



MULTI DIMENSION IMPACT ACCOUNTING (MDIA)

Units of Measure for Impact Accounting

February 2015

Introduction

The dominant unit of measure in society and in economics is money. Money is, however, a very flawed unit of measure in itself, and even worse when the idea that the value of something is going to be accurately measured by using a 'market' as a means of value discovery. So, something else is needed.

An effective measure is one that has a constant size, not matter what the conditions. Many physical measures like, volume and distance are defined by the International Standards Organization (ISO). The ISO does not have a set of measures for the state, progress and performance characteristics that are important for a healthy enviro-socio-economic system.

A set of measures for everything that really matters is set out in the first section.

The dynamic of the enviro-socio-economic system is described in the second section and how the proposed measures will work in this model.

Note that the aim is to have a very small number of key measures that may be aggregated in a logical way to summarize performance, and analyzed in detail with drill down to the relevant element in the functioning of the system. This is analogous to the way cost and analytical accounting works in a corporate setting where money transactions are summarized to prepare financial statements and are analyzed in detail to provide cost and other management information.

Measures for Everything that Really Matters

A Measure for Quality of Life

A measure for elements that go into quality of life will be sQLUs standing for standard quality of life units.

The definition of this is:

A human life = 1 million sQLUs

A Measure for Land Use

A measure for elements that relate to land use will be sLUUs standing for standard land use units

The definition of this is:

A hectare of average land = 1,000 sLUUs

A Measure for Water Use

A measure for elements that relate to water use will be sWUUs standing for standard water use units

The definition of this is:

A kiloliter of fresh water = 1,000 sWUUs

A Measure for Atmospheric Degradation

A measure for elements that relate to atmospheric degradation will be sADUs standing for standard atmospheric degradation units

The definition of this is:

One metric ton of carbon dioxide emissions (CO₂e) = 1000 sADUs

A Measure for Mineral Resource Depletion

A measure for elements that relate to mineral resource depletion will be sMDUs standing for standard mineral depletion units

The definition of this is:

One metric ton of ??????? = 1000 sMDUs

A Measure for Energy Resource Depletion

A measure for elements that relate to energy resource depletion will be sEDUs standing for standard energy depletion units

The definition of this is:

One metric ton of ??????? = 1000 sEDUs

A Measure for Biological Resource Depletion

A measure for elements that relate to biological resource depletion will be sBDUs standing for standard biological depletion units

The definition of this is:

One metric ton of ??????? = 1000 sBDUs

A Measure for Ecosystem Services Depletion

A measure for elements that relate to eco-system services depletion will be sESUs standing for standard ecosystem services depletion units

The definition of this is:

One metric ton of ??????? = 1000 sEDUs

The Dynamics of the Enviro-Socio-Economic System

Elements of This Dynamic

There are three components of the enviro-socio-economic system which are:

- Human Life
- Natural Resources / Nature's Bounty ... Natural Capital
- Man Built Structure and Systems

The process of optimizing the performance of the system should result in these changes:

- Human life ... a better quality of life for people
- Natural Resources / Nature's Bounty ... much reduced degradation and depletion of Natural Capital
- Man Built Structure and Systems ... improving performance that facilitates better quality of life for people and a minimum of degradation of natural capital.

Human Life ... The Value Dynamic of Quality of Life and Living

At any moment in time, a person has a history, a future and a present.

A person's quality of life at any moment in time is 'state', something similar to the balance sheet of a business, and subject to some analytic techniques that are similar to those used for business analysis.

Over a period of time, the 'state' may change brought on by any number of factors including some of the following:

- Changes in health;
- Changes in education, skills, knowledge;
- Changes in access to recreation in all its forms;
- Changes in physical security;
- Changes in financial security;
- Changes in public policy;
- Changes in availability of food;
- Changes in employment;
- Changes in employment opportunities;
- Changes in family; and
- Changes in friends

In a period of time, there are:

- some things that people can do for themselves;
- some things that people can do for others;
- some things that people can buy; and
- some things that are provided by others

In a period of time, there are certain needs that must be met:

- food;
- water;
- shelter;

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- clothes;
- healthcare;
- education;
- recreation; and
- space

Many of these needs are satisfied by PRODUCTS ... that is goods and services that are purchased for use. An important determinant of the performance of the enviro-socio-economic system is the choices that are made in the buy or not to buy decision for products.

This is something that has been recognized for a long time by manufactures of goods and the provider of services, and explains the big role that advertising plays in the modern economy. In general, advertising serves the interests of the advertiser and offers little information that is valuable to the consumer.

Because of the critical role products have in linking the different components of the enviro-socio-economic system together, and the fact that the buy or not to buy decision is so critical, it suggests that easy information access should exist regarding every aspect of the life cycle of products.

In a period of time there are critical constraints. These are:

- A person's time ... in a year there are only ??? hours. About one third of these are required for sleep leaving just two-thirds for everything else. Part of this time must be devoted to satisfying essential needs, usually income from paid work
- A person's money ... many things to satisfy essential needs may be bought, but this requires money. Money may be obtained from income from paid work or may be obtained from existing wealth.
- A person's skills and knowledge ... without skills and knowledge opportunities are limited
- Man Built Structure and Systems ... which enable a person's productivity
- Natural Resources / Nature's Bounty ... upon which everything else depends, and which is finite and probably already stressed beyond its sustainable limits.

All of the elements that go into quality of life and living ... the flows ... may be thought of in terms of accounting debits and credits ... T-accounts.

TO DO THIS SECTION IN DETAIL

Natural Resources / Nature's Bounty ... The Value Dynamic of Natural Capital

The planet has a size that is constant, and the relationship with the sun has not changed over millions of years. On the other hand, in the last 300 years the population of people has increased substantially and there has been a massive increase in the man built structures and systems that people use to improve and sustain their standard of living.

There are many components of natural resources, nature's bounty, natural capital. These may be grouped as follows:

Land Use

A measure for elements that relate to land use will be sLUUs standing for standard land use units. The definition of this is that 1 hectare of average land = 1,000 sLUUs

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The quantity of land

Water Use

A measure for elements that relate to water use will be sWUUs standing for standard water use units. The definition of this is that 1 liter of fresh water = 1 sWUUs

Atmospheric Degradation

A measure for elements that relate to atmospheric degradation will be sADUs standing for standard atmospheric degradation units. The definition of this is that 1 metric ton of carbon dioxide emissions (CO₂e) = 1000 sADUs

Mineral Resource Depletion

A measure for elements that relate to mineral resource depletion will be sMDUs standing for standard mineral depletion units. The definition of this is that 1 One metric ton of ??????? = 1000 sMDUs

Energy Resource Depletion

A measure for elements that relate to energy resource depletion will be sEDUs standing for standard energy depletion units. The definition of this that 1 metric ton of ??????? = 1000 sEDUs

Biological Resource Depletion

A measure for elements that relate to biological resource depletion will be sBDUs standing for standard biological depletion units. The definition of this is that 1 metric ton of ??????? = 1000 sBDUs

Ecosystem Services Depletion

A measure for elements that relate to eco-system services depletion will be sESUs standing for standard ecosystem services depletion units. The definition of this is that 1 metric ton of ??????? = 1000 sEDUs

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The measurement of Quality of Life

Quality of life is measured in standard life units (SLUs). An SLU is defined as follows:

$$\text{A human life} = 1 \text{ million SLUs } (1 \times 10^6)$$

A person's quality of life at any moment in time is 'state', something similar to the balance sheet of a business, and subject to some analytic techniques that are similar to those used for business analysis. A person in a 'good' state has a QoL of 1 million. This can be more where a person's quality of life is better than good, and will be less when the quality of life is less than good.

What is 'good' is very subjective which reflects the reality of life and all its perceptions.

At any moment in time, a person has a history, a future and a present. All of these are elements that go into the measurement of state at any moment in time.

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Over time, the 'state' may change brought on by any number of factors including some of the following:

- Changes in health;
- Changes in education, skills, knowledge;
- Changes in access to recreation in all its forms;
- Changes in physical security;
- Changes in financial security;
- Changes in public policy;
- Changes in availability of food;
- Changes in employment;
- Changes in employment opportunities;
- Changes in family; and
- Changes in friends

In a period of time, there are:

- some things that people can do for themselves;
- some things that people can do for others;
- some things that people can buy; and
- some things that are provided by others

In a period of time, there are certain needs that must be met:

- food;
- water;
- shelter;
- clothes;
- healthcare;
- education;
- recreation; and
- space

Some things are renewable, others are not. Take the example of time. A lifetime is around 80 years, more or less. A year is 8,760 hours, more or less (24 hours a day and 365 days a year).

A standard year might be considered to be 8,500 hours, of which 3,000 is required for sleep (8 hours a day) 3,000 is required for job work (8 hours a day). 1,000 for family duties (3 hours a day) and 1,500 for other activities (recreation, social, leisure, etc.)

A person can allocate time in any number of ways, but in the end there is only so much time that is available in a year's time. The way the time is used has a big impact on a person's quality of life and the quality of life of those that are in the family and the immediate circle of friends and colleagues.

Sleep is essential ... around 8 hours a day, or about 3,000 a year.

The best way to allocate the other 5,500 hours a year depends on many factors. For parents with young families, the job of parenting has a large value that benefits the child or children. Parenting by parents has a value that cannot easily be replicated by non-family child care services. Parenting takes time.

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There are a number of basic necessities ... food, water, shelter, clothes, sanitation, healthcare, education ... which have to be made or bought. This requires wealth or income that can be exchanged for these items. Without wealth, a certain amount of time has to be used to have the income required to buy these goods and services. In an efficient economy it should be possible to pay for these basic needs by working no more than 20 hours a week (1,000 hours a year)

Working for more hours and for more pay enables the purchase of wants rather than needs. A 'good life' may be chosen when the basics are paid for. A good life may take many forms including the use of money for 'good works' of various sorts, or the use of spare time to volunteer to help others in the community.

When a person has to work for 10 hours a day or more, 6 or 7 hours a day, (3,000 hours a year or more) in order to buy basic necessities, this reflects an inefficient economy. There is no money to buy goods and services for the 'good life' and no time for it anyway.

TOTAL	24	365	8760	
Sleep	8	365	2920	3000
Job work	8	365	2920	3000
Family duties	3	365	1095	1000
Recreation / Social / Leisure	5	365	1825	1500
	24			8500
	24	354	8496	
Sleep	8	354	2832	3000
Job work	8	354	2832	3000
Family duties	3	354	1062	1000
Recreation / Social / Leisure	5	354	1770	1500
	24			8500

Sleep
 Job work
 Family duties
 Recreation / Social / Leisure

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The surface area of the Earth is 510 million square kilometers or 5.1×10^8 km².

There are 100 hectares per square kilometer

The Earth is a water heavy planet, so, if you break its surface area into water and land segments, it would look like this:

land 149 million km²

water 361 million km².

land 149 million km² is equivalent to 15×10 to the power 11 hectares

$(150 \times 10$ to the power 6) $\times (1 \times 10$ to the power 2)

→ 150×10 to the power 8

→ 15×10 to the power 9

If there are 7.5 billion people populating the earth (7.5×10 to the power 9) then the average land per person is 2 hectares

However not all land is habitable:

33% is desert

24% is mountainous

leaving only 43% habitable

Which translates into 0.86 hectares habitable land per capita.

The Global Footprint Network (GFN) uses a Global Hectare as the unit of measure for issues that affect the earth's ecosystem ... on average about 1 hectare of habitable land is supporting 1 person.

The issues here is that not all land is not equal and all people are not the same.

Some land is contributing significantly to the functioning of the enviro-socio-economic system, other land less so. The measures of land value reflect activities that result in money wealth creation while measures of the activities that are vital to the performance of the ecosystem are ignored.

Some people are consuming resources at a rate that exceeds the carrying capacity of the planet, while others are consuming less. If everyone was to consume at the rates of the rich, the ecosystem would be destroyed in a few decades.

My footprint as calculated by the Global Footprint Network is 6 planets ... meaning that my relatively modest lifestyle by American standards requires 6 planets to sustain it.

I like the idea that GFN has put together a methodology to relate economic activity and lifestyle to the carrying capacity of the planet

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There is enough natural ecosystem capacity to provide the basic needs for a world population of 7.5 billion but there are not enough of these resources to provide for the high consumption life style that has become the hallmark of modern western life, and increasingly of the emerging global middle class.

Health

Genetics

Preventative healthcare

Vaccination

Exercise

Food

Sugar

Fats

Water

Micro-nutrients

Micro-toxins

If a person has good health ... quality of life is not compromised.

When a person's health deteriorates, quality of life deteriorates as well.

Health

Genetics

Preventative healthcare

Vaccination

Exercise

Nutrition

Big pharma

Medical professionals

Public health

Infectious diseases

Environmental health

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Universities

Pharmaceutical research

Government

FDA

NIH

CDC

Costs

Prices

Medical equipment

Medical information

When a person has inadequate income, quality of life deteriorates.

Inadequate income may be offset by the conversion of wealth into income.

Quality of life deteriorates in part because of the inability to buy what is needed, but is also impacted by the worry associated with the lack of money.

When a person has no friends, quality of life deteriorates.

When a person has no family, quality of life deteriorates.

When a person has a job, quality of life improves.

A job gives a person an income, and an income makes it possible to buy things that are needed.

A job gives a person a purpose and some structure that improves quality of life. A job gives a person something to grumble about ... and in the process relieves stress.

A job gives a person access to colleagues and a circle of friends that improve quality of life

Working at a job gives the employer access to your skill set so that the employer's work can get done.

When a person volunteers, quality of life improves

Volunteering gives a person access to other people who can become colleagues and friends

Volunteering gives a person the satisfaction of doing something good for others

Volunteering does something positive for the society in which one lives

The role of food in quality of life

In many cultures food and eating are an important part of the culture.

Food is required to stay alive, but food can also be a significant contributor to quality of life over and beyond the role of food as a source of energy.

The choice of food makes a big difference to health and therefore quality of life.

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TO DO THIS SECTION IN DETAIL

The Value Dynamic of Man Built Structure and Systems

The modern enviro-socio-economic system is based on a complex of man built structures and systems

There is the question of ownership

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There is the question of benefits arising

There is the question of impact of the operation of these entities on Natural Capital

FC – Financial Capital

PC – Physical Capital

KC – Knowledge Capital

IC – Institutional Capital

SC – Social Capital

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- clothes;
- healthcare;
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TO DO THIS SECTION IN DETAIL

The Dynamic of

rather than the business having the financial capital.

The retained surplus is net of the business revenue and the total of all the costs.

I have observed as early as the 1980s that the biggest 'cost' in modern business, was the profit. I said this because even though productivity was increasing and

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*manufacturing costs were declining, the prices to consumers were increasing.
This was because all of the benefit of productivity was translating into profit more
than being used to reduce prices to customers.*

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