

Erasmus Platform for Sustainable Value Creation

# Working paper

## Decision rules for integrated value

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# Abstract

Future-oriented companies manage for integrated value rather than merely for shareholder value to earn their social license to operate. Managing for integrated value involves managing and balancing several types of value (financial, social and environmental) at the same time, often involving trade-offs. Companies need decision rules that help them make investment decisions accordingly.

This article derives model-based decision rules for integrated value. The decision model allows for the prioritisation of specific types of value, in line with a company's purpose. The decision model is tested with several investment projects. It appears that companies can improve their integrated value with the new decision model.

Key words: Capital budgeting, net present value, integrated value, financial capital, social capital, natural capital

JEL codes: G31, G34, G38

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## 1. Introduction

The economic system has brought great prosperity, but its negative social and ecological results are increasingly apparent. There is an urgent need for better outcomes, for social fairness (Stiglitz, Sen and Fitoussi, 2009) and to stay within planetary boundaries (Steffen *et al.*, 2015). Companies are under pressure to move away from the classical shareholder model based on the Friedman Doctrine, which states that the government takes care of societal issues including social equality, healthcare, education and the environment, while companies focus on financial profit maximisation and are only required to adhere to the legal framework (Friedman, 1970).

This model assumes the government can manage social and environmental externalities through policy and regulation. But externalities are inextricably linked to industrial production and are difficult to overcome fully by external regulation, because of asymmetric information (Hart and Zingales, 2017). Companies know the precise consequences of their operations better than external parties and are therefore better placed to reduce or prevent negative effects by adapting their business models.

In the alternative stakeholder model, companies are viewed to be part of wider society (Freeman, 1984). Companies are expected to comply with community expectations to maintain their social license to operate (Deegan, 2002; 2019). The idea of a social license to operate has sparked a new literature on responsible companies, that balance profit and impact (Mayer, 2018; Edmans, 2020). Also in practice, the increased emphasis on stakeholder values has given rise to a new organisation form, the Certified B Corporation (Kim *et al.*, 2016). Benefit corporations, abbreviated as B corps, aim for profit and social and environmental impact.

The emergence of B corps raises the question how to manage these three elements: financial, social and environmental value. Early attempts to do so are the balanced scorecard and the multicapital scorecard, which incorporate financial, social and environmental indicators in a qualitative way into strategy setting and decision-making (Kaplan and Norton, 1997; McElroy and Thomas, 2015). But scorecards do not have a clear system to weigh and aggregate the different indicators.

To address that problem, a more quantitative approach, multiple decision criteria analysis, emerged in the operations research literature (Greco, Figueira and Ehrgott, 2016; Hallerbach and Spronk, 2002). This method allows to weigh different criteria or goals in management decision-making, but not to aggregate the goals.

Recent developments in impact valuation enable companies to measure environmental and social effects and express these in monetised form via cost-based prices (Serafeim, Zochowski and Downing, 2019; De Adelhart Toorop *et al.*, 2019). The monetisation of the different value

components allows aggregation. The concept of integrated value combines financial, social and environmental value in an integrated way (Schoenmaker and Schramade, 2019). In the integrated valuation concept, the decision rule for investments moves from net present value (NPV) of financial flows to integrated present value (IPV) of financial, social and environmental flows.

This article derives a new model for calculating the integrated present value. The theoretical framework builds on the recent literature on responsible companies (Mayer, 2018; Schoenmaker and Schramade, 2019; Edmans, 2020). The decision model allows for the prioritisation of specific types of value, in line with a company's purpose. It also includes rules for remedying any shortfalls. The integrated value model enables us to develop testable propositions that a company's integrated valuation profile can be assessed. These tests are performed with different investment projects. The ultimate test is to assess whether a company is able to improve its integrated value.

The contribution of this article is threefold. First, the article contributes to management decision-making by expanding the net present value rule for investment decisions in order to respect social and planetary boundaries (Ding et al., 2020). Second, the article adds to the literature on corporate governance, which has introduced the concept of long-term value creation (Mayer, 2018). This article makes the concept of long-term value creation operational. Third, the article contributes to recent advances in financial reporting to include sustainability information.<sup>1</sup> The missing link is how to steer investments on this new information, linked to a company's mission. This article aims to fill this gap.

This article is organised as follows. Section 2 contrasts the shareholder and stakeholder approaches and develops the concept of integrated value. Next, section 3 advances our decision model for corporate investments. Section 4 applies the decision model to various settings and types of companies. Finally, section 5 concludes.

## 2. From shareholder value to integrated value

### 2.1 Challenges to shareholder value

In the shareholder model, the goal of the company is to maximise the value of the company. This is the value of the securities provided by the financiers, i.e. shareholders and creditors. Shareholders are in control of the company, because they are residual, non-contractual claimants (Jensen and Meckling, 1976). They get paid after all contractual claims to other stakeholders, such as creditors, employees, customers, and government, are paid. Shareholders thus maximise financial value, after the other stakeholders are satisfied.

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<sup>1</sup> See, for example, the steps of the IFRS to create an International Sustainability Standards Board to set IFRS Sustainability Standards <https://www.ifrs.org/projects/work-plan/sustainability-reporting/>.



The shareholder model is consistent with the argument of Friedman (1970) that 'the business of business is business'. In this view, it is the task of the government to take care of social and environmental concerns. Mehrotra and Morck (2017) discuss several challenges to the shareholder view: contractual and business ethics. First, it is difficult to incorporate all possible future circumstances in contracts with stakeholders. Unforeseen circumstances, including social and environmental externalities, can happen, which give rise to the notion of incomplete contracts (Hart and Moore, 1990). In these cases where the contract does not provide for, the shareholder interest would override the interests of the other stakeholders in the shareholder model.

Second, business ethics concerns are a final line of defence for stakeholders (Mehrotra and Morck, 2017). Obeying the letter of the law regarding the rights of stakeholders can pit shareholder value maximisation against social welfare. Where externalities are important, a narrow focus on shareholder value can create scope for managers making morally dubious decisions. For example, maximising shareholder value ex ante might justify cutting costs and entertaining acceptably small risks of environmental disasters. Even if such a disaster triggers legal actions that bankrupt the committing company, its shareholders are protected by limited liability and so lose only the value of their shares (Shapira and Zingales, 2017).

Although the shareholder model cannot fully satisfy the interests of stakeholders, there are also problems with the stakeholder model (Tirole, 2001). The manager has to serve all interests. Managers can in that case design their own objective functions and run their company in their own interests (Jensen, 2002). Stakeholder theory thus leaves managers unaccountable, as simultaneously optimising several objectives (value to each stakeholder) is difficult to measure and control and these objectives can be directly conflicting. By contrast, the shareholder model has a single roughly measurable objective.

## 2.2 Integrated value

The stakeholder model (Freeman, 1984) states that managers should balance the interests of all stakeholders, which include financial agents (shareholders and debtholders) as well as social agents (consumers, workers, suppliers). Companies seek to create optimal societal value, which requires equal consideration of the various interests. A contemporary stakeholder interpretation takes not only current stakeholders into account, but also future generations. In this way, social and ecological effects can be fully incorporated.

But the stakeholder model scores poorly on accountability because it lacks clear decision-making rules for managing the multiple goals (Tirole, 2001; Bebchuk and Tallarita, 2021). Formal mechanisms, such as co-determination under which employees and possibly other groups along with shareholders elect directors, have proven to be rigid (Coffee, 2020). Moreover, the extent and number of stakeholders evolve over time, while formal mechanisms are static.

An integrated measure that aggregates and balances the different goals of stakeholders can offer the required flexibility, while still keeping management accountable. The concept of integrated value, which combines financial value, social value and environmental value, includes the interests of current and future stakeholders (Schoenmaker and Schramade, 2019). Social value encompasses the impact on employees (human capital) and on (local) communities (social capital), while environmental value measures the impact on the physical environment (natural capital). Recent advances in the field of impact valuation enables companies to measure social and environmental effects and to express these in monetised form via cost-based prices (Serafeim, Zochowski and Downing, 2019; De Adelhart Toorop et al., 2019). While measurements of social and environmental value are improving, assessments of social and environmental value are typically less robust than those of financial value. Few companies use social and environmental assessments explicitly to steer on. In this article, we anticipate the further development of impact valuation to robust indicators that can be used for steering. Section 3 develops decision-making rules that will help companies balance the various types of value and deal with trade-offs.

2.3 Corporate models

Corporate models that adopt the shareholder value paradigm do not account for the social and environmental externalities. The corporate objective is maximising financial value (FV). In terms of value creation, these companies are in the upper half of the value creation matrix: quadrants 1 and 2 of Table 1.

**Table 1: Value creation matrix**

	<b>S+E value destroying</b>	<b>S+E value creating</b>
<b>F value creating</b>	<b>Quadrant 1</b> <b>Overexploitation</b>	<b>Quadrant 2</b> <b>Win-win</b>
<b>F value destroying</b>	<b>Quadrant 3</b> <b>Collapse</b>	<b>Quadrant 4</b> <b>Charity</b>

Source: Schramade (2020).

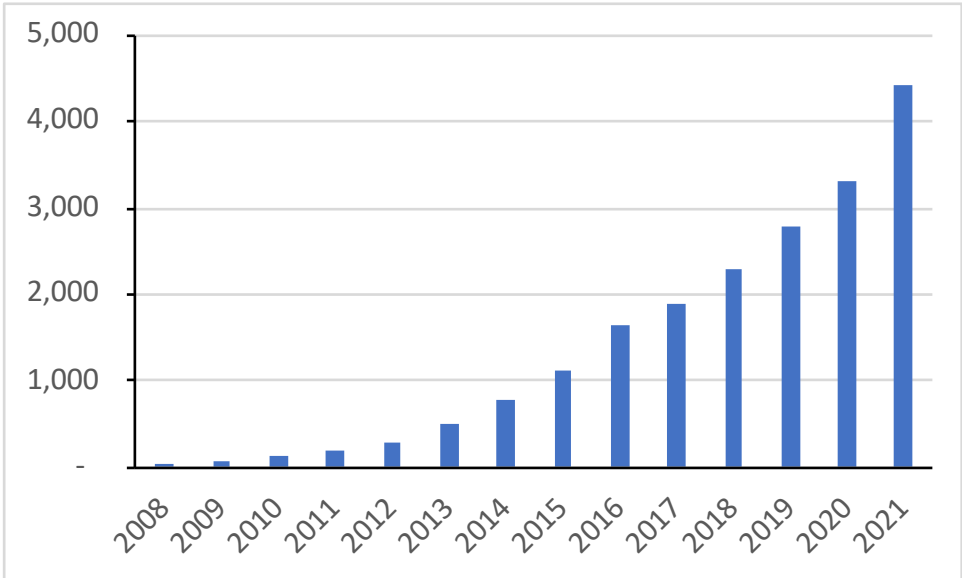
By contrast, corporate models following the stakeholder model aim for positive value for all stakeholders: financial (F), social (S) and environmental (E) stakeholders. In terms of value creation, these companies want to be in quadrant 2 of the value creation matrix in Table 1. To achieve that, the financial, social and environmental value dimensions need to become positive for these companies. Companies that are now in quadrant 1 will have to move to quadrant 2 to remain in business or face collapse (quadrant 3). The desired model for responsible companies is quadrant 2 and they need transition pathways for quadrant 1 and 4

(Kurzack, Schoenmaker and Schramade, 2021). That is a business opportunity for the frontrunners, especially when governments will speed up their rules and taxes to internalise social and environmental externalities. For example, companies such as Philips and Novozymes will benefit from a serious carbon price, as these companies have adopted a strategy aimed at reducing carbon emissions ahead of their competitors (Schoenmaker and Schramade, 2019).

An example of a corporate model that aims to serve all stakeholders is the B corporation, which is a certified company meeting certain social and environmental standards (Kim et al., 2016). The B corporation certification is provided on a private basis to for-profit companies by B Lab, a global non-profit organisation. To be granted certification and to preserve it, companies must receive a minimum score for "social and environmental performance". Public transparency and accountability on balancing profit and purpose are other requirements. Figure 1 shows the exponential rise of certified B corps. The number of B corps has risen from 43 in 2008 to 4,413 in 2021, spanning 77 countries.

However, formal decision-making rules to balance profit and social and environmental impact (purpose) are lacking. The next section develops such rules.

**Figure 1: Number of certified B Corporations**



Source: B Lab

### 3. Integrated value model

The integrated value model combines financial value (FV), social value (SV) and environmental value (EV). This section develops model-based investment decision rules for combining and balancing these values.



### 3.1 Criteria

To develop our integrated value model, we first formulate several criteria or principles for investment decision-making.

#### ***Multivalue creation***

The stakeholder model suggests that companies should serve the interests of all stakeholders. Articulating these interests, legitimacy theory argues that companies are expected to comply with community expectations to maintain their social license to operate (Deegan, 2019). We will discuss the expectations for each value dimension.

First, society expects an economy operating within planetary boundaries (Steffen et al., 2015; Ding et al., 2020). Economic actors should not contribute to (further) exceedance of the safe operating space for planetary systems (e.g. no net emission of greenhouse gases, no contribution to biodiversity loss). This means that companies should not create negative impact on environmental value. But for the planet, not impairing the systems is not enough. In particular for biodiversity, climate and nitrogen, the eco-systems should actively be restored to fit the planetary boundaries again (Steffen et al., 2015). While this cannot simply be demanded from businesses, they should contribute to restoring the systems where possible (e.g., by net carbon and nitrogen sequestration and restoring biodiversity). Ideally, the typical or average company creates positive environmental value (EV).<sup>2</sup>

$$EV \geq 0 \tag{1}$$

Second, and likewise, society expects an economy operating above social thresholds, which means no exploitation, living wage paid in each part of the corporate value chain, contribution to local communities, respect for human rights and gender equality (Raworth, 2017). Ideally, the typical or average firm creates positive social value (SV).

$$SV \geq 0 \tag{2}$$

Third, society expects that business models are economically viable to be able to generate profit (FV) as well as impact (SV and EV). Hence firms create positive financial value (FV), which follows from the standard net present value rule (Berk and DeMarzo, 2017). This is also valid for social and mission-driven firms that prioritise their societal purpose (SV and/or EV) and do not pursue profit (maximisation FV).

$$FV \geq 0 \tag{3}$$

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<sup>2</sup> This does not only hold for the sum of all environmental effects, but it also applies to its elements. For example, if a project reduces GHG emissions, but hurts biodiversity, then both these effects should be visible and considered. It does not necessarily mean that the project cannot proceed, because otherwise nearly nothing can happen. Initially, it will mainly be about avoiding big negatives.

Boundaries should not be interpreted in an absolute way. Given the non-linear impact of shocks to complex ecosystems, the precautionary principle states that actors should stay clear of environmental boundaries under conditions of uncertainty (Weitzman, 2009). This implies an increasing price for environmental externalities, which becomes prohibitive when the boundary is approached. For social impacts, directly contributing to the fact that people live below the social threshold is seen as a social externality, e.g., when paying employees below the living wage. In addition, much of the social thresholds can be provided by governments, paid by taxes (Raworth, 2017).

These three community expectations mean that EV, SV and FV are all non-negative, or even positive, i.e. the economy is in quadrant 2 of the value creation matrix (Table 1). Value creation is thus stimulated and positive for all three value dimensions. Multivalue creation is the long-term goal for all decisions, but is not always immediately possible for existing activities.

### ***Transition***

Business reality is that most companies are currently in quadrant 1 of the value creation matrix (Table 1), with negative social and/or environmental value. Lima de Miranda and Snower (2020) introduce a balanced function to deal with multiple value dimensions. When one (or more) value dimension is negative, companies should gear their investments and efforts to fixing their underperforming type of value, rather than maximising their better performing value dimension(s). When investments are already in progress, they are to be trimmed down over a transition period (working with minimum reference points and transition pathways back to the planetary/social boundary). The end goal is to restore a negative value dimension to become positive over a credible time period.

When a company's investments are positive on all three value dimensions, the company can balance the value dimensions. The prioritisation of further improvements depends on the company's purpose (see below). It then also makes sense to add up the three types of value.

Summing up, if all three value dimensions are positive (i.e. in balance) then weighted summing is allowed. If one or more is negative, then the most negative dominates. A credible transition pathway back to positive is then the main focus.

### ***Non-substitutability***

There is a distinction between weak and strong sustainability (Neumayer, 2013). Weak sustainability allows netting (substitutability) across value dimensions. A shortfall in one dimension can be compensated by other dimensions. Businesses that reduce but do not eliminate negative social and/or environmental value can still have positive integrated value if financial value is sufficiently large. But it can be debated whether these companies create value for society.

Strong sustainability requires that each capital type is maintained separately, that is economic, social and environmental capital (Van den Bergh, 2010). This view applies the precautionary

principle very stringently and is motivated by a strict interpretation of the social and planetary boundaries (Neumayer, 2013).

In principle, netting across value dimensions is not allowed. If netting happens, credible transition pathways are needed to phase out such netting.

### **Purpose**

Mayer (2018) argues that companies should have scope (conditional on the above principles) to set their own purpose and incorporate that into decision-making. The purpose reflects what companies are good at, which can be interpreted as a company's comparative advantage (Edmans, 2020). Companies can thus prioritise a specific type of value, without neglecting the other value dimensions. The board can set the company's priorities for social and environmental value (purpose) with parameters  $\beta$  and  $\gamma$ . Integrated value  $IV$  is then defined as follows:

$$IV = FV + \beta \cdot SV + \gamma \cdot EV \quad \text{with } \beta, \gamma > 0 \quad (4)$$

While the parameters  $\beta$  and  $\gamma$  are strictly positive, the next section investigates possible values of beta and gamma for case study companies.

### 3.2 Decision model

Based on our discussion in the previous sub-section, the following principles underlie the decision model for value balancing:

1. **Multivalue creation:** value creation is stimulated and is positive for all three value dimensions. This is the long-term goal for all decisions, but is not always immediately possible for existing activities;
2. **Transition:** Where value is destroyed, a transition pathway to recovery is established. This applies to all three value dimensions. The path to ending value destruction must be credible;
3. **Non-substitutability:** in principle, netting is not allowed. In principle, negative effects on one value dimension cannot be compensated for by positive effects on the other value dimension(s);
4. **Purpose:** companies have scope to define their own purposes and incorporate those into decision-making; accordingly, the company can prioritise a specific type of value, without neglecting the others.

The model implications of these principles are as follows. The long-term goal is optimising integrated value  $IV$  with  $FV \geq 0$ ,  $SV \geq 0$ ,  $EV \geq 0$  in line with the (leading) principle of multivalue creation. A strict ban on negative values in the short term may lead to a standstill of corporate investments and thereby of value creation. The principles of transition and non-substitutability guide organisations in the short term. They imply that negative values should 'hurt' more than positive values of the same size. At the same time, we do not propose an absolute ban on negative effects in any of the value dimensions (hence the words 'in principle')

in the description of non-substitutability above). Discouraging, but not banning, negative effects on one of the value dimensions is possible with parameter  $\delta > 1$  for negative values. Companies have then an incentive to phase out negative (social and environmental) externalities and thus create positive value on all three dimensions in the long term.

The integrated value decision model can be formulated as follows:

$$IV = \{FV^+ + \beta \cdot SV^+ + \gamma \cdot EV^+\} + \delta * \{FV^- + \beta \cdot SV^- + \gamma \cdot EV^-\} \quad \text{with } \delta > 1 \quad (5)$$

The superscript +/- stands for a positive/negative value respectively.  $\beta$  and  $\gamma$  are the weightings for the social and environmental value dimensions, based on a company's preferences. The application of the integrated value decision model is similar to the net present value rule (Berk and DeMarzo, 2017). Companies should undertake only projects that have positive integrated value. Among the projects with positive integrated value, the company should first undertake the project with the highest integrated value.

The decision model acknowledges the interrelationships between the different types of values and allows a structured balancing of stakeholder interests. By setting the parameters ( $\beta, \gamma$  and  $\delta$ ) of the decision model for calculating integrated value ( $IV$ ) in advance, management can be held accountable for delivery of integrated value. The setting of the parameters is also part of engagement by committed shareholders and other stakeholders with the company.

Companies in transition may set the parameters of  $\beta$  and  $\gamma$  at an intermediate level of a half, while stakeholder or mission-driven companies will set the parameters closer to one or even above one (Schoenmaker and Schramade, 2019).<sup>3</sup> In the same vein, companies that aim to phase out a negative value faster will set the weight of  $\delta$  higher. In the long run, the weight of  $\delta$  may go to infinity, which is *de facto* a ban on social and environmental externalities.

#### 4. Company case studies

The ultimate question is whether the integrated value decision model leads to different decisions on corporate investments and in what way. To analyse potential differences, we apply the model to two hypothetical companies: an oil company and a medical technology company. We also show the naïve integrated value model with simple adding up of the three value dimensions as benchmark.

Table 2 shows the valuation creation profile of the companies. The value profile of the oil company is typical for the sector: profitable ( $FV = 3$ ), but with major environmental externalities due to carbon emissions ( $EV = -15$ ) and some social externalities in the supply chain ( $SV = -2$ ). The company has no explicit purpose and thus applies equal weights across

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<sup>3</sup> More shareholder driven companies may set the parameter values close to zero, but then we are back at shareholder value. The company is then managed for shareholder value and not for integrated value.

the value dimensions ( $\beta = \gamma = 1$ ), which already goes well beyond how the typical oil company is currently managed (with values for  $\beta$  and  $\gamma$  close to zero). The integrated value model delivers a large negative annual value creation profile ( $IV = -22.5$ ), as the negative impact of the polluting oil company counts 1.5 times ( $\delta = 1.5$ ). Simple adding up delivers a smaller negative value profile ( $IV = -14$ ).

Next, the medtech company is strong on its mission of health care ( $SV = 15$ ) and profitable ( $FV = 8$ ), but does generate negative environmental externalities ( $EV = -2$ ), be it much smaller than those of the oil company. The medtech’s purpose is reflected in the higher weight for SV ( $\beta = 1.6$ ) than for EV ( $\gamma = 1$ ) and FV (1 by definition). The medtech company wants to phase out its negative values as fast as possible ( $\delta = 2$ ). The integrated value model shows large positive value creation profile ( $IV = 28$ ), due to the higher parameter for its social mission. Simple adding up gives a smaller positive value profile ( $IV = 21$ ).

**Table 2. Value creation profile of an oil and medtech company**

Value dimensions & parameters	Company 1: Oil	Company 2: Medtech
<i>FV</i>	3	8
<i>SV</i>	-2	15
<i>EV</i>	-15	-2
<b>Annual value creation by simple adding up</b>	<b>-14</b>	<b>21</b>
$\beta$	1	1.6
$\gamma$	1	1
$\delta$	1.5	2
<i>FV</i> <sup>+</sup>	3	8
$\beta \cdot SV$ <sup>+</sup>	0	24
$\gamma \cdot EV$ <sup>+</sup>	0	0
$\delta \cdot FV$ <sup>-</sup>	0	0
$\delta \cdot \beta \cdot SV$ <sup>-</sup>	-3	0
$\delta \cdot \gamma \cdot EV$ <sup>-</sup>	-22.5	-4
<b>Annual integrated value creation</b>	<b>-22.5</b>	<b>28</b>

Note: This table shows the value creation profile of two companies based on three value dimensions (FV, SV, EV). The oil company has equal weights for the value dimensions ( $\beta = \gamma = 1$ ), while the medtech company has higher weights for SV ( $\beta = 1.6$ ) than for EV ( $\gamma = 1$ ) and FV (1). In the integrated value model (rows 7 to 12), negative values count 1.5 times ( $\delta = 1.5$ ) for the oil company and double for the medtech company ( $\delta = 2$ ) in the value creation. The top rows show annual value creation by simple adding up of the three values (rows 1 to 3).

Table 3 summarises the details of the investment projects available for the oil company. Projects 1 and 2 have positive impact on the social side (2) and the environmental side (2) respectively, but make financial losses (-1). Project 3 generates a profit (1) with no externalities. We first analyse the choice of projects on a stand-alone project base, i.e. irrespective of the company’s current value creation profile. The NPV rule would select project 3 with the highest financial value, which is positive (1). Punishing negative values in the

integrated value model leads also to project 3, which has no negatives. The simple adding up sees no difference among the projects, they all create a value of 1.

The second step is to analyse the projects with regard to the company's value profile. The last three columns in table 3 illustrate that the integrated value model would select project 1 and/or 2, as these projects (partly) repair the value destruction on the social and environmental side. In terms of the value creation matrix, the oil company is a quadrant 1 type value destructive company, which can improve its value profile by doing financially loss-making projects that generate positive impact. Finally, simple adding up again does not distinguish between the projects.

**Table 3. Change in value creation by an oil company**

Value dimensions / parameters	Oil company profile	Project 1	Project 2	Project 3	Company after project 1	Company after project 2	Company after project 3
$FV$	3	-1	-1	1	2	2	4
$SV$	-2	2	0	0	0	-2	-2
$EV$	-15	0	2	0	-15	-13	-15
<b>Annual value creation by simple adding up</b>	<b>-14</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>-13</b>	<b>-13</b>	<b>-13</b>
<b>Improvement</b>					<b>1</b>	<b>1</b>	<b>1</b>
$\beta$	1	1	1	1	1	1	1
$\gamma$	1	1	1	1	1	1	1
$\delta$	1.5	1.5	1.5	1.5	1.5	1.5	1.5
$FV^+$	3	0	0	1	2	2	4
$\beta \cdot SV^+$	0	2	0	0	0	0	0
$\gamma \cdot EV^+$	0	0	2	0	0	0	0
$\delta \cdot FV^-$	0	-1.5	-1.5	0	0	0	0
$\delta \cdot \beta \cdot SV^-$	-3	0	0	0	0	-3	-3
$\delta \cdot \gamma \cdot EV^-$	-22.5	0	0	0	-22.5	-19.5	-22.5
<b>Annual integrated value creation</b>	<b>-22.5</b>	<b>0.5</b>	<b>0.5</b>	<b>1</b>	<b>-20.5</b>	<b>-20.5</b>	<b>-21.5</b>
<b>Improvement</b>					<b>2</b>	<b>2</b>	<b>1</b>

Note: This table shows the value profile of an oil company which has the choice of three projects. The last three columns show the value profile of the oil company after the project (1, 2 or 3). The oil company has equal weights for the value dimensions ( $\beta = \gamma = 1$ ), while negative values count 1.5 times ( $\delta = 1.5$ ). The annual integrated value creation is obtained by adding the adjusted values in rows 7 to 12. The improvement is relative to the original company profile in the first column. The top rows show annual value creation by simple adding up of the three values in rows 1 to 3.

Table 4 provides the details of the investment projects available for the medtech company. The set-up of the projects is identical to the oil company. Again, projects 1 and 2 have positive impact on the social side (2) and the environmental side (2) respectively, but make financial



losses (-1). Project 3 generates a profit (1) with no externalities. The integrated value model leads to the selection of project 1, due to the medtech's healthcare mission with a higher weight for SV ( $\beta = 1.6$ ). In this way, the company makes use of the comparative advantage (Edmans, 2020) of its purpose (Mayer, 2018).

Analysing the projects from the company's value creation profile produces a different outcome. Table 4 shows that project 2 is selected, as this project repairs the value destruction on the environmental side (integrated value improvement of 3). The second choice is project 1 with the added value coming from the company's mission (integrated value improvement of 2.2). In terms of the value creation matrix, the medtech company is a quadrant 1 company (albeit close to quadrant 2 already), which can improve its value creation profile by doing financially loss-making projects that generate positive impact. With project 2, the company is able to erase its negative environmental value and thus move to quadrant 2.

The naïve integrated value model with simple adding up sees no difference between the projects, while the net present value rule would select project 3 which has the highest financial value (both on a stand-alone and a company basis).

**Table 4. Value creation by a medtech company**

Value dimensions / parameters	Medtech company profile	Project 1	Project 2	Project 3	Company after project 1	Company after project 2	Company after project 3
<i>FV</i>	8	-1	-1	1	7	7	9
<i>SV</i>	15	2	0	0	17	15	15
<i>EV</i>	-2	0	2	0	-2	0	-2
<b>Annual value creation by simple adding up</b>	<b>21</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>22</b>	<b>22</b>	<b>22</b>
<b>Improvement</b>					<b>1</b>	<b>1</b>	<b>1</b>
$\beta$	1.6	1.6	1.6	1.6	1.6	1.6	1.6
$\gamma$	1	1	1	1	1	1	1
$\delta$	2	2	2	2	2	2	2
<i>FV</i> <sup>+</sup>	8	0	0	1	7	7	9
$\beta \cdot SV^+$	24	3.2	0	0	27.2	24	24
$\gamma \cdot EV^+$	0	0	2	0	0	0	0
$\delta \cdot FV^-$	0	-2	-2	0	0	0	0
$\delta \cdot \beta \cdot SV^-$	0	0	0	0	0	0	0
$\delta \cdot \gamma \cdot EV^-$	-4	0	0	0	-4	0	-4
<b>Annual integrated value creation</b>	<b>28</b>	<b>1.2</b>	<b>0</b>	<b>1</b>	<b>30.2</b>	<b>31</b>	<b>29</b>
<b>Improvement</b>					<b>2.2</b>	<b>3</b>	<b>1</b>

Note: This table shows the value profile of a medtech company which has the choice of three projects. The last three columns show the value profile of the medtech company after the project (1, 2 or 3). The medtech company has a higher weight for SV ( $\beta = 1.6$ ), than for EV ( $\gamma = 1$ ) and FV (1), while negative values count double ( $\delta =$

2). The annual integrated value creation is obtained by adding the adjusted values in rows 7 to 12. The improvement is relative to the original company profile in the first column. The top rows show annual value creation by simple adding up of the three values in rows 1 to 3.

These case studies show that similar projects can have a different value for different companies and situations. The value depends on a company's purpose ( $\beta, \gamma$ ) and its starting position, where a potential negative value dimension is weighted heavier ( $\delta$ ). The integrated value decision model leads to different investment decisions than both the standard NPV rule and the naïve integrated value model with simple adding up of the three value dimensions.

We can also illustrate the operation of the integrated value decision model with a real-world example in the oil industry. Shell has a negative ecological value because of the carbon emissions of its main products, oil and gas. This negative ecological value outweighs the positive financial value (profits). Investment in green energy companies, with simultaneous divestment of the exploration of new oil and gas, can reduce this negative value. An example of this was the possible acquisition in 2019 of Eneco, an energy utility company with a green strategy. With the integrated value decision model, Shell would have arrived at a relatively high valuation of Eneco, because Eneco would reduce Shell's negative ecological value score (which outweighs its positive financial value score). However, Shell applied its traditional financial analysis model with a high discount rate, resulting in a low valuation of Eneco. As a result, Japan's Mitsubishi, which applied a lower discount rate, was able to acquire Eneco with a higher bid, and Shell continued to focus its investments on oil and gas exploration (Grol, 2020).

## 5. Summary and conclusions

Managing for integrated value requires managing and balancing several types of value (financial, social and environmental) at the same time, often involving trade-offs. Companies need to have decision rules that help them to make investment decisions accordingly. This article derives such decision rules by starting from what is needed for integrated value, and by showing to what extent it differs from shareholder value maximisation only. It also outlines pathways for companies that are currently value destructive on one of the dimensions. In addition, the integrated value decision model allows for the prioritisation of specific types of value, in line with a company's purpose (Mayer, 2018).

While advances in impact valuation allow companies to measure social and environmental value alongside financial value, these measurements are still approximations under conditions of uncertainty. The balancing of positive and negative values is a key element of the decision rules for integrated value. Just summing of positives and negatives allows for the netting of financial, social and environmental values. Imbalances in the social and/or environmental dimension can then continue to build up, as is currently happening. The other extreme, no netting, is very restrictive. Any negative value should be avoided, which may lead to a standstill of corporate investments and thereby of value creation. Our model indicates that decision

rules that weigh negative values higher than positive values are capable of achieving integrated value. Under these decision rules, companies have an incentive to phase out negative (social and environmental) externalities and thus create positive value on all three dimensions in the long term.

A second element of our decision rules is the weighting across the value dimensions. While shareholder driven companies only value the financial dimension, companies that pursue integrated value also give a positive weight to the social and environmental dimensions. Our model allows companies to choose their degree of sustainability: from moderate (weight of half) and equal weights (weight of one) to purposeful (higher weights for the social and environmental dimensions). While the majority of companies may apply low, moderate or equal weights, purposeful companies are initiators in the return to operating within social and planetary boundaries by shaking up industries and supply chains (Kurznack, Schoenmaker and Schramade, 2021). Companies that are subsequently capable to scale up their comparative advantage, are the ultimate frontrunners, that accelerate the transition to a sustainable economy (Edmans, 2020).

There are also limits to this research. An important limit is the availability of company data on social and environmental impacts. Mandatory reporting of sustainability data, as envisaged by the International Sustainability Standards Board and the European Union's Corporate Sustainability Reporting Directive, is crucial. Another (and related) limit is the advance of impact valuation. Progress is needed in the valuation of social and environmental impact to include the quantified impacts in investment decision-making. This article aims to inspire future research connecting the fields of finance and sustainability, as suggested by Ding et al. (2020).

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