enough food for his family and sufficient surplus, the farmer is assured that all his other needs of shelter, clothing and education will be adequately met. The bottom line for the farmer is to produce enough to eat and a surplus to exchange for his other needs. So long as he produces enough food to feed his family, the mason, the teacher, the clothier, the metal person, he can get all he needs. Similarly for the clothes man, as long as he produces enough cloth, he's assured of satisfying his food, shelter and metal needs. Money and the resulting exchange activities in a market just come in for convenience. With the relation $C - M - C$, money and the market remain subservient to society. But as Polanyi (1944: 63) explains, the market economy places exchange above society based on the belief that man behaves in such way as to maximize money gains. With this money takes prime place like opium that gives illusory value.

Monopoly

With money becoming the prime mover and hiding the real exchange relations, some people take advantage and start charging more than their worth. The main cause of this is a monopoly situation whereby someone with a monopoly of a resource or knowledge overcharges. Aristotle explains, with a touch of humour, what an ancient wise man, who was laughing stock because of his poverty, did:

... he knew by his skill in the stars while it was yet winter that there would be a great harvest of olives in the coming year; so, having a little money, he gave deposits for the use of all the olive-presses in Chios and Miletus, which he hired at a low price because no one bid against him. When harvest-time came, many were wanted at once and of a sudden, he let them out at any rate which he pleased, and made quantity of money. Thus he showed the world that philosophers can easily be rich if they like, but their ambition is of another sort. ... his device for getting wealth is of universal application, and is nothing but creation of monopoly (in McKeon (ed.), 2001: 1142).

For example, in the Beautiful Community Network, the designer-builder seeing that many require his esoteric skills and knowledge may start demanding far more food than is necessary for his survival in exchange for his services. With this extra food he can get the clothier to make him fancy clothing and the metal guys to make him lots of jewellery. Using his monopoly, he earns enough to support an ostentatious life-style.

The developing world suffers today partly because the developed world, with its monopoly of technological knowledge, overcharges manufactured items which people in the developing world crave to consume. Circumstances which make this monopoly situation obtain can be blamed on both: The people in the developing world who keep demanding in large quantities the manufactured items just because they are fascinated by gadgetry which they cannot manufacture; and the manufacturing countries that overcharge for the manufactured items while underpaying indispensable raw-materials sourced from the South.

It is quite clear that the South can force a change in price reduction by reducing demand (But for some goods e.g. medicines that is impossible, while for others it is also quite difficult to force people to stop consuming ostentatious items due to the international demonstration effect explained below)

International Demonstration Effect

The international demonstration effect makes it difficult for the South to stop consuming ostentatious goods from the North. By exposure through mass media, the tastes of the consumer in the South shifted to commodities that he has no clue of producing – TVs, cars, clothes, - he can't even make a spare part for the cars! The international demonstration effect has got people in the South addicted to manufactured commodities from the North. The result is that the North can charge any price – hence the cause of the balance of payment problems that send countries in the South begging for development aid. Yet, in an ironic twist, even the donated monies flow back to North because most of the so-called aid projects are filled with

the same ostentatious items – 4WD vehicles, complex machines etc and are staffed by foreign expatriates. Thus it is estimated that up to 70% of donated money goes back to the North and so instead of breaking the vicious circles in the beneficiary countries, they fuel the runaway growth in the North.

How much is Enough?

This paper has argued that the South needs to grow economically. The vicious circle must be broken and turned into a virtuous circle to fuel growth. But a virtuous circle begets the tendency for unlimited growth. This paper argues that once the virtuous circle has fuelled growth to a level where it is comfortable for all, it must be stopped and maintained at that level. To maintain the equilibrium requires that negative feedback mechanisms set in to avoid any significant any rise or fall of income. But just what is the level at which growth should stop? How much is enough?

Aristotle long ago tackled this issue and said that a person should acquire just the necessities so that he has a good life as opposed to greed and accumulating wealth or what Karl Marx calls surplus value. But just what necessities are sufficient to give a good life is difficult to determine as they will vary person to person, place to place and over time. Matters are complicated further by the modern-day attitude of trying to satisfy even the non-material needs with material means:

Some people desperately need more food, shelter, and material goods. Some people, in a different kind of desperation, try to use material growth to satisfy other needs, which are very real but nonmaterial – needs for acceptance, self-importance, community, identity (Meadows et al, 2004: 49).

In the contemporary world many people only get satisfaction if they are consuming more than the neighbour. This leads to what the World Bank (2003: 24) referred to as a growth in consumption similar to the arms race – a positive feedback mechanism leading to more and more consumption in a never ending chain. Such unlimited growth of consumption calls for unlimited growth. But unlimited growth is impossible in a finite world. In fact Meadows et al posit that the excessive growth has already led to overshoot of some of the earth's limits:

Much that we wrote in *The Limits to Growth* 30 years ago remains true. But science and society have evolved over the past three decades. All of us have learned much and gained new perspectives. The data and our own experience all tell us that the possible paths into the future have narrowed since we first addressed limits to growth in 1972. levels of affluence we might have provided sustainably to all the globe's people are no longer attainable; ecosystems we might have preserved have been extinguished; resources that might have given wealth to future generations have been consumed (2004: 12-13).

And yet it is pointless to consume more because it will not even lead to increased happiness as even Bernstein, who has written a whole book on how to achieve high economic growth, admits while referring to a graph in his book:

The right side of the graph ... demonstrates almost no relationship between wealth and happiness ... For example, Colombians are happier than Austrians, despite the four-fold difference in per capita GDP (2004: 326).

What then is the point of growth, if more growth does not lead to more happiness?

Concluding

Though it is difficult to determine with absolute certainty how much is enough, we can all recognise a glutton or starving man when we see one. Similarly it is clear that some countries are consuming far more than is necessarily for what Aristotle calls the good life, while others are consuming far less than required for the good life. This paper suggests that for some countries growth ought to be stopped or even retrogressed while for others growth ought to accelerate. This paper concentrates on how to achieve growth in the countries where it is needed. That growth will be through breaking the vicious circle as has been shown by the example of the informal settlement. This paper has argued that what is needed to break the circle is new knowledge (information). What is needed in the South is new knowledge input which also avoids some of the more destructive patterns followed by the North. By implication, that new knowledge must be based on the tenements of sustainable development (social, economic, environmental). In architecture, earth is one material that can lead to vast improvements in habitats in the South while maintaining environmental, economic and social sustainability.

As environmental resources and manpower exist in the South in plenty, the vicious circle in architecture and the entire economy can be broken by infusion of negentropy in the form of

new knowledge. Knowledge dissemination will start with the training of trainers with skills and new knowledge. The trainers will then spread the knowledge over the rest of the country.

At this juncture some may argue that knowledge is already being disseminated in education institutions in the South yet failure continues. To this we will counter that the kind of knowledge being disseminated at present is largely irrelevant as the poverty within such plenty of environmental resources attests. That is why the built habitat remains chaotic. That is why the South remains poor.

What is needed is a new kind of knowledge that will enable the people in the South to convert the resources around them into necessities for the good life. A knowledge that combines know-what and know-how to use brain and brawn to convert the resources around into the products we need.

In architecture school the training of the architects needs to shift from abstract design of pictures of buildings to actual buildings realised using the resources around with minimum importation of material. The architect who qualifies must not just be competent in using his drawing pen and computer to draw but also with building tools, and materials so that he has the competence to convert what is around him into forms and spaces with a high degree of order, aesthetics, durability and social liveability. The ultimate goal of architecture is the making of a materiality of forms with space. That is why Dunin-Woyseth (2000) has classified architecture as one of the *making professions*.

From Vitruvius we discern the kind of knowledge that the architect needs:

The architect's expertise is enhanced by many disciplines and various sorts of specialized knowledge; all the works executed using these other skills are evaluated by his seasoned judgment. This expertise is born both of **practice** and of **reasoning**. **Practice** is the constant repeated exercise of the hands by which the work is brought to completion in whatever medium is required for the proposed design. **Reasoning**, however, is what can demonstrate and explain the proportions of completed works skilfully and systematically.

Thus architects who strove to obtain practical manual skills but lacked an education have never been able to achieve an influence equal to the quality of their exertions; on the other hand, those who placed their trust entirely in theory and in writings seem to have chased after a shadow, not something real. But those who have fully mastered both skills, armed, if you will, in full panoply, those architects have reached their goal more quickly and influentially (Vitruvius: 30 – 20BC, translation by Roland and Howe, 1999: 21).

As architecture does not operate in isolation, the solution must be contextualised as was shown by the Beautiful Community Network. Infusion of well-targeted knowledge in all economic sectors will surely break the vicious circle. And good architecture will be one of the results.

Partly owing to the destruction of culture and traditional knowledge, and partly owing to new demands of modernity, the African is confounded by his present circumstances. Polanyi captures the wretched circumstances, albeit using very unflattering language for the African:

The condition of some native tribes in Africa today carries an unmistakeable resemblance to that of the English laboring classes during the early years of the nineteenth century. The Kaffir of South Africa, a noble savage, than whom none felt socially more secure in his native kraal, has been transformed into a human variety of half-domesticated animal dressed in the 'unrelated, the filthy, the unsightly rags that not the most degenerated white man would wear', a nondescript being, without self-respect or standards, veritable human refuse ... Their crafts have decayed, the political and social conditions of their existence destroyed, they are dying from boredom ... or wasting their lives and substance in dissipation. While their own culture offers them no longer any objectives worthy of effort or sacrifice, racial snobbishness and prejudice bar the way to their adequate participation in the culture of the white intruders (Polanyi, 1944: 157 – 158).

With his cultural base facing annihilation and with his rural village being replaced by a global village, the African experiences a paralysing bewilderment that makes it impossible for him to satisfy his modern-day needs. The solution to this debacle lies in new knowledge - knowledge that will strengthen the cultural roots of the African while enabling him to be a fruitful resident in the global village. The new knowledge required should be a hybridisation of the local and foreign, of tradition and modernity. It should also be based on the tenements of sustainable development so as avoid the destructive economic patterns followed by the North. That knowledge flow will not be one sided as the North could also benefit from the South. For example, global sustainable development can benefit from the answer to this question: what maintained happiness in the pre-colonial African society amidst low levels of materiality?

Knowledge sharing between the North and South can therefore lead to the win-win situation of sustainable development. But will the North and South do what is necessary to share and create the necessary new knowledge? That is the question.

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