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**U.S. Department of Commerce**

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**The Economic Costs of Informing the  
Public on Seafood Safety Matters**

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**by:**

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## **Introduction**

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The purpose of this memorandum is to provide managers of seafood safety programs with an understanding of the economic consequences of disseminating information to the public regarding health risks. The paper begins with some definitions and discussion of terms that relate to the general discussion of risk. This section is followed by a discussion of biased risk perception and framing effects, avoidance costs, societal attitudes and avoidance costs, and cognitive dissonance and avoidance costs. The paper concludes with a summary of the topics discussed and some closing remarks on how managers may minimize economic costs to the public.

## **Defining Risk**

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The definitions of a risk, according to Webster's Dictionary (Soukhanov, Anne H. ed., 1984) are (1) Possibility of suffering harm or loss, synonymous with danger, (2) a factor, course, or element involving uncertain danger, synonymous with hazard, and (3.a.) the danger or probability of loss to an insurer, (b.) the amount that an insurance company stands to lose, (c.) one considered with respect to the possibility of loss to an insurer, e.g., a good risk. Using Webster as a starting point, we can readily see that a risk involves something potentially detrimental to the person who is undertaking the risk in terms of a harm or loss.

Risk may be passive or active. For example, failing to buckle one's safety belt is a passive risk which may result in bodily injury while hang-gliding is an active risk which may also result in bodily injury.

Risk is inevitably part of the human condition since harm or loss can come from a number of circumstances regardless of the control we may believe we have. A risk may be presented as a probability of occurrence where the probability lies between 0 and 1.00. A small or low risk infers a small probability of occurrence with the opposite being a large or high risk.

The time between accepting a risk and suffering the consequences of the risk may vary. For instance, the consequences of the risk associated with smoking cigarettes may not appear until years after one begins smoking, but the consequences of the risk associated with skydiving are immediate. However, risk is always defined in present terms and the probability of consequence may either increase or decrease in the future due to technology, education, or environment.

Risk may be transferred as in the case of health insurance. Economic models that predict the amount a person would be willing to pay to avoid a possible future cost have been utilized for several years by the insurance industry.

## **Assessment of Risk**

The discipline of risk assessment has grown substantially in recent years with this growth being not only a function of the large advances in medical research and technology but also a function of advances in the field of statistics itself. Nonetheless, risk assessment is a complex discipline, not fully understood by its practitioners, much less the lay public (Slovic, 1986). The complexities surrounding the issues of risk assessment arise from general disagreement on terminology and techniques among experts.

Slovic believes that those who communicate risk must be fully aware of the strengths and limits of the methods used to generate the information they are attempting to convey to the public. He also argues "to be credible and trustworthy, a communicator must know enough to acknowledge valid criticisms and to discern whether the available risk estimates are valid enough to have value for helping the public gain perspective on the dangers they face and the decisions that must be made". If the risk assessment is based on a chain of conservative decisions in regard to assumptions and subjective judgments at each point of the analysis, the actual risk is likely to exceed the estimate. While this approach may lessen the economic burden to the seafood producer, it may result in a lower degree of protection of the public health

## **Biased Risk Perception and Framing Effects**

The individual may perceive a health risk to be different than the actual risk. Recent studies in the field of psychology concerning biased perceptions of risk, such as that of Lichtenstein et al. (1978), indicate that individuals tend to overestimate risks of relatively infrequent events, e.g., death from botulism, and underestimate risks of more frequent events, e.g., death from heart disease. Also, individuals have a tendency to overestimate certain risks characterized by wide media exposure, memorability, or uniqueness of various events.

Public perception is also affected by the way the information is organized and presented. This is referred to as framing effect.

McNeil, Pauker, Sox, and Tversky (1982) conducted a study which showed the results of framing effect on people who did not have strong prior opinions. The study asked people to imagine they had lung cancer and had to choose between two therapies, surgery or radiation. The subjects were split into two groups and the therapies were described in detail. One group was presented with the probability of surviving for varying lengths of time following the treatment while the other group received the same probabilities framed in terms of dying. When the statistics were framed in terms of dying the percentage of subjects choosing radiation therapy over surgery decreased from 44 percent to 18 percent. This result substantiates earlier work done by Tversky and Kahneman (1981) where they concluded that people will be more willing to assume

risk when faced with a probable loss and less willing to assume risk when faced with a probable **gain**. McNeil's study provides further evidence that large differences in perceptions on the part of the public may be caused by subtle differences in the way information is expressed. It would not be difficult to imagine the decrease in sales for the bar soap that advertises '99 and 44/00 percent pure' if they had advertised their product as '56/00 percent impure'.

## **Avoidance Costs**

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There are two basically unavoidable economic costs created by dissemination of information regarding a health risk. Consumers do not purchase the product in question and thereby lose the satisfaction (consumer surplus) associated with consumption and producers lose profits (producer surplus). Both of these adverse effects are attributable to a decrease in demand for the product. Shulstad and Stoevener (1978) coined the phrase avoidance costs when presenting methods to determine the impacts that public news articles may have had on demand for pheasant hunting. They measured the losses in consumer surplus relative to the intensity and scope of information regarding the risk of mercury ingestion for pheasant hunters. A study on public awareness of ciguatera poisoning and its effects on market demand (Raizin and Meaburn, 1987) measured decreases in producer surplus resulting from dissemination of information on ciguatera poisoning events. Raizin and Meaburn used newspaper articles as proxies for periods of public awareness. Therefore, their results reflect the aggregate effects of print media, broadcast media, word-of-mouth and any other public awareness vehicles which may have been employed during the period. Shwartz and Strand (1981) measured the avoidance costs due to kepone poisoning in Virginia. Their analysis captured losses in both consumer and producer surplus (net welfare loss). In this example, the avoidance costs are the direct market costs to both producers and consumers from a decrease in demand due to a health risk. The manager should be aware that all avoidance costs are directly attributable to negative information on the product.

## **Societal Attitudes and Avoidance Costs**

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Our discussion thus far has focused on individual behavior, but we cannot ignore the state of society, as a whole, when discussing the magnitudes of avoidance costs. Von Neumann and Morgenstern (1947) identified two general types of individual behavior regarding risk, risk taking and risk aversion. Risk takers were determined to be those individuals who would be willing to assume a risk and suffer the consequences of their position. On the other hand risk averters would be willing to pay some portion of their income to avoid the consequences of a risk. The Von Neumann/Morgenstern theory of risk attitudes is based on the singular argument of wealth as measured in monetary units. An extension of the theory indicates that as income levels of individual consumers increase, they will become more risk-averse. If we further translate this theory to

society as a whole , we might argue that as national income increases, whether it be Gross National Product or some other measure, society will continue to move toward a more risk-averse position. In this decade we have seen evidence of this theory as society has moved to strengthen those institutions that address our health problems such as the Food and Drug Administration, Center for Disease Control, and Environmental Protection Agency. While information, framing effects, and biased risk perception are direct causes of avoidance costs, we feel that the change in societal attitudes to a more risk-averse position has certainly been a factor in increasing these costs. It may be argued that not only is society willing to pay to insure against health hazards, but the levels of public funding that address health problems will continue to increase relative to growth in national income.

### **Cognitive Dissonance and Avoidance Costs**

The inability to alter peoples' beliefs concerning health risks, regardless of whether their beliefs are forged from societal attitudes or out of convenience to the individual, is interpreted to be a result of cognitive dissonance (Akerloff and Dickens, 1982). The theory of cognitive dissonance is an application of the theory of cognitive consistency which states that persons are uncomfortable in maintaining two seemingly contradictory ideas. Cognitive dissonant behavior results from peoples' beliefs that they are smart and do not make wrong decisions. The theory is understood by examining the behavior of workers in dangerous jobs. These workers must decide between two conflicting cognitions. On one hand, if the worker considers himself to be a smart person, he will not work in a dangerous job. Alternatively, if he considers himself to be stupid, he will continue on that job. Cognitive dissonance will allow him to remain on the job and consider himself to be a smart person by forging a belief that the job is not dangerous. Experiments as described by Akerloff and Dickens have shown that once a belief is formed thru cognitive dissonance, the person will not discard it even though he may receive contradictory information, and not only will he reject this information, but he will seek sources of information that confirm his belief. This systematic behavior leads researchers to conclude that the effects of cognitive dissonance are likely to be long-lasting. We have identified two examples of cognitive dissonance that may effect the magnitude of long-term avoidance costs arising from the risks associated with seafood consumption. Firstly, people who have consumed seafood because they consider it to be a good source of protein, low in cholesterol, and, in general, a healthy food may ignore information that is contrary to this belief. This behavior would tend to lessen the magnitude of long-term avoidance costs. Secondly, people who are marginal consumers of seafood and do not particularly view fish as a healthy alternative to other foods may use adverse information to formulate a belief that fish is unsafe to eat. This behavior would serve to increase the level of long-term avoidance costs. It is fair to assume that any adverse information concerning the safety of seafood will impact consumer demand in the short-term. However, cognitive dissonance may, in the worst-case scenario, cause a general suppression of market prices over a long period of time thus causing long-term losses in consumer and producer surplus.

## **Summary**

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In their efforts to safeguard the public health, the managers of seafood safety programs may not fully consider the impact of information on the economic well-being of the public they serve. Both the consumer and processor may suffer economic losses as a result of decreased demand for the product(s) involved. Although there are a number of problems in attempting to forecast the economic costs of information including biased risk perception, societal attitudes, and cognitive dissonance, there remains a major role for the person who disseminates information on seafood safety. While the manager cannot control everything, he does exert control over the content of the information released, the assessment of risk, and the manner in which the information is framed. Ideally, the manager should maximize the public health benefits of his research while minimizing the economic costs of information to the public. We feel that sound estimates that are well-framed and do not overstate actual health risk will serve to minimize avoidance costs while providing optimal protection to the producers and consumers of seafood.

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