Measuring the Impact of Health and Safety Interventions

Report

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DKM Economic Consultants Ltd.,
Davy House,
49 Dawson Street,
Dublin 2.
Telephone: 353 1 6797755
Fax: 353 1 6796379
E-mail: dkm@davy.ie

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Section 1: Introduction

Policy level interventions include mandatory national/regional level regulations (Department of Health and Safety regulations, European Union OHS directives) as well as voluntary guidelines recommended by professional, trade, research or other groups [International Labour Organisation (ILO) Conventions, International Standards Organisation (ISO) Standards etc.].

OHS regulatory interventions are often challenged by stakeholders for either being too stringent or too lax. However, there has been relatively little peer reviewed research published on the evaluation of such interventions (LaMontagne 2003) [i].

The Irish Government has just published a White Paper, *Regulating Better.* This responds to initiatives from the OECD, the EU Commission and other bodies urging more cost-effective regulatory interventions, and it envisages comprehensive review and reform of Ireland's regulatory arrangements.

Policy level interventions are particularly challenging to evaluate for many reasons, including the need for large-scale studies, the lack of control over the intervention, and limitations on the design of the study due to ethical concerns (e.g. one cannot perform a controlled study where one half of workers are exposed to carcinogenic materials and the other half are not). Relating interventions to disease outcomes can be difficult due to long latency periods from exposure to disease and the fact that non-work practices contribute to many diseases that are caused by working conditions. [1]

Despite the challenges outlined above, research evaluating OHS policy implementation and effectiveness is playing an increasingly important role in a political and environmental environment that demands greater justification for new regulation as well as greater accountability for regulations that are already in place.

In this report, we present a synoptic literature review of some of the key publications in the field of occupational health and safety intervention evaluation. It is by no means complete but gives an overview of the development of thought in the area and also outlines the limitations to the full implementation of the theoretical constructs.

In Section 2 we discuss the basic features of the intervention research process, focussing in on cost-benefit analysis and other methods. We also summarise the common data limitations encountered by researchers nationally and internationally.

Section 3 presents some international econometric studies on the impact of OHS regulation.

[1] LaMontagne (2003) cites the fact that in Australia, the peak of asbestos related mesothelioma incidence is projected to occur after 2010, although regulatory interventions began in earnest in the 1970s.

Section 4 briefly describes some alternative methods to the regulatory approach and assesses their effectiveness. It also summarises the main proposals in the Irish Government's recent White Paper, *Regulating Better,* and considers what implications there may be for Occupational Health and Safety interventions.

Finally, in Section 5 we present our summary and conclusions.

Section 2: Economic Evaluation of OHS Policy: Theory and Limitations

2.1: Intervention Research Process Phases (Goldenhar 2001) [ii]

In order to ensure maximum efficiency of government interventions in health and safety, all stages from development to implementation should be evaluated. Below, we give a brief outline of what such a process should entail. Ideally the phases listed below should be conducted in sequence. The findings from each phase should be used to revise the intervention development and implementation, establishing a cycle of continuous improvement.

2.1.1: Intervention Development Research

The following questions need to be asked during the period leading up to the development of a policy intervention:

1. What changes are needed to enhance the health of the population?
2. What are the best ways to bring about these changes?
3. What principles or theories in OHS and related fields might apply in a particular situation?
4. What barriers hinder the desired changes from happening?
5. To what extent does the target audience understand and buy into the need for the changes?

It is recommended to use surveillance and epidemiological data to ascertain and isolate the problem of interest and its cause(s). Claims data, medical records and expert opinions are also valuable.

Knowledge of the target population and of its attitudes and behaviours are critical for developing effective interventions. The context in which the proposed intervention is being tested plays an important role in determining its prospects of success. Standards-based regulatory approaches to OHS may be less successful when a government is committed to deregulation or when an industry is faced with declining markets, because support for OHS activities decreases in these circumstances.

Theoretical principles/constructs must be incorporated into the intervention itself.

Finally, at the development phase of a policy intervention, the relevant authority should concern itself with the type of measurement tools that should be developed in order to assess any change in the constructs. Ideally, benchmark data should be available before the implementation of any policy, so that its effects can be assessed subsequently. As we shall see later, this is certainly not the case in most European countries where the lack of suitable data poses a severe restriction on the evaluation of the effectiveness of interventions.

2.1.2: Intervention Implementation Research Phase

Implementation research studies systematically document how an intervention is carried out. Weak, inconsistent or even non-existent implementation is as common in OHS intervention as it is in any other field. It is not recommended to conduct a resource and time intensive effectiveness study before ensuring that implementation is complete. By documenting the experience of recipients and participants receiving the intervention, implementation research helps explain how and why changes were or were not achieved.

Implementation studies serve the following purposes:

- Provide feedback for improving the intervention
- Help interpret effectiveness study findings
- Can be used to replicate an intervention that has been shown to be effective in one context to another setting.

2.1.3: Intervention Effectiveness Research Phase

OHS effectiveness studies determine the extent to which an intervention worked or did not work under real world conditions.

Randomised, controlled trials are the accepted standard for determining cause and effect between interventions and outcomes. But this is not always feasible in OHS because of practical, ethical and legal constraints. Other design options (quasi-experimental) and data collection methods (qualitative case studies) can be used in such cases. We will discuss the different evaluation methodologies below.

Finally, it is important that intervention effectiveness research is completed. A number of factors may make this a difficult task:

- Interventions may take years to implement completely as planned
- Intervention may change during implementation
- Changes in cofactors that can confound the measurement of intervention effects
- Changes in participation by study subjects

- The effects of the intervention (i.e. reduction in workplace related illnesses) may take years to manifest themselves.

2.2: Cost – Benefit Analysis (CBA) of Health and Safety Interventions

Theoretically, regulatory interventions provide an optimal level of care, where the marginal benefits of the precautions are equal to the marginal costs. Costs are typically more easily measured (Ogus 1994) [iii].

2.2.1: Measurements of Costs

The costs associated with regulatory standards can be classified as

- Administrative costs
- Compliance costs
- Indirect costs

Administrative costs are largely borne by the public agency, which has the task of formulating the standards, monitoring the behaviour and enforcing compliance.

Compliance costs entail the capital cost of equipment needed and the adaptation of plant required to meet standards and the productivity loss associated with it (calculated on an opportunity cost basis).

The true state of compliance with regulatory standards is unobservable. In theory, an establishment could be assessed at any point in time. In an ideal test of the performance of OHS regulation, certain types of standards used to measure compliance are also desirable (Weil 1996):

- The set of H&S standards under scrutiny must not have been appreciably changed over the period under study, and should have been consistently enforced. This is not always the case, as we will see below. Standards may have been refined or eliminated or have received varied enforcement scrutiny over time.
- The standards under scrutiny should be associated with practices that differ from what would be undertaken by the firm in its own profit-maximising interest.

An additional complication lies in the fact that companies are heterogeneous. The marginal cost of meeting a standard may be significantly higher for one firm than for another. These indirect effects of regulation arise from two possible sources:

- Firstly, a compliance asymmetry whereby one firm suffers a greater cost burden per unit of output even though regulations are equally enforced across firms.

- Secondly, enforcement asymmetries occur where regulations are more vigorously enforced against certain firms.

Bartel (1987) [iv] showed that there are economies of scale in compliance – smaller firms suffer a larger unit-cost effect. Regional imbalances may also occur: companies in traditional industries in old industrial areas (for example the US Frost Belt) will have higher compliance costs because they are older, even when regulations are evenly enforced.

Enforcement asymmetries can have the opposite regional effect if new industries in new locations (for example the US Sun Belt) are required to follow stricter regulations than old ones. Companies located in cleaner areas of a country may also be faced with tighter regulations than companies in polluted regions.

If the competitive advantage gained through these indirect effects is sufficiently large it can more than offset any direct costs associated with compliance, producing a net benefit for the regulated firm and its workers. Bartel showed empirically that large firms in the Frost Belt gained wealth at the expense of small firms in the Sun Belt.

A number of measures are used to influence the extent to which companies and individuals internalise the costs of occupational accidents prevention:

- Differentiation of premiums by safety and health risks or by number of previous accidents and occurrences of diseases, or based on present risks, act as incentives to internalise costs. Such premium differentiation and 'no-claims bonus' measures are widely used in EU member states (see Section 4.2).

- Liabilities – the right and ability of workers to claim the costs of occupational accidents and diseases from their employer.

- Changes in social insurance systems, such as limiting the possibility of insuring the costs of sick leave.

- Full cost pricing, where all employers are forced to sell products at prices that include costs for OSH investments and damages due to work related illnesses.

The more costs are internalised, the more visible economic effects become and the better the insights into the true costs of adverse working conditions. However, Mossink (1999) questions whether full cost internalisation can ever be attained. Extensive dependence on employer liability is difficult because employees often have difficulties in claiming their rights. Liabilities only act as an incentive if employers cannot insure against claims. As with many insurance products, there is a potential problem of so-called 'moral hazard'; the act of insuring risk may serve to diminish the insured company's incentive to take risk-minimising actions.

2.2.2: Measurement of Benefits

Some benefits can be assessed with reasonable precision. For example, if the aim of a regulation is to reduce accidents/illness, then the subsequent reduction in medical costs and lost earnings can be calculated. Equally, improved environmental health can increase the value of properties in the area. In general, however, benefits are much more difficult to establish than costs.

1. Many benefits are diffuse and significantly removed in time and space from the regulated activity -–for example many people derive benefits from a cleaner environment.

2. The causal relationship between the regulation and the benefits may be disputable or influenced by other factors.

3. Many of the benefits are non-marketed assets, which cannot be easily priced.

   One method of calculating the price of non-marketed assets is a market-oriented 'willingness-to-pay' test: the sum of money individuals would be willing to pay to avoid the risk of damage, or destruction of the assets, if fully informed of the risk. This information can be obtained directly via a survey or implicitly by reference to the difference between wages which are earned in jobs which give rise to a known specific risk and those earned in jobs without such risks by individuals with similar characteristics (training, status, union membership).

4. The benefits may accrue over an extended time period and some discounting mechanism would have to be applied to give them a present value.

   If regulatory benefits are discounted by traditional market-based criteria, the present value of such benefits will be only trivial. Therefore, a "social" discount rate is commonly adopted. However, there is little consensus on how such a rate should be calculated.

5. Distributional considerations

   A cost-benefit model should take into account the relative wealth of those who incur the cost and those who reap the benefits. [2] It therefore becomes necessary to identify – in broad terms – the sections of the community on whom the costs and benefits fall, and to adjust the values accordingly. However, we have seen above that the evaluation of non-market assets is at best unreliable or at worst arbitrary. The values adopted may also reflect distributional ideologies. Policy makers may wish to adopt only measures that are consistent with their ideology or which may be politically acceptable.

2.3: Other Methods of Policy Evaluation

[2] Under the traditional assumption of diminishing marginal utility of wealth, an extra pound is worth more to a poor person than to a rich person.

Given the problems associated with proper cost-benefit analysis of regulatory measures, other methods of evaluating standards are being used.

Cost-Effectiveness (CE) Models

If, say under EU regulations, the fatal accident rate associated with an activity were to be reduced by 10 per cent, the standard setter has the task of formulating a policy that minimises the costs of achieving that goal. For this purpose, costs can be interpreted in a number of different ways: They can include all the costs described under the description of cost-benefit analysis above or be confined to direct administrative and compliance costs, calculated on an accounting basis (simply aggregating expenditure and capital depreciation).

The policy maker may quantify the cost (a budgetary limit) and require the standard setter to formulate standards so as to maximise the benefits accruing from the use of those resources. Benefits here tend to be limited to those which can be assessed on objective criteria, such as reduction in health costs and lost earnings.

These approaches impose fewer informational demands on policy makers than cost-benefit analysis, but the problem of quantifying unquantifiables and comparing incommensurables are not solved.

Cost of Illness (COI) Analysis

This is a method of calculating costs that can be associated with work-related diseases and illnesses. It can quantify the magnitude of the problem, but other methods such as CBA or cost-effectiveness must be applied to choose between solutions.

2.4: Data Limitations

There is a lack of reliable data that could be used in cost-benefit studies in almost every EU country.(Mossink, 1999) [v] The following types of data/indicators are widely used:

Notification data

Cases notified to social security/insurance are very useful in calculations relating to workers' compensation. Thus, figures for 'total costs of accidents' [3] based on insurance costs can be calculated for many countries. The coverage of a notification system depends on the incentives to notify (for example by the chance of receiving compensation) and on the level of attention paid by the health system to workplace exposure or workplace risk. This leads to a bias against 'new' work-related diseases and diseases that have multiple causes.

[3] Used in Austria, Belgium, Italy, Germany, Ireland, Portugal and Sweden

General health and workforce surveys [4]

Such surveys are easy to aggregate at national level and can be used to calculate the total costs of work-related diseases. They are based on self-reporting or the judgement of a physician. This avoids the notification bias mentioned above, but the problems of 'knowledge and recognition' and of determining causal factors in individual cases remain.

There has been little empirical evidence on the links between illnesses and workplace risks. Therefore the concept of work-relatedness is poorly defined and leaves room for debate.

Epidemiological studies

These studies try to establish causal relationships between exposure and a specific health outcome, comparing the risks of an exposed person to that of the general population. Quantification can be applied to specific work-related illnesses only. Knowledge of the level of sickness that would not have occurred if the risk factor had been absent is closer to the ideal CBA requirement then the previous two data sources. However, economically relevant health outcomes (sickness leave, early retirement) are also influenced by behavioural and legal factors.

Estimates of socio-economic costs can be severely limited by narrow definitions of occupational diseases. Recognition of new occupational diseases is a long process involving conflicting interests.

Beatson and Coleman (1998) [vi] have found that none of the national assessment studies of the socio-economic costs of OHS interventions include all of the relevant cost components. The last conference on the costs and benefits of OSH was told that studies inside and outside of the EU focus primarily on health related costs. Prevention costs were used only in Holland and Italy.

The results of a survey conducted by the EASHW (1997) [vii] showed that financial subsidies are provided by many European states in order to promote the development of H&S programmes, and also for the application of these measures. However, the effects of this kind of financial incentive to companies are evaluated only in a few member states.

Indirect effects on national economies are seldom evaluated. These include the effect on consumer purchases and the effects on national competitiveness. The importance of health at work also impacts on productivity, innovation and competitiveness at a micro level. Due to the absence of reliable data, these factors have so far not been included in national cost estimates.

Current cost-benefit methods do not factor in the effects of enforcement (even if its costs are included), although the costs of non-prevention are high. There is need to research this issue further.

A recent working paper of the European Agency for Safety and Health at Work (EASHW, 2003) [viii] found that in the field of health and safety there are several areas in which data collection and publication are not yet well organised at European level. They cite:

[4] Used in Finland, Denmark, Netherlands, Sweden and the UK

1. OHS management (services, experts, country-coverage etc.);
2. Labour inspection activities;
3. Best practices in the field of OHS; and
4. Cost-benefit information.

Given the limitations of national data and thus with effectiveness studies on a national level, international comparisons (even within the EU as outlined above) are fraught with difficulties.

Countries differ in the type of data collected, the purposes for which they are collected, the definitions used, the social security system in place and the policy objectives and approaches taken in dealing with occupational accidents and diseases (Mossink, 1999).

Section 3: Econometric Studies on the Impact of OHS Regulation

Research on the impact of OHS interventions at micro level has largely focussed on the effectiveness of inspections and penalties. Generally, these studies present only weak evidence of positive impacts of inspections on injury rates. Researchers offer two main reasons for this:

1. The standard-setting process tends to be complex and cumbersome, whereas workplaces tend to be much more diverse and more dynamic. Therefore, it is unlikely that standards can be kept current, especially in the face of changing work practices and advancing technology.

2. Some injuries are caused by random effects, which are independent of compliance with regulations. Therefore it is unclear whether standards applying to permanent, physical hazards in the workplace should have significant effects on injury rates.

Below we summarise some research papers on the impact of OHS interventions from the U.S. and Canada, which have applied regression analysis to aggregate data at industry level.

3.1: Effect Workers' Safety Awareness

Regulations either place constraints on hazard levels in the case of complete compliance or else impose expected penalties that increase with the level of the hazard. However, the role of worker action is also important.

Viscusi (1978) [ix] showed that as the quality of the work environment provided by the firm increased, workers diminished their level of safety enhancing actions (i.e. a worker might get more careless if the company adds safety cables or guards to a machine).

The analysis of pooled time series and cross section data on industry health and safety investments and injury rates (1972-1975) showed that enterprise investments in work quality will increase if such allocations will diminish the expected penalties associated with non-compliance with US OSHA [5] standards.

Although the provision of a safer work environment will be partially offset by reduced safety-avoidance actions by workers, regulation will only be counterproductive in the case of very severe penalties.

[5] US Occupational Safety and Health Administration, established in 1970

However, Viscusi found no significant effect of the OSHA on worker injuries. The temporal downward trend in injuries observed over the period analysed may rather have been explained in part by the existence of the agency as such and by misperceptions regarding the effectiveness of its enforcement procedures.

3.2: Effectiveness of Inspections

Bartel and Thomas (1985) [x] estimated a simultaneous equation model that included equations for inspections, inspection penalties, and the lost workday injury rate. They pooled industry-level data for the period 1974 to 1978. Their results revealed that a greater incidence of inspections resulted in increased OSHA compliance, but this had only a small effect on reducing injury rates.

Viscusi (1986) [xi] analysed injury rates while controlling for inspection probabilities and expected fines, industry, year and non-OSHA variables that could have resulted in changes in the injury rate. He used pooled time-series and cross-section industry-level data for the 1973 to 1983 period. He found significant effects of OSHA inspections on injury rates. Further, he found no evidence that increasing expected penalties would result in lower injury rates.

In the first econometric study on the effectiveness of the OSHA's enforcement of health standards in reducing work place hazards throughout the manufacturing sector, Gray and Jones (1991) [xii] showed that the number of citations and the number of violations of worker exposure restrictions decreased with additional health inspections in manufacturing plants. They also found that the first health inspection had the strongest impact. In the study, they matched all OSHA health inspections for individual manufacturing plants inspected during the 1972 to 1983 period. They derived workplace hazard measures from reports filed by OSHA inspectors.

However, there are problems with measuring the OSHA's impact on health: no measure exists of future incidence of occupational diseases that current workplace hazards will eventually produce. Their best estimates indicated that the average plant in their sample experienced a reduction of 50 per cent in citations and 42 per cent in overexposures, compared to the hazards found on initial inspection of the plant. These results may even have underestimated the OSHA's total effect on the plants since compliance efforts that took place before the first inspection were not taken into account. They could not estimate the health benefits of compliance because the health effects of many hazardous substances are not fully known.

Gray and Scholz (1993) [xiii] analysed data from large US manufacturing plants between 1979 and 1985. This longitudinal, plant-level data set allowed them to measure the total number of inspections and the OSHA penalties imposed on foot of these inspections. By comparing individual employers, they avoided the problems that arise from aggregating data on injuries and penalties at industry level. They also tested and corrected their estimates for potential biases that can arise with longitudinal data, including endogeneity of inspections.

Gray and Scholz provided evidence that inspections with penalties resulted in reductions in lost-workday injury rates. They estimated that a plant that is inspected and penalised in any given year would record a 22 per cent reduction in lost-workday injuries in the following three year period.

3.3: Effects of a Wider Range of Government Measures

Lanoie (1992) [xiv] utilised both pooled time-series and cross-sectional industry-level data from Quebec for the period 1982-87 to evaluate the effectiveness of policies adopted by the CSST (Quebec board responsible for H&S).

In a major improvement on previous studies, Lanoie considered all the most important aspects of government intervention in workplace safety (inspections, fines, safety committees, right of refusal and workers' compensation experience rating [6]) rather than just focusing on one aspect. His results showed that at best, CSST interventions led to a minor reduction in injury frequency. The rate of inspections was the only safety-enforcing measure that was statistically significant in reducing lost-time injury frequency.

Cousineau, Girard and Lanoie (1995) [xv] used annual pooled time-series and cross-sectional data collected for 23 industries in Canada. They used four different injury rates as the dependent variable and the overall rate of all injuries. They utilised direct measures of the intensity of regulation, such as inspection rates, fines and prosecutions. In addition, they examined the determinants of changes in injury rates to avoid making spurious inferences resulting from simultaneity biases [7].

Their empirical results showed that regulation had a greater impact on the rates of particular types of injuries than on the overall injury rate. The specific injury types affected made up only half of all injuries and the authors stated that policy makers may have to rely on other policy instruments, such as financial incentives for employers, to substantially improve safety in the workplace.

Weil (1996) [xvi] argued that total industry-intervention measures are problematic as they may pick up shifting focuses of OSHA enforcement rather than the underlying state of compliance. They also require estimating the costs of complying with all relevant standards.

Weil maintained that the proper measurement of compliance requires a standard-specific approach and therefore has to be conducted on an industry-by-industry basis. An establishment deciding whether or not to comply with standards faces a series of choices, based on assessed probabilities of inspections, expected fines and compliance costs. Weil found (in a study on the American custom woodworking industry) that the empirical results

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[6] See Section 4

[7] Such biases can be generated because more injuries in a given industry could lead to heightened intervention by the regulatory government agency.

implied highly responsive behaviour, particularly between the first and second inspections. A number of explanations were put forward for this:

1. Compliance decisions may be made on the basis of potential, rather than actual, penalties.

2. H&S inspections may provide firms with information on the benefits of compliance with H&S regulations they would not otherwise have. This would apply particularly with respect to poorly understood or complex standards.

The empirical estimates also show that unionisation has a strong positive impact on compliance.

Section 4: Alternatives to Regulatory Approach

4.1: Internal Responsibility System (IRS)

With an internal responsibility system, workers obtain some legal rights to participate in local health and safety decision making. While those rights differ across jurisdictions, they almost always include rights to know, to be consulted and to refuse unsafe work. Associated with IRS are joint health and safety committees (JHSCs). In Ontario, IRS and compulsory JHSCs form the foundation to health and safety [8]. This means that employers and employees, who are closest and most familiar with workplace conditions and requirements, are responsible for controlling hazards in their workplace and promoting health and safety. In addition, inspections are made to monitor compliance. Investigative field visits are made by the Ministry of Labour (MoL) in response to reported events such as fatalities, injuries, complaints, refusal to work or dispute.

A review of the literature reveals some positive effects of IRS on workplace injury prevention. Kralj (2000) cites a study by Lewchuk, Robb and Walters [xvii] (1996), which compared the safety performance (measured by injury frequency rates) of 200 firms before and after the introduction of IRS and compulsory JHSCs. The results of their regression analysis showed that the introduction of Bill 70 and JHSCs had a beneficial effect on lost-time injury frequency for key industrial sectors in Ontario. Specifically, the introduction of JHSCs has reduced lost-time injury frequency rates by up to 18 per cent.

4.2: Experience Rating Mechanism

As we have seen in Section 3, North American studies have so far found that occupational health and safety regulations have had little effect on workplace injuries. One alternative to the regulatory approach consists of financial incentives through increasing the insurance premium costs to individual employers with higher accident rates rather than penalising a whole industrial sector. This mechanism, called experience rating, shifts the responsibility for at least some workers' compensation costs from the industry group to the particular employer incurring the accident costs. Firms with high accident rates will be faced with higher premium costs, creating a monetary incentive for them to reduce accidents.

Differentiation of premiums for insurance against occupational accidents and diseases is the most common incentive used by EU member states.

[8] Bill 70, introduced in 1978

Some of the incentive effects are positive: employers are encouraged to take safety precautions and reduce accidents. However, it can also encourage them to contest claims. While some of this appeals activity may be legitimate in deterring fraudulent claims, it can also thwart legitimate claims. Experience rating may also encourage employers to hire only low-risk workers. This can be a costly process. Another option for employers would be to subcontract the most dangerous activities.

Public enterprises in the EU have began to select contractors or suppliers of products, goods and services on the basis of the contractor's performance regarding OHS. Public organisations may even asks for OHS standards that go beyond the minimum set of regulations or demand that specific initiatives are undertaken. Contractors that have been found guilty of offences concerning OHS may be excluded from the tendering process (EASHW, 1997).

Organised labour has traditionally been opposed to the concept of experience rating. They claim the mechanism encourages employers to institute elaborate claims monitoring and control systems. These claim management efforts can result in diminished safety activity efforts and introduce delays and costs and reinforce an adversary system of human resource management.

There are only a limited number of published studies that examine the impact of experience rating. Kralj (2000) reviews thirteen North American papers and concludes that:

> *"an empirical linkage between experience rating and workplace safety has proved to be elusive." (page 203)*

There are even fewer studies on the impact of experience rating on the duration of injured workers receiving workers' compensation benefit and the results are ambiguous.

4.3: The Irish Government's White Paper

In January 2004, the Irish Government released a White Paper entitled *Regulating Better,* which contains a range of proposals for the reform of Ireland's regulatory regime. The White Paper enunciates six principles which will guide future policy. Thyese are

Necessity: Higher standards of evidence will be sought before new regulatory interventions will be embarked upon. Regulatory institutions and framework will be subject to ongoing review.

Effectiveness: Regulation will be targeted more effectively and enforcement will be strengthened.

Proportionality: Regulation will be as light as possible, burdens of compliance and penalties will be "Fair", and there will be greater reliance on Regulatory Impact Analysis.

Transparency: Consultation will be wider, public service obligations will be clarified and regulations more straightforward.

Accountability: Accountability and appeals procedures will be improved throughout the regulatory process.

Consistency: Greater consistency will be sought across regulatory bodies and economic sectors.

The White Paper contains a discussion of actions to be taken. The Government will pilot a system of Regulatory Impact Analysis in a small number of Departments and, following the pilot phase, RIA "....will be integrated with existing procedures." The Departments to be included in the pilot phase have not yet been selected.

Systematic reviews of the regulation of key areas and sectors will be carried out, including reviews of regulatory institutions. No timetable for this process has as yet been announced.

There will also be a Statute Law Revision, focussed on pre-1922 statutes. Appeal procedures will be reviewed. Other main elements include a review of compliance burdens, possible rationalisation of regulatory structures, and skill-enhancement in Government Departments.

While the White Paper is a declaration of intent rather than a series of measures actually accomplished, it is clear that the Government intends that the costs and benefits of regulation in Ireland will henceforth be more explicitly addressed than heretofore. In particular, agencies can expect to be involved in assessing the impact on the broader economy of regulatory actions.

Section 5: Summary and Conclusions

Cobin (2000) [xviii], perhaps with tongue in cheek, has compiled and arranged the thoughts of many scholars and has constructed four principal alternative theories about safety regulation. They are summarised as follows:

- Regulation increases safety but perhaps inefficiently; or
- Regulation is an ineffective but desirable placebo; or
- Regulation is a public choice phenomenon that primarily serves special interest groups; or finally
- Regulation is unlikely to increase safety efficiently, and perhaps not even effectively, because it is always constrained by inadequate local knowledge.

Maybe we should add a further theory, which we have seen put forward frequently, if indirectly in the literature we have perused during the research for this project:

- Research into the economic impact of regulatory instruments is very difficult to conduct. Their effects may not be measurable.

Nevertheless, research into the economic impact of policy interventions has become increasingly important, as cost effectiveness is a key requirement both at national (and EU) level and at the level of the individual company. Not only should new regulations be justified, but accountability for those already in place is also needed.

However, the traditional tools of cost-benefit analysis and cost-effectiveness analysis of OHS regulations are particularly challenging. Problems include:

- The need for large scale studies
- Long time frames
- Lack of control over intervention
- Study design, as controlled studies are often not possible.

The quantification of costs and benefits associated with regulations that cover often very diverse industries and their workers and the environment is fraught with difficulty. In particular, compliance costs are difficult to assess, since the marginal cost of complying with a standard can differ significantly from one firm to another, even if regulations were enforced uniformly. If companies could be enticed to internalise the costs of occupational accident

prevention, the economic effects would be more visible and better insights into the true costs of adverse working conditions could be attained. However, it is doubtful whether that goal can be attained in all circumstances.

The measurement of benefits (with the exception of straight medical costs and lost earnings in relation to accident prevention) is always more difficult than the measurement of costs and with respect to policy instruments even more so:

- Many benefits are diffuse and removed from any specific activity – particularly in environmental regulations.
- The causal relationship between regulations and benefits may be not be clear-cut and is often influenced by other factors.
- Many benefits are non-marketed assets, which cannot be easily priced.
- Because many benefits accrue over a long period of time, the discounting process may leave the present value of the benefit very small in relation to the costs. The choice of discount rate becomes controversial.

A review of the European literature on the economic impact of OHS found that most European countries prepare evaluations (ex ante) before the introduction of legislation. This is done on a routine basis, in some countries it is even mandatory. However, due to the difficulties with measurements and the lack of suitable indicators, most member states do not conduct conventional (ex post) cost-benefit analyses. In most member states, no efficiency assessment instruments for the occupational health and safety system are available. Avoided cost of illness is a common category in estimating benefits. Reduction of health care costs and the cost of rehabilitation are estimated to a lesser extent. On the whole there is little experience in quantifying effects on productivity and product quality.

Thus it becomes clear that the comparison of OHS impacts across countries is not feasible at this stage. However, EU member states are of the view that a methodology is needed to assess the impact of applying EU directives using common factors that would allow for comparison.

The development of a methodology or of instruments to be used at company level is also urged by European countries, so that it can be used by firms, including SMEs, in their day-to-day practice.

However, given the difficulties in measuring benefits and some indirect costs, the adoption of a Europe-wide system for the monitoring and evaluating of OHS interventions seems still a long way off.

Econometric studies on the impact of OHS interventions have largely focussed on the effectiveness of inspections and penalties. The complexities of industrial regulations and their enforcement make the causality between intervention and work place safety very difficult to prove. This becomes an even more onerous task if data are pooled across a number of different industries. Studies become more valuable if they include not just the narrow

enforcement variables such as inspections and penalties, but also incentives, workers' rights to refuse and different types of injury in their models.

Due to the complicated array of interventions it appears that the best route to a meaningful result is to conduct the research on an industry-by-industry basis. Total-industry intervention measures are problematic because they involve controlling for shifting enforcement practices as well as having to estimate compliance costs for all standards.

However, due to the long-term nature of OHS interventions the link between enforcement, compliance and improvement in work place safety is often tenuous, as most of the studies reviewed in this paper have shown.

In Ireland the consequences for agencies such as the Health and Safety Authority of the Government's recent White Paper will emerge as the Government's specific intentions come to be clarified. At a minimum, it is reasonable to expect that regulated firms and sectors will seek justification for regulatory intervention to a greater extent than hitherto. The HSA will need to consider what capacity it will need to respond to requests from business and industry, and from other arms of the State, for analyses of the impact of its activities.

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