Psychological Barriers to Minimizing Risks in Dealing with Chromium(VI) – An Analysis of Biases in Government and Industry

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1. Introduction

This study examines the psychological mechanisms and biases involved in the management of chromium(VI) compounds and hazard mitigation, especially among authorities tasked with regulating and monitoring these risks. Despite clear legal requirements to minimise hazardous substances (e.g. through the S-T-O-P principle), we observe in practice that both industry and authorities often rely on personal protective equipment (PPE) as the primary measure instead of prioritising preventive measures such as substitution or technical solutions. This study analyzes the psychological and organizational reasons for this behavior

and shows how biases and cognitive biases influence risk perception and decision-making.

2. Objective

The aim of this study is to identify and analyse the psychological barriers that stand in the way of effective risk minimisation.

The focus is on:

- The psychological bias that influences decision-making in authorities and companies.
- Risk perception in the handling of chromium(VI) compounds
- the overvaluation of personal protective equipment (PPE)
- The role of economic interests and their influence on regulatory decisions
- Ways to overcome these biases in order to establish more effective protective measures

3. Psychological biases in decision-making

3.1 Cognitive dissonance

The theory of cognitive dissonance describes the psychological discomfort that arises when people receive new information that contradicts their previous beliefs or actions. In the situation of authorities who have maintained for years that the causes of chromate formation are unclear, admitting an error would cause significant dissonance.

• **Official behaviour**:

Admitting that the measures taken so far have been inadequate would mean that mistakes have been made in the past, which could undermine trust in the authority. Therefore, there is a tendency to hold on to previous positions in order to avoid this discomfort.

3.2 Status quo bias

The status quo bias describes the tendency to prefer the current state of affairs and avoid change. In terms of risk mitigation, this means that both companies and authorities tend to stick to the use of PPE as the standard solution, even though there are more effective and safer alternatives.

• **Economic pressure**:

The status quo is financial for companies

more attractive, as investments in alternative insulation materials or technical protective measures entail additional costs. The authorities also avoid questioning the status quo in order to circumvent the need for comprehensive changes.

3.3 Confirmation bias

Confirmation bias refers to the tendency to seek out or prefer information that confirms existing beliefs. Authorities who are convinced that chromates are difficult to avoid and that PPE is sufficient tend to ignore or devalue information that indicates the opposite.

• **Reliance on industry expertise**:

This bias is reinforced by the reliance on the statements of the industry, which claims that the exact causes of chromate formation have not been clarified. Studies that prove the opposite may be perceived as less credible or devalued or not even considered.

3.4 Loss of reputation and face

The so-called "saving face" is often a strong motivator in official and political contexts, because the admission that the previous measures to minimise risks were inadequate could be perceived as a threat to official authority and credibility.

• **Fear of loss of reputation**:

Authorities may be reluctant to revise their position for fear that it could undermine their credibility. They fear that the public and political decision-makers could lose confidence in their abilities.

3.5 Expert Bias

Expert bias describes the tendency to give excessive weight to the opinions of persons or organizations perceived as "experts", even if they could be characterized by conflicts of interest.

• **Industry as an expert**:

In many cases, authorities rely on the expertise of the industry as they seem to know the technical details better. This can lead to critical, external voices being ignored or devalued, especially if they contradict statements from the industry.

4. Economic interests as a hurdle

The psychological barriers are often reinforced by economic interests. In industries where hazardous substances such as chromium(VI) are regularly used, substitution or minimization would come at a significant cost.

4.1 Short-term profit maximization

The preference for PPE as a solution is often due to the short-term cost savings. Technical and organisational measures to replace hazardous substances or to introduce safer production methods require high levels of investment, which would reduce profits.

4.2 Long-term healthcare costs and reputational risks

In the long term, however, the health effects of exposure to chromates could result in high costs for the healthcare system and the affected companies themselves. Although these costs can be significant in the long run, there is little incentive to change current practices as long as the short-term financial gains can be sustained.

5. Suggestions for overcoming psychological barriers

5.1 Increased training and awareness

To overcome psychological barriers, it is crucial to raise awareness of the real risks and to emphasize the relevance of substitution of hazardous substances. Training that clearly communicates the legal requirements and the long-term health risks could help to change the perception of risk in authorities and companies.

5.2 Involvement of neutral third parties

Independent experts could be called in to enable a more objective assessment of risks and preventive measures. This could help to break the confirmation bias and bring alternative solutions such as the substitution of chromium(VI) more to the fore.

5.3 Public pressure and transparency

Increased public relations and the demand for more transparency could encourage authorities and companies to take effective measures to minimise risk. As external pressure increases, it becomes more difficult for authorities to maintain the status quo.

6. Conclusion

The analysis shows that the decision-making regarding the minimization of the risks posed by chromium(VI) compounds is strongly influenced by psychological biases.

Biases such as cognitive dissonance, status quo bias and confirmation bias contribute to the fact that both industry and authorities rely on PPE instead of implementing the legal requirements for substitution and minimization of hazardous substances.

Economic interests reinforce these tendencies by prioritizing short-term profits over long-term health and safety. To overcome these barriers, increased training, the involvement of independent experts and increased public pressure are needed.

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Version history

Version	Date	Change
1.0	September 2024	First edition
1.1	November 2026	New layout in the design system of the Chromate Experts; spelling of chromium(VI) standardized.