

Mutually Compatible, Yet Different:

A Theoretical Framework for Reconciling Different Impact Monetization Methodologies and Frameworks

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I. INTRODUCTION

In a world of finite resources, choices and tradeoffs are a constant feature of economic and social life; we decide in which projects or organizations to invest, how to focus time and expertise, and which products we purchase. Whether conscious or not, we are constantly making choices using a variety of data-points and sources that indicate value, including the price relative to some benchmark of fair value, the costs of not acting, and our own values and preferences. The latter type can be referred to as implicit valuation when a decision is made based on some heuristic that may not be well documented or even conscious.

Implicit valuation is especially common in any resource allocation decision relating to social and environmental impacts in which valuation and the comparison of different impacts and dependencies usually happens based on beliefs and values of the decision makers.² However, using implicit valuation methods can result in a misalignment with those experiencing the impacts as well as substantial underestimation of the magnitude of the impacts. Indeed, there is a fundamental power imbalance between those who own and control resources and make resource allocation decisions and those who most prominently experience the social and environmental impacts of these decisions. We assert that making valuations transparent and informed by those experiencing impacts will be more inclusive and lead to decisions that are more likely to increase positive net impact.

Numerous efforts are underway to make these implicit valuations more transparent and informed by an understanding of the impacts and of the relative preferences for them by those experiencing the impact. In our view, making these valuations transparent requires a common measure; otherwise it is extremely difficult for those outside the subject-matter specialties that describe the impact (i.e. non-experts), a condition that is required for mainstreaming of a more fair, sustainable, and inclusive economy, to assess the decisions being made. One approach is to use monetary value, often called impact monetization. This converts impacts from the terms and measures of the various academic, practice and scientific disciplines, such as environmental science, human capital management, or public policy, into a common measure. The focus of this paper is to propose a theoretical explanation for how the underlying

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² For clarification, here we are referring to the value gained or extracted/lost by those people or the environment experiencing the impact. Any impact valuation should begin with a determination of who/what experiences the impact. The idea of double materiality recognizes that some but not all of these may be material to the organization or its investors.

monetization values from the various efforts and approaches that are being developed can differ and yet still be theoretically sound and co-exist.

In addition to our starting position that transparent and stakeholder-informed valuations help to rectify power imbalances that underpin many of the challenges facing the world today and lead to increased positive net impact, this paper also starts from the assumption that these valuations should relate to all those impacts that matter to those affected (i.e. they are complete) and consistently accounted for. This paper is not intended to explore the ethics or methodology of impact monetization. The Capitals Coalition, Social Value International (Capital Coalition 2016, Social Value International 2019) and others have explored the challenges to these methods in relation to decision making. Neither does it explore approaches to impact measurement more widely.

To explore the heterogeneity of approaches to monetized impact valuation, we will compare and contrast the approach used in the Impact-Weighted Accounts Initiative (IWAI) with the approach used by Social Value International (SVI). At its simplest, IWAI uses secondary market data as the basis for valuations predominantly using market-wide cost-based, market price, revealed preference, and/or stated preferences techniques (hereafter referred to as preferences for conciseness)³ and in SVI's valuation standard valuation is informed by stakeholder preferences,⁴ which are converted to monetary valuations.⁵ The goal of both is to maximize either the health, welfare, needs, preferences as relevant for stakeholders. For simplicity, we have characterized these as top-down starting with global level secondary data and bottom-up approaches starting with localized primary data. Our conclusions are that these approaches

- are not an either or, are complementary and both would be necessary in an ecosystem designed to increase positive net impact,
- to some extent top down is more relevant to investors and bottom up is more relevant to enterprises, though this does not override the first point, and
- can leverage the concept of bounded flexibility for valuations to allow for context specific differences while avoiding egregious under- or over-estimation. For example, based on what is known about the risk of global warming, a carbon cost of \$0 would be unacceptable regardless of current policy

If this approach is seen as useful it could be expanded to incorporate other related approaches such as the Capitals Coalition and VBA.

II. SETTING THE STAGE

We will use the term bounded flexibility, or “choice within limits,” put forth by Dr. Kate Ruff, to describe a range of acceptable impact monetization values based on the specific use cases and values of

³ Revealed preferences here is used to include all accepted price discovery methods including damage cost and restoration costs, not just imputed and stated preference techniques; as has been explored by the Capitals Coalition in some cases, cost based methods can represent preferences.

⁴ Stakeholder preferences can be identified using a wide range of valuation approaches including stated and revealed preference. We also include under the term preferences, damage costs, such as losses to human health or restoration costs, such as costs to restore or replace ecosystems).

⁵ This is a simplification of the approaches. Stakeholder specific approaches need to address a number of challenges in summarizing group values, inter-group comparison and determining the group

the relevant stakeholders. The concept of bounded flexibility (Ruff 2013) provides a middle ground that is both pragmatic in its acknowledgement that there is no single value for each impact that will stand across time, stakeholders, cultural and geographic contexts (and more). Moreover, bounded flexibility places consensus-based boundaries on the limits of the expected deviation in an impact valuation within a framework. This maintains a level of comparability whilst allowing for context.

Our argument is that differences in choice of valuation approach and precise valuation can be understood in context of both the resource allocation decisions that are expected to be made and the number of possible options that are then available. The valuation approach taken should reflect the preference rankings of those affected and should manage the risk that these are incorrect either within or between options under consideration, both of which would result in suboptimal decisions. Put more simply, it is important for the decision makers to evaluate, within the constraints they are given and taking the viewpoint of maximizing stakeholder preference, would they make a different decision given more granular or different information. We acknowledge that reflecting personal let alone group preferences is well documented in its difficulty (Arrow 1951). The aim of this paper is not to provide an absolute solution to these issues, but to focus, as described above, on relative transparency and comparability and reducing risk in order to improve the outcomes of decisions. We also acknowledge that preferences can be dynamic in nature and may require adjustment. For example, a critical potential adjustment that has been raised is the need to escalate valuations as societal and ecological tolerance thresholds are neared and breached. Although this paper does not cover wider impact measurement issues including adjustments, this issue is important and Annex A explores the implications for valuation and is consistent with the main arguments in this paper. The risk that decision makers are not aware of the limitations of their chosen approach and simply replace their personal and unstated preferences with preferences derived using other techniques without understanding the potential limitations of those techniques does need to be recognized and addressed.

Those who would criticize this note as trying to achieve consensus by endorsing the lowest common denominator between existing efforts, ignore other areas of commonly accepted practice in which multiple approaches co-exist. Traditional finance and investment management are full of different measurement methodologies based on the decision being made or the views of the managers as to the important components. A very simple example are the four accepted ways of accounting for inventory cost: specific identification, first-in, first-out (FIFO), last-in, first-out (LIFO) and weighted-average.⁶ Numerous considerations go into selecting an inventory cost method, including matching the actual flow of goods through a business, as FIFO would for a grocery-store, projecting the replacement cost of sales in the cost of goods sold, as LIFO may in a rising cost environment. These methods co-exist in our current accounting methodology based on context. So too with impact valuation.

III. DIVING DEEPER

Any valuation method should start by considering the decision at hand: the level of assurance decision makers require, the activities being analyzed and those who will be affected. Decisions require assurance that the analysis is complete, that the valuations reflect preferences and that any subsequent adjustments to those preferences are relevant, so as to assure that decision makers are not adjusting the

⁶ While many jurisdictions do not allow LIFO, it still exists in several large markets.

numbers to get the result they want. The level of assurance required for a given decision depends on a number of factors including:

- the scale of the decision in relation to the organization's resources;
- the time available to make the decision;
- the expected variation between values;
- the consequences of getting it wrong, both for the organization and its stakeholders; and
- the cost of reversing a decision.

Some of these issues are considered below. For simplicity, we will first compare and contrast two broad approaches to valuation so that readers understand the primary differences. However, it should be noted that this structuring should not be viewed as biasing toward one approach or the other nor should these approaches be viewed as substitutes. They are complementary approaches and should be used in tandem as explored below.

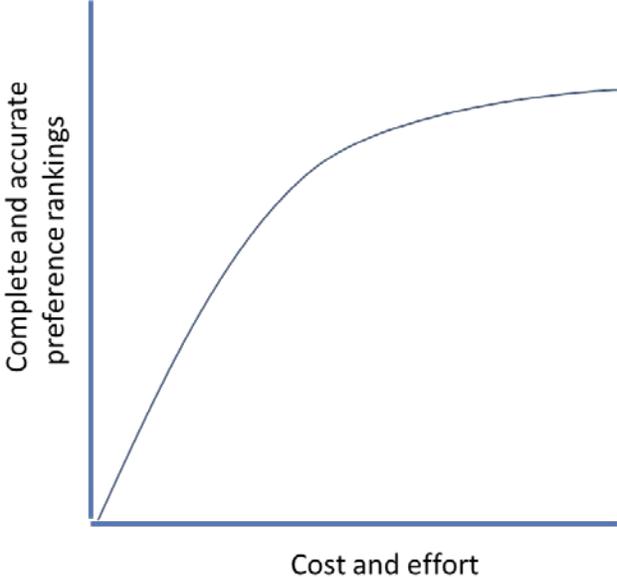
III.A THE SCALE OF THE DECISION IN RELATION TO THE ORGANIZATION'S RESOURCES

Micro-economics suggests that there are generally diminishing marginal returns to effort. We propose that this is the same for valuation as demonstrated in Figure 1. In a world of scarce resources and where almost all externalities are still not required to be internalized by shareholders or regulators, it is critical that sustainability and impact advocates do not place too high a precision and accuracy burden on organizations that want to start incorporating impact into their decision making processes. The risk is that this burden will increase organizational inertia, causing them to sit on the impact sidelines and reducing the community of organizations voluntarily pursuing impact management and measurement. Further, it could galvanize the community actively lobbying against impact regulation and legislation. In the words of John Maynard Keynes, "It is better to be vaguely right than precisely wrong" to which we would add, so long as you understand the implications of the assumptions implicit for your decisions. The trick is to ensure that the approach taken balances cost and risk with completeness and accuracy and has enough precision and accuracy for the decision being made.

Monetization approaches operate in a continuum between top-down and bottom-up. In top-down approaches, analysis often focuses at the organization or organizational-unit levels using secondary data to identify the expected outcomes and to determine proxies for the relative importance of those outcomes. The top-down approach uses organization level data and global or country level monetization pricing values, with some adjustments to account for regional differences, such as water scarcity, living wage, and social supports. According to the Natural and Social Capital Protocols as well as the ISO 14008 Standards, there are numerous accepted price discovery methodologies including damage costs, revealed preferences, and stated preferences. Top-down approaches often rely on a technique called value transfer, in which values from one context, for example damage costs in OECD countries, are applied to a different context, with necessary adjustments to account for contextual differences. In bottom-up approaches, the analysis focuses at the project or decision-unit level with outcomes and the relative importance of those outcomes determined by those affected. Both approaches can be appropriate, depending on the decision that is being made and the need for granularity. In subsequent sections we will

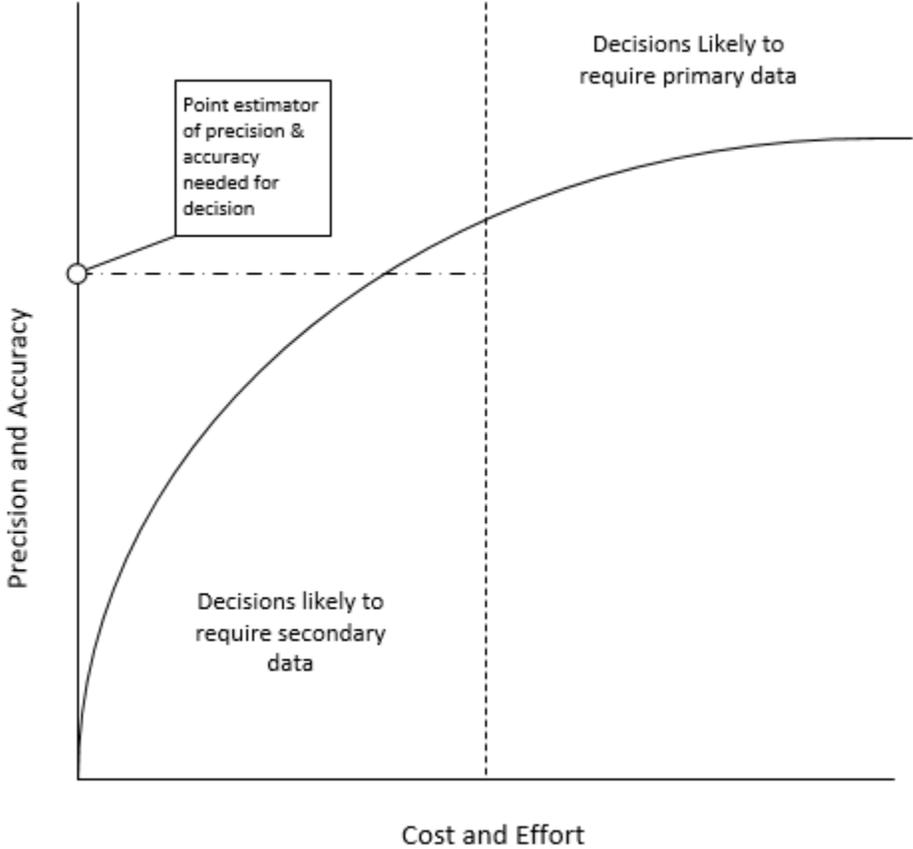
propose some rough rules that will help to provide clarity on which approach to use, based on the required level of precision, completeness and accuracy vs cost and effort.

Figure 1. Diminishing returns to effort in impact monetization.



Secondary data will be in a range between localized and context specific on the one hand, and global averages on the other. This paper focuses on a comparison between global averages taken from secondary research and localized valuation estimates obtained via primary research with stakeholders. Over time, as more decisions are informed by valuations and these are shared, there will be more examples of secondary localized valuations. Within the constraints explored here, this will reduce the need for primary data. Figure 2 expands Figure 1 this to show a relationship between secondary and primary data.

Figure 2. Framework for contextualizing primary and secondary data within cost and precision needs



III.B TIME AVAILABLE

For organizations trying to decide to invest or divest in another or trying to evaluate their global impact, the organizational complexity, supply chain effects, data challenges, and massive number of products and populations in today’s multinational organizations makes a bottom-up approach currently impractical unless and until there are more context specific valuations available. Furthermore, a bottom-up approach might be counter-productive; organizational inertia is a real challenge and a decision that is delayed for a year or more while awaiting a bottom-up analysis might end up perpetuating an investment or capital allocation that is mis-aligned with values and impact priorities when a week’s worth of top-down analysis could have come to the same conclusion. Freiberg et al, 2020 used a top-down methodology to show that on average organizational environmental impacts for stakeholders outside the organization, such as investors, across the categories essential for sustenance of human health and well-being, represent 2% of revenue at the median with a mean of 11.6% of revenue, furthermore, about 30%

of variation detected is due to organization specific effects.⁷ For example, Freiberg *et al* calculated the environmental impacts as a percentage of revenues for the airline industry at a median of 26.7%, with companies at the first and third quartiles at 18.0% and 31.7% respectively. This shows that for most organizations, some impacts are very large, and thus likely to overwhelm other specific impacts at a population or community level. Although a top down approach may then exclude some material impacts and use secondary and more global averaged values for those impact included, this approach would still account for organizational differences and inform investor decisions. This has significant implications for investors seeking to understand or mitigate environmental impact across their portfolio or in evaluating the difference between companies. While potentially not as precise or comprehensive as a bottom-up approach, for investors seeking to move quickly in a dynamic market, the research documented an improvement in quantifying actual environmental performance over ESG ratings from three popular providers.

Assumptions are still required to proceed with this approach, including, but not limited to, which impacts across products, services, and activities are material to measure and the ranking of relative importance of those impacts. It is certainly not necessary to measure every impact down to the precise population or community level for all decisions. However, deciding what matters requires a decision of what matters to whom and for what purpose; reference to work on industry specific materiality guidelines can be helpful in this effort. It should be noted, that herein, materiality should be determined in relation to those experiencing impacts as opposed to the alternative definition of impacts that are financially material to the organization or investors. This is important as some impacts may not rise to the level of financial importance to the organization or investors creating the impact given the relatively short-time horizon for such determinations or protracted delays in policy and regulation enforcement, among other reasons, however, if our goal is to maximize positive net impact, a stakeholder centric view is the fastest means to do so.

It is critical that users of the valuation understand and communicate these assumptions, especially if the judgement of what matters has been restricted, for example by the use of industry specific guidelines on stakeholder materiality. If so, there is a risk that impacts will be excluded that would have been included in a bottom-up approach. This is not to entirely invalidate these potentially excluded impacts but rather to emphasize that the importance of context. If an investor's decision is to invest in a global company or not, and if the high level impacts are so large that they overwhelm community specific impacts, then the risk of excluding these may be low in the context of the decision. There are certain wrongs that are categorically bad, such emitting toxic cancer causing waste into groundwater sources, and thus are grounds for unqualified exclusion regardless of the magnitude of other impacts.⁸ And yet even drawing such lines has challenges; as air quality in industrialized countries has declined, governments and communities have knowingly allowed levels of air pollution that have shortened lives. Either this has

⁷ These categories are Human Health (Working Capacity), Crop Production Capacity, Meat Production Capacity, Fish Production Capacity, Wood Production Capacity, Drinking Water & Irrigation Water (Water Production Capacity), Abiotic Resources, and Biodiversity

⁸ This assumption itself can prove challenging. Valuation is one of many tools in evaluating impact, and corroboration with other sources, such as pending litigation, department of labor reports, and interviews with industry experts is required. This is no different from due diligence in existing financial markets in which an educated buyer will use multiple sources to supplement financial models and risk projections.

not been included and not considered material or has been included but not considered sufficiently valuable to effect decisions. Impact valuation in the top-down approach alone may presume that organizations have already rid themselves of these egregious wrongs. However, this is where both approaches can be complementary.

III.C VARIATION BETWEEN VALUES

A top-down approach does not provide the level of granularity required for decisions that may be affecting very specific geographies, populations, resources or decisions where the variation in impact valuations between the options are much smaller and therefore a higher level of precision is needed. For example, an organization may be considering changing its manufacturing processes or packaging from traditional plastics to bioplastics. Amongst other impacts, it needs to weigh the benefits of using renewable sources vs hydrocarbons against the downsides of the higher water use required to produce bioplastics. As shown in the example at the end of the paper, depending on the water scarcity and cost of water delivery in a specific watershed, more precise information may be needed to properly value the water use. An additional example is that of an organization weighing community reinvestment would want to incorporate the specific preferences of the community into its impact projections and bounded flexibility would provide preferences for the minimum and maximum values that could be placed on some impacts based on scientific or academic study. Effectively, top down is more appropriate for investors seeking to make a decision to invest or not and bottom up is more appropriate for businesses seeking to balance context-specific decisions.

Table 1 proposes a relationship between types of decision within a business and the valuation approaches. For inter-business and some strategic decisions where the risk of the value of missing impacts and the variation between impacts is low a top-down approach can be taken. This is not intended to be prescriptive as both approaches can still be useful to all users and decisions, rather this shows a bias in potential usefulness.

Table 1. Types of decisions and approach - allowing for cost and risk

	Top-down	Bottom-up
Inter-business (for investors and analysts)	*	
Intra-business strategy (for managers comparing with other businesses)	*	*
Intra-business – products and services		*

Intra-business – operations		*
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III.D CONSEQUENCES OF GETTING IT WRONG

Inevitably there is a risk that, whatever approach is taken, the analysis of relative preferences is incorrect and results in a different decision to the one that would have maximized net impact on stakeholders. Those making the decision will make better decisions if they understand the risk and have an agreed willingness to accept particular levels of risk (i.e. their risk appetite.) Business make decisions irrespective of scale but smaller businesses with less resources may have to use approaches that have a higher risk. Table 2 sets out a matrix to propose an assessment of the risk of error in the preference ranking of the impacts . The consequence of an error would be a sub-optimal decision, where the alternative would have had a higher net positive impact, or worse, a decision that is projected to have a positive impact but which actually has a negative impact.

Table 2. Assessment of risk against completeness and accuracy

Risk that impact materiality assessment is incomplete	Risk that the data on preferences is inaccurate		
	L	M	H
H	H	H	H
M	M	M	H
L	L	M	H

H= High, M=Medium, L=Low

If risks are evenly spread, then over 50% of the matrix results in high risk decisions and only just over 10% low risk. In addition, the wider the variation and the difference between relative preferences the lower the risk. For example if the values are 10, 11, and 12, the risk that the ranking of values is misstated is higher than if the values are 10, 50 and 100. Nonetheless, the importance of both completeness and accuracy is highlighted. Bottom-up approaches that focus on completeness and context are important for reducing risk.

Table 3 summarises the pros and cons of each approach within the context of two decisions. This is not meant to be a comprehensive decision chart. They are merely illustrative of a process of evaluating the pros and cons of the approaches for a given decision.

Table 3. Pros and cons of top-down and bottom-up approaches

		Top-Down	Bottom-Up
Purpose: Organization-wide quantification of risk	Pros	Cost and time effective Facilitates broad understanding of organizational impacts globally based on monetization factors derived from studies of similar contexts	Detailed and specific with impact monetization factors tailored specifically to the preferences of the stakeholders affected reduces risk, however, when stakeholders have divergent preferences, discord may still result
	Cons	Excludes more nuanced populations affected and their specific preferences	Detailed and specific with impact monetization factors tailored specifically to the preferences of the stakeholders affected may be less necessary More cost and time intensive especially as organizational scale increases Could increase organizational inertia
Purpose: Specific Product, Project or Investment with Distinct Impacted Stakeholders	Pros	Less cost and time intensive Can be used to provide an initial estimate of material impacts for further deep dives	Detailed and specific with impact monetization factors tailored specifically to the preferences of the stakeholders affected
	Cons	May over or under estimate specific preferences or damages for the stakeholders affected by the decision May miss differences in preferences of segments within populations	More time and cost intensive Requires engagement with specific stakeholders affected Smaller numbers of people involved in valuation can increase range of values and mean no preference rankings are possible for a group.

The above discussion paints the use of these two methods as mutually exclusive, when in fact, they can be used in complementary ways. For example, a top-down approach can be used as a starting point for evaluating impacts. Once an organization has determined the most significant impacts across its global organization, it can conduct a deep dive bottom-up analysis on the sources of those impacts to examine the implications for the specifically affected stakeholders. Just as an auditor conducts a review of the organization wide practices and controls, with specific checks performed by sampling and testing, so too the two approaches can be used in concert. The Capitals Coalition Natural Capital Protocol provides guidance, framed in terms of the decision objective and audience, on this point in Table 1.2.

In some situations, it will be necessary to do both. Where strategic decisions have been informed by a top-down approach, it may be necessary for a more bottom-up approach to be taken as these are transformed into operational decisions. Situations where this has not happened could contribute to the reasons for a disconnect between board policy to address social and environmental issues which are not effective at management level, for example in a situation where a mining company’s management override community concerns in order to meet operational targets that are purely informed by financial returns.

IV. DECISIONS AND DECISION MAKING

So far, our focus has been on making the best decision. However, decisions are made from a list of possible alternatives. This is not the perhaps common ‘do nothing’, ‘do something ridiculous’, ‘do what I am proposing’ list of options but a list of possible options, all of which are viable ways of increasing net impact and some of which are within the organization’s resources and capacity to do.

The objective is not only for the valuation approach to guide the best decision but also for the approach to support the identification of the number of viable alternatives to be as high as possible, increasing the likelihood that options that are proximate to the most effective option are included.

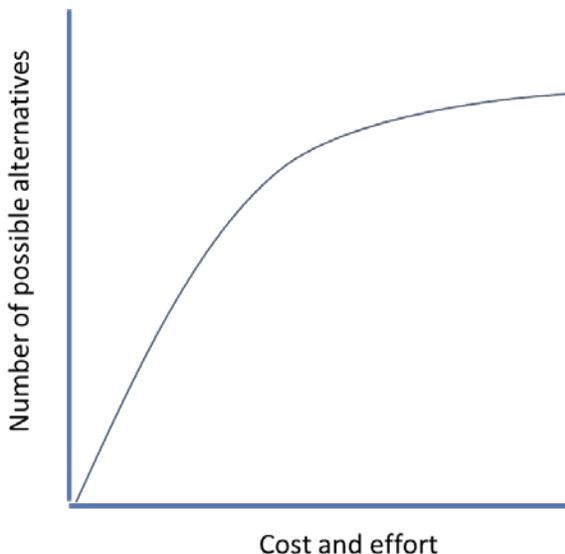
Table 4 expands the lines in Table 1 relating to products and services and operations to consider this and sets out a matrix of the full value chain for a product or service against the segmentation of stakeholders. Impact data that allows insights into more of the cells in the matrix will result in more operational options to increase impact.

Table 4. Sample Alternatives Matrix

Opportunities for options to increase net impact in product or service	Segmentation of stakeholders		
	A	B	C
Design/produce			
Delivery/distribution			

This suggests that a bottom-up approach will also generate more options than the top-down approach. However, this can also be linked back to the issue of diminishing returns. The number of options being identified will also be subject to diminishing returns to effort. Identifying new options initially has high marginal value as potentially entirely new opportunities become clear from the analysis conducted; however, at some point, additional options are likely to be variations on the prior ones proposed, thus diminishing their incremental value-add. A decision maker could leverage a top-down analysis to approximate which options are worth conducting further bottom-up analyses on to identify the “best” option.

Figure 3. Diminishing returns to generating options



V. BOUNDED FLEXIBILITY

The conclusion is that there is not a single valuation for any impact, but rather a range of acceptable impact valuations based on the decision being made, the context, and preferences of those affected by the decision. The concept of bounded flexibility allows for a set of possible valuations within a range akin to values that arise from private markets, for example the price of a liter of milk. Consensus efforts should focus on exploring the range rather than on identifying a single value to meet all needs. For example, it is well documented that Particulate Matter 2.5⁹ has substantial consequences for human health, so a lower bound of \$0 would be an unacceptable valuation. However, the precise valuations, expressing preferences between this and other impacts, will depend on proximity to the pollution source, height of emission, wind patterns, quality of healthcare in the region affected, among others, though even these precise valuations will have an element of variation to them. Figure 4 below seeks to illustrate this

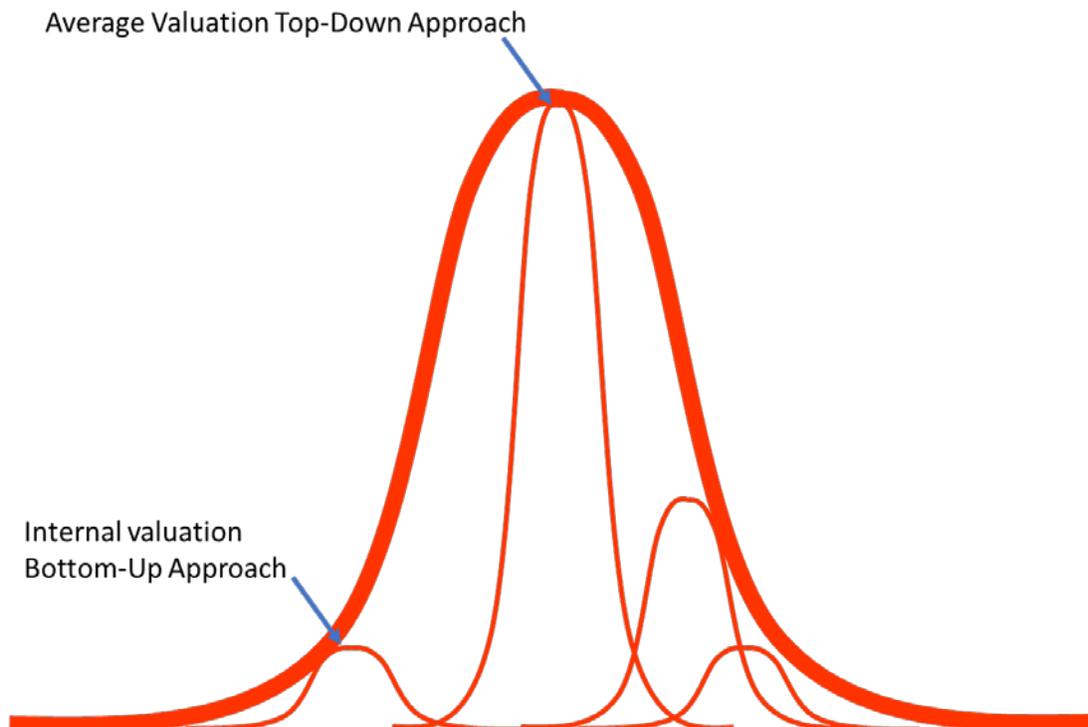
⁹ Refers to tiny particles or droplets in the air that are two and one half microns or less in width.

concept by illustrating total range and uncertainty with smaller ranges of contextual valuations within. The top down approach provides an average valuation within a range and the bottom up approaches would provide specific valuations but within that range.

Numerous organizations, including the Capitals Coalition, the ISO, and Social Value International have defined processes for determining the valuation ranges for various impacts. Discussion of the differences between these approaches and the values they produce is beyond the scope of this paper; our purpose is to suggest that future efforts around standardization should focus on validating the various processes, clarifying when to use each and defining the values that comprise that acceptable limits of the valuation rather than seeking to agree upon a single valuation. Nonetheless, the range is likely to emerge over time as a result of an interplay between:

- Decisions being influenced by valuations relating to different stakeholder segments and different contexts for impact informed by impact measurement principles and norms
- An assurance process for both internal and external decisions starts to frame the range as it tests whether process and values are reasonable in the context of a generalized purpose.

Figure 4. Bounded Flexibility Illustrated – choices within the boundary remain broadly comparable



VI. EMPIRICAL EXAMPLE

Park, Serafeim, and Zochowski (2020) compare the results of a bottom up analysis and the top down methodology developed in Frieberg *et al* (2020) for four organizations' water use which is adjusted for water scarcity. They find that a top-down approach leads to over and under-estimation, depending on the context, for which they develop a decision framework. The nuances of each organization are developed in specific cases studies within the analysis. However, as can be seen, while there are substantial fluctuations in the precise valuation of the water use, the ordering of organizational water use remains the same in both top-down and bottom-up approaches: Ball Corporation < Golden Agri-Resources Limited < Alpek < The AES Corp with the exception of Alpek and Golden Agri-Resources which flip for second and third positions. However, if the decision is to identify the more and less sustainable companies the granularity provided by the top-down approach may be sufficient.

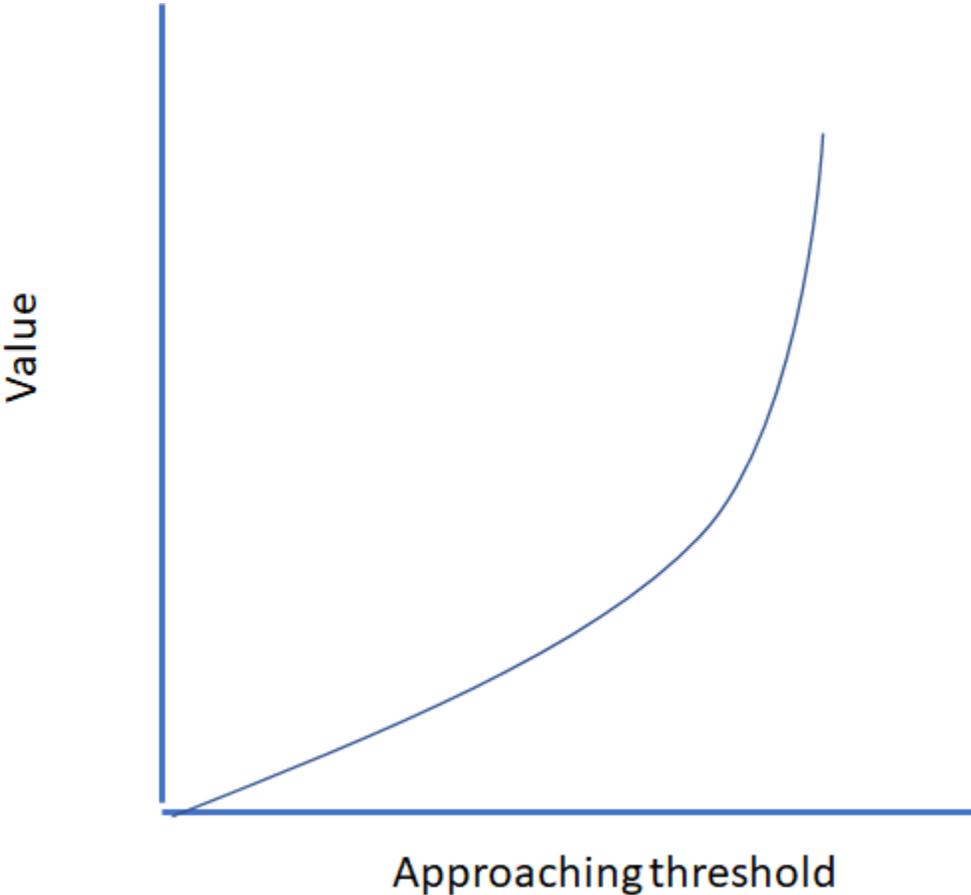
Table 5: Comparison of Results (Three Different Models of Estimating Water Usage Costs)

Company	Top Down (\$M)	Mid-Level (\$M)	Bottom Up (\$M)
Ball Corporation	11	14	14
The AES Corp	11,317	18,080	7,870
ALPEK	98	92	28
GOLDEN AGRI-RESOURCES LIMITED	20	116	33

Reproduced from Park, Serafeim, and Zochowski 2020. Table 5 illustrates the total corporate water usage costs using three different models. The column *First Model* refers to our first model described in the methodology section, which makes use of global water costs and domicile country's AWARE factor. The column *Second Model* indicates our second model that employs global water costs and country-level AWARE factors according to a firm's asset distribution. The column *Third Model* highlights our third model, which involves using both the localized water costs and the country-level AWARE factors. Country-level water costs are either directly taken from Waterfund's data or extrapolated using the *multipliers* method as explained in the methodology section.

Preference rankings are the starting point for the valuations that would inform decision making. Impact accounting requires other adjustments for example for the counterfactual and for planetary and societal thresholds. As an activity creates impacts that approach these thresholds, and significantly affects dependency, the value rises exponentially as shown in Figure 5.

Figure 5. Societal and planetary thresholds and valuation.



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