

MAS-ESS Essay Competition 2020

Does environmental sustainability make economic and business sense?

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ABSTRACT

The tension between environmental sustainability and economic and business sense, or in other words, profitability, is not new. Sustainability management practices may be too expensive or difficult for firms to implement. However, the exponentially deteriorating climate situation necessitates the adoption of such measures to ensure that our planet remains liveable for the future generations.

This essay argues that balancing environmental sustainability and profitability is not a zero-sum game. Sustainability can maintain or even *increase* current levels of profitability, hence making economic and business sense. In **Chapter II**, we outline three methods through which firms can be sustainable and profitable in both the short and long term: (a) changing the production process, (b) changing the product, and (c) changing the revenue model. We provide case studies of such methods in **Annexes A, B and C** respectively. Moreover, we note that the actions of external parties, like the government and investors, make sustainable practices even more profitable for firms. This is so through government-provided research and development, subsidies and taxation, regulations, and environmentally-conscious investing.

In addition, firms often face challenges in setting practical and meaningful targets to gauge their sustainability management. In **Chapter III**, we recognise that this challenge is two-fold, and we propose solutions to aid firms in this regard. First, firms face difficulty in *measuring* their environmental footprint, as shown in **Annex D**. This impedes them from setting goals in the first place. We believe firms should be discretionary when reviewing Sustainability Reporting Tools (SRTs), specifically keeping in mind the relative significance of different SRT components. Second, firms face difficulty in *setting* targets. We set out several principles that firms should use to craft practical and meaningful targets for sustainability, namely: (a) relative significance of area of environmental impact, (b) scalability, (c) economic and managerial sense, and (d) transparency.

299 words

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CHAPTER I

Introduction

“We are at the beginning of a mass extinction and all you can talk about is money!”

Greta Thunberg, at the UN General Assembly

“If we don’t want to go backwards, we still need growth.”

LVMH Chairman Bernard Arnault, responding to Thunberg¹

Conventional economics holds that any rational firm aims to maximise profit. To this end, a firm may increase its sales volume, assuming product price remains constant, lower its cost of production, or do both. However, some environmentalists decry that this profit motive has blinded businesses to negative externalities that harm the environment.² To increase revenue, firms produce ever greater quantities of goods to satiate the high levels of demand that they induce through marketing, causing resource overconsumption and harmful byproduct overproduction. To cut costs, firms engage low-cost production methods, like slash-and-burn agriculture or improper disposal of by-products, that significantly impact the environment. Conversely, some business leaders say sustainable practices are cost prohibitive. Adopting them is even more challenging given the difficulty of both *measuring* and *setting* practical and meaningful sustainability management targets.³

Indeed, sustainable development⁴ is important to mitigate the twin threats of climate change and resource depletion facing our generation. However, statistics have shown that current efforts to combat these threats are insufficient,⁵ implying that even more drastic action has to be taken by

¹ Bain, M. (Sept 26, 2019). France’s luxury titan criticised Greta Thunberg at a sustainability event. *Quartz*. Retrieved from <https://qz.com/1716828/lvmh-ceo-criticizes-greta-thunberg-at-sustainability-event/>.

²Turner, A. (Sept 3, 2019). Is capitalism incompatible with effective climate change action? *World Economic Forum*. Retrieved from <https://www.weforum.org/agenda/2019/09/is-capitalism-incompatible-with-effective-climate-change-action/>

³Ibid.

⁴ Sustainable development is defined in this essay as a level of growth wherein the needs of the current generation are met without reducing the ability of the future generation to do the same. In practice, sustainable development usually entails lower and more efficient resource use, and lower waste production.

⁵ Andrew, S. (Nov 26, 2019). Countries are not doing enough to keep Earth’s temperature from rising to near catastrophic levels, a UN report says. *CNN*. Retrieved from <https://edition.cnn.com/2019/11/26/us/climate-change-un-emissions-report-2019-trnd/index.html>.

more firms to achieve sustainability. At the same time, firms must remain profitable to continue providing workers with jobs and wages, and consumers with products.

Through this essay, we demonstrate that environmental sustainability can make economic and business sense, enabling firms to maintain or even increase profitability in the short and long term. Further, we propose guiding principles for firms to measure their environmental imprint and set practical and meaningful targets in sustainability management. The infographic below summarises our points.

RECONCILING SUSTAINABILITY WITH PROFITABILITY

OUR THESIS

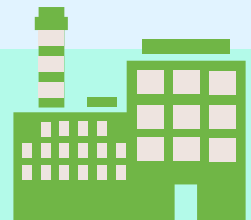
Promoting sustainability and profitability is a **non-zero-sum game**.

THREE CHANGES to promote sustainability and profitability

1

Changing the Production Method:

Firms with efficient means of production accrue cost savings and consume resources more sustainably.



Changing the Product:

Products can be made from recycled materials, and/or be recycled themselves in closed-loop supply chains.

2

3

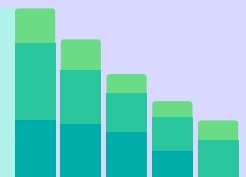
Changing the Revenue Model:

Product-Service System revenue models incentivise product functionality and reuse over sheer volume.



CALCULATING a firm's environmental footprint meaningfully

Upon receiving composite sustainability ratings, firms must discern the **relative significance** of each footprint component and decide which to prioritise. With this in mind, firms can then set goals for sustainability.



FOUR CRITERIA for practical and meaningful sustainability goals

Setting **practical** goals

Economic and Managerial Incentives:

Targets should enable firms to increase profits, and executive compensation can be tied to key sustainability indicators.

Maintaining Transparency:

Transparent sustainability statistics increase recognition, attract investment and encourage stakeholder dialogue.

Setting **meaningful** goals

Prioritising Significant Areas:

To maximise impact, firms should focus on the most significant components of their environmental footprint.

Ensuring Scalability:

To ensure long-term significance, targets should scale with a firm's plans to expand or contract its scale of operations.



CHAPTER II

Reconciling Sustainability with Economic and Business Sense

2.1 Defining Sustainability and Profitability

For this essay's purposes, a practice implemented by a firm is sustainable if it accomplishes one or both of the following goals: a reduction in the consumption of inputs, especially non-renewable ones, and a reduction in the amount of waste by-products produced in the good or service's consumption or production.

We then use profitability as a metric for economic and business sense, where a practice must allow a firm to either reap immediate short-term profits or accrue long-term profits that offset short-term losses. Profits can be gained through a reduction in production costs, an increase in revenue, or both.

2.2 Sustainable and Profitable Changes

In accordance with the above metric, we propose three changes firms can implement that are simultaneously sustainable and profitable.

2.2.1 Changing the Production Process

Firms can adopt more efficient production processes that require a lower quantity of inputs and produce lower amounts of waste. We identify two main ways of doing so: replacing old capital goods with more technologically advanced and efficient ones, or adopting entirely new production techniques like process integration⁶ or using energy-optimising AI.

Both these methods lower resource consumption and waste production, reducing production costs. However, this would only increase a firm's profitability in the long term once the initial cost of adopting these new processes has been recouped.

⁶ Unit Manufacturing Processes: Issues and Opportunities in Research (1995), Chapter 8: Integrated Processes, 111.

In the short term, the initial unaffordability of some changes, like procuring efficient, high-tech machinery, threatens short-term profitability, particularly for SMEs that lack large cash reserves. However, this issue can be resolved if firms adopt a two-pronged approach by making minor and cheaper tweaks to their existing production process to optimise resource use and accrue cost-savings, before using the returns to embark on more expensive changes later.⁷ For instance, Shree Cement, an Indian cement company, initially employed relatively inexpensive recycling methods to decrease resource consumption before pursuing more expensive conservation efforts, like buying big-ticket electrical plants to further reduce its environmental footprint and operating costs (see **Annex A**).

2.2.2 Changing the Product

Firms can also render their products themselves environmentally friendly by altering their design. This may be accomplished by incorporating eco-friendly or *recycled* materials in the product's creation, or rendering the product itself *recyclable*—that is, adopting a cradle-to-cradle design.

Doing so allows firms to capitalise on the trend of green consumerism,⁸ where an increasing proportion of consumers preferentially purchase products perceived to be environmentally friendly, even if their prices are higher than alternatives.⁹ Profit may be secured in the short run as goods appealing to consumers' tastes would experience higher demand, while in the long run, increased consumer loyalty would allow a firm to raise prices while retaining its consumer base. However, firms must ensure that the 'greenness' of a product is made sufficiently evident to consumers through marketing campaigns and product labelling:¹⁰ Adidas, for instance, has been incorporating recycled ocean plastic in several product lines since 2015, marketing their efforts well to consumers in the process (see **Annex B**).

⁷Haanaes, K., Michael, D., Jurgens, J., Rangan, S. (March, 2013). Making sustainability profitable. *Harvard Business Review*. Retrieved from <https://hbr.org/2013/03/making-sustainability-profitable>.

⁸ Young, K. (Oct 17, 2018). The rise of Green Consumerism: What do brands need to know? *Global Web Index*. Retrieved from <https://blog.globalwebindex.com/chart-of-the-week/green-consumerism/>.

⁹ Choi, Sungchul, and Ng, Alex. "Environmental and Economic Dimensions of Sustainability and Price Effects on Consumer Responses." *Journal of Business Ethics* 104, no. 2 (2011): 269-82. Accessed April 10, 2020.

¹⁰Woolverton, Andrea, and Carolyn Dimitri. "Green Marketing: Are Environmental and Social Objectives Compatible with Profit Maximization?" *Renewable Agriculture and Food Systems* 25, no. 2 (2010): 90-98. Accessed April 2, 2020.



Figure 2.1: Percentages of consumers surveyed across different age groups willing to pay more for eco-friendly products.¹¹

In some cases, using eco-friendly materials in a product's design can itself make manufacturing more affordable. One notable example is aluminium: recycled aluminium is vastly cheaper to obtain than virgin aluminium. It is hence seeing increased popularity in the automotive industry as it enables closed-loop supply operations, where aluminium is incorporated into the design of new vehicles to allow for the reuse of scrap aluminium from old ones. (see **Annex B**).¹²

¹¹ Young, K. (Oct 17, 2018). The rise of Green Consumerism: What do brands need to know? *Global Web Index*. Retrieved from <https://blog.globalwebindex.com/chart-of-the-week/green-consumerism/>.

¹² Ayres, M. (Jan 15, 2016). The future for aluminium recycling. *Automotive World*. Retrieved from <https://www.automotiveworld.com/articles/future-aluminium-recycling/>.

2.2.3 Changing the Revenue Model

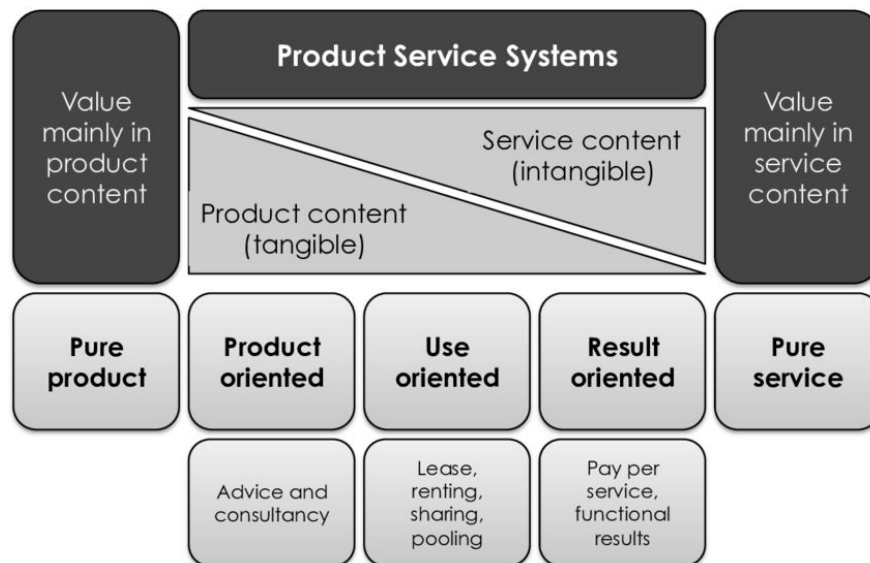


Figure 2.2: Categorisation of product-service systems (PSS) showing a continuum from a tangible pure product to an intangible pure service.¹³

Firms can also alter their revenue models—frameworks of extracting financial income—to reconcile profitability with sustainability. One such way is to adopt a result-oriented Product-Service System (PSS) revenue model, where firms offer an integrated system of product and service to sell “functionality instead of product”. This means that a firm earns revenue when consumers pay for the *output or result* of a product rather than product *ownership*, which remains with the firm.¹⁴

A PSS reduces resource use through two means. Firstly, it incentivises firms to maximise product lifespan and minimise manufacturing, since functionality rather than production volume determines profitability. Secondly, End-of-Life (EoL) strategies that optimise resource use are encouraged. Firms retain ownership of units even after they no longer function, meaning that

¹³Bertoni, Alessandro. (March 2012). “Value Assessment Capabilities in Early Product Service Systems Development: a study in the aerospace industry.” Blekinge Institute of Technology. Retrieved from https://www.researchgate.net/publication/260244173_Value_Assessment_Capabilities_in_Early_Product_Service_Systems_Development_a_study_in_the_aerospace_industry.

¹⁴ Remanufacturing in the Circular Economy: Operations, Engineering and Logistics, Nabil Nasr, 2019, 190-197.

they are incentivised to use EoL strategies like remanufacturing or aforementioned closed-loop supply systems to maximise value extraction.¹⁵

PSS promises increased profitability as well. In the short run, reduced resource use would lower production costs. Moreover, in the longer term, the increased range of services that firms adopting a PSS might offer, such as maintenance and repair to upkeep performance throughout a product's lifespan, may yield additional revenue.



English translation

Circular lighting cycle

1. You get lighting for a fixed monthly amount. You do not need to buy any light fixture.
2. Management and maintenance are taken care of by Philips.
3. Philips recovers all the lights and takes care of recycling.
4. New cycle and client satisfaction.

Benefits (from left to right)

- No investment. Cost reduction thanks to a sustainable lighting plan.
- Energy consumption greatly reduced by high-quality sustainable lighting.
- Lower CO₂ emissions.
- Optimal use of raw materials.

Figure 2.3: Illustration of the principle of Philips' Pay-per-Lux or Circular Lighting result-oriented PSS system (see **Annex C**).¹⁶

In practice, several firms, like Philips, have experimented with PSS models to balance sustainability with profitability (see **Annex C**).

¹⁵ Spray-On Socks: Ethics, Agency, and the Design of Product Service Systems, Taylor, Design Issues (2013), 29 (3), 52-63.

¹⁶ Athanassiadis, Aristide. (Nov, 2017). "Economie Circulaire dans le secteur de la Construction a Bruxelles: Etats des lieux, enjeux et modele a venir." Universite Libre de Bruxelles. Retrieved from https://www.researchgate.net/figure/Illustration-du-principe-Pay-per-Lux-de-Philips-84_fig17_321156948.

2.3 The Role of External Stakeholders

Admittedly, the above means of increasing a firm's sustainability are not always profitable in and of themselves. Rather, external parties like the government and investors may render such methods financially viable, *mutatis mutandis*.

The government can fund research and development to render the aforementioned methods affordable or accessible to firms. Firms may be averse to embarking on self-funded innovation due to high initial costs, or rival businesses copying said innovations and competing away profits. However, firms are incentivised to adopt government-provided research and development to increase their competitive advantage without bearing the costs of financing said research themselves.

Moreover, incentives such as taxes and subsidies can be used to 'artificially' render these methods profitable. Non-renewable inputs could be taxed and the revenue used to subsidise sustainable ones, encouraging firms to use the latter in cases where, without taxes and subsidies, non-renewable inputs would be cheaper.¹⁷

Additionally, regulations can be implemented to necessitate firms' adoption of sustainable measures. A 2018 crackdown on green regulations by the Chinese government, for instance, forced Japanese firm Toppan Printing to install new systems for emissions treatment, reducing its environmental footprint to acceptable levels.¹⁸

¹⁷ Auld, Douglas. "Tax and Subsidy Policies to Encourage the Use of Recyclable Material." *Journal of Environmental Assessment Policy and Management* 17, no. 2 (2015): 1-9. Accessed April 2, 2020.

¹⁸ Uematsu, M. (May 29, 2018). China's pollution controls catch foreign companies flat-footed. *Nikkei Asian Review*. Retrieved from <https://asia.nikkei.com/Business/Business-trends/China-s-pollution-controls-catch-foreign-companies-flat-footed>.

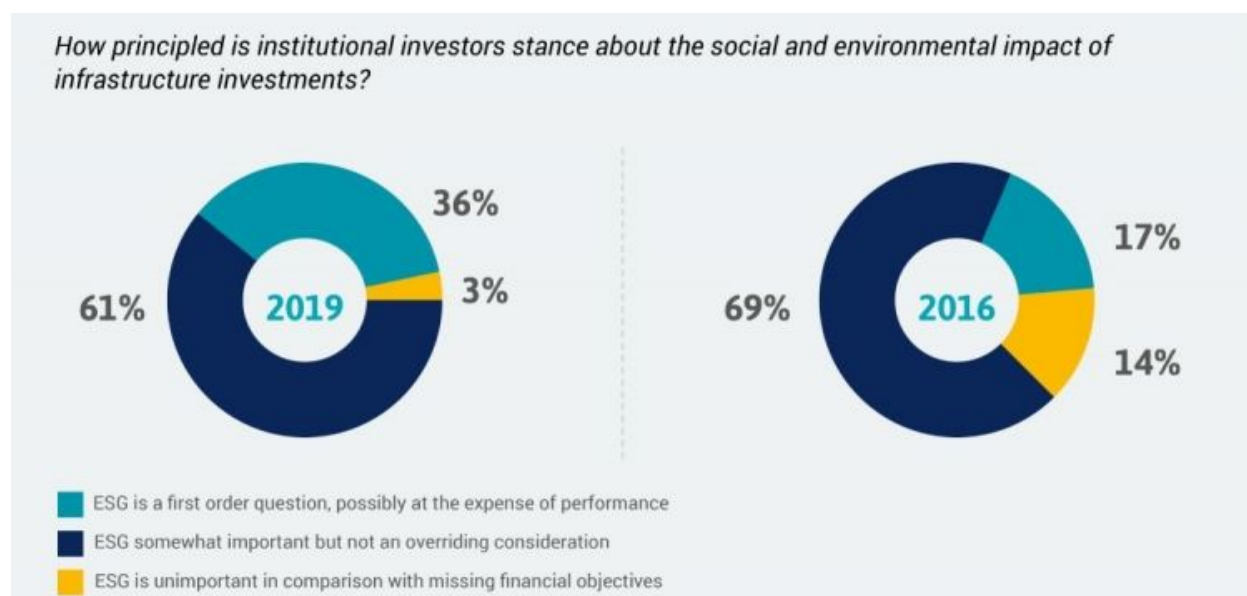


Figure 2.4: Global Infrastructure Hubs’ 2019 Global Infrastructure Investor Survey reflecting the increasing importance of ESG to investors.¹⁹ Of note, a significant and increasing portion of investors consider ESG a “first order question, possibly at the expense of performance”.

The increasing trend of environmentally-conscious investment makes sustainability management practices profitable too. Environment Social Governance (ESG) ratings—of which sustainability is a major component—have recently become one of the most significant indicators investors consider.²⁰ They recognise that products produced by high ESG companies could experience higher demand due to green consumerism, and lack exposure to stranded assets.²¹ Ergo, the more sustainable a firm, the more likely it is to receive capital from third-party investors.

¹⁹ Hong, S. (July 31, 2019). What’s next for ESG and investment decisions? *World Bank Blogs*. Retrieved from <https://blogs.worldbank.org/ppps/whats-next-esg-and-investment-decisions>.

²⁰ Ibid.

²¹ Stranded assets are assets that suffer premature or unexpected devaluation. In this context, they refer to environmentally unsustainable assets like fossil fuels that face devaluation because of, among other things, the implementation of strict government regulations, and its finite quantity.

CHAPTER III

Setting Targets for Sustainability Management

In setting targets for sustainability management, firms face two key questions: How can a firm measure its environmental footprint? And using these measurements, what is a practical and meaningful sustainability target to set? This chapter addresses both questions.

3.1 Measuring Environmental Footprint

The measurement of a firm's environmental footprint is significant on two counts. Firstly, it lets a firm evaluate its sustainability management prior to goal-setting, allowing it to set goals realistically based on current performance. Secondly, it quantifies the progress of a firm in meeting sustainability management targets. This is particularly useful in attracting environmentally-conscious investors and deciding on future development plans.

Measuring a firm's environmental impact is surprisingly problematic. Firms contract rating agencies to measure and rate a firm's sustainability management through composite corporate Sustainability Rating Tools (SRT).²² However, results from different agencies diverge—MIT found that the correlation of ESG ratings²³ across different agencies was only 0.61 (a relatively low positive correlation).²⁴ This divergence occurs as different ratings have different scopes, use different indicators to measure components, or assign different weightages to components (see **Annex D**). Consequently, firms experience “aggregate confusion” when measuring sustainability management.²⁵

²² Siew, Renard Y.J. (Apr 27, 2015). “A Review of Corporate Sustainability Reporting Tools (SRTs).” School of Civil and Environmental Engineering, University of New South Wales. Retrieved from <https://www.sciencedirect.com/science/article/pii/S0301479715302620>.

²³ As alluded to in Chapter II, ESG ratings are a type of SRT that firm owners and investors use to measure a firm's environmental impact, among other things.

²⁴ Mayor, T. (Aug 26, 2019). Why ESG ratings vary so widely (and what you can do about it). *Massachusetts Institute of Technology, Sloan Management School*. Retrieved from <https://mitsloan.mit.edu/ideas-made-to-matter/why-esg-ratings-vary-so-widely-and-what-you-can-do-about-it>. Of note, the MIT study points out that other ratings, like credit ratings from Moody's and Standard and Poor's are correlated at 0.99, meaning that ESG rating agencies cause “aggregate confusion”.

²⁵ Edmans, A. (Feb 17, 2020). The inconsistency of ESG ratings: Implications for investors. *Eco-Business*. Retrieved from <https://www.eco-business.com/opinion/the-inconsistency-of-esg-ratings-implications-for-investors/>.

This issue underscores the necessity for firms to be discretionary when measuring sustainability. Upon receiving SRT reports, they should interrogate which components are to be prioritised over others. Firms should also ensure that indicators used to measure components in a composite rating are direct rather than proxy indicators. If possible, firms could also cross-reference multiple SRT reports.

3.2 Setting Practical and Meaningful Targets

After a particular firm has measured its present environmental footprint, this essay proposes the following criteria in ensuring that future targets for sustainability strike a balance between being meaningful—that is, creating a significant positive environmental impact—and being practical, meaning reasonably achievable.

3.2.1 Prioritising Significant Areas

Firstly, to ensure the largest possible environmental boon, targets should focus on the firm's most significant area of environmental impact. A 2013 survey by engineering firm CH2M Hill of 23 leading companies in sustainability management found that most adhered to this principle: companies in the oil and gas industry, for example, centered strategies around areas such as greenhouse gas emissions and energy efficiency, rather than improper waste disposal.²⁶

²⁶ "Sustainability Goals that Make an Impact." (July, 2013). CH2M HILL. Retrieved from <https://www.jacobs.com/sites/default/files/content/article/attachments/CH2M-HILL-sustainability-goals-imp-act-july-2013.pdf>.

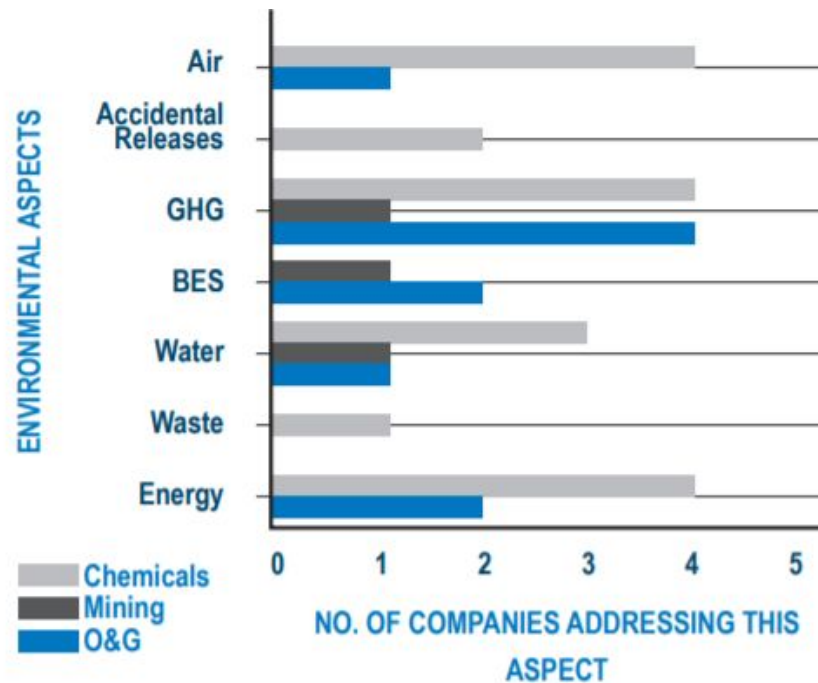


Figure 3.1: Bar graph showing the number of targets set around different environmental aspects by companies across three different sectors.²⁷

3.2.2 Ensuring Scalability

Secondly, to preserve long-term significance, targets should scale with a firm's plans to expand or downsize. In the long run, as a firm's scale of operations changes, so would its environmental footprint: targets should then increase or decrease in accordance with a firm's environmental impact as reflected by indicators to ensure they remain significant yet within the realm of possibility.

3.2.3 Providing Economic and Managerial Incentives

Thirdly, a practical target has to make economic and managerial sense. An economically viable target would, as per means outlined in **Chapter II**, enable the firm to make short-run or long-run profit without incurring unreasonable startup costs. Beyond this, to incentivise the implementation of sustainability strategies by a firm's management, executive compensation

²⁷ Ibid.

can be tied to key sustainability indicators, and regular reporting to the board of directors encouraged.²⁸

3.2.4 Maintaining Transparency

Lastly, targets should be transparent to the public and tracked regularly. This would engender three positive impacts: Firstly, the likelihood of receiving awards and recognition by third-party sustainability indices would be raised, thus increasing loyalty among green consumers. Secondly, as detailed in **Chapter II**, the increased salience of a firm's sustainability efforts would also attract environmentally-conscious investors. Thirdly, publicly disclosed goals encourage dialogue among a firm's shareholders which may further innovation, sustainability-related or otherwise, and reduce the chances of shareholder resistance to environmentally-oriented change.²⁹

²⁸ Ibid.

²⁹ Ibid.

CHAPTER IV

Our Conclusion

Tension need not exist between sustainability and profitability. It is indeed possible for not only short-term but also long-term gains to be reaped from sustainable business practices. Namely, firms may opt to make greener changes to their production methods, products, or revenue models. In situations where these methods are not profitable *per se*, pressure from the government and investors could still incentivise their adoption.

When measuring the success of these initiatives, firms must corroborate their measurements and discern between the different components of SRTs, focusing on those deemed more crucial. With these measurements in mind, firms should maximise the practicality and meaningfulness of sustainability goals by focusing on key areas of environmental impact, ensuring scalability, establishing economic and managerial incentives, and promoting transparency.

As the weight of climate change's consequences grows heavier and heavier on the shoulders of future generations with each successive day of inaction, it is Imperative that firms work towards a greener future not just for economic benefit, but for the collective good of society.

1998 words

REFERENCES

Websites

Adidas X Parley Collection. *Adidas Group*. Retrieved from <https://www.adidas.com.sg/parley>.

Andrew, S. (Nov 26, 2019). Countries are not doing enough to keep Earth's temperature from rising to near catastrophic levels, a UN report says. *CNN*. Retrieved from <https://edition.cnn.com/2019/11/26/us/climate-change-un-emissions-report-2019-trnd/index.html>.

Ayres, M. (Jan 15, 2016). The future for aluminium recycling. *Automotive World*. Retrieved from <https://www.automotiveworld.com/articles/future-aluminium-recycling/>.

Aziz, A. (Oct 29, 2018). The Power of Purpose: How Adidas will make \$1 billion helping solve the problem of ocean plastic. *Forbes*. Retrieved from <https://www.forbes.com/sites/afdhelaziz/2018/10/29/the-power-of-purpose-how-adidas-will-make-1-billion-helping-solve-the-problem-of-ocean-plastic/#25360fc5d215>.

Bain, M. (Sept 26, 2019). France's luxury titan criticised Greta Thunberg at a sustainability event. *Quartz*. Retrieved from <https://qz.com/1716828/lvmh-ceo-criticizes-greta-thunberg-at-sustainability-event/>.

Cerry, P. (Jan 25, 2019). Adidas plans to make a whopping 11 million pairs of sneakers in 2019 with recycled ocean plastic. *Footwear News* 75. Retrieved from <https://footwearnews.com/2019/focus/athletic-outdoor/adidas-parley-for-oceans-recycled-plastic-shoes-1202735137/>.

Edmans, A. (Feb 17, 2020). The inconsistency of ESG ratings: Implications for investors. *Eco-Business*. Retrieved from <https://www.eco-business.com/opinion/the-inconsistency-of-esg-ratings-implications-for-investors/>.

Feifei, Li and Polychronopoulos, Ari. (Jan, 2020). What a Difference an ESG Ratings Provider Makes! *Research Affiliates*. Retrieved from https://www.researchaffiliates.com/en_us/publications/articles/what-a-difference-an-esg-ratings-provider-makes.html.

Haanaes, K., Michael, D., Jurgens, J., Rangan, S. (March, 2013). Making sustainability profitable. *Harvard Business Review*. Retrieved from <https://hbr.org/2013/03/making-sustainability-profitable>.

Hong, S. (July 31, 2019). What's next for ESG and investment decisions? *World Bank Blogs*. Retrieved from <https://blogs.worldbank.org/ppps/whats-next-esg-and-investment-decisions>.

Mayor, T. (Aug 26, 2019). Why ESG ratings vary so widely (and what you can do about it). *Massachusetts Institute of Technology, Sloan Management School*. Retrieved from

<https://mitsloan.mit.edu/ideas-made-to-matter/why-esg-ratings-vary-so-widely-and-what-you-can-do-about-it>.

Philips' transition from linear to Circular Economy. (Dec 13, 2013). *Philips Innovation Services*. Retrieved from <https://www.innovationservices.philips.com/news/philips-transition-linear-circular-economy/>.

Turner, A. (Sept 3, 2019). Is capitalism incompatible with effective climate change action? *World Economic Forum*. Retrieved from <https://www.weforum.org/agenda/2019/09/is-capitalism-incompatible-with-effective-climate-change-action/>.

Uematsu, M. (May 29, 2018). China's pollution controls catch foreign companies flat-footed. *Nikkei Asian Review*. Retrieved from <https://asia.nikkei.com/Business/Business-trends/China-s-pollution-controls-catch-foreign-companies-flat-footed>.

Young, K. (Oct 17, 2018). The rise of Green Consumerism: What do brands need to know? *Global Web Index*. Retrieved from <https://blog.globalwebindex.com/chart-of-the-week/green-consumerism/>.

Books, Journals and Papers

Athanassiadis, Aristide. (Nov, 3017). "Economie Circulaire dans le secteur de la Construction a Bruxelles: Etats des lieux, enjeux et modele a venir." Universite Libre de Bruxelles. Retrieved from https://www.researchgate.net/figure/Illustration-du-principe-Pay-per-Lux-de-Philips-84_fig17_32115694.

Auld, Douglas. "Tax and Subsidy Policies to Encourage the Use of Recyclable Material." *Journal of Environmental Assessment Policy and Management* 17, no. 2 (2015): 1-9. Accessed April 2, 2020.

Bertoni, Alessandro. (March 2012). "Value Assessment Capabilities in Early Product Service Systems Development: a study in the aerospace industry." Blekinge Institute of Technology. Retrieved from https://www.researchgate.net/publication/260244173_Value_Assessment_Capabilities_in_Early_Product_Service_Systems_Development_a_study_in_the_aerospace_industry.

Choi, Sungchul, and Ng, Alex. "Environmental and Economic Dimensions of Sustainability and Price Effects on Consumer Responses." *Journal of Business Ethics* 104, no. 2 (2011): 269-82. Accessed April 10, 2020.

Crasto, Cheryl George, Daisy Mui Hung Kee, Alyssia The Yi Huan, Chen Woan Xin, Hoon Xian Juin, Lau Kiew Man, and Divya Pandey. "Product innovation by Adidas Group through Sustainability." *Journal of the Community Development in Asia*, vol. 3, no. 1 (2020). Accessed June 1, 2020.

Remanufacturing in the Circular Economy: Operations, Engineering and Logistics, Nabil Nasr, 2019, 190-197.

Siew, Renard Y.J. (Apr 27, 2015). "A Review of Corporate Sustainability Reporting Tools (SRTs)." School of Civil and Environmental Engineering, University of New South Wales. Retrieved from <https://www.sciencedirect.com/science/article/pii/S0301479715302620>.

Spray-On Socks: Ethics, Agency, and the Design of Product Service Systems, Taylor, Design Issues (2013), 29 (3), 52-63.

Unit Manufacturing Processes: Issues and Opportunities in Research (1995), Chapter 8: Integrated Processes, 111.

Woolverton, Andrea, and Carolyn Dimitri. "Green Marketing: Are Environmental and Social Objectives Compatible with Profit Maximization?" Renewable Agriculture and Food Systems 25, no. 2 (2010): 90-98. Accessed April 2, 2020.

Company White Papers, Presentations and Press Releases

"Minimise your environmental footprint and create instant savings." Philips Industry. Retrieved from https://images.philips.com/is/content/PhilipsConsumer/PDFDownloads/United%20Kingdom/ODL120171031_001-PDF-en_GB-7036_Circular_Lighting_Digi_WTO_01.pdf.

"Q&A Adidas X Parley Partnership." *Adidas Group*. Retrieved from https://www.adidas-group.com/media/filer_public/16/29/16299d3c-ad48-4f62-a8ef-c44c25fa4e5a/adidas_x_parley_qa_website_en.pdf.

"Sustainability Goals that Make an Impact." (July, 2013). CH2M HILL. Retrieved from <https://www.jacobs.com/sites/default/files/content/article/attachments/CH2M-HILL-sustainability-goals-impact-july-2013.pdf>.

ANNEX A

Changing the Production Process

(a) Replacing capital goods while remaining profitable in the long and short terms

Shree Cement³⁰ is an example of an Indian firm that has attained environmental sustainability and profitability by replacing old capital goods with technologically advanced and more efficient ones through the two-pronged approach of accruing cost-savings before spending on expensive equipment elaborated upon in **Chapter II**. By doing so, it managed to sidestep the problem of the initial unaffordability of adopting efficient technology and the threat that it posed to short-term profit.

It first made minor adjustments to its production process to achieve its sustainability goal without spending large amounts of money on new investments. For instance, it replaced a material called clinker with waste coal slag and fly ash recycled from the operation of kilns used in the production of cement to reduce energy consumption and the cost of production. After accumulating significant cost-savings from this production method, Shree was eventually able to invest in more expensive capital, like an exhaust-powered electrical plant, to produce even more cement while consuming less input. Overall, it currently produces cement using 9% less energy than an average Indian manufacturer and 15% less than the global average, proving its high level of environmental sustainability. At the same time, Shree remains highly profitable—it is one of the top five cement producers in India and had a revenue in excess of \$809 million in 2009.

(b) Adopting new techniques

Zhangzidao Fishery Group³¹ of Dalian, China adopted a low-cost technique known as integrated multitrophic aquaculture to accrue cost savings in the short term. It created a balanced ecosystem of scallops, sea cucumbers, sea urchins, abalone and other interlinked species instead of maximising production of a single species. This method of production allows

³⁰ Haanaes, K., Michael, D., Jurgens, J., Rangan, S. (March, 2013). Making sustainability profitable. *Harvard Business Review*. Retrieved from <https://hbr.org/2013/03/making-sustainability-profitable>.

³¹ Ibid.

Zhangzidao to be more sustainable by reducing the amount of food needed to be sourced externally to feed the species that the firm produces, and the quantity of waste generated as waste produced by some species can be converted into food for other species in the ecosystem. Consequently, the firm also cuts down on its cost of production and increases profitability because it spends less on waste management and buying feed for its species. In addition, the greater variety of species produced means additional sources of revenue for the firm. Case in point, Zhangzidao sustained a compound annual growth rate of 40% compared to the average of 13% of other firms in the industry, hence proving the profitability and business viability of its decision to change its production process.

ANNEX B

Changing the Product

(a) Incorporating recycled materials into a product's make

Sportswear firm Adidas, in collaboration with nonprofit organisation Parley for the Oceans, has garnered widespread recognition for the incorporation of recycled marine plastic pollution in several of their product lines.³² Plastic pollution is collected from the sea and woven into synthetic yarns, replacing virgin plastic used in Adidas' footwear.³³ In terms of business, this collaboration has proven highly profitable, as evidenced by Adidas' rapidly expanding sales targets for Parley footwear: 1 million pairs in 2017 grew to 5 million in 2018, and 11 million in 2019.³⁴ According to Adidas, the Parley Ocean Plastic used in one pair of shoes removes 11 plastic bottles' worth of pollution from the sea; the environmental boon created by Adidas is, thus, undeniable.³⁵ Going beyond positive environmental impacts, however, Adidas also understands the need to increase the salience of their environmentally-friendly initiatives through marketing in order to fully profit from the trend of green consumerism: campaigns such as the Run for the Oceans project, a series of Adidas-hosted marathons in major cities, effectively drew attention to its Parley footwear.³⁶

³² Crasto, Cheryl George, Daisy Mui Hung Kee, Alyssia The Yi Huan, Chen Woan Xin, Hoon Xian Juin, Lau Kiew Man, and Divya Pandey. "Product innovation by Adidas Group through Sustainability." *Journal of the Community Development in Asia*, vol. 3, no. 1 (2020). Accessed June 1, 2020.

³³ Adidas X Parley Collection. *Adidas Group*. Retrieved from <https://www.adidas.com.sg/parley>.

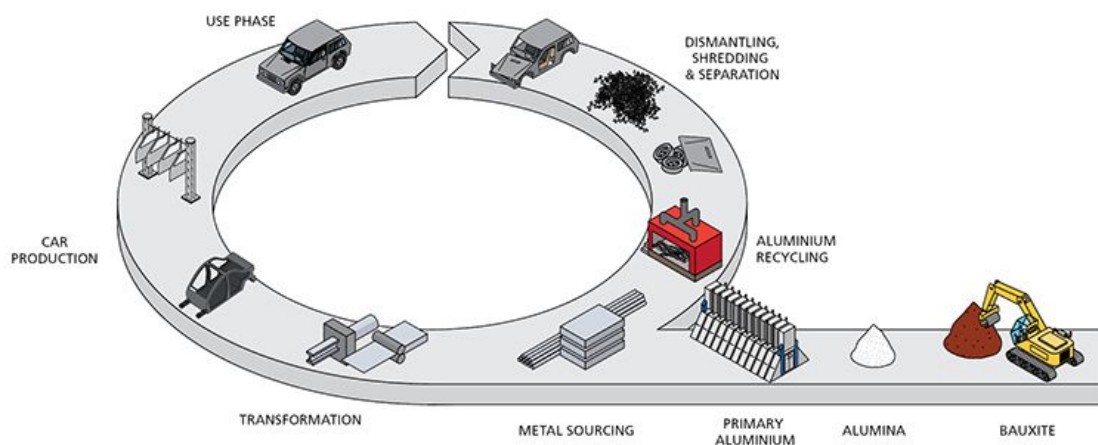
³⁴ Cerry, P. (Jan 25, 2019). Adidas plans to make a whopping 11 million pairs of sneakers in 2019 with recycled ocean plastic. *Footwear News* 75. Retrieved from <https://footwearnews.com/2019/focus/athletic-outdoor/adidas-parley-for-oceans-recycled-plastic-shoes-1202735137/>.

³⁵ "Q&A Adidas X Parley Partnership." *Adidas Group*. Retrieved from https://www.adidas-group.com/media/filer_public/16/29/16299d3c-ad48-4f62-a8ef-c44c25fa4e5a/adidas_x_parley_qa_website_en.pdf.

³⁶ Aziz, A. (Oct 29, 2018). The Power of Purpose: How Adidas will make \$1 billion helping solve the problem of ocean plastic. *Forbes*. Retrieved from <https://www.forbes.com/sites/afdhelaziz/2018/10/29/the-power-of-purpose-how-adidas-will-make-1-billion-helping-solve-the-problem-of-ocean-plastic/#25360fc5d215>.

(b) Rendering the product itself recyclable

Automotive Original Equipment Manufacturers (OEMs) around the world are collaborating with aluminium suppliers to create closed-loop supply chains, where scrap aluminium sourced from old vehicles is processed and used to create parts for new ones. Novelis, a major supplier of recycled aluminium, recently expanded its facilities in Germany, Brazil, South Korea, and the UK, bringing the proportion of recycled aluminium used as inputs for Novelis products up to 50% of its total aluminium inputs. The aluminium is then used to create automotive parts purchased by major firms such as Ford and Jaguar Land Rover. Though an amount of primary aluminium is still used to manufacture automotive parts, large steps are evidently being taken towards fully closing the loop for aluminium supply chains.³⁷



*Figure B-1: The life-cycle of aluminium in the automotive industry.*³⁸

³⁷Ayres, M. (Jan 15, 2016). The future for aluminium recycling. *Automotive World*. Retrieved from <https://www.automotiveworld.com/articles/future-aluminium-recycling/>.

³⁸ Ibid.

ANNEX C

Changing the Revenue Model

The Philips “Pay-per-Lux” lighting model, also known as “Circular Lighting”, is a result-oriented product-service system (PSS) in which the “end product” of light is sold rather than any hardware. Within this model, customers contract Philips to offer lighting solutions without owning any hardware. Customers pay for the *provision of light* instead of ownership of light installations. Philips has used this PSS model for contracts with the Washington DC metro system, the UK’s National Union of Students and the Netherlands’ RAU Architects, and the Amsterdam Schipol Airport, demonstrating that it is indeed a model that makes business sense.³⁹

The “Pay-per-Lux” model is more environmentally sustainable than the conventional method of selling physical light installations on a number of counts. First, because Philips is contracted to provide light rather than a certain quantity of light installations, it is incentivised to produce a durable lighting system so it does not spend extra cost to maintain or replace faulty installations. Cumulatively, this means that less resources are used by Philips. Second, light systems designed under this PSS incorporate as much natural sunlight as possible, reducing the quantity of hardware that needs to be installed and minimising the cost incurred by Philips. This ensures that there is no surplus of material or energy in the lighting system, hence making it as efficient and environmentally sustainable as possible. Third, since Philips retains ownership of the hardware, it can reuse raw materials from lighting products even at the end of a contract period, thereby facilitating a circular remanufacturing process that reduces the total quantity of resources consumed.

More than that, the model makes business sense as well. It opens up a new stream of revenue in the repair and maintenance of light fixtures, thus increasing profitability. The model also gives Philips flexibility in designing an optimal lighting system that uses the least amount of resources to illuminate a given area such as by incorporating natural light. By doing so, Philips is able to cut down on the costs it incurs in providing physical light fixtures. In addition, remanufacturing

³⁹ “Minimise your environmental footprint and create instant savings.” Philips Industry. Retrieved from https://images.philips.com/is/content/PhilipsConsumer/PDFDownloads/United%20Kingdom/ODLI20171031_001-PDF-en_GB-7036_Circular_Lighting_Digi_WTO_01.pdf.

lets Philips save costs as it does not have to spend extra money to obtain new raw materials for its production process.⁴⁰

⁴⁰ Philips' transition from linear to Circular Economy. (Dec 13, 2013). *Philips Innovation Services*. Retrieved from <https://www.innovationservices.philips.com/news/philips-transition-linear-circular-economy/>.

ANNEX D

“Aggregate Confusion” in Facebook ESG Ratings

A paper published by Research Affiliates LLC, an investment management service provider, in 2020 compared the ESG ratings assigned to Facebook by two well-known ESG ratings providers.⁴¹ It specifically looked at how the environmental sustainability aspect of the ESG ratings differed significantly across the two agencies. As seen in Figure D-1, Provider 1 rated Facebook highly in the 90th percentile and well above the average, as evidenced by its Z score of 1.29. On the contrary, Provider 2 rated Facebook poorly in the 39th percentile and below the average, with a Z score of -0.45.

Facebook Environmental Rating Breakdown by Provider as of December 31, 2017

Provider 1				Provider 2			
Category	Score	Weight		Category	Score	Weight	
Environmental Strategy	37	33.0%		Operations Incidents	100	22.3%	
Minimizing Environmental Impacts from Energy Use	68	33.0%		Green Procurement Policy	0	10.0%	
Management of Environmental Impacts from Personal Transportation	30	33.0%		Sustainable Products & Services	0	10.0%	
Pollution Prevention	0	0.0%		Environmental Management System	20	6.7%	
Green Products and Services	0	0.0%		Env. Management System (EMS) Cert.	0	6.7%	
Protection of Biodiversity	0	0.0%		Environmental Supply Chain Incidents	100	6.7%	
Protection of Water Resources	0	0.0%		Product & Service Incidents	100	6.7%	
Atmospheric Emissions	0	0.0%		Environmental Policy	0	3.3%	
Waste Management	0	0.0%		Environmental Fines and Penalties	100	3.3%	
Local Pollution	0	0.0%		CDP Participation	0	3.3%	
Impacts of Product Use and Disposal	0	0.0%		Scope of GHG Reporting	0	3.3%	
Supply Chain: Environmental Factors	0	0.0%		GHG Reduction Program	50	3.3%	
				Renewable Energy Program	100	3.3%	
				Carbon Intensity	20	3.3%	
				Carbon Intensity Trend	20	3.3%	
				Renewable Energy Use	100	3.3%	
Provider 1 E Score	45			Provider 1 E Score	51		
Z-Score	1.29			Z-Score	-0.45		
E Score (Percentile)	90.00%			E Score (Percentile)	39.00%		
E Score	0.77			E Score	0.23		

Source: Research Affiliates, LLC.

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Figure D-1: Breakdown by component of Provider 1 and 2's ESG rating of Facebook⁴²

⁴¹Feifei, Li and Polychronopoulos, Ari. (Jan, 2020). What a Difference an ESG Ratings Provider Makes! *Research Affiliates*. Retrieved from https://www.researchaffiliates.com/en_us/publications/articles/what-a-difference-an-esg-ratings-provider-makes.html.

⁴²Ibid.

Ultimately, the divergence between the two ESG ratings mainly boils down to two factors: a difference in scope, and a difference in component weightage. First, the paper identified that several components measured by one provider were not considered at all by the other. Case in point, Provider 1's rating only consists of three broadly-defined categories, namely "Environmental Strategy", "Minimizing Environmental Impacts from Energy Use" and "Management of Environmental Impacts from Personal Transportation". Provider 2's rating, conversely, considers a range of more specific components. Significantly, some components, like "Operations Incidents", which has a weightage of 22.3% in Provider 2's rating, are not captured in any of Provider 1's components. Second, the weightage given to similar components differ vastly between the Providers. Provider 1 assigns "Environmental Strategy" with a weightage of 33% while Provider 2 attaches only 3.3% of weightage to "Environmental Policy" in its rating.

This paper underscores the challenges that business owners face in using SRTs like ESG ratings to determine their level of environmental sustainability. It thus also highlights the necessity for business owners to be discretionary when relying on SRTs, as elaborated upon in **Chapter 3.1.**