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ARTICLE

An Attribute Perspective on Regulatory Regimes in Risk Governance

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Abstract

Increasing interest from stakeholders has brought new focus on risk governance and risk regulation, such as the regulator's execution of duty and tangible results on safety and environmental protection in oil and gas industry. One recent example, from 2019, is the Office of the Auditor General Norway's (OAG) investigation of the Petroleum Safety Authority's (PSA) follow-up on health, safety and the environment in the petroleum industry, where the regulatory regime in Norway resting on functional requirements was questioned. Simplistically speaking, there are two current traditions or main schools in regulatory regimes: use of functional requirements associated with co-regulation and use of normative requirements associated with prescriptive regulation. In this paper, we introduce a generic model from an attribute perspective on contrasting, gauging or evaluating the two different regulatory regimes. Furthermore, this approach may explain the controversy regarding the favouring of functional or prescriptive regulatory regimes by the different players in the industry. Our case is based on regulations relating to offshore oil and gas operations, in particular focusing on the Norwegian sector. We use the OAG's investigation of the PSA and the public reaction as our material because this material is proposed to provide a thorough and valid description of how the effects of the Norwegian regulatory regime are perceived from the outside. We believe that the generic concept presented here is applicable when performing investigations in other industries involved in hazardous activities.

Keywords: Attribute; functional; prescriptive; regulation; risk governance

I. Introduction

One may anticipate that regulation is expected to evolve, albeit not straightforwardly, in a positive direction. However, not all such developments will necessarily be good for everyone involved. Regulation must relate to a political context, which often is fickle due to conflicting values and interests among the actors involved.

Dissatisfaction with prescriptive regulation and its accompanying "hard law" features of inspection and enforcement to ensure compliance has led to the widespread adoption of co-regulatory programmes in Europe. These programmes have common features: the regulator's role is to supervise and ensure that companies self-regulate in accordance with the performance-based rules and goals set forth in the legislation that created the programmes, and when its evaluation of a company's self-regulatory efforts finds

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inadequacies, it is first to take a "soft law" approach by suggesting regulatory obligations, and later taking enforcement action to impose sanctions only if serious problems persist.[1]

The two main regulatory traditions[2] – promoting functional requirements or focusing on prescriptive rules – may be regarded as two different expressions of what Pierre Bourdieu has described as "symbolic systems".[3] Symbolic systems are means for dealing with and sorting knowledge and for communication. Bourdieu claims that such systems define who has the power to construct reality, or at least how knowledge is perceived and expressed. Bourdieu further claims that the state often is the constructor of such symbolic systems (eg through legislation and bureaucracy).[4]

Our intention for this paper is to incorporate an engineering methodology in the assessment of regulatory regimes, here named "systems". In our taxonomy, the difference between a regulatory regime and a system is that a regime is how integrated things work in real life, whereas a system relates to a decoupled and less nuanced view. The latter some will call a "technologist" view, but it might also be denoted as a "social system", as defined by Bourdieu.

II. Method

First, we introduce a method from an attribute perspective developed to support engineering design assessment. This approach is then applied to the regulatory regime regarded as a social system by identifying relevant attributes of this system. These attributes then are weighted and given ordinal, numerical values, as seen from different players' perspectives. Finally, the model is applied by using textual analysis[5] on the report[6] on the Petroleum Safety Authority's (PSA) activities made by the Office of the Auditor General Norway (OAG).[7]

III. Context

Our basis is the Norwegian offshore oil and gas operations. This is a context of co-regulation and where the choice of a functional regulatory framework in the regulatory strategy will in practice have consequences beyond the regulatory texts and the use of standards as legal norms.[8] Furthermore, the regulator bears the full burden of ensuring the efficacity[9] and credibility of co-regulation under circumstances that inevitably involve disputes with and between industry, other units of government, labour and stakeholders, whose interests range from the personal sphere to the global. This regulatory strategy resting on a functional framework has been endorsed by lawmakers (parliament) in

[1] M Baram and PH Lindøe, "Modes of Risk Regulation for Prevention of Major Industrial Accidents" in PH Lindøe, M Baram and O Renn (eds), *Risk Governance of Offshore Oil and Gas Operations* (Cambridge, Cambridge University Press 2014).

[2] MA Langøy and GS Braut, "A Novel Model for Risk Regulations in the Offshore Oil and Gas Industry" (2022) 13 European Journal of Risk Regulation 635–42.

[3] P Bourdieu, *Symbolsk makt. Artikler i utvalg* (Oslo, Pax Forlag 1996) (originally published in French: P Bourdieu, "Sur le pouvoir symbolique" (1977) 3 Annales 405–11).

[4] P Bourdieu, *Symbolsk makt. Artikler i utvalg* (Oslo, Pax Forlag 1996) (originally published in French: P Bourdieu, *Raisons practiques. Sur la théorie de l'action* (Paris, Seuil 1994)).

[5] K Asdal and H Reinertsen, *Doing Document Analysis. A Practice-Oriented Method* (London, SAGE Publications 2022).

[6] Document 3:6 (2018–2019) (Petroleum Safety Authority, Norway).

[7] The OAG is an audit agency of the Norwegian parliament (the Storting). "We are unique, as we are the only institution that can provide the Storting with a comprehensive and independent audit of the government" (<riksrevisjonen.no>, last accessed 11 September 2023).

[8] Baram and Lindøe, supra, note 1.

[9] Efficacity; the ability, especially of a medicine or a method of achieving something, to produce the intended result <https://dictionary.cambridge.org/dictionary/english/efficacity> (last accessed 17 December 2019).

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consecutive white papers,[10] underpinned by extensive research conducted over several years.[11] However, an investigation by the OAG[12] sparked a public discussion on regulatory strategy in which strong voices from the lawmakers (politicians) advocated for a normative framework opposing the current functional framework. A similar criticism was given by the OAG to the Norwegian Energy Regulatory Authority[13] in 2019. Given the previous mutual strong support of the functional framework, how can that be?

By introducing the method of engineering concept[14] selection from Pahl and Beitz,[15] a regulatory regime may be evaluated in a new way and the question raised above can be answered. Here, we have applied their evaluation method for designing engineering systems/products to two different regulatory systems/regimes. A regulatory system is the intended construction of the regulation, whereas a regulatory regime is the actual outcome. This method of constructing a system perspective is presented and demonstrated in the following sections.

IV. An attribute model evaluation

1. Basic principles

An evaluation is meant to determine the "value", "usefulness" or "strength" of a system with respect to the objective for a given attribute.[16] An objective is indispensable since the value of a system attribute is not absolute but must be gauged in terms of certain requirements. An evaluation involves a comparison of system variants or, in the case of a comparison with an imaginary ideal system, of a "rating" or degree of approximation to that ideal. The evaluation should not be based on individual aspects but should, in accordance with the overall goal, consider all attributes in an appropriate balance.

Hence, there is a need for methods that allow for a more comprehensive evaluation or, in other words, to cover a broader spectrum of objectives, including task-specific requirements and general constraints. These methods are intended to elaborate not only the quantitative but also the qualitative properties of the system variants, thus making it possible to apply them for system evaluation.

Presented here is a basic evaluation procedure of use-value analysis.

2. Identifying evaluation criteria

The first step in any evaluation is the drawing up of a set of objectives from which evaluation criteria can be derived. In the technical field, such objectives are mainly derived from the requirements list and from general constraints, which are identified while working on a particular solution. A set of objectives usually comprises several elements that not only introduce a variety of technical, economic and safety factors, but also differ greatly in importance.

[10] White Paper: ASD. Meld. St. 12 (2017–2018): Helse, miljø og sikkerhet i petroleumsvirksomheten. Det konglige arbeids- og sosialdepartement (2018).

[11] Robust Regulatory Regimes. Defences Against Major Accidents. PETROMAX. Norwegian Research Council 2014–2018.

[12] The OAG's investigation of the PSA's follow-up of health, safety and the environment in the petroleum industry, Document 3:6 (2018–2019).

[13] OAG "Revisjonsrapport for 2019 om NVEs tilsyn med vassdragsanlegg" (NVE = the Norwegian Energy Regulatory Authority).

[14] A method for determining what features a product should have and what metrics can be used to measure the quality or performance of the product based on analysis of customer needs and preferences <www.businessdictionary.com/definition/concept-engineering.html> (last accessed 23 June 2020).

[15] G Pahl and W Beitz, *Engineering Design: A Systematic Approach* (Berlin, Springer 1995).

[16] Attribute; a quality, character or characteristic ascribed to someone or something <https://www.dictionary.com/browse/attribute> (last accessed 5 June 2020).

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Table 1. Assessing numerical values in use-value analysis. Amended from Pahl and Beitz (1995) with equivalent descriptors from Guideline VDI 2225.

Mark	Equivalent descriptor
0	Not at all
1	To a small degree
2	To some degree
3	To a large degree
4	Full extent

A range of objectives should satisfy as far as possible the following conditions:

- The objectives must cover the decision-relevant requirements and general constraints as completely as possible, so that no essential criteria are ignored.
- The individual objectives on which the evaluation must be based should be as independent of one another as possible; that is, provisions to increase the value of one variant with respect to one objective must not influence its values with respect to the other objectives.

3. Weighting evaluation criteria and assessing numerical values

The evaluation criteria should be derived directly from the objectives. To establish evaluation criteria, we must first assess their relative contribution (weighting) to the overall value of the solution (or system) by assigning "weighting factors". A weighting factor is a real, positive number indicating the relative importance of a particular evaluation objective (for an attribute). In use-value analysis, weightings are based on factors ranging from 0 to 1. The sum of the factors of all evaluation criteria (sub-criteria at the lowest stage) must be equal to 1 so that a percentage weighting can be attached to all of the sub-objectives.

The assessing values are derived from the consideration on a relative scale of the evaluation criteria, and they are thus more or less subjective in character. The values are expressed by points on a range from 0 to 4[17] (see Table 1). The next step would be to determine the values of the different attributes. We will present these steps in our assessment on regulatory systems in the following section.

V. Attributes for regulation

1. Enforcements and sanctions

When choosing a regulatory strategy, enforcements and sanctions will follow. They will here be characterised as two distinct attributes. The form of these is described by Baldwin and Cave[18] in their chapter on "rules and enforcement", and the hierarchy of enforcements is (from the top down):

- Command regulation
- Insistent strategy
- Persuasive strategy
- Enforced self-regulation

[17] Based on Guideline VDI 2225.

[18] R Baldwin and M Cave, *Understanding Regulation* (Oxford, Oxford University Press 1999).

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Table 2. Values of attributes for the given regulatory systems.

	Regulatory system	
	Functional	Prescriptive
Enforcement	1	3
Sanction	2	4
Intervention	2	3
Competence	4	1
Transparency	2	3
Knowledge-based	4	1

← Low	Degree of intervention			High →
Information	Standards			Permission
	Goal-orientated	Functional	Prescriptive	

Figure 1. Regulations categorised based on degree of intervention (see Nordrum, 2019). Translated from Norwegian.

The hierarchy of sanctions is (from the top down):

- Criminal prosecution
- Notices: improvement and prohibition
- Warnings: infractions; written warnings; verbal warnings
- Persuasion: shaming; deadlines; photographic evidence; education and advice

What above is categorised as "written warnings" can be translated into nonconformities in the PSA's audit reports. This is the most frequently used sanction. However, notices are regularly used, and from the perspective of sanctions functional regulation gives room for firmer actions. In addition, one could argue that the values given in Table 2 should be higher.

2. *Intervention*

Nordrum[19] categorises legal norms based on the extent to which the norm limits the regulator's room for action, or on how interfering the norm is in some other way, as illustrated in Fig. 1. The intervention attribute for functional regulations becomes mid-level, so there is room for intervention and control.

3. *Competence*

A functional regulatory framework places high demands on the competence of the regulator's employees. There is a need for a high level of technical expertise in assessing a

[19] JCF Nordrum, *Betre regulering? Årsak-virkningsanalyser i norsk reguleringspraksis.* [*Better Regulation? Cause–effect Analyses in Norwegian Regulatory Practice*] (Oslo, Gyldendal 2019).

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company's performance, far beyond what is necessary for the same purpose in a normative ("prescriptive") regulatory framework.[20]

4. Transparency

A functional regulatory framework can create a democratic deficit as the regulated will oppose the sharing of internal information and thus limit public insight and discussion. The regulator[21] must counteract this by publishing its own reviews and creating forums/arenas for public debate.

5. Knowledge-based

A functional regulatory regime leans heavily on the use of standards developed by the industry. Baram and Lindøe[22] discuss modes of risk regulation, the features of co-regulation and regulation and the importance of the Regulated's resources and expertise to develop legal standards as underpinning and enabling functional regulations.

Turning back to Pierre Bourdieu's concept of symbolic structures, the prescriptive rules tradition appears to be controlling and calls for adherence. The functional requirements require participation and even negotiation in some instances. This requires trust among the participating agencies and organisations.[23] However, from Bourdieu's perspective, it also might enhance trust by the distribution of knowledge and power.[24]

6. Cause-and-effect model

In the search for relevant attributes, we have identified the logic model presented in Fig. 2 as suitable for illustrating one form of identification process.

7. Identifying attributes

The overall objective of the regulation of the oil and gas industry is safe and prudent operation.[25] To achieve that overreaching goal, we need to identify the important attributes and associated sub-goals. Here, we have categorised three types of such attributes[26]: inputs, activities and outputs (in this model, "safe" and "prudent" would be, respectively, impact and outcome). The following attributes of the execution of regulatory duty are identified:

- Enforcement – activity
- Sanction – output
- Intervention – activity
- Competence – input
- Transparency – output
- Knowledge-based – activity

[20] Baram and Lindøe, supra, note 1.

[21] ibid.

[22] ibid.

[23] Langøy and Braut, supra, note 2; CR Hellebust and GS Brautm "Regulated Self-Regulation or External Control? Effects of Different Legislative Approaches in the Petroleum Sector in Norway and Brazil" (2012) 4 SPE Economics & Management 115–18.

[24] Bourdieu, supra, note 4.

[25] Norwegian Petroleum Law – Lov om petroelumsvirksomhet § 4-1 and 9-1.

[26] Based on PJ Rogers, "Using Program Theory to Evaluate Complicated and Complex Aspects of Interventions" (2008) 14 Evaluation 29–48.

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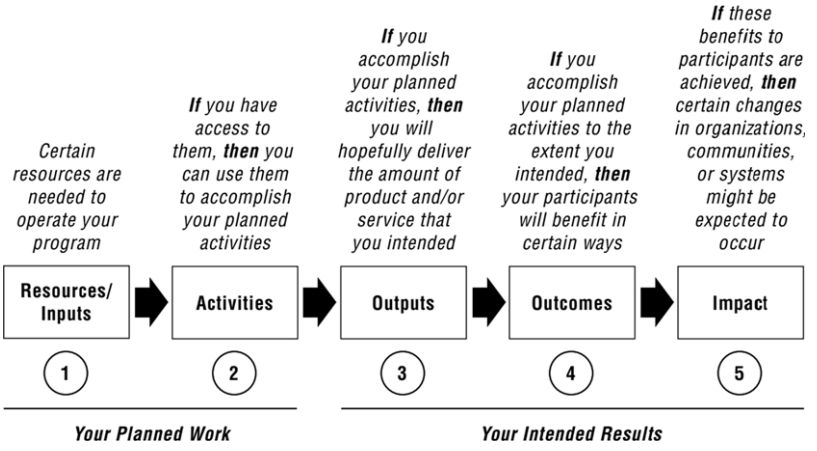

Figure 2. How to understand the logic model and its classification and sequence of attributes.[27]

8. Attribute values

Based on the above description and elaboration, we have given values to the attributes for the functional and prescriptive regulatory systems, which are presented in Table 2.

VI. Independency and weight of attributes

From the above, we have seen that the individual objectives on which the evaluation must be based should be as independent of one another as possible; that is, provisions to increase the value of one variant with respect to one objective must not influence its values with respect to the other objectives. We cannot claim that we in the above analysis have been able to find attributes that are fully independent or without room for refinement. However, for the sake of presenting our perspective we find them fulfilling. Furthermore, the attributes' weighting factors shall be numbers indicating the relative importance of particular evaluation objectives or the overall goal, which in the oil and gas industry is safe and prudent operation with no major accidents. Fortunately, major accidents are not frequent, so the achievement of this goal must be evaluated indirectly, and we will use the attributes identified in this work.

The Regulatory Forum is a tripartite arena for companies, unions and government concerned with the development and maintenance of the health, safety and environment regulations for Norway's petroleum sector,[28] where the government is represented by civil servants. In addition to these three players, we will represent (elected) politicians as a fourth group. To our knowledge, there are no large controversies in the Regulatory Forum, and we consider that the groups within this Forum can be regarded as one: "the Regulated".

1. Attribute weight

Based on the above description and elaboration, we have given values to the attributes for the functional and prescriptive regulatory systems from the Regulated's perspective, which are presented in Table 3. We acknowledge that assigning quantitative numbers (hard figures) does not make the assessment more accurate than (soft) qualitative data.

[27] W.K. Kellogg Foundation, 2004.

[28] <ptil.no/en/tripartite-cooperation/regulatory-forum/> (last accessed 12 September 2023).

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Table 3. Weights of attributes for the given regulatory systems.

	Stakeholder		Office of the Auditor General
	Regulated	Politicians	
Enforcement	0.20	0.20	0.20
Sanction	0.05	0.30	0.30
Intervention	0.05	0.20	0.20
Competence	0.30	0.05	0.05
Transparency	0.10	0.20	0.20
Knowledge-based	0.30	0.05	0.05
Sum	1.00	1.00	1.00

Table 4. Stakeholder evaluations of the functional regulatory system.

		Stakeholder			
		Regulated		Politicians	
	Value	Weight	Score	Weight	Score
Enforcement	1	0.20	0.20	0.20	0.20
Sanction	2	0.05	0.10	0.30	0.60
Intervention	2	0.05	0.10	0.20	0.40
Competence	4	0.30	1.20	0.05	0.20
Transparency	2	0.10	0.20	0.20	0.40
Knowledge-based	4	0.30	1.20	0.05	0.20
Sum		1.00	3.00	1.00	2.00

The OAG's numbers are based on our discretion after a textual analysis of the OAG's investigation of the PSA's follow-up on health, safety and the environment in the petroleum industry. The use, by number, of a given word and associated terms in the report is proportional to its importance for the OAG, presented here as the weight of the attribute. As can be seen from Table 3, we have assigned equal weights to the attributes for the politicians and the OAG. The rationale behind this is the public endorsement of the OAG's recommendations and the expectation of more sanctions and interventions from the PSA. This underplays the importance of the industry's competence and distribution of knowledge and power, as we have described in Section V.5.

VII. Evaluation and conclusions

However, the process leading up to the deployment of the selected regulatory regime has been less frequently investigated; similarly, understanding that the regime may be challenged over time in the quest to achieve "good" regulation. We believe that an attribute approach to regimes with functional requirements could improve this process.

The evaluations from two of the stakeholders of the regulatory systems are given in Tables 4 and 5 for functional and for prescriptive regulatory systems, respectively. Clear

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Table 5. Stakeholder evaluations of the prescriptive regulatory system.

		Stakeholder			
		Regulated		Politicians	
	Value	Weight	Score	Weight	Score
Enforcement	3	0.20	0.60	0.20	0.60
Sanction	4	0.05	0.20	0.30	1.20
Intervention	3	0.05	0.15	0.20	0.60
Competence	1	0.30	0.30	0.05	0.05
Transparency	3	0.10	0.30	0.20	0.60
Knowledge-based	1	0.30	0.30	0.05	0.05
Sum		1.00	1.85	1.00	3.10

differences between the stakeholders' evaluations are demonstrated. The Regulated favour a functional regulatory system, whereas the politicians (people) favour a prescriptive regulatory system. This approach can therefore explain the difference in support for functional or prescriptive regulatory regimes by the different players (stakeholders) in the industry.

Similarly, expectations and assumptions can generically be set for voters, customers, interested organisations and organisations representing employers and employees. However, the evaluation should then be based on the assessment of values and weights based on document analysis and/or interviews with representatives from the stakeholders.

The OAG has not reported any compound analysis on possible explanations as to why a rather non-punitive system still appears to have the desired effects regarding the continuous improvement of safety-related parameters over several decades, even though they at several points address constituencies in the Norwegian regulatory tradition in a positive way. Again, turning back to Pierre Bourdieu, arguing for a more reactive (and possibly more punitive) system might gradually shift the control of knowledge in favour of the state. Certainly, it is a core task of the state to have control over safety levels in certain sectors of society. However, sticking with Bourdieu, this is not necessarily best achieved via "command and control", particularly when detailed knowledge of what is going on in the sector remains with the actors in the field and not necessarily with the state.

Back to the question posted in this context: given the previous mutually strong support for the regulatory strategy following a functional framework, how have strong voices from the lawmakers (politicians) emerged advocating for the opposite? Comparing the scores for the stakeholders in Tables 4 and 5, we can see that the Regulated score the functional and prescriptive regulatory systems as 3.00 and 1.85, respectively, and the politicians score the same as 2.00 and 3.10, respectively. The model proposed here gives a possible explanation for these figures.

Competing interests. The authors declare none.

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