SOCIETAL RESPONSIBILITY IN ENGINEERING EDUCATION; A CASE STUDY ON RD&I-COOPERATION WITHIN CIVIL ENGINEERING

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ABSTRACT
This paper describes how co-operation on Research, Development, and Innovation (RD&I) between the university and the value chain within road construction has resulted in increased awareness on the responsibility public institutions have to support industry, and at the same time attend fairness and equal treatment between industrial competitors.
Universities are major contributors to societal development, through the formation of aspiring young professionals. In addition to having responsibility for equipping young professionals with knowledge and skills necessary for becoming attractive participants in working life, universities have responsibility for forming a society in responsible and ethical directions.
Co-operating on RD&I with private companies might be challenging for governmental universities, as new knowledge is developed to increase the competitive advantage of the funding company only, and thus should not be distributed. The mandate of governmental universities is to develop and distribute knowledge openly.
It is important to attend that any secluded industrial activities are fully funded by industry, not subsidised by the general governmental funding for the university. The case discussed in this paper concerns an RD&I cooperation between two governmental bodies; a university and a newly established road construction client organisation. Both organisations share the societal mission of supporting the industrial value chain.
As a consequence of new awareness, it is realised to be important to safeguard that not only new technical knowledge is internalised in engineering education programmes and practice, however also the societal responsibility.

Keywords: Societal responsibility, RD&I cooperation, Industrial value chain, Road construction, University Societal Responsibility (USR)

1   INTRODUCTION

University of Agder (UiA) recently entered an RD&I cooperation agreement with a major governmental construction client organisation. The Norwegian Public Road Administration (NPRA) hosts both the governing directorate for road construction and the construction client for the major part of national highways and regional roads. NPRA is highly respected for professional level and integrity. However, suspicions are that innovation might suffer in this near monopolistic situation.

To promote innovation, the government recently established a second building client organisation; Nye Veier (NV). NV has been given the societal mandate to build parts of the national roads "more efficient and smarter". The headquarters of NV was politically localised to Agder – the home region of UiA. Hence, UiA approached NV to start cooperating on RD&I.

Being solely a construction client means that the primary way to promote innovation for NV is through contributing to competence elevation in the value chain. Operating in a commercial market means that actors parallel in the value chain – competitors – must be offered the same competence elevation, to facilitate competition.

It is obvious that the construction client NV has no interest in shielding competence, neither formally nor practically. On the contrary, the societal responsibility of distributing knowledge evenly to all industry is emphasised in all activities and initiatives.

UiA has entered agreements with both construction client organisations (NV and NPRA), covering responsibility for education and RD&I.

2   METHODS

Responsibility can easily be divided into two groups: a) the formal – given by legislation, and b) the ethic – driven by "the right thing to do"; norms and expectations from society.

The primary legislation ruling the university world is the Norwegian Act on Universities (Lov om universiteter og høgskoler). The word "responsibility/-ies" is applied 29 times throughout the legislation text. Mainly, this regards details regulating responsibility between the university and other governmental institutions, between university board and subsequent management levels, between employer and employee and between students and university. Responsibility at an overall institutional level is directly described only in two areas: responsibility for maintaining a professional level of all activities (1-5.1) and responsibility for maintenance and development of the Norwegian language within each profession (1-7). The word "responsibility/-ies" is never applied directly in combinations like "societal responsibility" or "social responsibility".

It is however easily observable that the intention of the Act is to authorize the university to having comprehensive societal responsibility. This is apparent in the paragraph instructing on activities to take place at the university (1-3), that is where the university is given its mandate. This mandate includes to promote and offer education and continuing education, to develop and distribute new knowledge (research), to contribute in development and innovation in working life, to participate the public debate and to cooperate with related institutions at all levels from regional to international – all at the professional level of the international frontier within each profession.

Having clarified already that the societal responsibility of universities is not directly expressed however clearly apparent in the act governing universities, it seems reasonable to look towards ethics for guidelines; norms for behaviour.

However reasonable, nor ethics seems to offer any easy solution or definition explaining and defining societal responsibility. Göbbels [1] sites Votaw and Sehti from an early article, claiming societal responsibility to be a brilliant term, because: "it means something, but not always the same thing to everybody".

Business life seems to have worked more structured on the societal responsibilities than universities. (Maybe business has more to prove.) A designated concept has been introduced and adopted: "Corporate Societal Responsibility" (CSR). In a founding article from 1979, Carroll [2] divides CSR into four categories;

1. Economic responsibility: The main mandate of business is to produce goods and services that society demands, and to sell at profit. This also constitutes a responsibility, as the distribution of duties is fundamental to the existence of society.
2. Legal responsibility: All activity should acknowledge and respect legislations.
3. Ethical responsibility: Both economic and legal responsibilities embody ethical norms, however to a large degree codified into legislation. There are "additional behaviour and activities expected of business by society's members", that has not yet been codified.
4. Discretionary responsibility: Volitional and often tending to be philanthropic.

Carroll states that these four are neither cumulative nor additive; however, they should all be met simultaneously. He continues, "Ethical responsibilities are ill-defined, and consequently are amongst the most difficult for business to deal with".

Carroll also attempts to quantify the four responsibilities towards one another (Figure 1). The dotted lines between the four areas indicate that all four should be satisfied simultaneously, for a corporate to fulfil its societal responsibility. No areas are exclusive towards other.

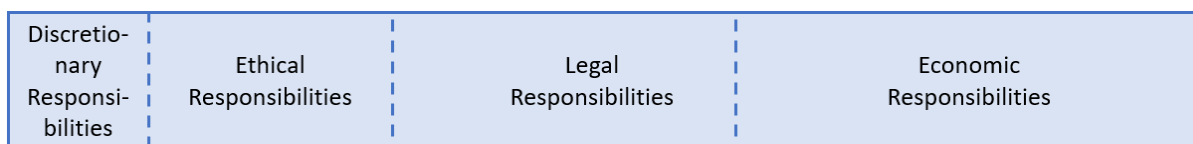| Discretio- nary Responsi- bilities	Ethical Responsibilities	Legal Responsibilities	Economic Responsibilities

Figure 1. The relative magnitude of the four categories, together constituting the total social responsibility of a corporate, according to Carroll [2]

Society has developed heavily during the nearly 40 years since Carroll presented his model. Awareness of societal responsibility has grown, and probably become more apparent as a customer demand. Environmental issues are presently emphasised, maybe to a degree where it should be considered a separate area of responsibility. However, it might also be considered covered by all of the four areas.

According to Marrewijk [3], the responsibility of different actors in society tends to be more integrated (Figure 2). Marrewijk suggests that "We see moving panels, changing circumstances and new existential problems arousing various members in society to act and transform into value systems and corresponding institutional arrangements". He then continues "Accepting their new position in society, companies develop new values, new strategies and policies and new institutional arrangements that support their functioning in areas that were once left to others, redefining."
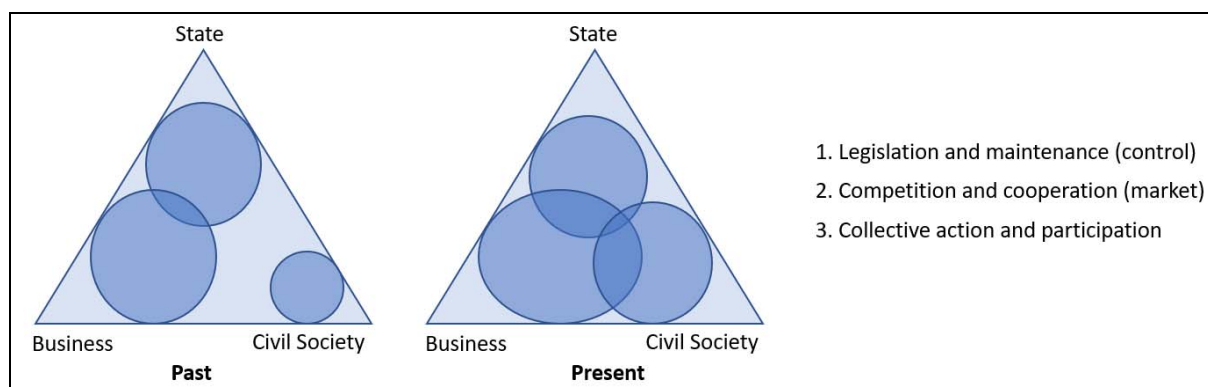

Figure 2. The relationship between state, business, and civil society (Marrewijk [3])

What seems not to have been altered though is that the main responsibility of any corporate is to fulfill its primary function in producing and making a profit from selling goods and services – and to do so within valid legal limitations. This is clearly promoted by e.g. Marrewijk [3].

3   RESULTS AND DISCUSSION

3.1 Conceptualising University Societal Responsibility

Though business obviously has struggled with definition and content of the concept Corporate Societal Responsibility" (CSR) for more than 40 years, it seems relevant to introduce the parallel concept "University Societal Responsibility" (USR).

Any society is based on the fundamental distribution of duty between different types of entities or actors. One role is producing goods and services according to society's demand, and to create profit from the sale of these. Another is given by the mandate for university – in our case by the Norwegian Act on Universities. Even if any actor is expected to have responsibility for wide areas in society, it remains each actor's main responsibility to fulfill its primary mandate – according to the distribution of duties that society is based on.

Corresponding to Carroll's model of CSR (Figure 1), the University Societal Responsibility (USR) could be conceptualised by simply substituting the concept "economic responsibilities" with "responsibility for developing new knowledge and distributing it through education, innovation and public debate", as illustrated in Figure 3.

Discretionary Responsibilities	Ethical Responsibilities	Legal Responsibilities	Main societal mandate: Responsibility for developing new knowledge, and distributing it through education, innovation and public debate
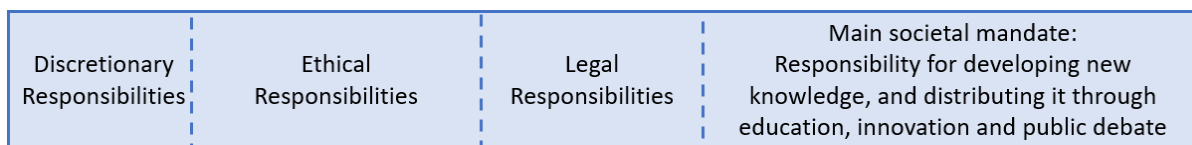
Figure 3. Suggestion for conceptualising "University Societal Responsibility" (USR) comprising four areas, including implying relative magnitude amongst those

The dotted lines between the four areas are moved slightly from that of Carroll's model [2]; indicating representation of another societal actor, and also that the magnitude of expectations for the ethical and discretionary responsibilities have increased during the time. This is in accordance with Marrewijk [3], and also emphasises Carrol's original idea that the internal position of these lines is not fixed. Nor do they constitute solid borders between the four areas, as practical issues often interfere with several of the areas simultaneously.

Anticipating that the legal considerations are simpler for a governmental university than for business easily opens for reducing the relative magnitude of the area legal responsibilities.

However, fulfilling the main mandate given by society's fundamental distribution of duty remains the most important responsibility of any societal actors – also for universities. Hence, the societal norms (the ethics) are to a large degree safeguarded, when the Norwegian Act on Universities mandates university without explicitly describing the societal responsibility. Then, of course, society has higher expectations also towards universities.

When searching for research on USR (without using this denotation), it seems to be a plurality focusing within areas of ethical or discretionary responsibility (Figure 3). Some examples are research focusing on caretaking of certain groups; [4] (elderly) and [5] (gender), culture differences [6] and [7] and low-resource societies [8].

Although all of these interferes with the major responsibility of USR (development and distribution of new knowledge), they clearly mainly focus on the areas covered by definitions "ethical" and "discretionary" responsibility. By doing so, they probably attend more affection in society, than research solely focusing on the fundamental duty of universities. This might probably be well explained by proximity ethics, utilising Levinas' "the face of the other".

3.2 Applying the USR model on the case

The RD&I cooperation between NV and UiA was initiated by choosing broad dialogue as a primary method for accelerating innovation. To secure involvement, the cooperation started by NV and UiA together inviting for an industrial workshop. It was emphasised that participants should represent all the value chain of road construction, by including building clients, consultancies, contractors, a broad scope of suppliers, regulatory authorities, and recognised research institutes, in addition to universities. This initial workshop was used to identify central challenges, and to prioritise four topics for further exploration.

Several workshops have subsequently been arranged according to the same value chain concept, to advance on the prioritised topics. The primary intention of these workshops has been to identify obstacles preventing innovation. Further work is then to challenge these obstacles.

Advisory boards have been established or are under establishment for each of the four prioritised topics. Subject to each advisory board is an industrial reference group with a wide range of members (Figure 4). The advisory boards are vital in choosing directions for the development and conducting innovation work. The reference groups act as consultative committees for suggested solutions.
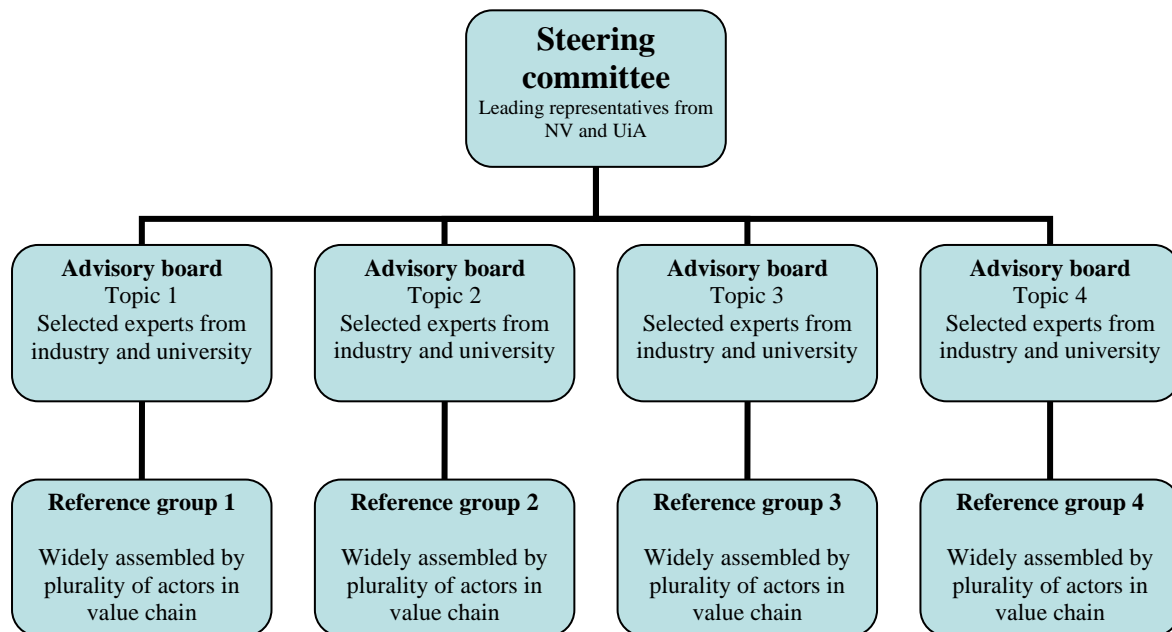
Figure 4. Organisation of industrial involvement in RD&I project

The strategy of NV to approach its societal mission of constructing roads "more efficient and smarter" goes through elevating the competence of the constructional value chain. This corresponds with the mandate and primary societal responsibility of UiA: "developing new knowledge and distributing it through education, innovation, and public debate".

During the work so far, more than 150 stakeholders from the constructional value chain have been at UiA campus, participating one or more workshops. In parallel to the RD&I organisation, a 4,1 mill USD research project (MEERC) has been established, partly funded by the Research Council of Norway (NFR) through a programme aiming at strengthening educational programmes through research. The scope of the MEERC project is to strengthen the engineering programme in Civil and Structural engineering, but repercussions positively affect far wider.

As part of the project description for MEERC, a matrix was developed showing 54 interaction points between research activities and courses offered in the civil and structural engineering programme. Each interaction point was emphasised for showing potential for developing courses in the engineering education programme, with new technical knowledge. There is a big potential for updating the engineering education with new technical knowledge, developed through co-operation with the constructional value chain on RD&I.

 Being a new organisation, NV is carefully attending correct implementation of all aspects of its mandate. Again, utilising Correll's model for CSR (Figure 1), main emphasise during start-up is probably put on the economic and legal responsibilities. (There is an upcoming discussion on whether the traditional construction client NPRA has been too generous on ethical and discretionary responsibility, increasing cost above pain threshold.)

To promote innovation, and hence to approach its societal mission, NV strives to include all actors of the value chain in development. This is of course at the same time within the legal responsibility, as it relates to acts on public procurement.

This strive from NV to equally benefit all value chain, regardless of e.g. localisation, has improved the university's awareness of the importance of distribution. It is not sufficient to strive for scientific publication in peer-reviewed channels. It is the university's responsibility that new knowledge is offered to benefit all industry actors.

In our case, this new awareness is implemented in the RD&I organisation (NV and UiA) and the research project MEERC, by openly inviting for participation, by endeavour distribution of information on activities and results in education, in the press, in open websites, etc.

4 CONCLUSIONS

1. Both the legal system and ethical norms confirm the existence of a "University Society Responsibility" (USR), corresponding to the well-established "Corporate Societal Responsibility" (CSR) of business life.
2. The major part of this USR is for the university to contribute according to the fundamental distribution of duty in society, by "developing new knowledge and distributing it through education and innovation". Of course, a part of this responsibility is to safeguard that the legislative system is respected.
3. The society also expects the university to have responsibility for additional activities that might be defined by the concepts "Ethical" and "Discretionary" (Figure 1 and 3).
4. Cooperating with the complete value chain on RD&I facilitates massive results on technology, to implement in educational programs and practice.
5. Involving the whole value chain in co-operation rather than just individual companies has increased university's awareness of the importance of being open, inclusive and fair in development and distribution of knowledge, not prioritising individual actors.
6. Responsibility for being open, inclusive and fair in the distribution of new knowledge, should also be implemented in the engineering education programmes and practice.

ACKNOWLEDGMENTS

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