MULTI DIMENSION IMPACT ACCOUNTING (MDIA)

Metrics about Product … Life Cycle Impact

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About product … product accountability

Product is used throughout to be both goods and services. The performance of society and the economy depends very much on the whole of the value chain for all the goods and services … product … that flow through economic activities.

The supply chain

Every product, all goods and services, used by an economic activity have a supply chain, and in the course of this supply chain there is either value destruction or value add. There are very limited data about this, and getting the needed data is not easy. However, it is a step forward to identify this area of missing data.

To buy or not to buy

It is 'product' that is at central to the decision to buy or not to buy. This is recognized in the corporate world as being of critical importance. The corporate world makes a substantial commitment of its financial resources to underwrite advertising and brand PR, because of a well justified belief that this drives customers to buy.

Impact of using the product

When a product is used, there are impacts on people and planet that might be either good or bad, or a combination of both.

An item like an automobile is good insofar as it provides convenient transportation which is a positive for quality of life for people, but it is also bad as it uses energy which is depleting the resources of the planet. The burning of petroleum also produces pollutants that enter the atmosphere and contribute to degradation of the environment. Both the good and the bad need to be taken into account. The same logic applies to almost any item that is used.

The post use waste cycle

When a product is no longer being used, it becomes part of a post use waste cycle. The post use waste cycle may be scrapping the product and dumping it into a land fill, or otherwise letting the product degrade the environment. Some products are worse than others in the damage that they do to the environment in the post use waste cycle,

Aggregation for product through the life cycle

The purpose of aggregating for a product is to influence the buy or not to buy decision. This is the time when a buyer's behavior is going to have the biggest impact on the performance of the economy

The money profit aggregation into product is well known by the organizations involved. This is the profit and loss of the supply chain, with optimization so that profit is maximized and the investment minimized.

Over the past 30 years technology has made logistics a very efficient part of the global economy, and this has made long supply chains possible in ways that were not possible a generation ago. But it has all been about profit and nothing about impact on people and planet.

However, the aggregation of impact on people and planet across the product life cycle is potentially a game changer. Ordinary people make buy or not to buy decisions based on price and perception of value. This conversation is dominated by business advertising and brand PR without much information about impact on people and planet along the supply chain and during use and in the post use waste chain.

Product … Value Chain and Impact

Product

A product is the aggregation or summation of all the economic activities that have gone into the creation of the product. A product may become an input for an economic activity. A product's life cycle includes: (1) the supply chain; (2) its use; and, (3) its post use waste chain.

In a buy/sell transaction involving a product the price for the seller becomes the cost to the buyer. The price/cost is made up of various elements as shown in the tabulations later, and include a component of profit arising at each stage of the product's value chain.

Products … that is both goods and services … are the vehicle which delivers quality of life to people, to everyone. Quality of life and standard of living are very much connected to access and availability of products, of goods and services.

In money profit accounting, only a very small amount of information is used to connect profit performance of the organization with the revenue and cost behavior of products. When business impact on people and planet is analyzed in the corporate environment it is apparent that the impact of product is way broader and more important than the impact of any single organization in the supply chain.

The MDIA framework provides a rigorous construct for value chain and impact of product in society and the economy.

Conventional money profit accounting value chain analysis shows how a product moves from process to process adding cost all the time. In this accounting, each step also has a profit component that gets added in and becomes part of the product cost and price. The following are the money accounting elements:

- Cost brought forward;
- Additional materials;
- Materials;
- Energy;
- Labor;
- Use of machinery and equipment;
- Other expenses;
- Financial expenses;
- Knowledge expenses;
- Taxation;
- Pro-good expenditures;
- Profit; and
- Price/cost carried forward.

In the MDIA framework, there are not only the money accounting elements but also the value impact elements.

Labor: The labor dimension has both a cost dimension and a value dimension. While the labor payroll is a cost for the organization, the labor payroll is also a value to the employee, the employee's family and to the community where they live and spend their money.

Materials: The materials dimension is an aggregation of everything that has gone on before for all of the materials. Each material item has its own value chain with a complete set of trucost elements.

Energy: The energy dimension is similar to materials, with the supply chain for the energy having all of the trucost elements

Natural environment - Resource Depletion: The natural environment is effected by the depletion of natural resources. All products in the course of production, use and post use waste chain will usually impact resource depletion, though this may be significantly mitigated.

Natural environment – Environmental Degradation: The natural environment is effected by the degradation of the environment. All products in the course of production, use and post use waste chain have impact on environmental degradation.

Built environment: The built environment contributes to the processes that are used to manufacture goods and deliver services. All products in the course of production make use of the built environment and contribute to its deterioration.

Enabling environment: The enabling environment includes the effectiveness of government which is facilitated to some extent by the taxation that is levied during the product life cycle value chain.

Knowledge environment: In some cases there may be costs and value flows associated with knowledge.

In addition to the trucost of a product, there is also the truvalue of a product. The truvalue of a product is the value that an individual, family or other consumer gets from buying and using the product.

These are some examples:

- It may be possible to produce a life saving drug for just 10 cents a pill. Though the cost and price may be quite modest, the truvalue of the drug is closely connected to the value of life.
- The cost of the shoes may be quite modest (say $50) but they are high fashion and the price is much higher (say $500). If they are the only shoes a person is going to have, the value is going to be one thing (say$200) while if these shoes are going to be just another pair in a collection of 500 pairs of shoes, the value will be something else (say $20).

Product … Value Chain and Impact

Impact on people and their quality of life is related in some way to the access and use of product. Product is also a link between all the various economic activities of the supply chain, and the places where such economic activities are located.

Product life cycle

Every product has a unique life cycle which may be represented in a value chain analysis format. The life cycle value chain has three sections: (1) the supply chain; (2) use; and (3) the post use waste chain.

The product and the economic activity interact along all the life cycle value chain.

Conventional money profit accounting

It is possible to present the supply chain in a form along the following lines. In this there are a series of steps where the product passes through an economic activity and some additional costs are incurred while the cost/price of the product also augments. What is the price at the of one step becomes the cost at the beginning of the next step.

Supply Chain for Product

	Step 1	Cum	Step 2	Cum	Step 3	Cum
PRICE/COST beginning		111		222		333
made up as follows:						
Purchase price beginning			111		222	
Material	mm	MM	mm	MM	mm	MM
Energy	ee	EE	ee	EE	ee	EE
Labor (payroll)	pp	LL	pp	LL	pp	LL
Cost of process plant and equipment	aa	AA	aa	AA	aa	AA
Overhead	oo	OO	oo	OO	oo	OO
Financial	ff	FF	ff	FF	ff	FF
Taxation	tt	TT	tt	TT	tt	TT
Pro good expenses	gg	GG	gg	GG	gg	GG
Profit – surplus	ss	SS	ss	SS	ss	SS
TOTAL	sc1	SC1	sc2	SC2	sc3	SC3
PRICE/COST end	111	111	222	222	333	333

Note that there is a profit or surplus arising at each step. What this means is that 'profit' becomes integrated into the cost of the product during the supply chain.

In this analysis there are accounts for all the expenses elements. The purchase of product from the prior step, other materials needed, energy, and labor. There is a cost associated with using process planet and equipment, and then there is overhead, financial costs, taxation and pro-good expenses. These are all separated out because they all have different impact behaviors.

Price and profit

Price and Profit in the Supply Chain

	Step 1	Cum	Step 2	Cum	Step 3	Cum
PRICE/COST beginning		111		222		333
made up as follows:						
Purchase price beginning			111		222	
Material	mm	MM	mm	MM	mm	MM
Energy	ee	EE	ee	EE	ee	EE
Labor (payroll)	pp	LL	pp	LL	pp	LL
Cost of process plant and equipment	aa	AA	aa	AA	aa	AA
Overhead	oo	OO	oo	OO	oo	OO
Financial	ff	FF	ff	FF	ff	FF
Taxation	tt	TT	tt	TT	tt	TT
Pro good expenses	gg	GG	gg	GG	gg	GG

Profit – surplus	ss	SS	ss	SS	ss	SS
TOTAL	sc1	SC1	sc2	SC2	sc3	SC3
PRICE/COST end	111	111	222	222	333	333

Material, Energy and Other

Material A,B, Energy X,Y, Other P,Q, for each step

	Material A	Material B	Energy A	Energy B	Other P	Other Q	Sub Total		
PRICE/COST beginning									
made up as follows:									
Purchase price beginning									
Material	mm	mm	mm	mm	mm	mm			
Energy	ee	ee	ee	ee	ee	ee			
Labor (payroll)	pp	pp	pp	pp	pp	pp			
Cost of process plant and equipment	aa	aa	aa	aa	aa	aa			
Overhead	oo	oo	oo	oo	oo	oo			
Financial	ff	ff	ff	ff	ff	ff			
Taxation	tt	tt	tt	tt	tt	tt			
Pro good expenses	gg	gg	gg	gg	gg	gg			
Profit – surplus	ss	ss	ss	ss	ss	ss			
TOTAL	sc1	sc1	sc2	sc1	sc3	sc1			
PRICE/COST end	111	111	222	111	333	111			
PEOPLE IMPACT									
RESOURCE DEPLETION									
ENVIRONMENTAL DEGRADATION									
BUILT ENVIRONMENT									
ENABLING ENVIRONMENT									
KNOWLEDGE									

People Impact

People Impact through the Value Chain

	Step 1	Cum	Step 2	Cum	Step 3	Cum
People impact			+PP1		+PP2	
… on employee	+ppe	+PPE	+ppe	+PPE	+ppe	+PPE
… on family	+ppf	+PPF	+ppf	+PPF	+ppf	+PPF
… on community	+ppc	+PPC	+ppc	+PPC	+ppc	+PPC
TOTAL	+pp1	+PP1	+pp2	+PP2	+pp3	+PP3
People impact			+PP1		+PP2	
… on employee	+ppe	+PPE	+ppe	+PPE	+ppe	+PPE
… on family	+ppf	+PPF	+ppf	+PPF	+ppf	+PPF
… on community	+ppc	+PPC	+ppc	+PPC	+ppc	+PPC
TOTAL	+pp1	+PP1	+pp2	+PP2	+pp3	+PP3
People impact			+PP1		+PP2	
… on employee	+ppe	+PPE	+ppe	+PPE	+ppe	+PPE
… on family	+ppf	+PPF	+ppf	+PPF	+ppf	+PPF
… on community	+ppc	+PPC	+ppc	+PPC	+ppc	+PPC
TOTAL	+pp1	+PP1	+pp2	+PP2	+pp3	+PP3
And						

Resource depletion

Resource Depletion through the Value Chain

Resource depletion			RD1		RD2	
Minerals depletion	rmd	RMD	rmd	RMD	rmd	RMD
Energy depletion	red	RED	red	RED	red	RED
Resource use (water)	ruw	RUW	ruw	RUW	ruw	RUW
Resource use (land)	rul	RUL	rul	RUL	rul	RUL
TOTAL	rdl	RD1	rd2	RD2	rd3	RD3

Environmental degradation

Environmental Degradation through the Value Chain

Environment degradation			ED1		ED2	
Solid waste	esw	ESW	esw	ESW	esw	ESW
Freshwater pollution	efw	EFW	efw	EFW	efw	EFW

Ocean pollution	eow	EOW	eow	EOW	eow	EOW
Air pollution (GHG)	eag	EAG	eag	EAG	eag	EAG
Air pollution (N2O)	ean	EAN	ean	EAN	ean	EAN
Food chain pollution	efc	EFC	efc	EFC	efc	EFC
Biodiversity loss	ebd	EBD	ebd	EBD	ebd	EBD
TOTAL	ed1	ED1	ed2	ED2	ed3	ED3

Built environment

Enabling environment

Knowledge

To buy or not to buy, that is the question?

The 'to buy or not to buy' decision is based on the price for the product and the underlying trucost of the supply chain, the trucost of use and the trucost of the post use waste chain.

Use has a trucost, but use also has a truvalue that must be quantified.

The decision to buy or not to buy should be based on the surplus of truvalue over the aggregate of trucost. This information must be available easily when the buy or not to buy decision is being made.

Life cycle analysis for a product

Value Analysis for a Product

	Supply chain	Use	Post use waste chain	TOTAL
PRICE				PPP
Purpose of the product ... value quantified				
Value Surplus				
Trucost of Product				
Material	mm	mm	mm	MM
Energy	ee	ee	ee	EE
Labor (payroll)	pp	pp	pp	LL
Assets employed	aa	aa	aa	AA
Overhead	oo	oo	oo	OO
Financial	ff	ff	ff	FF
Taxation	tt	tt	tt	TT
Pro good expenses	gg	gg	gg	GG
Profit – surplus	ss	ss	ss	SS
TOTAL	sc1	sc1	sc2	SC2
Transfer price	111	111	222	222
And				
People impact			+PP1	
… on employee	+ppe	+ppe	+ppe	+PPE
… on family	+ppf	+ppf	+ppf	+PPF
… on community	+ppc	+ppc	+ppc	+PPC
TOTAL	+pp1	+pp1	+pp2	+PP2
And				
Resource depletion			RD1	
Minerals depletion	rmd	rmd	rmd	RMD
Energy depletion	red	red	red	RED

Resource use (water)	ruw	ruw	ruw	RUW
Resource use (land)	rul	rul	rul	RUL
TOTAL	rdl	rdl	rd2	RD2
And				
Environment degradation			ED1	
Solid waste	esw	esw	esw	ESW
Freshwater pollution	efw	efw	efw	EFW
Ocean pollution	eow	eow	eow	EOW
Air pollution (GHG)	eag	eag	eag	EAG
Air pollution (N2O)	ean	ean	ean	EAN
Food chain pollution	efc	efc	efc	EFC
Biodiversity loss	ebd	ebd	ebd	EBD
TOTAL	ed1	ed1	ed2	ED2
Built environment				
Enabling environment				
Community (Place)				
Government				

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