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ENGINEERING ETHICS AND SUSTAINABLE DEVELOPMENT

Abstract: *The adoption of the code of ethics of engineering in the 21st century should involve putting public interest above all others. However, in market economy collective interest is not in the foreground. In the foreground are placed particular interests of employers, i.e. multinational companies. The degradation of the environment and endangering life on Earth, brought about a new philosophy in form of sustainable development, which should include the adoption of the Code of Ethics that puts the public interest above individual, especially when it comes to economic activities. The economy and the environment are equaly important for sustainable development in terms of ethics. Engineers have an ethical dilemma that arises from the conflict of ecological and economic conditions of their work. In this article, scientific approach of professor Sharon Beder on this issue is presented.*

Key words: engineers, ethics, engineering ethics, sustainable development.

INTRODUCTION

This paper presents the scientific view of professor Sharon Beder. She is a visiting professor in the School of Social Sciences, Media and Communication at the University of Wollongong in New South Wales, Australia. Sharon's research has focussed on how power relationships are maintained and challenged, particularly by corporations and professions. She is interested in environmental politics; the rhetoric of sustainable development; the philosophies behind environmental economics; and trends in environmentalism and corporate activism/public relations. She specifically studied the engineering ethics, she points out on the relationship between individual and public interests. The author connects engineering ethics and sustainable development, she considers that them fundamental ethical values are identical.

As pointed out by the author, most engineering codes of ethics worldwide exhort engineers to consciously put the public interest above all others. This seems to run counter to the market philosophy that the public interest will be achieved by individuals pursuing their own self-interest. It is this latter philosophy that is at the heart of sustainable development with its emphasis on economic valuation and economic instruments to achieve environmental protection. Sustainable development policies generally embody an economic determinism with respect to technological change. It avoids the issue of ethics and assumes environmental and economic goals are compatible. Yet engineers today are grappling with the ethical dilemmas posed by everyday conflicts between the economic and environmental requirements of their work.

In the past conflict between self-interest and public interest was seldom a problem for engineers, since engineering works were almost synonymous with human progress. Today environmental issues have created a divergence between self-interest, employer interest, professional interest and public interest. But how realistic is it to expect engineers to display higher ethical standards than those normally expected of the wider community? And can individual ethics play a significant role in influencing technologies that are collectively shaped by professional paradigms and philosophies?

Modern engineering codes of ethics require engineers to put the public interest before professional interests and business interests. In the first part of this paper we will show how the author creates a link between the professional interests and business interests. In the second part of the paper we will consider the ethical requirement for engineers to serve the public interest comparing this with the prevailing ethic of the market which stresses self-interest as the norm, from the perspective of professor Sharon Beder. Finally we will show how the author Beder understands the relationship between the sustainable development and the engineering ethic.

PROFESSIONAL INTERESTS - BUSSINES INTERESTS

The first engineering society to adopt a code of ethics was the Institution of Civil Engineers in England in 1910. The American Institute of Consulting Engineers used the British Code to derive their own which they formally adopted the following year. Other engineering societies quickly followed. Such codes were, and still are, a mixture of moral values and rules of business etiquette governing how engineers should relate to each other in their business dealings, a code of gentlemanly

conduct rather than a code of ethics to protect the public welfare.

Codes of ethics serve several purposes. Firstly they are the hallmark of the professions. Engineers "lay claim to professional standing" to distinguish themselves from workers in general and to share in the prestige of the older more respected professions of medicine and law.[1] Edwin Layton[2] claimed that the emergence of a professional identity was also a reaction to the large authoritarian bureaucratic structures which engineers were increasingly finding themselves working in. The ideal of professionalism was based on esoteric knowledge and social service and Layton identifies three themes to the new ideology. Firstly, the engineer was identified as the agent of technological change and so essential to human progress. Secondly, the engineer was considered a "logical thinker free-of bias" and therefore able to lead and arbitrate between classes. Thirdly, the engineer was thought to be socially responsible for ensuring progress and the benevolence of technological change.[3]

The claim to professionalism and social responsibility also enabled engineers to assert their independence from business,[4] at least rhetorically if not in practice. Engineers had readily aligned themselves with business and capitalist values because it was business people and their capital which enabled them to build their great works.[5] Layton points out "Engineers accepted without question the structure, power, and basic ideological principles of business."[6] David Noble suggests that the modern engineer came into being to serve the purposes of the capitalist.

From the outset, therefore, the engineer was at the service of capital and, not surprisingly, its laws were to him as natural as the laws of science. If some political economists drew a distinction between technology and capitalism, that distinction collapsed in the person of the engineer and in his work, engineering.[7]

Engineers, at least in the West, have therefore incorporated business values into their engineering activities. Zussman argues that "cost is itself a criterion of technical efficiency" which must be considered along with the physical properties of the materials. The purpose of technology, in a capitalist society, is determined by the market and engineering is seen as a means, not an end.[8] Ritti's study of an American systems design company also found that engineers placed great importance on having the opportunity to help their employing company increase its profits.[9] Whalley suggests that engineering employees "are socialised and selected" from the beginning to accept the legitimacy of both bureaucratic authority and the dominance of business values. These are secured by a career structure which rewards the trustworthy.[10]

Business interests and engineering interests have always been aligned and in the past there has been little conflict between engineering interests and the public interest since engineering works were perceived to be almost synonymous with human progress. However, as the community began to question whether new technology was always in their interest so engineering interests have been seen to occassionally conflict with the public interest and in recent years engineering codes of ethics have stressed the importance of prioritising the public interest. This element of the code of ethics can best be understood in terms of a social contact between the engineering profession and the community in which the engineering profession promises public service in return for professional status.

PUBLIC INTEREST – SELF INTEREST

About modern engineering codes in Australia, author writes as follows: most modern engineering codes of ethics state that engineers should hold paramount the health and safety of the public or, in the words of the Australian Code of Ethics, engineers: shall at all times place their responsibility for the welfare, health and safety of the community before their responsibility to sectional or private interests...[11]

In a recently released discussion paper on "Dealing with Risk" the Institution of Engineers, Australia, argued that its code of ethics is part of a longstanding agreement the engineering profession has with the community; "its terms are that engineers will put the health, welfare and safety of the community before all other considerations; and the quid pro quo is, and should continue to be, that the community allows us to regulate the profession ourselves."

In the words of professor Beder, Traditionally morality has been defined by religion, laws and cultural conventions. In today's society many people are not religious and religious morality seems to be confined to issues of life, death and sexuality; not reaching far into people's everyday working lives. Laws also, necessarily only have limited jurisdiction. They can cover blatant fraud and deception but are not able to force engineers to make "good" judgements.

Furthermore, in his study the author explains the relationship between a work ethic and the category of ethical egoism or self interest. She claims that increasingly in a market economy, the morality of working life (apart from a work ethic that stems from Protestantism[12]) is based on cultural conventions which often fall within the category of ethical egoism or self interest. Ethical egoism is a minimalist form of moral reasoning which some would argue has nothing to do with morality. It reasons that each individual should look after themselves. Some argue that this form of reasoning involves considering other people's interests as well because in the long-term it serves one's own self-interest to do so. Adam Smith, demonstrated ethical egoism in his argument that social welfare is best served by individuals pursuing their own interests and companies pursuing maximum profits in a free market.

As the author says, engineering ethics normally go beyond ethical egoism, at least in principle. The ethical

principle that engineers put the public interest before other interests seemingly works against their self-interest. However some philosphers, such as Hobbes and Rousseau, discuss ethics and morality in terms of a social contract that serves self-interest in the long-term. The terms of this contract are that if everyone follows the rules of morality rather than acting on personal self-interest, then everyone will be better off, society will be a better place to live in.

Morality consists in the set of rules, governing how people are to treat one another, that rational people will agree to accept, of their mutual benefit, on the condition that others will follow these rules as well.[13]

However, as Rachels points out, there is a natural limit to the social contract. If people obey these rules so that they will be better off then, in cases where obeying the rules means they will be worse off, they won't do it. "We may not exact a sacrifice so profound that it negates the very point of the contract." [14]

This is particularly relevant to the engineering code of ethics because if it is a form of social contract which provides social status to engineers then it is not reasonable to expect engineers to obey any rules in the code of ethics which requires them to forfeit their status as engineers. If putting the public interest first requires them to risk their jobs and career then this will be seen as too great a sacrifice by most engineers. And because the individual status of engineers is so dependent on their employers, this social contract has little power for engineers.

The author claims that the various studies have confirmed that codes of ethic and conduct have little power.[15] Engineers are essentially subordinate and their status derives from organisational mobility rather than technical expertise. As the Australian Institution of Engineers' Professional Practices Officer, Derek Baldwin, readily admits, "it takes a man or women of considerable strength and courage" to obey the code of ethics rather than his or her employer. And Michael Dack, a Director of the Institution, admits that the code of ethics has a "very weak moral power" compared to the employer who has the "power of economic life and death over an employee".[16]

THE ETHIC OF SUSTAINABLE DEVELOPMENT

The central ethical principle behind sustainable development is *intergenerational equity*. The Brundtland Commission defined sustainable development as: "development that meets the needs of the present without compromising the ability of future generations to meet their own needs."[17]

According to the author's opinion the intergenerational equity can be defended in both consequentialist and deontological terms. Firstly it can be considered in terms of ensuring long term consequences of today's actions. This utilitarian viewpoint fits the pragmatic concerns of some business interests. The environmental crisis threatens the sustainability of economic activity. Many activities such as agriculture, forestry, fishing, tourism and recreation are dependent on a healthy environment. Others are indirectly affected as it becomes more expensive to obtain resources and because pollution decreases the health of the work-force. Looking ahead to the future ensures the sustainability of business activities.

Also the author believes that the intergenerational equity can also be considered a duty that current generations have to future generations or a right of future generations. However, if we examine the way that sustainable development is operationalised we see that it is done in a way that protects the market system and perpetuates individualism and self-interest above any ethic of equity.

David Pearce argues that if we are to ensure intergenerational equity then future generations need to be compensated for any environmental damage done by current generations and that this is best done by ensuring that damage is made up for by increased wealth and human-made assets. In other words natural capital (the environment) can be run down if human-made capital (money, equipment, infrastructure, knowledge etc) are increased.[18] In order to compensate future generations we need to value of the environment in the same way as we value human-made assets; that is we need to give it a monetary price.[19]

Environmental economists, such as Pearce, also claim that environmental degradation has resulted from the failure of the market system to put any value on the environment. They argue that because environmental `assets' are free or underpriced they tend to be overused or abused, resulting in environmental damage. Because they are not owned and do not have price tags then there is no incentive to protect them. This is a view shared by business people. The Business Council of Australia claims that the environmental problem is that important environmental assets tend not to be priced in a market like other assets. These assets are common property - they belong to everybody, and to nobody. Without ownership rights there is not the incentive for any person or group to look after them properly... if the environment has a zero price to users it will eventually be used up.[20]

These views, which have been incorporated into sustainable development rhetoric and sustainable development policies, call for putting a price on the environment. However the whole process of pricing the environment to ensure that decisions take account of environmental degradation works against intergenerational equity and instead extends market logic and market morality into a wider sphere of operation.

There are two main ways of operationalising the idea of putting a price on the environment. The first is through cost-benefit analyses. The second is through the use of economic instruments.

Cost-benefit analyses has traditionally been used by governments as part of their decision-making processes but in the past environmental costs and benefits have usually not been quantified and incorporated into the analyses but listed separately in a qualitative form for consideration. The sustainable development approach is to incorporate these environmental costs and benefits by pricing them and incorporating them into the calculations.

In a way CBA is the ultimate embodiment of consequentialist ethics in that it seeks to ensure that good consequences outweigh bad consequences and consequences are measures in money terms. In reality however CBA works against the ethic of equity and the measuring of consequences in financial terms fails to capture the consequences fully.

As the author says, using the market, whether an actual market or a contrived one, to value the environment tends to produce values that reflect and therefore maintain the prevailing distribution of income. Wealthier people are willing to and able to pay more for what they want so their preferences will have more weight in any survey. Moreover according to a CBA siting a dirty industry in an already dirty area will be less costly than siting it in a clean area where wealthier people can afford to live. This is because the decline in property values will be less as a result of the resulting pollution.

The valuation of the environment in terms of the total of what each individual is willing to pay denies a separate concept of public interest. As Lenihan and Fletcher state "The welfare of society has meaning only as the summation of the welfare of its individual members"[21] Daly and Cobb also point out that the economic view of value is based on a reduction of human values to individualism and reduces the world to one in which "individuals all seek their own good and are indifferent to the success or failure or other individuals' is fundamental to economics..."[22] Therefore valuation of the environment through CBA is a concept that embraces the values of ethical egoism and is in fact antithetical to an ethic of

The author claims that another increasingly popular way of incorporating environmental values into decision-making is through the use of economic instruments. The idea is that prices of resources should reflect the true cost, including environmental costs involved in their extraction and manufacture. If this were the case then, the economists argue, people would use environmental resources more wisely.

Of course putting a monetary value on these costs suffers the same problems involved in cost-benefit analysis. However in practice, economic instruments seldom involve calculating the real value of environmental damage. Rather, in the case of price-based measures such as pollution charges, an extra amount is charged, chosen somewhat arbitrarily by the government, that is supposed to provide an incentive to change environmentally damaging behaviour. In the case of tradeable pollution rights, a level of emissions is chosen and rights to emit up to that level are traded between companies or auctioned off by the government. In both cases the idea is that by making economic adjustments, individuals and firms can continue to pursue their self interest and the environment will be protected at the same time.

Professor Beder says that advocates claiming that economic instruments provide a way that the power of the market can be harnessed to environmental goals[23]. They also serve a political purpose in that they reinforce the role of the `free market' at a time when environmentalism most threatens it. Chant et al argue that "contrary to the popular view that a market system leads to the abuse of the environment" it is in fact the absence of a market which leads to environmental degradation.[24] Economic instruments attempt to make a virtue out of the profit motive and ethical egoism.

CONCLUSIONS

The emergence of ecological crisis, the conflict between the personal and the public interest for the engineers was very rare, as are the inventions of engineers were synonymous with human progress. However, the problem of environmental causes disagreements between the interests of employers, engineers and the public interest. In 21th century modern engineering code of ethics to require the engineer to put the public interest before the professional and business interests. Sustainable development with its philosophy should be the basis of a new code of ethics, which will protect the environment by putting the public interest above the professional, economic (business) and personal interests.

When considering the relationship between personal and public interests, it is necessary to examine the question of morality of engineers. As a kind of a social norm, morality is one flexible category that can be examined from the aspect of an individual or society as a whole. Therefore, every engineer has their own moral principles which should be incorporated in the values which society promotes as desirable. This applies, among other things, on the issue of sustainable development.

When a society recognizes a moral norm as particularly important, it obtains the character of a legal norm prescribed by a legal act. Only in this way it can be secured with reasonable certainty that a moral principle is respected as mandatory in society. Otherwise, the disrespect of the principle is followed by a prescribed sanction, where it is known in advance which entity carries out the sanction and what the sanction is. Legal norms are obeyed for two reasons – one's own beliefs about the validity of conduct which is required or the fear of sanctions which will follow in the event of non-compliance with the code of conduct. Therefore, every individual, including engineers, should observe legal

standards from their own beliefs about their validity, which is very desirable. But it is sufficient to comply with the legal standards for fear of prescribed sanctions. For this reason, it is especially important that every legislator recognizes the importance of the principle of sustainable development, which is to be standardized by legal acts and specified by the rights and obligations of environmental protection systems. In this way, the society can ensure the respect of this principle in practice.

The authors conclude that a revolution in ethics is needed to displace the powerful ethical egoism that rationalises the market as the predominant decision-making tool in our society. It is unrealistic to expect engineers to manifest higher ethical conduct than is the norm throughout the community in which they live. Sustainable development, with its rhetoric of intergenerational equity, is in reality a way of endorsing market morality and is inadequate to the solution of modern environmental problems.

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BIOGRAPHY

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INŽENJERSKA ETIKA I ODRŽIVI RAZVOJ

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Apstrakt: *Etički kodeks inženjera u 21. veku, treba da obuhvati etičke norme koje svesno stavljaju javni ili opšti interes iznad svih ostalih interesa. Međutim, sa razvojem tržišne ekonomije opšti (kolektivni) interes nije u prvom planu. U prvi plan se stavljaju posebni i individualni interesi poslodavaca, odnosno multinacionalnih kompanija. Degradacija životne sredine i ugrožavanje života na Zemlji, dovodi do nove filozofije u vidu održivog razvoja, koji bi trebalo da uključuje usvajanje Etičkog kodeksa koji stavlja javni interes iznad pojedinca, posebno kada je reč o ekonomskim aktivnostima. Privreda i životna sredina u etičkom smislu su podjednako važne za održivi razvoj. Međutim, inženjeri imaju etičke dileme koje proizilaze iz sukoba ekoloških i ekonomskih uslova njihovog rada. U ovom radu se razmatra refleksivno razmišljanje i naučni aspekt profesorke Sharon Beder o prevazilaženju sukoba između opštih i individualnih interesa inženjera u proizvodnom procesu.*

Ključne reči: inženjeri, etika, etika inženjera, održivi razvoj.