

Exploratory (Multi) Cost Benefit Analysis in New Zealand's fishing industry

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1. Background

New Zealand's commercial fishing industry has received comparatively little attention (Lucas, Kincl, Bovbjerg & Lincoln, 2014) in spite of it having the highest fatality and injury rates of any employment sector between 2001-2009 (Maritime NZ, FishSAFE, ACC & DoL, 2012, p.8). Approximately 7000 people work in the marine industry in New Zealand, the majority of whom are male, aged 25-54 years (Statistics New Zealand, 2011). Fishing is a very competitive environment with workers placing emphasis on pride, respect and being good at what they do. Although this study was motivated principally by the desire to improve onboard safety, staff health and wellbeing, within such exercises it is possible to also consider performance and process optimisation. The two are intertwined, especially when we are ultimately seeking the widespread uptake of interventions.

Internationally there has been greater proportional research activity - especially in North America and Northern Europe, but this has been mostly epidemiological and far less concerned with intervention design, implementations or measured impacts amongst the target populations. As a result there has been a growing interest, as in other primary industries, in approaching continual improvement of this kind more systematically. For the research funders and others providing in-kind support this is simply an effort to optimise return on research investments. Several initiatives have been instigated. As noted by Lucas et al (2014) these include **r2p** (Research to Practice) by NIOSH (National Institute for Occupational Safety and Health) in the USA; and *Knowledge Transition* (KT) by the Canadian Institutes for Health Research. Translational Research (Khouri 2010) or TR, is an overarching approach that describes a five stage process for developing evidence-based interventions, implementing them in practice and conducting meaningful evaluations that allow a cycle of continual improvement to operate.

Without a structured iterative approach upon which to build business cases for research or intervention design our proposals lack conviction. The work by Lucas et al (2014) showed the studies in peer reviewed journals relating to occupational health and safety in the fishing sector internationally was concentrated 70% in T0 (epidemiology – quantifying the problems), to just 5% (widespread implementations and measurement of health outcomes) in T4. T1 (identification of risk factors and intervention ideas) was regarded in 18% of papers, and T2 and T3 (from intervention design and testing through to wider application including barriers to uptake) in 24% combined. Overwhelmingly therefore we are short on research about how to get interventions taken up more widely in the sector, and whether or not they work when they are.

A discussion on this gap between industry members and researchers at the AUT Centre for Occupational Health and Safety Research in 2013 led to this exploratory study on *Multi Cost Benefit Analysis* (MCBA). The starting point was the agreement that success on board vessels and amongst crews and companies generally is measured in many ways. Success is not only measured by improved end of year financial profits returned to shareholders. There are intermediary process stages to this, such as improved performance in finding fish, tonnage landed in a given time, fuel economy, quality of fish, yield and so forth. In addition there are human resources and crew-specific measures. Some are relatively easy to estimate costings for such as staff turnover and direct injury costs. Others, no less important in the view of Skippers and First Mates, such as team work and morale, are less so. Never the less, a gain in this area would be recognised and valued it was suggested.

A cost-benefit approach was also favoured as it provided a recognisable evidence base for investment action. This study was therefore carried out to demonstrate to a host fishing operator the likely scope, benefits and value of injury prevention and process improvement initiatives. Therefore the aims of the study were to understand more fully:

1. What constituted success for the various crew members. The assumption being that if we understand more clearly what the key change agents at various levels value, we are better placed to design interventions that are valued and capitalised upon industry-wide.
2. The *true cost* of an injury or a processing problem.

2. Method

The MCBA gathered and analysed injury and process data not previously considered by New Zealand's

commercial fishing sector operators. As the approach was unfamiliar in the sector it was important that interviewees deemed the researcher to be approachable. Information was therefore collected through casual, exploratory discussions with crew and exploratory and semi-structured interviews with senior crew and managers - and interpreted accordingly. This enabled an honest and holistic overview of current practice to be gained. Five crew members and five shore-based staff participated.

Types of costs included in the *true cost* included personal costs, worker productivity, fish quality and yield, the direct medical cost of an injury and other indirect staffing costs. The terminology of 'cost' was approached with an open mind, acknowledging that this could refer to any number of things that people may have reason to value. Constructs such as pride, respect, family time, lifestyle and wellbeing were considered, not just money or other productivity measures.

Through analysis of interview data; vessel productivity data, consideration of factory design and function, and direct and indirect cost data, conclusions were drawn as to which areas could be addressed next for further research and development.

3. Findings and discussions

3.1 What success looks like

The MCBA firstly identified how success would be measured by various crew members – what was valued, and considered how these measures could impact direct and indirect costs to the company, its staff, productivity and other aspects of vessel running. Figure 1 shows what crew members deemed as most important to them in their job.

















	Competition	Productivity	Finding fish	Catching fish	Pride respect	Throughput tonnage	Quality of fish	Health & safety	Time with family	Good gear	Teamwork	Money	Lifestyle	Mediator	Sleep	Communication
																
Skipper & 1st Mate	X	X	X	X	X	X	X	X	X							X
2nd Mate - Medic		X				X	X	X		X		X	X	X		
Engineer					X				X			X	X			
Factory Manager & Supervisor		X			X		X					X				
Deckhands										X	X	X	X			X
Factory worker									X			X	X		X	
TOTAL	1	3	1	1	3	2	3	2	3	2	1	5	4	1	1	2

Figure 1. Constructs of success/value identified by crew.

3.2 True costs

Not all aspects identified as valued could be measured using currently available sector data. The following are those that could – in the time and given the resources available for this study.

3.2.1 Costs of Musculoskeletal Disorders (MSDs)

Injury data indicates that the reporting of MSDs is increasing. Between 2010 and 2013 the occurrence of MSDs increased from 44% to 63%, it also attributed to greater than half of the 'Days Lost' per vessel. Identifying MSDs as the largest target injury group supports further ergonomics analysis of workstation design and task procedures. Improving the workplace design, fit and functioning for users and tasks will

improve the overall usability of vessels and is likely to reduce the occurrence of MSDs.

Cross-analysis of interview data, vessel productivity and injury related costs per vessel identified that some older vessels had greater need for ergonomics review. This is strong evidence for the inclusion of ergonomics skills in the vessel design/construction team, including any factory refits and modernisation projects.

3.2.2 Costs of recruiting, training and equipping new employees

In 2011-2012 the company experienced a loss of over 50% of new employees within the year, representing a significant financial loss in terms of wasted employment and training costs of more than \$3.5 million. Recognition of this loss triggered the questions: '*who is a 'good fisher'?*' and then '*how do we determine if an applicant is a 'good fisher'?*' Through semi-structured interviews with industry personnel it was established that it is not until the applicant is actually out at sea that they are able to determine their suitability. This suggests that better identification of the skills and attributes of 'good fishers' and related improvements to the fisher selection process would benefit individual companies and the fishing industry.

3.2.3 Total direct and indirect monetary costs of the injuries

The industry has been creating over half a million dollars per week in compensation costs (Kwon, B. & Maritime NZ, 2012). Since 2003 these compensation costs have gradually dropped - as illustrated in Figure 2, which shows this company's costs in comparison to all fishing industry compensation costs. (N.B. the 2003-2004 peak is thought to be related to a focus on better injury reporting).

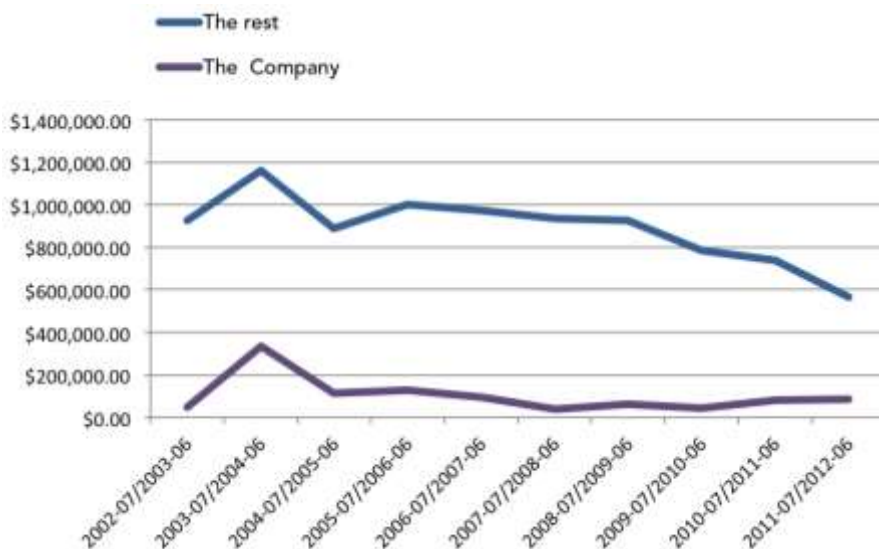


Figure 2. Total weekly compensation costs (2013) and ongoing.

The Accident Compensation Corporation's (ACC) online '*Create your own scenario*' injury cost calculator tool was used to determine estimated direct and indirect monetary costs of an injury. Exploratory scenarios were created from information in company reports and from the reported experiences of company personnel. Once indirect factors were included such as loss of worker productivity, Health and Safety manager's time, clean up, replacement training, transport etc. the total cost increased to three to four times the initial amount documented. For Health and Safety managers, this puts a new perspective on the use of their time alongside the 'new' total cost associated with injury incidents. From their point of view this hasn't been looked into before in great detail, so there is greater motivation for it to be addressed.

4 Concluding points on change within the sector

Money and tradition are strong drivers in decision-making in the New Zealand fishing industry. Recognition that the financial (and probably other) losses related to injury, poor design and staff turnover identified in this study are much greater than expected should motivate fishing operators to address these areas – and become a strong driver for change.

The MCBA report's findings provide new insights for consideration by this operator and the New Zealand fishing industry. The report identified a number of initiatives that offer considerable economic gains such as the recruitment process, crew training programs and improved workstation design on vessels. Greater understanding of similar processes and practices in overseas companies will also be beneficial to New Zealand operators. Some proposed interventions will challenge traditional fishing practices and accepted wisdoms. Successful implementations in these cases will need to draw upon expertise that is relatively new to the industry - such as ergonomics (human factors) and industrial design. For this to happen trust must be earned, and that requires pragmatic, measureable approaches and methods that year by year puts clear results that can be understood by all concerned.

Acknowledgements

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