



Stakeholder Engagement, Knowledge Problems and Ethical Challenges

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Abstract

In the management and business ethics literatures, stakeholder engagement has been demonstrated to lead to more ethical management practices. However, there may be limits on the extent to which stakeholder engagement can, as currently conceptualized, resolve some of the more difficult ethical challenges faced by managers. In this paper we argue that stakeholder engagement, when seen as a way of reducing five types of knowledge problems—risk, ambiguity, complexity, equivocality, and a priori irreducible uncertainty—can aid managers in resolving such ethical challenges. Using a practical illustration of the ethical challenges surrounding the development and application of genetic modification technologies, we demonstrate how stakeholder engagement enables managers to better address these knowledge problems, thereby to manage more ethically. In this way, we suggest that stakeholder engagement has an even more crucial role to play in business ethics research and practice.

Keywords Stakeholder engagement · Uncertainty and knowledge problems · Ethical challenges

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With an ever-increasing global population, hunger in the developing world, and the health risks of pesticides, some experts view genetically modified food as a panacea. Others view it as one of the most serious threats to human civilization. These diametrically opposing views point to an ethical dilemma that will certainly be difficult to resolve: whether the benefits of developing and supplying the world with genetically modified foods outweigh future consequences that these products may have for the human species, animal life, and the ecosystem (Jefferson 2006, p. 33).

Introduction

We begin with an epigraph that presents a situation with ethical implications for managers, profound consequences for the stakeholders engaged, and a high level of difficulty due to the many unknowns. We do so in order to introduce our task in this paper, which is to offer theory to suggest how refining the concept of stakeholder engagement (see Dawkins

2014; Fassin et al. 2017; Greenwood 2007; Laplume et al. 2008; Maak 2007; Noland and Phillips 2010; Sachs and Rühl 2011; Winkler et al. 2018) can assist in the management of the knowledge problems (Townsend et al. 2018) that give rise to ethical challenges for the firm and its stakeholders. The idea of managers resolving ethical challenges by engaging stakeholders is intuitively appealing. For example, stakeholder engagement is thought to lead to more ethical practices where managers “[take] a more active stance toward stakeholders by trying to anticipate their needs and develop substantive firm-specific, stakeholder-oriented practices” (Cennamo et al. 2012, p. 1154). Stakeholder engagement also has been suggested to produce ethical strategy that “enables stakeholders to represent their interests on relatively equal footing with corporations (Dawkins 2014, p. 292), or to yield “a strategic approach to CSR that addresses firm-stakeholder relationships as assets that managers must manage” (Winkler et al. 2018, p. 3). Additionally, stakeholder engagement has been suggested to produce a relationship through which “the organisation may glean contributions (Sillanpaa 1998), manage risks (Deegan 2002) posed by influential stakeholders” (Greenwood 2007, p. 318), “work together to create value” (Bosse and Coughlan 2016, p. 1214), or “establish common ethical ground” (Maak 2007, p. 335).

However, a gap exists in the practical relevance of stakeholder engagement as evidenced by the ethical challenge posed in the beginning epigraph: “*whether the benefits of developing and supplying the world with genetically modified foods outweigh future consequences that these products may have for the human species, animal life, and the ecosystem.*” From the perspective of managers, a case can be made for either side: stakeholder relationships that result in an economic benefit such as more food versus stakeholder relationships that result in protecting public health, through preserving life and the natural ecosystems upon which it depends. The ethical challenge arises not because action on either side is necessarily wrong, but rather because such action is taken in the face of the different kinds of knowledge problems that comprise uncertainty (Townsend et al. 2018). As a result, such knowledge problems can lead to mistakes as managers in organizations weigh potential economic benefits against public health requirements.

As early consequentialist philosophers have argued, if a certain premise is “more likely to produce a false belief than a true one,” then the assertion that one outcome is better than the other is “to be discredited on account of its derivation” (Sidgwick 1879, p. 111). Consequently, knowledge problems (Townsend et al. 2018) often subvert the premises of arguments intended to justify actions, because gaps in understanding between firms and their stakeholders ultimately undermine accomplishment of the mission of the organization that stakeholder relationships are expected to affect (Freeman 1984). Thus, managers who aim to resolve ethical challenges faced

by a firm and its stakeholders are required to first address the knowledge problems that underlie such ethical challenges. In this sense, additional development in the management and business ethics literatures is needed to refine further our understanding of the stakeholder engagement concept using a knowledge problems focused perspective. We argue that doing so will better enable managers to resolve the ethical challenges that previous conceptualizations of stakeholder engagement have been unable to resolve sufficiently.

The term *knowledge problems* has been introduced into the literature to enable scholars to unbundle the notion of uncertainty (Townsend et al. 2018). This conceptualization is necessary because in much of the literature, a variety of terms have been used somewhat indiscriminately to refer to various aspects of uncertainty. Townsend et al. (2018) have argued that, in actuality, the term “uncertainty” subsumes five sub-types of knowledge problems: (1) risk (Kobeissi and Damanpour 2009), (2) ambiguity (Ellsberg 1961; March 1994; Weick 1979), (3) complexity (Selden and Fletcher 2015; Sull and Eisenhardt 2015), (4) equivocality (Daft and Weick 1984; Weick 1995), and (5) a priori irreducible uncertainty (Knight 1921). Each of these knowledge problems presents unique obstacles to managers in their relationships with stakeholders. We therefore argue that at least part of the difficulty in resolving ethical challenges arises due to gaps in managers’ understanding about certain beliefs, facts, inferences, needs, etc., vis-à-vis their stakeholders.¹

Thus, in this paper we argue that an even more finely-grained analysis will be useful in improving the practices of stakeholder engagement. In particular, we develop theory that can enable managers to recognize and identify each particular type of knowledge problem, and then utilize various forms of stakeholder engagement to manage such problems. Through our analysis of the stakeholder literature, we articulate how these managers can operate to reduce each of the five primary knowledge problems thereby to help resolve the ethical challenges that such knowledge problems foment. We argue accordingly, that in choosing to engage stakeholders, managers can in fact close the gap that arises due to the effects of underspecified knowledge problems. We argue further that this gap in understanding how to manage knowledge problems in part creates the ethical challenges such as the one noted in the epigraph concerning the tension between economic benefits and public health considerations with respect to genetically modified foods; and that stakeholder engagement understood in terms of a

¹ We note that another difficulty in resolving ethical challenges may also result from an unwillingness on the part of managers to address knowledge problems relating to certain beliefs, facts, inferences, needs, etc., vis-à-vis their stakeholders. In this sense, a boundary condition of our approach is that a manager must first want to address a knowledge problem through stakeholder engagement.

knowledge problems perspective represents a way of resolving such challenges.

As a result of our theorizing we offer four contributions. First, we make progress in providing theory to aid in the resolution of what often can, due to underspecified knowledge problems, appear to be intractable ethical challenges among stakeholders. Second, in the process, we respond to critiques of the current state of the stakeholder engagement literature (e.g., Greenwood and Mir 2019) which call for a deeper and more systematic understanding of the purposes of stakeholder engagement in society. Third, we present for the use of the research community, a conceptualization of stakeholder engagement that has been crafted to take account of the knowledge problems that often plague relationships among stakeholders. Fourth, we offer a set of practical steps which managers can take to ensure that their engagement with stakeholders matches the nature of the knowledge problem, such that they actually are able to resolve ethical challenges.

Stakeholder Engagement and Knowledge Problems

Stakeholder Engagement

The notions of instrumental stakeholder theory (Jones 1995), and proactive stakeholder/ environmental practices (Henriques and Sadorsky 1999), have been foundational in the development of the concept of stakeholder engagement. Stakeholder engagement has been linked to a wide variety of outcomes, such as: trust-building that increases stakeholder support (Jones 1995), motivating employee stakeholders through stock-purchase plans (Marens and Wicks 1999), garnering community goodwill (e.g., Brammer and Millington 2003a, b; Godfrey 2005), building reputations (Carter 2006; Snider et al. 2003; Ulmer and Sellnow 2000), forging organizational identity (Brickson 2005, 2007), fostering job satisfaction (Valentine and Fleishman 2008); developing intangible resources (Surroca et al. 2010); and enhancing economic performance (e.g., Barnett and Solomon 2006, 2012; Waddock and Graves 1997; Wang and Bansal 2012). We suggest, however, that these beneficial outcomes are more likely to be achieved as managers resolve such ethical challenges using stakeholder engagement to address knowledge problems.

For purposes of this paper we thus define stakeholder engagement as *the interaction among a firm and its stakeholders that addresses knowledge problems to improve correspondence in understanding between managers and stakeholders, thereby to assist in resolving ethical challenges faced by managers*. As we explain further, this conception of stakeholder engagement builds upon, and is consistent

with, other descriptions and definitions in the literature. For example, Girard and Sobczak (2012) have defined stakeholder engagement as a set of learning activities that involve “the creation and diffusion of trust, knowledge, and values, to build a foundation of social capital” (2012, p. 217). Likewise, Greenwood (2007) has defined stakeholder engagement as “practices that the organization undertakes to involve stakeholders in a positive manner” (2007, p. 218). In these respects, while we acknowledge that variation in definitions of stakeholder engagement exists in the literature, our proposed definition is intended to represent a helpful extension of prior definitions by making explicit the importance of the linkage between stakeholder engagement and resolving ethical challenges. Specifically, for purposes of this paper, this definition captures the idea that stakeholder engagement enables managers to address knowledge problems to resolve the ethical challenges attendant to such problems. In the next section we develop the concept of knowledge problems as being relevant in practice to the ethical challenges faced by managers.

Knowledge Problems in Practice

To illustrate the importance of addressing knowledge problems as the basis for resolving the ethical challenges faced by managers, we consider the circumstances surrounding the genetic modification issue raised previously. In the early 1970s, scientists developed a revolutionary set of technologies for recombining DNA (i.e., Recombinant DNA or rDNA) from a variety of biological sources to create hybrid sequences of genes that are novel but artificial (Krimsky 1982). Over the past few decades, rDNA from such sources has generated a wide variety of scientific and technological breakthroughs, fueling groundbreaking research and revolutionary new products in the fields of biotechnology and medicine (e.g., genetically-modified foods, insect and pesticide resistant crops, novel treatments for a variety of viral infections, synthetic insulin, etc.).

The commercial success and immense scale of genetic modification technologies have created a multiplicity of ethical challenges for managers.² As noted in the epigraph, the genetic modification of foods using rDNA technologies generates diametrically opposing views that result in the aforementioned ethical dilemma (Jefferson 2006, p. 33)—the

² We recognize that the example of recombinant DNA that we utilize involves decision makers who are primarily scientists. Nonetheless, we consider these individuals to be managers of a set of technologies that have given rise to an industry valued in the hundreds of billions of dollars and acknowledge that a subset of these scientists went on to be the founders and managers of the firms that make up this industry. In this role, they created both their own firms and also substantial value for their universities through the licensing of their patents.

promise of better supplying the world with food versus the potential threats to the human species, animal life, and the ecosystem. Such ethical challenges are faced regularly by managers in their decision-making (Ford et al. 1994; Trevino 1986). Should these ethical challenges be shown to arise from knowledge problems (e.g., diametrically opposing views based on premises with questionable correspondence in understanding between managers and stakeholders), then resolving such ethical challenges will be facilitated by better addressing knowledge problems, which we argue occurs, or at least improves, through stakeholder engagement. Such stakeholder engagement will require managers to address each of the five types of knowledge problems: risk, ambiguity, complexity, equivocality, and a priori irreducible uncertainty. In the sections that follow, we develop a knowledge problems framework, and provide several examples in the case of genetic modification that both illustrate the challenge of knowledge problems in ethical decision-making, and enable us to explain how stakeholder engagement can serve to mitigate the effects of such knowledge problems.

Knowledge Problems and Ethical Challenges

A knowledge problem is defined as “any decision-making state or context in which the decision-maker has moved past ignorance—that is, he or she is at least minimally aware that a decision, judgment, prediction, observation or assessment must be made—but does not possess certitude regarding either antecedent conditions, contextual or mitigating factors, or likely consequences” (Townsend et al. 2018, p. 670). As noted earlier, as part of unbundling the broad concept of uncertainty, Townsend and colleagues (2018) have made the case for conceptualizing separately the five aforementioned knowledge problems. Thus, depending upon which of the knowledge problems are present in a given situation, ethical challenges are expected to arise where either the premises (antecedent conditions/contextual mediating factors) or the likely consequences (action taken) have questionable correspondence in understanding between managers and stakeholders, as we now argue.

Risk is a knowledge problem that involves incomplete knowledge regarding precise outcomes, but with some measure of insurability. That is, the knowledge problem of risk exists when probabilistic outcomes are a priori knowable and reducible insofar as the anticipated distribution of possible outcomes can be calculated, predicted, parsed, measured, or foreseen, without knowing exactly which outcome will actually occur at any given point in time (e.g., Hardy and Maguire 2016; Knight 1921; Shapira 1995; Sitkin and Pablo 1992; Wiseman and Gomez-Mejia 1998). An ethical challenge produced by the knowledge problem of risk occurs wherein, for a variety of reasons, managers and/or stakeholders fail to calculate, predict, parse, measure or foresee

potential outcomes. In the case of genetic modification, the knowledge problem of risk surfaced in situations when managers decided to proceed with the commercialization of rDNA technology without providing adequate assessment of consequences, despite demands by the public to do just that: assess the benefits and costs, and gather sufficient data (Berg and Singer 1995). In this sense, an ethical challenge arises because the likely consequences have questionable correspondence in understanding between managers and stakeholders as a result of inadequate risk assessment.

Ambiguity is a knowledge problem that refers to doubtfulness as regards to interpretation. Ambiguity emerges when people lack interpretative frames upon which to make sense of decision environments, such as when the world is no longer constituted as a rational, orderly system (Weick 1995), or in “decision environments in which alternative states are hazily defined or in which they have multiple meanings” (March 1994, p. 179). An ethical challenge produced by the knowledge problem of ambiguity occurs where managers and/or stakeholders cannot reach interpretive consensus. In the case of genetic modification, we see the knowledge problem of ambiguity arise with the recent introduction of the “Impossible Burger,” which was created using rDNA technology to re-engineer plant-based ingredients using yeast to mimic the gastronomic properties of animal-based proteins (Heffernan 2017; Lewis 2019). The question as to whether the Impossible Burger is genetically modified is, however, ambiguous, as suggested by Lewis (2019, para. 16):

Does an Impossible Burger contain a GMO? Well, yes and no. Yes, because a soybean gene wouldn’t naturally be in a yeast cell. But no because the legHB [the Impossible Burger protein] that the yeast cells crank out is identical, amino-acid-by-amino-acid, to the protein from soybean root nodules. So, the yeast is genetically modified, the product, not.

We see in this example how the term genetically modified food is “hazily defined” and “has multiple meanings” (March 1994, p. 179) for the various stakeholders involved. In this sense, an ethical challenge arises because the antecedent conditions that specify the nature of the Impossible Burger lack correspondence in understanding between managers and stakeholders in that they are hazily defined such that managers and/or stakeholders cannot easily reach interpretive consensus about the consequences of human consumption of GMOs.

Complexity is a knowledge problem that is characterized by the inability to identify the relevant factors influencing a decision in complicated and/or nonlinear environments; or is characterized by incompleteness, inadequacy, or inaccuracy of information possessed relative to what is required (Townsend et al. 2018; Winter 1987). The knowledge

problem of complexity therefore involves a combination of detail complexity, which refers to the number of *variables* involved in a problem, and from dynamic complexity, which refers to the number of *interactions* that occur between these variables over time (Nutt 1998; Rivkin 2001; Simon 1962; Zack 1999). An ethical challenge produced by the knowledge problem of complexity occurs where managers and/or stakeholders are overwhelmed by the inability to make decisions in a given context on account of detail or dynamic complexity (Gilbert and Osborne 1989). In the case of genetic modification, recent extensions of rDNA technology to develop a set of gene editing tools (e.g., CRISPR) that enable scientists to “edit” the genetic code of already existing organisms, can:

... solve a range of food-related concerns for both consumers and growers: reduced-gluten wheat that could be tolerated by those with sensitivities, a mushroom that doesn't brown when bruised or cut, soybeans lower in unhealthy fats, and even protecting the global chocolate supply ... (Niiler 2018, para. 7).

But the commercial application of rDNA technology invokes knowledge problems reflecting complexity, which are emblematic of the numerous edits to multiple plant genes (detail complexity) and of the potential unintended consequences of the changes that ripple through the unique genome of each plant (dynamic complexity). Yet, managing both detail and dynamic complexity is essential for decision-making, as managers must communicate among and engage with a variety of stakeholders including regulatory agencies, growers, processors, distributors and retailers, to garner the commercial benefits of these technologies (see e.g., Brosard et al. 2019). In this sense, an ethical challenge results because of detail and dynamic complexity arising from contextual mediating factors that undermine correspondence in understanding between managers and stakeholders because these factors can overwhelm managers.

Equivocality is a knowledge problem that involves “the existence of multiple meanings or interpretations that are individually unambiguous but collectively lie in direct conflict with one another” (Daft and Macintosh 1981; Townsend et al. 2018, p. 660). Equivocality often is confused with ambiguity, but is a distinct knowledge problem because, while the interpretation of each stakeholder group might individually be unambiguous, among the parties together, the interpretations and meanings differ and often are either mutually exclusive or in conflict (Daft and Weick 1984; Sonenshein 2016; Weick 1995). Under equivocal conditions no amount of additional information can resolve an impasse in interpretation (Townsend et al. 2018). An ethical challenge produced by the knowledge problem of equivocality occurs wherein managers and/or stakeholders interpret both antecedents and consequences

differently. For example, managers and stakeholders may experience confirmation bias and bring only their preferred interpretations of the relevant antecedents and consequences to the table. We see this in the case of ongoing tensions between economic benefits and public health requirements that firm managers must consider as they engage stakeholders. In the case of genetic modification using rDNA technology, it is exactly the problem of equivocality that generates the impasse highlighted in the epigraph. As noted by Jefferson (2006): “some experts view genetically modified foods as a panacea ... [while] others view it as one of the most serious threats to human civilization, [and] these diametrically opposing views point to an ethical dilemma” (p. 33). In this sense, the ethical challenge arises because interpretations of antecedent conditions and contextual mediating factors differ so vastly that correspondence in understanding between managers and stakeholders is impaired because expected consequences are potentially mutually exclusive or in conflict, which conflict seemingly is irresolvable.

A priori *irreducible uncertainty* is a knowledge problem which depends on a set of future conditions that remains unknowable until the passage of time shows them to have occurred or not to have occurred (Knight 1921; McGrath and MacMillan 2000). In this sense, a priori irreducible uncertainty is wholly stochastic and indeterminate. As ‘unknown unknowns’ due to missing and/or incomplete information (Kuechle et al. 2016), a priori irreducible uncertainties cannot be predicted, measured, modeled, or foreseen (Miller 2012; Townsend et al. 2018). An ethical challenge produced by the knowledge problem of a priori irreducible uncertainty occurs where managers and/or stakeholders have no knowledge. In the case of genetic modification, a priori irreducible uncertainty emerged early in the ethical debates surrounding the use of rDNA technology. As Berg and Singer (1995) have described:

The primary motivation for the prompt actions taken by scientists and governments in the period 1973–1976 was to protect laboratory personnel, the general public, and the environment from any hazards that might be directly generated by the experiments. In particular, there were speculations that normally innocuous microbes could be changed into human pathogens by introducing genes that rendered them resistant to then-available antibiotics, or enabled them to produce dangerous toxins, or transformed them into cancer causing agents. The uncertainties stimulated a sometimes-turbulent debate. Public fear was fanned by the popularity of “The Andromeda Strain” and the myriad “what ifs” floated by both serious and demagogic commentators. (Berg and Singer 1995, p. 9011).

In this sense, then, the ethical challenge in the case of a priori irreducible uncertainty arises because, by definition, the premises (as antecedent conditions/contextual mediating factors) and the likely consequences (action taken), completely lack correspondence in understanding between managers and stakeholders due to unknowingness in the present.

Knowledge Problems and Stakeholder Engagement

As we have articulated in the foregoing sections, then, managers confront knowledge problems as they interact with stakeholders. Recognizing that the stakeholder literature has examined the many ways in which managers and stakeholders interact, it is reasonable to suppose that this literature also will have provided a rich source of instances where managerial action has influenced and been influenced by knowledge problems. Accordingly, we analyzed the stakeholder literature for illustrative instances where managers have taken action to address various issues that represent knowledge problems, and through this analysis, to uncover the underlying mechanisms for how stakeholder engagement can reduce such knowledge problems. As shown in Table 1, the stakeholder literature demonstrates various explicit and implicit actions that managers have taken in their stakeholder management activities that can demonstrate how engaging stakeholders can address knowledge problems thereby to resolve the associated ethical challenges.

Interestingly, while we did not expect that the actions taken by managers would be directed at only one knowledge problem, we observed that clear distinctions could be made among various stakeholder engagement behaviors by appealing to a theory of knowledge problems (Townsend et al. 2018). Our analysis suggests an underlying pattern that can be useful both to theory and to practice—that stakeholder engagement enables managers to use a variety of approaches that reduce knowledge problems thereby to help resolve ethical challenges. As previously argued, this resolution is enabled because the reduction in knowledge problems through stakeholder engagement can increase the likelihood that outcomes will redound to an increase in understanding among managers and stakeholders. In the following subsections, we develop propositions based on the foregoing reasoning supported by representative excerpts from the research included in Table 1.

Risk and Stakeholder Engagement

In our analysis, we observed situations of risk where managers sought to address the lack of assignability of an a priori knowable and reducible distribution of probabilistic outcomes, *by engaging stakeholders according to a means-to-ends marketplace-based calculation*. For example, as Husted et al. (2016) described in their paper on the influence

of location on CSR engagement (a kind of stakeholder engagement): “the mechanism through which cognitive legitimation occurs [in CSR engagement] is ... the process of imitation in which managers engage when dealing with uncertainty about the relationship between means and ends ... CSR engagement lowers the perceived riskiness of a firm” (Husted et al. 2016, pp. 2053, 2055). The mechanism they described (Table 1, Col. 5) exemplifies the idea that the underlying stability of means and ends in a decision environment allows managers to better estimate the likely outcome probabilities through stakeholder participation. Shiu and Yang (2017) further noted that: “CSR engagement does have insurance-like effects on both the stock and bond prices of a firm, thereby implying that CSR engagement can serve as a risk management tool for the preservation of corporate stock and bondholder wealth” (Shiu and Yang 2017, p. 455). In this way stakeholder engagement insures firm value to resolve the knowledge problem of risk (Table 1, Col. 5).

Accordingly, when viewed from the knowledge problems perspective, stakeholder engagement can enable managers to hedge against the known probability that a favored outcome might not occur or that a negative outcome may occur, by engaging with stakeholders to calculate, predict, parse, measure or foresee potential outcomes. Stakeholder engagement so viewed (through a more precise understanding of risk as a knowledge problem) enables risk to be reduced by creating new regularities from which, for example, probability distributions can be obtained in order to increase correspondence in understanding between managers and stakeholders. To resolve ethical challenges faced by managers through stakeholder engagement, knowledge problems based in risk thus may be managed through means-ends based calculations of probabilities (e.g., by becoming essentially insurable with a loss-mitigating result), such that the premises of arguments intended to justify action are less likely to be subverted. Hence:

Proposition 1 *Stakeholder engagement that enables managers to make means-ends based calculations of probabilities reduces knowledge problems due to risk, thereby increasing the likelihood of resolving ethical challenges.*

Ambiguity and Stakeholder Engagement

In our analysis, we observed situations of ambiguity, where managers sought to address the absence of interpretive consensus, situational cues, and/or the interpretive frames that enable sensemaking, *by engaging stakeholders to add clarity to definitions of key concepts and ideas*. For example, DeTienne and Lewis (2005) noted in their article documenting the legal case of Nike that “the need for a standardized [CSR] reporting procedure among all multinational

Table 1 Illustration of stakeholder engagement and knowledge problems

(1) Knowledge Problem Illustrated	(2) Author(s)	(3) Year: Page(s)	(4) Illustrative Quotation	(5) How Managers Engage Stakeholders
Risk	Bansal and Roth	2000: 717	The decision analysis of these managers aimed to reduce the costs and risks of noncompliance. Discussions focused not on what would occur if the firm met the conditions of stakeholders but, rather, on what would happen if they did not ... These concerns were also reflected in the firms' initiatives in that they reduced risks rather than publicized their ecological responsiveness	Calculating to reduce risk, based on interactions with stakeholders
Risk	Kobeissi and Damanpour	2009: 330	Firms view their stakeholders as part of an environment that should be managed because stakeholders control certain means or resources that could influence corporate outcomes	Making means-ends assessments to manage stakeholders
Risk	Bowen et al.	2010: 297	Firms can gain legitimacy, manage social risk and even co-develop innovative solutions to social problems with community members through a well-designed community engagement strategy	Managing risk; co-developing solutions to social problems
Risk	Cheng et al.	2014: 16	Superior stakeholder engagement enhances the revenue or profit generating potential of the firm through higher quality relationships with customers and business partners and among employees... Higher levels of transparency reduce informational asymmetries between the firm and investors, thus mitigating perceived risk	Developing high quality, transparent relationships among stakeholders as a means to enhance performance
Risk	Henisz et al.	2014: 1728	... in addition to improving resource efficiency, environmental management can reduce risk, including that of detrimental action by external stakeholders	Managing environmental practices to avoid detrimental action by stakeholders
Risk	Husted et al.	2016: 2053, 2055	The mechanism through which cognitive legitimation occurs [in CSR engagement] is mimetic isomorphism, which refers to the process of imitation in which managers engage when dealing with uncertainty about the relationship between means and ends... CSR engagement lowers the perceived riskiness of a firm	Engaging in CSR according to a means-ends calculation to better estimate the likely outcome probabilities
Risk	Dorobantu et al.	2017: 588	Every corporate organization faces the risk that seemingly isolated events trigger a cascade of stakeholder reactions forming an episode of market contention that undermines the value of a project or of the organization as a whole. We highlight that media transmitted information about stakeholders' actions and reactions is critical for the emergence of a critical mass of unconnected or loosely connected stakeholders targeting or defending an organization	Managing risk using the mobilization of stakeholders through use of media to create a critical mass
Risk	Shiu and Yang	2017: 455	On the occurrence of a negative event, CSR engagement does have insurance-like effects on both the stock and bond prices of a firm, thereby implying that CSR engagement can serve as a risk management tool for the preservation of corporate stock and bondholder wealth	Insuring firm value through CSR

Table 1 (continued)

(1) Knowledge Problem Illustrated	(2) Author(s)	(3) Year: Page(s)	(4) Illustrative Quotation	(5) How Managers Engage Stakeholders
Ambiguity	DeTienne and Lewis	2005: 371–372	The need for a standardized reporting procedure among all multinational companies has increased in recent years for several reasons... globalization has played a major role in influencing the ambiguity of business practices and the difficulty of consistent reporting among companies... formal CSR statements would encourage companies to improve transparency by providing a safe vehicle to disclose information while further distinguishing CSR reporting from traditional advertising... current CSR reporting is mostly piecemeal, anecdotal, and generated without third party credibility...	Establishing standardized reporting to foster transparency
Ambiguity	Hall and Vredenburg	2005: 11	... stakeholder ambiguity is difficult to manage because it is idiosyncratic and context-specific. Managers are often ill-prepared to deal with stakeholder ambiguity and typically revert to formulaic decision-making frameworks such as discounted cash flow and cost–benefit analysis, which misrepresent the challenges	Developing sufficient definition such that the idiosyncratic and context-specific can be addressed by more-general characterizations
Ambiguity	Fassin	2009: 117	This ambiguity, and also a certain ambivalence, has been amplified by a combinatorial use of stakeholder definitions	Developing definitions to overcome ambiguity
Ambiguity	von Groddeck	2011: 70	From this exploration, it will be educed through empirical illustration what the role of value communication is for organisations, namely, that values deliver a capacious possibility for coping with societal and organizational fuzziness. The term fuzziness here reflects three typified situations where organisations have first to deal with different and ambiguous expectations...	Communicating using values semantics to manage societal and organizational fuzziness
Ambiguity	Dawkins	2014: 284	In order to address the ambiguity surrounding stakeholder engagement it is necessary to develop a set of guidelines that address power asymmetries and typify substantive engagement. Hence, stakeholder engagement requires... the principle of good faith	Using good faith (dialogue, negotiation and transparency) to increase accountability to stakeholders
Complexity	Mezhar and Nigh	1995: 978	... environmental uncertainty [treated as complexity in this paper] has been shown to increase all types of boundary-spanning activity... As an environment becomes more complex and turbulent, firms will use whatever means they have at their disposal to deal with the increased uncertainty	Using boundary-spanning tools, as a bridge to connect with stakeholders

Table 1 (continued)

(1) Knowledge Problem Illustrated	(2) Author(s)	(3) Year: Page(s)	(4) Illustrative Quotation	(5) How Managers Engage Stakeholders
Complexity	Aragón-Correa and Sharma	2003: 84–85	... it is important to adopt a long-term, consistent strategy that fosters the following: continuous outside-in learning from multiple stakeholders, so as to reduce the complexity and state uncertainty of conflicting environmental issues; development of managerial and organizational knowledge for managing the organization and effect uncertainty at the business-natural environment interface; and generation of continuous improvement and innovation	Fostering continuous outside-in learning from multiple stakeholders
Complexity	Christmann	2004: 747	Moreover, these results provide important insights into the complex relationships between the nature of external stakeholder demands and firm responses to stakeholder pressures... My results show that pressures by different external stakeholders contribute to global standardization of different dimensions of MNCs' environmental policies	Co-developing standardized responses to pressure with external stakeholders
Complexity	Lotila	2010: 397–398	Corporate managers are faced with a complex range of unstable and shifting issues and an equally complex range of stakeholder groups with varied resources and interests ... The level of responsiveness is determined by the extent to which the firm discusses activities with outside groups, makes information freely available to publics, accepts inputs from outside groups in decision-making and is willing to be publicly evaluated for corporate activities	Managing complexity using inputs from outside groups as part of engaging stakeholders
Complexity	Zattoni	2011: 259	The above kinds of [relational] contracts are particularly powerful in solving the information problems caused by the complexity or the future manifestation of contingencies ... However, in order to be effective, a relational contract requires that both parties share common values and informal expectations ... inspired by mutual collaboration and obligation	Collaborating and contracting in mutual way to manage complexity
Complexity	Fassin et al.	2017: 107	Our comparative analysis of plant-closing decisions in various contexts points out the complexity of the relationships among the various stakeholders involved and their dynamic nature. It acknowledges how stakeholder relationships affect the value-creation process and how stakeholders can sometimes see how value is created (or may be destroyed) more clearly than management	Developing stakeholder relationships to more clearly understand how value is to be created or destroyed
Equivocality	Holzer	2008: 54;62	The engagement with stakeholders can be conceived as a means of establishing the assumptions an enterprise is based on ... To reduce the resulting uncertainties, corporations negotiate their environments	Negotiating agreement regarding assumptions upon which the enterprise is based

Table 1 (continued)

(1) Knowledge Problem Illustrated	(2) Author(s)	(3) Year: Page(s)	(4) Illustrative Quotation	(5) How Managers Engage Stakeholders
Equivocality	Rehbein et al.	2013: 138	Dialogue provides opportunities for corporations and activist shareholders to come to agreement on common principles and ways to address social concerns that take into account the needs and interests of both parties	Engaging in dialogue to reveal common needs and interests that promotes intersubjective agreement among stakeholders
Equivocality	Garud et al.	2014: 1483	Such envisioning on the part of stakeholders generates a psychological-buy-in into the story, which triggers “commitment” rather than “critical evaluation” of premises. These observations resonate with Weick’s observation that it is only by trying out something that actors can make sense of equivocal phenomena	Storytelling to stakeholders to enable common expectations and commitment regarding equivocal phenomena
Equivocality	Clark et al.	2017: 1136	...firms engage with socially contested issues—where there is a high degree of societal disagreement—in a different manner from issues that have social consensus, or high agreement...For social issues with consensus, a firm is more likely to opt for a low level of shareholder engagement whereas resolutions regarding contested issues lead to engaging shareholders at a higher level	Addressing socially contested issues to resolve competing conceptions through stakeholder engagement
A priori Irreducible Uncertainty	Sharma and Vredenburg	1998: 729	It was found that strategies of proactive responsiveness to the uncertainties inherent at the interface between the business and ecological issues were associated with the emergence of unique organizational capabilities. These capabilities, in turn, were seen to have implications for firm competitiveness	Responding proactively to uncertainty, through use of stakeholder integration, higher-order learning, and continuous innovation
A priori Irreducible Uncertainty	Cennamo et al.	2012: 1161	When firms invest in actions that may be questionable from an economic perspective, such as addressing the conflicting needs of stakeholders, top managers may require the assurance of continuity in order to commit the firm’s resources to practices that are uncertain and whose value can be appraised only in the long term. And for PSE [proactive stakeholder engagement] to be fully accepted, internal stakeholders might also need some sort of pledge that the firm is truly committed to a stakeholder approach	Reducing uncertainty through proactive stakeholder engagement
A priori Irreducible Uncertainty	Torugsa et al.	2012: 494	SME owner-managers, if they wish their firms to remain competitive, might do well to reconsider the value of proactive CSR as a means for anticipating and responding actively (rather than merely reacting) in uncertain business environments	Anticipating and responding proactively

Table 1 (continued)

(1) Knowledge Problem Illustrated	(2) Author(s)	(3) Year: Page(s)	(4) Illustrative Quotation	(5) How Managers Engage Stakeholders
A priori Irreducible Uncertainty	Alvarez et al.	2018: 3	During the opportunity formation process, entrepreneurs experiment in a trial and error manner as they navigate an uncertain context... beginning a cycle of interactive change between the entrepreneur and his or her stakeholders... Learning by trial and error often is the result of directly interacting with stakeholders	Interacting through experimentation in a trial and error manner

companies has increased in recent years for several reasons ... globalization has played a major role in influencing the ambiguity of business practices and the difficulty of consistent [CSR] reporting among companies” (2005, p. 371). In their discussion of the need to distinguish between advertising and CSR they articulate the importance of establishing standardized reporting to foster transparency (Table 1, Col. 5), which at its core produces a common definition to address ambiguity. Hall and Vredenburg (2005) likewise have argued that “stakeholder ambiguity is difficult to manage because it is idiosyncratic and context-specific” and “managers are often ill-prepared to deal with stakeholder ambiguity and typically revert to formulaic decision-making frameworks such as discounted cash flow and cost–benefit analysis, which misrepresent the challenges” (2005, p. 11). Thus, when confronting ambiguity, managers need to develop sufficient definition such that situations that are idiosyncratic and context-specific can be addressed by more-general characterizations (Table 1, Col. 5) (Cohen et al. 1972; Fassin 2009; March 1994).

Accordingly, when viewed from the knowledge problems perspective, stakeholder engagement can serve as an opportunity to address ambiguity by providing managers an interpretive frame that they can use to make sense of hazily defined decision environments and idiosyncratic contexts. Stakeholder engagement so viewed (through a more-precise understanding of ambiguity as a knowledge problem) enables ambiguity to be reduced by stimulating communication among stakeholders across contexts that lead to consensus (March 1994) thereby to increase correspondence in understanding between managers and stakeholders. To resolve ethical challenges faced by managers through stakeholder engagement, knowledge problems based in ambiguity thus may be managed through purposeful, outward looking effort that facilitates clarity in definitions to address multiple meanings, such that the premises of arguments intended to justify action are less likely to be subverted. Hence:

Proposition 2 *Stakeholder engagement that enables managers to establish common definitions reduces knowledge problems due to ambiguity, thereby increasing the likelihood of resolving ethical challenges.*

Complexity and Stakeholder Engagement

In our analysis, we observed situations of complexity, where managers sought to address the relevant factors influencing a decision in complicated and/or nonlinear environments and/or information incompleteness, inadequacy, or inaccuracy relative to what is required. They do so by *engaging stakeholders to foster continuous outside-in learning as a way to simplify the multiplicity of variables*. For example, Meznar

and Nigh (1995) suggested that complexity “has been shown to increase all types of boundary-spanning activity... As an environment becomes more complex and turbulent, firms will use whatever means they have at their disposal” (1995, p. 978). In their examination of the way managers relate to social and political stakeholders, these authors focused on how undertaking internal changes to adapt to external expectations represents boundary-spanning tools that managers can use as a bridge to connect with stakeholders (Table 1, Col. 5). Similarly, Aragón-Correa and Sharma (2003) have highlighted how managers maintain the balance between the internal and external through adopting “a long-term, consistent strategy that fosters ... continuous outside-in learning from multiple stakeholders, so as to reduce the complexity” (2003, p. 84). In this way stakeholder engagement can assist managers to foster continuous outside-in learning from multiple stakeholders (Table 1, Col. 5).

Accordingly, when viewed from the knowledge problems perspective, stakeholder engagement can help to reduce complexity by enabling managers to identify the relevant factors influencing a decision in complicated and/or nonlinear environments, and to overcome incompleteness, inadequacy, or inaccuracy of information. In this way, managers engaging stakeholders must adopt processes for developing the tools needed to disentangle detail and dynamic complexity (Rivkin 2001; Simon 1962). These tools can include, for example, using inputs from outside groups, collaborating and contracting in mutual way, and co-developing standardized responses to pressure (see Table 1). Use of such tools enables managers to align internal organizational structures with the perceived complexity of the external environment (Davis et al. 2009; Musteen and Ahsan 2013; Pieper et al. 2015) thereby to increase correspondence in understanding between managers and stakeholders. To resolve ethical challenges faced by managers through stakeholder engagement, knowledge problems based in complexity thus may be managed through use of tools that foster continuous outside-in learning as a way to simplify the multiplicity of variables, such that the premises of arguments intended to justify action are less likely to be subverted. Hence:

Proposition 3 *Stakeholder engagement that enables managers to employ tools that foster continuous outside-in learning as a way to simplify the multiplicity of variables reduces knowledge problems due to complexity, thereby increasing the likelihood of resolving ethical challenges.*

Equivocality and Stakeholder Engagement

In our analysis, we observed situations of equivocality, where managers sought to address the simultaneous existence of multiple meanings or interpretations of the world *by engaging stakeholders to cultivate intersubjective agreement through dialogue that surfaces competing conceptions relative to a shared purpose*.³ For example, Clark et al. (2017) noted that “firms engage with socially contested issues—where there is a high degree of societal disagreement—in a different manner from issues that have social consensus... resolutions regarding contested issues lead to engaging shareholders at a higher level” (Clark et al. 2017, p. 1136). In their analysis of managers’ responses to societal disagreement, they articulated the importance of addressing socially contested issues to resolve competing conceptions through stakeholder engagement (Table 1, Col. 5). In this same vein, Rehbein et al. (2013) suggested that managers engage stakeholders to increase intersubjective agreement through dialogue, which “provide[s] opportunities for corporations and activist shareholders to come to agreement on common principles and ways to address social concerns that take into account the needs and interests of both parties” (Rehbein et al. 2013, p. 138). In this way, stakeholder engagement can produce dialogue—which potentially can be grounded in concepts such as reciprocity and fairness (Bosse et al. 2009)—but relative to a common purpose, as a mechanism to reveal common needs and interests that prompts an intersubjective agreement among stakeholders with respect to that purpose (Table 1, Col. 5).

Accordingly, when viewed from the knowledge problems perspective, stakeholder engagement can serve to help address equivocality by enabling managers to address the difficulties posed by multiple meanings or interpretations (Daft and Macintosh 1981). Stakeholder engagement, when viewed through a more precise understanding of equivocality as a knowledge problem, enables equivocality to be reduced through dialogue. This occurs, not by providing more information, but rather by promoting commonalities among stakeholders in the development of and/or agreement to work toward some set of common objectives. Stakeholder engagement thus enables equivocality to be reduced through a negotiated conception of facts relative to such a common objective, thereby to increase correspondence

³ As we previously have noted, equivocality often is confused with ambiguity; but these are distinct concepts. With ambiguity, increases in information lead to increases in consensus. Whereas with equivocality no amount of additional information can create consensus. Only increased dialogue relative to some common purpose will produce the intersubjective agreement necessary to coordinated action, without any expectation that the distinct world views that give rise to equivocality will be reconciled (Townsend et al. 2018).

in understanding between managers and stakeholders. To resolve ethical challenges faced by managers through stakeholder engagement, knowledge problems based in equivocality thus may be managed through dialogue that cultivates intersubjective agreement around a common purpose, such that the premises of arguments intended to justify action are less likely to be subverted. Hence:

Proposition 4 *Stakeholder engagement that, through dialogue, enables managers to cultivate intersubjective agreement around a common purpose reduces knowledge problems due to equivocality, thereby increasing the likelihood of resolving ethical challenges.*

A Priori Irreducible Uncertainty and Stakeholder Engagement

In our analysis, we observed situations of a priori irreducible uncertainty, where managers sought to make decisions in the face of circumstances that cannot be predicted, measured, modeled, or even foreseen (Alvarez and Barney 2007; Knight 1921; Kuechle et al. 2016), *by engaging stakeholders to adopt an action-reaction approach*. For example, Sharma and Vredenburg (1998) found that “strategies of proactive responsiveness to the uncertainties inherent at the interface between the business and ecological issues were associated with the emergence of unique organizational capabilities” which were in turn “seen to have implications for firm competitiveness” (Sharma and Vredenburg 1998, p. 729). In their development of the notion of proactive corporate environmental strategy, they articulated a kind of action-reaction process to explain how managers are both proactive and responsive to uncertainty, through use of stakeholder integration, higher-order learning, and continuous innovation (Table 1, Col. 5). Similarly, Torugsa et al. (2012) noted that although it is difficult for small- and medium-sized enterprises to engage stakeholders given resource constraints, “SME owner-managers, if they wish their firms to remain competitive, might do well to reconsider the value of proactive CSR as a means for anticipating and responding actively (rather than merely reacting) in uncertain business environments” (Torugsa et al. 2012, p. 494). Linking capabilities and proactive CSR, these authors showed how managers engage uncertainty effectively through a process of *both* action and reaction to enhance clarity and increase certitude (Table 1, Col. 5).

Accordingly, when viewed from the knowledge problems perspective, stakeholder engagement that is an anticipatory (action) and proactive (reaction) response to uncertainty (see e.g., Cennamo et al. 2012), enables managers “to try and increase the certainty of the outcomes associated with

making their decisions” (Alvarez and Barney 2005, p. 777), and thereby to increase correspondence in understanding between managers and stakeholders. To resolve ethical challenges faced by managers through stakeholder engagement, knowledge problems based in a priori irreducible uncertainty thus may be managed through the adoption of an action-reaction approach (Alvarez and Barney 2007; Knight 1921; Kuechle et al. 2016; Townsend et al. 2018), such that the premises of arguments intended to justify action are less likely to be subverted. Hence:

Proposition 5 *Stakeholder engagement that enables managers to adopt an action-reaction approach reduces knowledge problems due to a priori irreducible uncertainty, thereby increasing the likelihood of resolving ethical challenges.*

In advancing the foregoing five propositions we have developed theory to suggest that resolving knowledge problems reduces false premises of arguments intended to justify action (Sidgwick 1879). And as we have further argued, as managers reduce false premises, they are more likely to have success increasing correspondence in understanding between managers and stakeholders, and thus in resolving the ethical challenges that arise from these false premises. A key focus in this paper, then, has been to demonstrate how stakeholder engagement enables the management of five distinct types of knowledge problems as a way to thereby resolve ethical challenges.

As articulated in the foregoing propositions, we suggest that stakeholder engagement is a mechanism for reducing each of five primary knowledge problems, improving correspondence in understanding between managers and stakeholders, and thereby increasing the likelihood of resolving ethical challenges. Specifically, we have argued that stakeholder engagement serves to manage: (1) risk through means-ends based calculations of probabilities, (2) ambiguity through facilitating clarity of definitions to address multiple meanings, (3) complexity through tools that foster continuous outside-in learning as a way to simplify the multiplicity of variables, (4) equivocality through dialogue that enables the cultivation of intersubjective agreement around a common purpose, and (5) a priori irreducible uncertainty through using an action-reaction loop as a way to increase certainty. In the following sections, we discuss the practical and theoretical implications of our argument and do so by returning to the illustrative case of rDNA and genetic modification to draw upon it in even greater depth.

Stakeholder Engagement in Practice

Stakeholder engagement is inherently practical. Indeed, the engagement of stakeholders to affect consequences is the essence of management (Freeman 1984; Lenn 1993;

Stanford Memo 1963). And as we have argued, stakeholder engagement is *essential* to managing more ethically, because without stakeholder engagement, knowledge problems subvert the correspondence in understanding between managers and stakeholders—of both the premises and expected consequences upon which the beliefs of managers must be based. Thus, we argue, stakeholder engagement is inherently practical.

The case of rDNA and genetic modification provides an apt illustration of how this is so, knowledge-problem-by-knowledge-problem. Specifically, the historical setting of this case illuminates the conditions and consequences that emerge when managers within society face an overwhelming set of knowledge problems and, in the midst of these problems, ethical challenges. As a practical example of our theorizing, the Asilomar Conference on recombinant DNA in 1975, which was intended to tackle these challenging issues, represents an early attempt to manage the consequent knowledge problems surrounding rDNA technology—messy as they were—through stakeholder engagement; and, it provides the outlines of how stakeholder engagement can combine ethics and business to overcome ethical challenges. Further examination of the conference details bears this out.

In April 1974, a group of seven scientists—one of whom was a Nobel laureate at the time (James Watson) and three others who would later receive that honor (David Baltimore, Paul Berg, and Daniel Nathans)—met to “consider mechanisms for reviewing potential dangers (as well as benefits) stemming from the ability to generate a wide variety of hybrid DNA molecules” (Fredrickson 2001, p. 15). Emerging from this meeting on rDNA and genetic modification technology was a report containing a series of recommendations to address the hazards. One of these recommendations was a proposal for a moratorium on rDNA research; another was the call for an international meeting of scientists be convened (Berg et al. 1974), which eventually would also include legal experts and the press. That meeting occurred in February 1975 at the Asilomar Conference Center in Pacific Grove, California. As Phillippe Kourilsky, a scientist from France who participated in the conference, described:

I remember the Asilomar Conference as an event both exciting and confusing. Exciting because of the scale of the scientific adventure, the great expanses which had opened to research, and because no one could be indifferent to the debate over the powers and responsibilities of scientists. Confusing because some of the basic questions could only be dealt with in great disorder, or not confronted at all. On the frontiers of the unknown the analysis of benefits and hazards were locked up in concentric circles of ignorance. (Fredrickson 2001, p. xvii).

While seeking to avoid oversimplification of the deep and rich history of these events, we nonetheless observe each of the five knowledge problems suggested by theory to be present in this case. The knowledge problem of risk was evident in the initial call for a temporary moratorium on certain experiments was “based on judgments of potential rather than demonstrated risk since there are few available experimental data on the hazards of such DNA molecules” (Berg et al. 1974, p. 303). Likewise, the knowledge problem of ambiguity existed in the fact that at the time, it was not even clear what was meant by the term “hazard” as it regards rDNA technologies (Fredrickson 2001, p. 25). The knowledge problem of complexity appeared in the nature of the research on “such a complex machine as the human” (Fredrickson 2001, p. 3) and response from the press that “had a field day conjuring up fantastical ‘what if’ scenarios” (Berg 2008, p. 290). The knowledge problem of equivocality is evident in the tension between the possible positive and negative “effects of recombinant DNA on public health and safety” (Berg and Singer 1995, p. 9012). And the knowledge problem of a priori irreducible uncertainty is demonstrated in the awareness that scientists at the Asilomar conference “were grappling with questions for which existing knowledge was woefully inadequate” and that “the very experiments proscribed as potentially hazardous were the ones from which the answers would ultimately have to come” (Fredrickson 2001, p. 23).

In the face of such knowledge problems, the Asilomar Conference involved stakeholder engagement in practice of the precise kind theorized in our propositions. From the perspective of *risk*, as part of lifting the moratorium consistent with the recommendations that emerged from the conference, the NIH sought to make it clear that “we would not stress any potential benefits over risks until these were calculable” (Fredrickson 2001, p. 57). This directive was grounded in an approach focused on making means-ends based calculations of probabilities to reduce knowledge problems due to risk as we have argued. From the perspective of *ambiguity*, the stakeholder engagement process at Asilomar included “numerous attempts to amend some definitions of [terms such as] hazard” (Fredrickson 2001, p. 25). In this way, the interactions and discussions of the conference enabled progress, as we have proposed, in the establishment of common definitions to reduce knowledge problems due to ambiguity. Likewise, from the perspective of *complexity*, the initial call for a moratorium also included a recommendation to convene “an international meeting of involved scientists from all over the world ... to further discuss appropriate ways to deal with the potential biohazards of recombinant DNA molecules” (Berg et al. 1974, p. 303). The international meeting that resulted, the Asilomar Conference, itself represents an outside-in learning approach to engagement, again as we have argued, that can simplify

the multiplicity of variables to reduce knowledge problems due to complexity. From the perspective of *equivocality*, “there is a lesson in Asilomar for all of science: the best way to respond to concerns created by emerging knowledge or early-stage technologies is for scientists from publicly funded institutions to find common cause with the wider public about the best way to regulate—as early as possible” (Berg 2008, p. 291). In this way, the dialogue that emerged through early stakeholder engagement started, again as we have argued, the process of cultivating intersubjective agreement around a common purpose to reduce knowledge problems due to equivocality. Finally, from the perspective of a priori *irreducible uncertainty*, the initial challenge of being “locked up in concentric circles of ignorance” (Fredrickson 2001, p. xvii)—essentially, the circumstances of facing the unknown unknowns—was only addressed as scientists and other actors in the emerging rDNA industry (e.g., newly emerging firms such as Genentech), began to use an action-reaction process; that is, to work closely with regulators and other policy makers to manage the relative strictness of the regulatory policies as more certainty was achieved. Thus, over time, these regulations on universities and firms were loosened in an iterative fashion as new scientific information emerged which enabled the interested parties to translate the uncertainties into manageable risks (Berg and Singer 1995).

And yet, this case also demonstrates how stakeholder engagement, in helping managers to manage more ethically, is not all-encompassing in its ability to eliminate knowledge problems and the attendant ethical challenges. As described by Sheldon Krimsky, a member of the NIH rDNA Advisory Committee from 1978 to 1981:

Although the scientific debate had subsided, neither the local media nor the citizens had forgotten the issues. There was little that a firm could do to keep the lid on, once the media publicized a site plan request for commercial laboratory space and small-scale production facilities when the word “DNA” was mentioned ... It took a different kind of public-relations campaign, which, in some cases, meant opening up new areas of negotiation (Krimsky 1982, p. 341).

While the stakeholder engagement that occurred at the Asilomar conference was successful in reducing knowledge problems in the immediate sense (e.g., the scientific debate had subsided), it failed to reduce all knowledge problems and actually created additional knowledge problems (e.g., neither the local media nor the citizens had forgotten the issues) that needed to be reduced by managers, through *further* stakeholder engagement. Thus, stakeholder engagement not only elicited a strong reaction from the public, but also provided the tools needed to manage such strong reactions more ethically (Fredrickson 2001). As recent commercial examples (e.g., the Impossible Burger) demonstrate, this

need for stakeholder engagement by firms doing work in rDNA and genetic modification remains continuously relevant for managers.

Stakeholder Engagement in Theory

In this study, we have sought, first, to make progress in providing theory to aid in the resolution of what often can, due to underspecified knowledge problems, appear to be intractable ethical challenges. We argue, however, that ethical challenges need not be intractable simply because knowledge problems subvert the premises of arguments justifying action. In this paper, we have developed our theory using a definition of stakeholder engagement that calls for the interaction among a firm and its stakeholders to improve the correspondence in understanding between managers and stakeholders thereby to resolve ethical challenges. Under this standard, managers are expected to recognize knowledge problems and to engage stakeholders to reduce the subversion of ethical management that these problems engender. Such an expectation is supported, for example, by the argument that “to the extent that we admit what should have been known about risk into our admonitions for moral failure, we should admit moral risk into our calculations of moral success” (Michaelson 2008, p. 784). It seems only reasonable to expect that in taking a knowledge problems perspective to stakeholder engagement can reduce moral failure in management and increase its moral success.

As our example from practice illustrates, ethical challenges emerged in the commercialization of rDNA and genetic modification technology when “the analysis of benefits and hazards were locked up in concentric circles of ignorance” (Fredrickson 2001, p. xvii). We argue that, at least in part, it is the ignorance generated by knowledge problems that undermines the correspondence in understanding between managers and stakeholders. To this end, we have drawn from the stakeholder management literature examples of the actions that managers can take to address ethical challenges (Table 1). The relationship of these actions to improving the likely resolution of such ethical challenges appears in our five propositions.

Thus, we argue that research—to distinguish, to situate further, and to examine empirically five specific types of stakeholder engagement—can enable scholars to suggest to managers how particular types of stakeholder engagement can lead to managing more ethically and to the resolution of ethical challenges. Herein we have developed a more fine-grained conceptualization of stakeholder engagement as a way to reduce knowledge problems. In this way our theorizing can help to close the gap in the management and ethics literatures—the need to better understand the usefulness of stakeholder engagement in resolving the ethical challenges that arise due to underspecified knowledge problems.

Second, in the process of developing theory to aid in resolving what appear to be intractable ethical challenges among managers and stakeholders, we have endeavored to respond to critiques of the current state of the stakeholder engagement literature (e.g., Greenwood and Mir 2019), which call for a deeper and more systematic understanding of the purpose of stakeholder engagement in society. We have specifically done so by adding vital dimensionality through a systematically-ordered conception of stakeholder engagement based in the five knowledge problems we have utilized herein. While not exhaustive, the literature review reported in Table 1 serves to illustrate how the broad-scope managerial actions that presently are termed stakeholder management, actually encompass distinct and identifiable stakeholder engagement actions that explain practice, and suggest at least the five common themes we have identified as stakeholder engagement to solve knowledge problems. We believe that through this theorizing we can assist in the further organizing of future stakeholder engagement research and practice in ways that have been envisioned in recent scholarship (e.g., Crane and Ruebottom 2011; Fassin 2008; Greenwood and Mir 2019).

Thus, we offer an approach grounded in a knowledge problems perspective to supplement and strengthen the previous approaches that have articulated the various purposes of stakeholder engagement. For example, Greenwood (2007, p. 319) has suggested stakeholder engagement “as a form of: fulfilling fiduciary duties, consent, corporate governance, cooperation and accountability,” which then becomes “a mechanism (respectively) for acquitting the moral duty of the firm, ameliorating unfairness, enhancing stakeholder voice, enhancing trust and accountability.” In like manner, we have suggested stakeholder engagement as a mechanism to solve knowledge problems, thereby to aid in the resolution of ethical challenges. As the stakeholder engagement literature matures, we foresee additional frameworks emerging to develop further the deeper and more systematic understanding of the purpose of stakeholder engagement in society that we have sought to contribute in this paper. For example, future research could seek to understand how the mechanisms we have suggested to underlie a knowledge problems perspective of stakeholder engagement might relate to other conceptualizations of stakeholder management such as those suggested by Friedman and Miles (2006), Mitchell et al. (1997), Rowley (1997), etc. Such investigations may yield fruitful insights regarding links between stakeholder theory and managing more ethically. Indeed, we see a benefit of future research that makes more explicit the link between addressing knowledge problems and solving ethical challenges in practice and invite such research.

Third, we have worked to present for the use of the research community, a conceptualization of stakeholder engagement that has been crafted to take account of the

knowledge problems that often plague relationships among stakeholders. Thus, using the rDNA and genetic modification illustration as an interpretive frame, we also see pragmatic ways in which managers and stakeholders can work in cooperation with each other to resolve ethical challenges through stakeholder engagement that increases the correspondence in understanding between managers and stakeholders. In one sense, this extends the work of Kaler (2002) who has argued that “at least for the purposes of business ethics, some form of claimant definition [of a stakeholder] is required” (2002, p. 92). This approach positions the stakeholder perspective “to be about improving the moral conduct of businesses” (2002, p. 91). In the conceptualization we offer in this paper, stakeholder engagement can be expanded toward pluralism in the Freeman (1984) and Mitchell et al. (2016) sense—where influencing and being influenced by (see e.g., Frooman 1999) can be viewed in terms of stakeholder engagement that enables managers to overcome ethical challenges as we have argued. We believe this conceptualization also to be consistent with the notions of stakeholder/firm reciprocity (e.g., Bosse et al. 2009; Fassin 2012; Phillips 2003). Hence, we suggest that while the primary actors in taking account of knowledge problems to ameliorate problematic relationships among stakeholders are managers, other actors or groups of actors also can be action initiators; and we recommend future research be conducted to continue this exploration.

Fourth, with our theorizing, we have provided managers a way to understand how their engagement with stakeholders might be much more fully specified such that stakeholder engagement actions are actually matched to the nature of the specific knowledge problems that they are intended to address. In this sense, whereas in the past managers have adopted stakeholder engagement as a more general strategy, such an approach did not differentiate between different types of knowledge problems. As a result, managers would be less able to fully resolve the ethical challenges created where the different knowledge problems engender questionable correspondence in understanding between managers and stakeholders. But by more precisely theorizing about the types of knowledge problem and engaging stakeholders accordingly, managers can resolve the ethical challenges they face in practice in a much more targeted and precise manner as we now briefly elaborate.

Managers seeking to address the specific knowledge problem of *risk* in practice will want to engage stakeholders through market-driven participation (e.g., StarTech.com’s use of regular customer panels to obtain systematic input from stakeholders) that results in systematic means-ends based understanding by both managers and stakeholders. Managers seeking to address the specific knowledge problem of *ambiguity* in practice will want to engage stakeholders through purposeful, outward looking effort that facilitates

clarity in definitions to address multiple meanings (e.g., universities that create communities, such as first-generation college students, to bridge cultural mismatches in meanings among stakeholders (Phillips et al. 2020) thereby to enable understanding between managers and various sets of stakeholders. Managers seeking to address the specific knowledge problem of *complexity* in practice will want to engage stakeholders through specialized disentangling of complexity through information gathering and action drawing upon, for example, strategy-based, structure-based, and/or capability-based tools (e.g., LEGO's use of open innovation as a tool to engage thousands of diverse stakeholders to revitalize the company). Managers seeking to address the specific knowledge problem of *equivocality* in practice will want to engage stakeholders through broad/deep, stakeholder involvement (e.g., the Royal Dutch Shell corporation's Scenarios Team which gathers opposing stakeholder views to help to a chart a "technically possible but challenging" pathway forward for society to achieve the goals of the Paris Climate Accord [Harris 2020]), which thus engages competing conceptions relative to a shared purpose among managers and stakeholders. Managers seeking to address the specific knowledge problem of irreducible uncertainty in practice will want to engage stakeholders through systematic action-reaction loop as a way to increase certainty (e.g., the approach of various entrepreneurs to irreducibly uncertain projects such as a city on Mars, which includes the engagement of stakeholders such as media, populace, scientific, and financial capital stakeholders⁴ in the action-reaction loop used to develop reusable rockets of sufficient size and guidance capacity).

Thus, as we have argued, through use of a knowledge problems perspective that we have applied to the in-depth example of genetic modification technologies—and especially through an improved awareness of which knowledge problems link to which ethical challenges as just discussed—the correspondence in understanding between managers and stakeholders can be increased, thereby also increasing the likelihood of resolving ethical challenges. That is, like Frooman (1999), who provided a set of influence strategies for stakeholders "seeking to influence firm decision-making" (p. 191), with our theory we provide a set of stakeholder engagement strategies for managers seeking to address knowledge problems and resolve the ethical challenges that can result.

⁴ See various documentaries e.g., National Geographic Channel (2018). Mars: Inside SpaceX, *Documentary*.

Conclusion

In our view, most knowledge problems are a consequence of the natural state of human beings living in the context of a virtually infinite expanse of possible experiences with numerous potential stakeholders. But it is exactly such experience—stakeholder engagement—that, we argue, is essential to the resolution of that ignorance. Paradoxically, it is the multiplicity of perspectives that arise through stakeholder engagement that provides some basis for eventually transforming a given knowledge problem—inherently detrimental to managing more ethically—into risk that can be insured or survived; ambiguity that can be addressed through definitional consensus, complexity that can be tackled by better tools for outside-in learning, equivocality that can be negotiated through dialogue aimed at a common purpose; but also through intentional action taken to encounter a priori irreducible uncertainty effectively. Thus, through the use of more finely-grained forms of stakeholder engagement that reduce knowledge problems, the correspondence in understanding between managers and stakeholders can be refined, thereby to better resolve ethical challenges.

Compliance with Ethical Standards

Conflict of interest To the best of authors' knowledge, there are no relationships or interests either financial or non-financial that could influence or bias the work presented in this paper, including not limited to personal relationships or competing interests directly or indirectly tied to this research, or professional interests or personal beliefs that may influence this research.

Research Involving Animal and Human Rights Authors attest that there are no sources of funding for this research, and that this research did not involve human subjects or animals.

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