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Working Paper 21-104

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# Accounting for Product Impact in the Water Utilities Industry

George Serafeim, Katie Trinh*

*Impact-Weighted Accounts Project Research Report*

## Abstract

We apply the product impact measurement framework of the Impact-Weighted Accounts Initiative (IWAI) in two competitor companies within the water utilities industry. We design a monetization methodology that allows us to calculate monetary impact estimates of water leakages and disruptions and contaminants, among other factors. Our results indicate substantial differences in the impact that competitors have through their products. These differences demonstrate how impact reflects corporate strategy and informs decision-making on industry-specific areas, including infrastructure investment choices.

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## 1. Introduction

Although significant progress has been made in the environmental and social metrics disclosed by companies and prescribed by reporting standards, these mostly pertain to a company's operations and are still not embedded in financial statements. In contrast to employment or environmental impacts from operations, product impacts, which refer to the impacts that occur from usage of a product once a company has transferred control of the good or service, tend to be highly idiosyncratic limiting the ability to generalize and scale such measurements. As such, for companies that do measure product impact, impact evaluation is highly specific, limiting comparability and scalability. Moreover, the number of companies that have managed to measure product impact in monetary terms is even more limited.

We have put forth a framework in which product impacts can be measured and monetized in a systematic and repeatable methodology across industries and have provided a sample application to the automobile manufacturing industry to address these issues.[1] Within any industry, the framework can be applied using a set of standard principles, industry assumptions and public data to estimate product impacts across the following seven dimensions.

**FIGURE 1**

Product Impact Framework Dimensions

| **Reach** | | **Dimensions of Customer Usage** | | | **Env Use** | **End of Life** |
|---|---|---|---|---|---|---|
| Quantity | Duration | Access | Quality | Optionality | Pollutants & efficiency | Recyclability |
| The magnitude of individuals reached | Length of time the product can be used, particularly for durables | Accessibility of product through pricing and efforts to provide for the underserved | Quality of product through health, safety, effectiveness, and inherent need or goodness | Ability to choose an alternative product with full information and free will | All pollutants and efficiencies enabled through customer usage | Projected product volume recycled at end of product life |

In this paper we apply the framework to two competitor companies in the water utilities industry. We then discuss potential data points and data sources for monetization and detail the

[1] George Serafeim and Katie Trinh. "A Framework for Product Impact-Weighted Accounts", Harvard Business School. Accessed July 6, 2020.

decisions behind assumptions made. Finally, we provide examples of insights specific to the water utilities industry that can be derived from impact-weighted financial accounts and their analysis. The application of the product impact framework to the water utilities industry demonstrates feasibility and actionability, while also providing guidance on the nuances and decision-making of applying the framework to other similar industries. The impacts derived demonstrate the potential for product impact measurement to inform strategic decision-making. We see our results as a first step, rather than a definitive answer, towards more systematic measurement of product impact in monetary terms that can then be reflected in financial statements with the purpose of creating impact-weighed financial accounts.

## 2. Application of the product impact framework

We apply the product impact framework of the Impact-Weighted Accounts Initiative within the water utilities industry to ensure the framework is feasible, scalable, and comparable in the space. Through a deep-dive of two competitor companies, we provide a cohesive example that examines the impacts of water utilities across the seven product impact dimensions of the framework to uncover nuances of the framework application in estimating actual monetary values. The companies will be referred to as Companies A and B given the purpose of this exercise is to examine feasibility and is not to assess the performance of individual companies. We do note that the data is from two of the largest water utilities globally, with Company A being one of the largest in the US and Company B being one of the largest in Brazil.

### *2.1 Data collection process*

This application is based on publicly available data from company disclosures and industry-wide assumptions informed by regulatory bodies and established research firms. These examples make use of existing data and metrics with the goal of incorporating publicly available data.

Self-disclosed company datapoints reflect information found in the company's disclosures from 2018 such as the Form 10-K or annual sustainability reports which often disclose Sustainability Accounting Standards Board (SASB) and Global Reporting Initiative (GRI) metrics. Industry-wide assumptions on average cost of water, cost associated with waterborne disease, and economic losses associated with lack of proper sanitation and dehydration also come from the

World Health Organization, IWAI's research on the cost of water[2], United Sates Department of Agriculture Economic Research Service, and various economic and academic studies. Given the methodology determines monetary impacts, the industry wide assumptions inevitably rely on some market-determined price and valuations.

## 3. Water utilities application of the product impact framework

### *3.1 Overall impacts estimated*

**TABLE 1**

Product Impacts of Company A and B

| | | | | | | Dimensions of Customer Usage | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Reach | | Access | | Quality | | | Option-ality | Env Use | End of Life |
| Company | Revenue | Positive Product Impact | Negative Product Impact | Quantity | | Affordability | Underserved | Health & Safety | Effectiveness | Need | Information | Emissions | Recyclability |
| A | $3bn | $1.1bn | -$3.9bn | Customers<br>Volume (kgal) | 14m<br>344m | - | $7m | -$342m | -$3,515m | $1,109m | - | - | - |
| B | $4bn | $2.0bn | -$1.6bn | Customers<br>Volume (kgal) | 25m<br>557m | - | $60m | - | -$1,586m | $1,988m | - | - | - |

* Total positive and negative product impact may differ from the sum of product impact within each dimension given health and safety and effectiveness are composed of impacts positive and negative in magnitude.

For the water utilities industry, the access dimension captures cost savings associated with service provision for the underserved, the health and safety dimension captures various water quality incidents, the effectiveness dimension captures system commodity loss, and the need dimension captures sanitation and hydration benefits from water access. There is no affordability impact given water utilities provide a commodity and have minimal price control. There is also no environmental usage impact since all emissions and water withdrawn from use of the product are operational and therefore, already fully accounted for elsewhere in the IWAI framework, the environmental pillar[3]. Finally, current innovation and disclosure levels prevent estimation of the

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[2] DG Park, George Serafeim and Rob T. Zochowski. "Measuring the Cost of Corporate Water Usage", Harvard Business School. Accessed January 5, 2021.

[3] David Freiberg, DG Park, George Serafeim, and T. Robert Zochowski. "Corporate Environmental Impact: Measurement, Data and Information". Harvard Business School Working Paper, No. 20-098. Published March 2020.

recyclability impact. As efforts to recycle and re-use water become more prevalent, the impact from such efforts could be estimated within the recyclability dimension. Similarly, companies with internal information on energy recovery from wastewater treatment could estimate those impacts within the recyclability dimension. The following sections dive into the details, assumptions, and decisions behind these estimated impacts.

### *3.2 Reach*

**TABLE 2**

Customers of Company A and B

| Data | | | |
|---|---|---|---|
| | | **A** | **B** |
| 10K | Number of connections | - | 9,053,000 |
| 10K | Number of customers | 14,000,000 | 25,100,000 |
| 10K | Sales volume (kgal) | 344,482,000 | 556,848,159 |

The goal of the reach dimension is to identify the number of individuals served by the company. Unlike other industries where the number of individuals served needs to be estimated, both water utilities disclose the number of individuals they serve as number of customers. In addition, these water utilities also disclose the sales volume of water to these customers.

### *3.3 Access - Affordability*

The goal of the affordability dimension is to identify the positive impact of more affordable product or service provision. Unlike other industries in which firms exhibit price control and price differentiation is observed, water utilities provide a commodity and are often government regulated entities. Given water utilities exhibit limited price control over their services as government regulated entities that provide a commodity, firms within this industry do not have an affordability impact. If there are any instances in which a water utility is not price regulated, there would be an affordability impact to be estimated.

### *3.4 Access – Underserved*

**TABLE 3**

Underserved Customers of Company A and B

| Data | | | | Estimation | | |
|---|---|---|---|---|---|---|
| **Company datapoints** | | **A** | **B** | | **A** | **B** |
| Program | Aggregate cost savings support | 483,386 | - | Total customers | 14,000,000 | 25,100,000 |
| 10K | Customers in geography | 660,000 | - | | x | |
| Assumed | Other customers w. cost savings (%) | 0.25% | 6.00% | Customers w. cost savings (%) | 0.25% | 6.00% |
| Assumed | Average cost savings per person | $203.10 | $40.07 | | x | |
| | | | | Cost savings per person | $203.10 | $40.07 |
| | | | | | = | |
| | | | | **Underserved impact** | **$7m** | **$60m** |

### *3.4.A The underserved customer*

The goal of the underserved dimension is to identify the impact associated with provision of service to underserved customers. In the water utilities space, we estimate the underserved impact by identifying customers who receive water services at reduced pricing due to their income level. While we identify underserved customers in other industries based solely on demographic information, the water utilities space requires a more conservative identification of underserved customers given the regulatory nature of the industry mandates service provision to all within the contracted region. We therefore examine price or cost savings, rather than income level or other demographic information, to identify the underserved customer.

### *3.4.B Price or cost savings data*

To identify customers receiving cost savings support with their water utility bills, we use company self-reporting on the number of percentage of customers receiving bill support and the average or total amount of bill support. Company A provides the aggregate amount of cost savings, the number of individuals receiving cost savings, and the total number of customers served within one of the states in which it operates through program-specific and financial disclosures. Given public data availability, we generalize within this example the average cost savings per customer within the state, $203.10, and the percent of customers within the state receiving bill support, 0.25%, to the other customers served by Company A.

Company B provides their pricing structure by residential category in their financial disclosures and notes that customers residing in a *favela,* residential areas characterized by a lack of urban infrastructure, are billed a lower price for consumption to assist lower-income customers. They also disclose the total number of customers and the overall volume billed per connection.

Given Company B does not identify the number of customers residing in a *favela*, we assume the percentage of customers residing in a *favela* reflects the distribution within the country at 6%. Given public data availability, we estimate the cost savings per person to be $40.07 from the disclosed average volume per connection and the pricing difference between residential and *favela* customers.

In practice, both companies could identify other underserved groups that receive cost savings and would use internal data to identify what percentage of their customers receive bill support and the average cost savings.

### *3.4.C The impact estimate*

We multiply the estimated percent of customers receiving bill support with the total number of customers to calculate the number of customers receiving bill support. We then apply the estimated cost savings per customer to estimate the underserved impact. As noted in section 3.4.B, companies that identify additional underserved customer groups can repeat this calculation for those additional groups.

## *3.5 Quality – Health and Safety*

**TABLE 4**

Health and Safety of Company A and B

| Data | | | |
|---|---|---|---|
| **Company datapoints** | | **A** | **B** |
| CSR | Number of acute violations | 4 | - |
| CSR | Number of non-acute violations | 2 | - |
| Assumed | Individuals affected by each violation | 8,750 | - |
| **Industry assumptions** | | | |
| USDA ERS Cost of e.Coli | | $6,510 | |

| Estimation | | |
|---|---|---|
| | **A** | **B** |
| Number of acute violations | 4 | - |
| | + | |
| Number of non-acute violations | 2 | - |
| | x | |
| Individuals affected | 8,750 | - |
| | x | |
| Cost of e.Coli | $6,510 | |
| | = | |
| **Health and safety impact** | **-$342m** | - |

### *3.5.A Water health and safety*

For health and safety of water utilities, we aim to capture instances where consumption of safe and clean water has been breached. In this example, we examine water quality violations reported by government enforcement agencies to identify instances of water safety breaches. While water quality violations should be representative of water contaminant levels, companies could supplement public water quality violation data with internal data on actual contaminants present in water, such as lead and mercury, which are hazardous in trace amounts. The actual contaminants for evaluation can vary by geography, with the example of utilities in Argentina[4] and Bangladesh[5] facing challenges around arsenic contamination.

### *3.5.B Water quality violation data*

For water quality violation data, Company A self-reported the number of acute and non-acute violations they received in their sustainability disclosures. To identify the number of customers affected by these violations, we assume one violation affects one of the 1,600 communities Company A serves and that Company A's customers are evenly distributed across these communities given public data availability. This example also makes the simplifying assumption for demonstrative purposes that e.Coli is the relevant waterborne contaminant for all the violations and does not differentiate between acute and non-acute violations. In practice, Company A could use internal data to identify the number of customers that have been served contaminated water and apply the costs associated with the relevant type and level of contaminant. Company B self-reported their water quality testing procedure in their sustainability disclosure but did not report any violations or contaminants found. In practice, Company B could use internal data to identify communities that have been served contaminated water, if any, along with the level and type of contaminant present.

### *3.5.C The impact estimate*

To estimate the impact of safe water, we multiply the total number of quality violations by the number of customers affected per violation to estimate the total number of customers affected by a water quality violation. We multiply the total number of customers affected by a water quality violation by the associated cost of the contaminant present to estimate the impact from breaches to safe water provision. A company estimating their own health and safety impact could identify the actual number of customers served contaminated water, the type of contaminant that has been found, and use a more specific estimate of the associated costs. Companies could use internal data

[4] P. L. Smedley, H. B. Nicolli, D. M. J. Macdonald, and D. G. Kinniburgh, "Arsenic in groundwater and sediments from La Pampa Province, Argentina". *British Geological Survey.* Published 2008. Accessed January 2021.
[5] D. G. Kinniburgh and P. L. Semdley, "Arsenic contamination of groundwater in Bangladesh". *British Geological Survey.* Published 2001. Accessed January 2021.

to include contaminants that are of particular concern within their operating geography as mentioned in Section 3.5.A regardless of whether a violation has been recorded.

### *3.6 Quality – Effectiveness*

**TABLE 5**

Effectiveness Impact of Company A and B

| **Data** | | | |
|---|---|---|---|
| **Company datapoints** | | **A** | **B** |
| CSR | System commodity loss (%) | 20% | - |
| 20F | System commodity loss (kgal) | - | 255,764,220 |
| CSR | Total water withdrawn (kgal) | 438,677,435 | - |
| | | | |
| **Industry assumptions** | | | |
| IWAI | Cost of water withdrawn (kgal) | $40.07 | $6.20 |

| **Estimation** | | |
|---|---|---|
| | **A** | **B** |
| System commodity loss (%) | 20% | - |
| | x | |
| Total water withdrawn | 438,677,435 | - |
| | = | |
| System commodity loss (kgal) | 87,735,487 | 255,764,220 |
| | x | |
| Cost of water withdrawn (kgal) | $40.07 | $6.20 |
| | = | |
| **Effectiveness impact** | **-$3,515m** | **-$1,586m** |

#### *3.6.A Water utility effectiveness*

In the effectiveness dimension, we aim to capture whether the product or service is effective at meeting customer expectations. For water utilities, this includes aspects of reliable and consistent water provision. We examine overall system commodity loss given it encompasses all service disruptions, flooding, pipe breaks and leaks, and other water loss issues as per SASB metric IF-WU-140a.2 on real water losses. We note that losses from other reported measures of lapse in water provision, such as SASB metric IF-WU-450a.3 on the number of unplanned service disruptions in main breaks per mile, would be included in overall system commodity loss. While we recognize that current available technology for water pipes is not capable of no system commodity loss, we choose to examine the absolute amount of water loss in our calculations per our application principles of conservatism and incentive alignment[6].

#### *3.6.B Data on system commodity loss and cost of water*

Company data on system commodity loss is self-disclosed in financial and sustainability disclosures. Company A provides the percentage of non-revenue real water loss in their sustainability disclosure. Company B provides the volume of water lost per connection per day in their financial disclosures. For Company A, we estimate the volume of water lost by multiplying

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[6] George Serafeim and Katie Trinh. "A Framework for Product Impact-Weighted Accounts", Harvard Business School. Accessed July 6, 2020.

the percentage of water loss with the total volume of water withdrawn. For Company B, we annualize the volume of water lost per connection and multiply by the number of connections to estimate the volume of water lost. We use the total volume of water lost for conservatism given data availability. A company that can identify which losses are borne by the company can exclude that loss volume from the impact estimate as the customers would be unaffected by those losses.

Country-level cost of water data comes from environmental and water-related research conducted by IWAI.[7] The cost of water estimates from IWAI are scaled to reflect water scarcity as defined by the Availability of Water Remaining (AWARE) model. The differences in the cost of water per kilo-gallon for Company A and B reflects the significant difference in water scarcity between the countries in which Company A and B operate. Company A faces a high cost of water given they operate in and serve water resource scarce areas, such as California.

### *3.6.C The impact estimate*

We calculate the impact of water loss by multiplying the estimated volume of water loss by the cost of water per kilo-gallon in United States for Company A and in Brazil for Company B.

### *3.7 Quality – Basic Need*

**TABLE 6**

Basic Need Impact of Company A and B

| Data | | | |
|---|---|---|---|
| **Company datapoints** | | **A** | **B** |
| 10K | Number of customers | 14,000,000 | 25,100,000 |
| **Industry assumptions** | | | |
| WHO | Loss fr. lack of water per person | $79.20 | |

| Estimation | | |
|---|---|---|
| | **A** | **B** |
| Customers | 14,000,000 | 25,100,000 |
| | x | |
| Loss fr. lack of water per person | $79.20 | |
| | = | |
| **Basic need impact** | **$1,109m** | **$1,988m** |

### *3.7.A Basic needs met by water utilities*

The basic need dimension aims to capture the impact created from a company by providing a service or product that meets a basic need. In the case of water utilities, provision of water meets a basic need as water is fundamental to sustaining life. Examining the elasticity of water demand

[7] DG Park, George Serafeim and Rob T. Zochowski. "Measuring the Cost of Corporate Water Usage", Harvard Business School. Accessed January 5, 2021.

cements this designation, given price sensitivity to water significantly decreases in situations of water scarcity.[8]

### *3.7.B Sanitation and averted dehydration data*

To estimate the value of provision of water as a basic need, we examine the economic losses associated with lack of access to water as estimated by the World Health Organization (WHO). The WHO estimates that the total global economic loss associated with inadequate water supply and sanitation is $260 billion annually, that 2.5 billion individuals lack proper sanitation, and that 783 million individuals use unimproved drinking-water sources. We make the simplifying assumption the individuals without proper sanitation are not the ones with unimproved drinking-water sources to ensure a conservative per person economic loss estimate. Dividing the total global economic loss associated with inadequate water supply and sanitation by the sum of individuals lacking proper sanitation and using unimproved drinking-water sources, we estimate that the economic loss associated with inadequate water supply and sanitation at $79.20 per person. To identify the number of individuals reached by Company A and B, we refer to figures self-reported by the companies as shown in section 3.2.

### *3.7.C The impact estimate*

To estimate the basic need impact from provision of water, we multiply the number of individuals reached by Company A and B by the economic loss associated with inadequate water supply and sanitation that has been averted.

### *3.8 Optionality*

The optionality dimension aims to capture the impact from consumers lacking freedom of choice when making a purchase, which we determine by examining whether the industry is monopolistic, whether the product or service is addictive, and whether there have been any information failures. In the case of water utilities, while there is limited optionality given the industry is a natural monopoly, there is no optionality impact given the regulatory nature of the industry.

[8] Paolo Garrone, Luca Grilli, and Ricardo Marzano. "Price elasticity of water demand considering society and attitudes", *Utilities Policy* Volume 59. Published August 2019. Accessed January 2021.

The impact from consumers lacking freedom of choice in the case of monopoly tends to result in experienced price rents and reduced innovation or quality. With the former, as in the affordability dimension, the nature of water utilities as a regulated industry prevents the price rents observed in other industries. With the latter, issues around reduced innovation would lead to system-wide inefficiencies or water quality issues that would already be captured by the quality dimension under effectiveness and health and safety.

### *3.9 Environmental Usage*

The environmental usage dimension aims to capture any environmental emissions, pollutants, or efficiencies produced from use of the product. While the use of water does have environmental impact, the impacts from the withdrawn water is fully captured by the environmental framework of the Impact-Weighted Accounts given these impacts are also operational.[9] Any innovations made to improve efficiency, such as replacement of pipes or innovative meters, would be reflected in the operational environmental impact. Furthermore, where the innovations reduce system commodity loss, the improvements would be reflected in the product effectiveness impact as shown in section 3.6. To avoid double-counting, we do not include impacts from environmental usage within the overall product impact.

### *3.10 End of Life Recyclability Impact*

The end of life dimension aims to measure the averted and created emissions from the end of life treatment of the product. For water utilities, the end of life dimension could capture the impacts from re-use water and wastewater treatment. While both water utilities mention efforts towards water re-use and wastewater treatment, data on volume and use case of recycled and reclaimed water and energy recovery from wastewater treatment is still unreported. While this example does not estimate the end-of-life impact for water utilities due to public data availability, a water utility could use internal data to estimate their own impact from re-use water specific to the volume and value associated with the use case of recycled and reclaimed water. Similarly, a water utility could use internal data to estimate their own impact from wastewater treatment specific to amount of and value associated with the energy recovered. As the industry continues to

[9] David Freiberg, DG Park, George Serafeim, and T. Robert Zochowski. "Corporate Environmental Impact: Measurement, Data and Information". Harvard Business School Working Paper, No. 20-098. Published March 2020.

adopt end of life and other recyclability innovations, we would expect disclosure and reporting on these innovations to improve, enabling more comprehensive impact estimates.

**4. Discussion**

This application of the product framework to water utilities not only indicates feasibility of estimating monetary product impacts within this industry, but also demonstrates the potential value of impact-weighted financial statement analysis.

The product impact dimensions reflect the nature of the water utilities industry and the potential for significant positive product impact. Water utilities do not have affordability or optionality impacts given that the industry is a natural monopoly making optionality issues irrelevant and pricing is also under tight regulation. The basic need dimension reflects the value of providing a fundamental basic need and demonstrates the potential for the industry to be highly positive where issues of health and safety and effectiveness are mitigated. More specifically, the health and safety dimension can indicate strategic decisions around water treatment processes, pipe replacement frequency and water quality testing while the effectiveness dimension reflects how these strategic choices and innovations influence system efficiency.

Another potential analysis could compare the product impacts of different companies. Within a single industry, one can identify differences in how the two companies approach different product attributes. For example, our analysis suggests that Company A is less effective than Company B given they operate in a water scarce region. Analyzing each dimension allows for a deeper understanding of the product impact performance of each company relative to competitors and the broader industry.

Finally, the impact-weighted financial statement analysis indicates which dimensions are most significant for product impact creation. In the water utilities industry, the impact is driven mostly by the quality dimensions, particularly the basic need and effectiveness dimension. Water provision has significant positive impacts from providing a fundamental basic need, and the potential for significant negative impacts given the level of unnecessary water loss. This suggests that the variance in company performance on product impact in water utilities is most dependent on provision of service and system efficiency.

### *4.1 Application of impact-weighted financial statement analysis*

To provide an example of the information enabled by impact-weighted financial statement analysis, we generated product impact estimates for other companies within the water utilities industry. These estimates allow us to identify competitive dimensions of product impact within water utilities and company strategy and product impact performance over time.

The dataset consists of product impact estimates across 4 years, 2015 to 2018, of 4 global publicly traded water utility companies that are listed or cross-listed in the US with over $2 billion in revenue to ensure data availability and comparability. Given most industry assumptions used for monetizing product impact are constant throughout the industry, the product estimates are calculated by applying the industry-wide assumptions to the respective company-specific data points as demonstrated with Companies A and B. For comparability, we examine the product estimates scaled by EBITDA and revenue.

For the underserved dimension, we collect company-specific data on the percentage of sales with cost savings support and estimate the average cost savings associated with support from company annual reports and corporate responsibility disclosures. We note that the reporting of these figures varies across companies. For companies with incomplete data, we conservatively estimate these figures by identifying the minimum number of individuals reported to receive cost support and assume the minimum of cost savings enabled.

For the health and safety dimension, the number of acute and non-acute health violations are from company annual reports. The population affected by such violation is provided from annual reports or estimated using company and country data about population demographics. We apply the same industry assumptions about the cost of waterborne illness, as shown in the examples with Companies A and B, to calculate the health and safety impact of each company.

For the effectiveness dimension, system commodity loss and total water withdrawn are from company annual reports and corporate responsibility disclosures. Industry assumption estimates of the cost of water are country-specific and adjusted for water scarcity.[10] For the need dimension, the number of customers served comes from company annual reports and we apply the same industry assumptions provided in the examples with Companies A and B. As indicated in

[10] DG Park, George Serafeim and Rob T. Zochowski. "Measuring the Cost of Corporate Water Usage", Harvard Business School. Accessed January 5, 2021.

section 3.1, we do not collect data for the affordability, optionality, efficiency, and recyclability dimensions.

**Table 7**

Product Impact of Water Utilities Companies

| | Impact Scaled by EBITDA | | | Impact Scaled by Revenue | | |
|---|---|---|---|---|---|---|
| **Impact** | N | Average | SD | N | Average | SD |
| Underserved Impact | 16 | 1.89% | 0.03 | 16 | 0.63% | 0.01 |
| Health and Safety Impact | 16 | -9.86% | 0.33 | 16 | -5.59% | 0.19 |
| Effectiveness Impact | 16 | -107.41% | 0.74 | 16 | -51.42% | 0.41 |
| Basic Need Impact | 16 | 95.50% | 0.73 | 16 | 39.10% | 0.17 |
| Overall Product Impact | 16 | -19.89% | 0.96 | 16 | -17.28% | 0.48 |

Table 7 shows the summary statistics for all the impact variables. Examining the average impact scaled by EBITDA and revenue indicates that effectiveness and basic need are significant drivers of the overall product impact. Effectiveness is also characterized by larger standard deviations when scaled by EBITDA and revenue, indicating variance in firm investments and water scarcity can influence effectiveness.

**Figure 2**

Distribution of Overall Product Impact Estimates Scaled by EBITDA

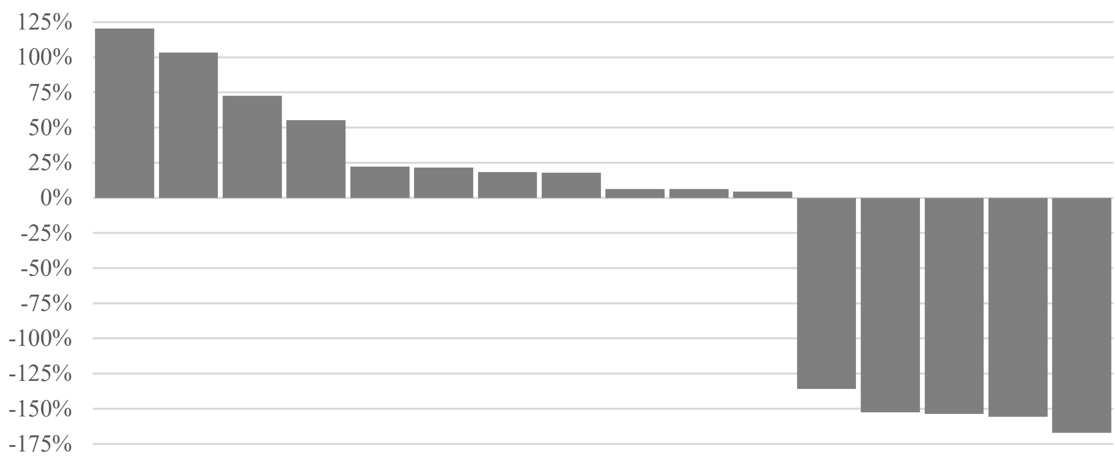



Figure 2 shows the distribution of total product impact in the sample showing significant variation. Despite the negative mean, the distribution exhibits a positive median and a small positive skew. While for some firm-years we do observe significant negative product impact due to either large health and safety breaches or system commodity loss in water scarce regions, for most firm-years we observe positive product impact when these issues are avoided.

### *4.2 Hypotheses explaining product impact estimates*

There are four hypotheses that can explain the product impact we are observing within the water utilities industry. The first hypothesis is the *baseline case* in which the product impact estimated is consistent with and captures the impact of the industry. The second hypothesis is the *scope bias case* in which some impacts created by the water utilities industry have not yet been estimated and included in the total product impact. The third hypothesis is the *measurement bias case* in which the benefits or costs are rightly scoped but incorrectly estimated. Finally, the fourth hypothesis is *sample selection bias* in which the companies selected in our sample are unrepresentative of the full industry.

We minimize issues of *scope bias* by estimating the impact of identified product impact issues raised in the financial and sustainability disclosures by water utilities firms. However, we note there may exist impacts which have not yet been estimated due to current data availability, such as impacts from wastewater treatment. To minimize *measurement bias,* we use commonly accepted industry research and guidance to estimate benefits and costs. We note that the health and safety costs for most firms may be underestimated given reporting standards and practices vary across countries and companies. Finally, we minimize *sample selection bias* by including firms across different geographies that serve regions with differing infrastructure levels.

### *4.3 Discussion of insights enabled by impact-weighted financial statement analysis*

**Figure 3**

2015 Overall Product Impact Estimates

(Scaled by EBITDA)

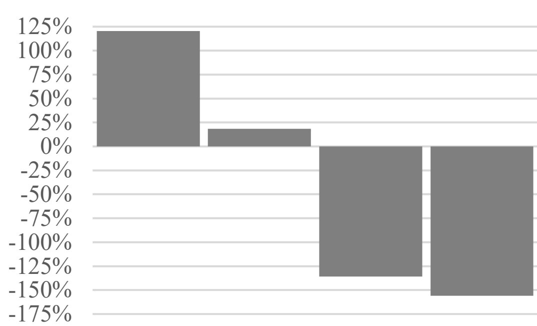



**Figure 4**

2018 Overall Product Impact Estimates

(Scaled by EBITDA)


Comparing the distribution of overall product impact estimates in 2015 and 2018 indicates a tending towards the mean in overall product impact performance. While two firms display negative product impact in 2015, only one firm displays negative product impact in 2018. This firm that has demonstrated improvement over these four years from negative to positive product impact has avoided significant health and safety issues in years following 2015. We note that the change in product impact of the industry leader, SABESP, is driven by a significant increase in EBITDA in 2018. We next examine the distribution of product impact estimates by dimension.

**Figure 5**

Underserved Impact Estimates

(Across All Years, Scaled by EBITDA)

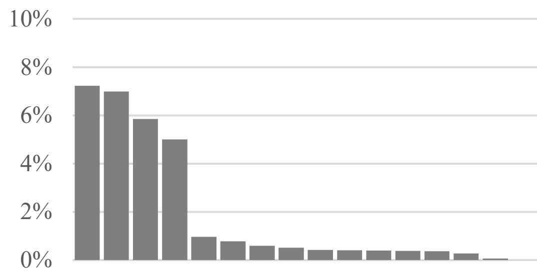



**Figure 6**

Health & Safety Impact Estimates

(Across All Years, Scaled by EBITDA)


**Figure 7**

Effectiveness Impact Estimates

(Across All Years, Scaled by EBITDA)

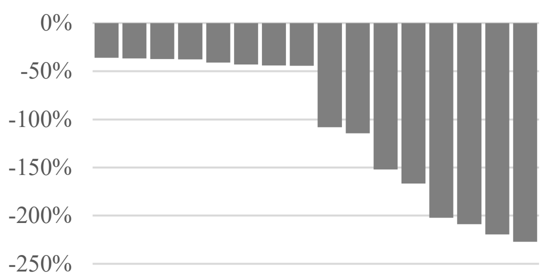
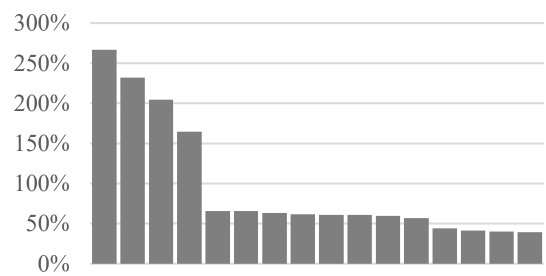



**Figure 8**

Basic Need Impact Estimates

(Across All Years, Scaled by EBITDA)




The magnitude and distribution of the underserved dimension suggests that service provision to the underserved is a driver of product impact for firms with meaningful efforts to provide water to the underserved. SABESP leads the underserved dimension across all years observed given their provision of service in regions lacking traditional urban infrastructure.

The magnitude of the health and safety dimension suggests that the water utilities observed in this dataset are relatively safe but can be susceptible to significant breaches to health and safety. While health and safety is not a key driver of product impact for the water utilities in this dataset in most years, one significant water quality issue or violation significantly influences overall product impact as demonstrated in Figure 6.

The magnitude and distribution of the effectiveness dimension suggests that effectiveness is a key driver of the observed variation in product impact across firms in the dataset. Since all four firms demonstrate similar system commodity loss, the observed variation in effectiveness is a function of the differing cost of water and water scarcity of regions in which these firms operate. The industry laggard faces a cost of water that is four times higher than that of its competitors, as a result of operating in a water scarce region.

Finally, the magnitude and distribution of the basic need dimension suggests that basic need is a key driver of product impact across all firms in the data set. SABESP leads the basic need dimension given the magnitude of individuals served.

Ultimately, examining the relationship between product impact performance across different dimensions, we identify trade-offs in different operating and strategic decisions. Firms that deliver positive product impact manage to deliver positive basic need impact that outweighs the negative effectiveness impacts while avoiding significant breaches to health and safety. For most firms, the underserved dimension is an untapped opportunity to deliver more positive product impact.

## 5. Conclusion

Although interest in ESG measurement continues to grow significantly, product impact has been difficult to systematically measure given the idiosyncratic nature of the impacts and the tendency to view products in broad categorizations of simply good and bad. The creation of a product impact framework allows for a systematic methodology that can be applied to different companies across a wide range of industries. This enables transparency, comparability, and scalability within product impact reporting. The identified standard dimensions on which product impact can be measured are rooted in existing measurement efforts, allowing data that is publicly available to be leveraged.

To ensure applicability, determine feasibility, and identify nuances within each dimension of product impact, we examine applications of the framework to company pairs across each GICS sector. In this working paper, we provide a sample application to the water utilities industry. We use publicly disclosed data and industry-wide assumptions to derive monetary estimates of a product’s reach, accessibility, quality, optionality, environmental use emissions and end of life recyclability. While publicly disclosed data can provide meaningful insights, use of internal company data can further enable precision and support internal decision-making. This example also highlights the need for ongoing discussion and refinement of industry-accepted assumptions as contemporary literature leads to changing guidance over time.

This paper is one within the series of applications of the framework across each GICS sector, covering water utilities in the utilities sector. Ultimately, the aspiration is to develop and provide a framework that enables more informed decisions which account for the many impacts created by products.