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# HOW CAN INDUSTRIAL DESIGN PRINCIPLES BE APPLIED TO DESIGN A USABLE AND EFFECTIVE HANDBOOK FOR IMPLEMENTING INTERNATIONAL SUSTAINABILITY STANDARDS IN MONGOLIAN MINES

**Bachelor Thesis**

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Ulaanbaatar/Nalaikh,
2026

## Statutory Declaration

Murun, Maral B2200339

I hereby affirm in lieu of an oath that I provided the submitted bachelor thesis

**How can industrial design principles be applied to design a usable and effective handbook for implementing international sustainability standards in Mongolian mines**

I did not use any sources other than those stated. In case that the work is additionally submitted on a data medium, I declare that the written and the electronic form are completely identical. The work was not submitted in the same or similar form to any examination authority.

Ulaanbaatar 29.05.2026

Place, Date Signature

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# Chapter 1: Introduction

## 1.1 Background of the Study

The mining sector plays a central role in Mongolia's economic development, contributing significantly to national revenue and employment. However, mining activities are also associated with environmental and social risks, requiring structured and responsible management approaches. In response to these challenges, international sustainability frameworks have been developed to guide mining companies toward improved environmental, social, and governance (ESG) performance.

One widely recognized framework is the Towards Sustainable Mining (TSM), developed by the Mining Association of Canada. TSM provides a set of performance indicators and protocols designed to enhance transparency, accountability, and sustainability in mining operations.

In Mongolia, TSM is currently at an early stage of introduction and has not yet been fully standardized across the mining industry. A key challenge in this process is the absence of a clear, structured, and user-friendly handbook that translates TSM principles into practical guidance for engineers and managers.

By applying human-centered industrial design principles, complex information can be transformed into a more accessible and usable format. This is especially important for technical guidelines like TSM, where users need to quickly understand and apply the information in practical situations.

Industrial design is a human-centered discipline that focuses on the needs, abilities, and experiences of users. Rather than only focusing on aesthetics or technical function, it aims to create solutions that are practical, clear, and easy to use in real-life situations. Human-centered design considers how users interact with a product or system, what challenges they face, and how those challenges can be reduced through better design.

This approach involves understanding the user's perspective, including their skills, knowledge level, and working environment. In the context of a handbook, this means organizing information in a way that is easy to navigate, visually clear, and logically structured. Elements such as layout, typography, spacing, and visual hierarchy are designed to support readability and quick understanding.

## 1.2 Research Aim and Objectives

The aim of this study is to design a usable and effective TSM handbook tailored to the Mongolian mining context through the application of industrial design principles.

**The specific objectives are:**

- To identify industrial and information design principles that improve the usability of technical documentation
- To develop a user-centered TSM handbook prototype adapted for Mongolian mining professionals
- To evaluate the usability of the handbook through interview methods
- To improve the handbook based on user feedback and usability analysis

## 1.3 Research Questions

**Main Research Question:**

How can industrial design principles be applied to design a usable and effective handbook for implementing international sustainability standards in Mongolian mines?

## 1.4 Scope and Limitations

This study focuses on the design and usability of a TSM handbook for engineers and managers in Mongolia. The research is limited to the early implementation stage of TSM and does not evaluate full-scale industry adoption.

Additionally, some participants had limited exposure to the handbook, which may influence the depth of feedback.

# Chapter 2: Literature Review

## 2.1 The Institutional Challenge: The Mongolian "Readiness Gap"

The transition toward international sustainability standards in Mongolia is not merely a legal hurdle but a logistical and educational one. According to the UNDP [7], the "Readiness Assessment" reveals a stark dichotomy between the desire for sustainability and the technical capacity to report it. With 59.8% of organizations citing a lack of guidance and nearly 97% lacking digital infrastructure, the "user" in this context is often overwhelmed by the high density of international requirements [7].

The report underscores that the current lack of localized, step-by-step frameworks acts as a significant deterrent for Small and Medium Enterprises (SMEs). This creates a unique design problem: the "product" (the handbook) must function as both an educational primer and a professional compliance tool within a market characterized by resource scarcity and emerging expertise [7].

## 2.2 The Design Philosophy: From Passive Text to Active Interface

In traditional technical writing, a manual is often a post-script. However, applying Norman's [8] principles of Industrial Design shifts the handbook into the realm of an "active interface." Norman posits that the most effective tools are those that utilize discoverability and feedback. In the context of a sustainability handbook, "discoverability" refers to how easily a Mongolian manager can find a specific reporting metric without reading the document cover-to-cover [8].

Furthermore, Norman's concept of mapping suggests that the layout of the handbook should mirror the chronological reality of the industrial workflow [8]. If the sustainability standard requires data collection before analysis, the design of the handbook should use visual signifiers (such as color-coding or progress bars) to "map" the user's physical progress through the reporting cycle. This reduces the friction of implementation by making the complex standard feel like a guided sequence of manageable tasks.

# 3. Cognitive Ergonomics: Reducing Information Overload

A critical expansion of the literature involves the intersection of Information Architecture and human cognition. When users interact with a document, they face a "cognitive load"—the total amount of mental effort being used in the working memory. By applying ID principles, the handbook can utilize chunking and visual hierarchy to prevent the "Information Overload" often associated with IFRS or ISO standards.

Effective design uses affordances features that suggest how the object is used to lower this load. For instance, a physical handbook with die-cut tabs or a digital PDF with interactive sidebars provides a "spatial affordance" that helps the user navigate the complexity of international regulations without feeling cognitively "lost" [8].

## 2.4 Methodological Rigor: Usability as an Industrial Metric

The success of a designed artifact is not subjective; it is measured through interaction. Møller [9] provides the framework for this empirical validation. He argues that usability testing for manuals must move beyond "proofreading" and into "user-document interaction analysis."

Møller's research suggests that even technically accurate information is a failure if the user cannot apply it correctly under pressure [9]. For the Mongolian sustainability context, this means that the handbook must undergo iterative testing. By observing "real-world" users (e.g., Mongolian sustainability officers) as they attempt to complete a reporting task using the handbook, designers can identify "pain points"-sections where the language is too academic or the layout is confusing [9]. This iterative cycle design, test, refine is the hallmark of the industrial design process and ensures the final handbook is a truly "usable" industrial tool.

# Chapter 3: Theoretical Framework

## 3.1 Human-Centered Design as the Main Framework

This study is grounded in human-centered design (HCD), an approach that places the people who will ultimately use a product at the center of every design decision. According to the International Organization for Standardization, human-centered design aims to make systems both useful and easy to use by developing a thorough understanding of users, their needs, and the contexts in which they interact with a product [1]. Rather than beginning with aesthetic preferences or technical constraints, HCD begins with people - their goals, their limitations, and the real-world situations they face.

In practical terms, this means that designers must resist the temptation to assume what users need. Instead, they are expected to study how people think, work, and process information in their actual environments. This shift-from assumption to observation is one of the most important

contributions of the HCD framework, because it ensures that design decisions are grounded in evidence rather than intuition.

The ISO standard outlines several key principles that guide this approach. First, it requires that designers develop a clear and detailed understanding of users, their tasks, and their working conditions before any design work begins. Second, it emphasizes that users should be involved throughout the entire design process not only at the early stages or at the point of final evaluation, but continuously. Third, it establishes that designs must be tested with real users and improved based on their feedback. Finally, and perhaps most fundamentally, the standard defines design as an iterative process: one that progresses through repeated cycles of development, evaluation, and refinement, rather than being completed in a single pass [1].

These principles carry particular importance when designing informational tools such as handbooks. People have natural limits in attention, working memory, and available time. When a design is overly complex, poorly organized, or visually dense, users are likely to struggle not because the content is wrong, but because the design makes it unnecessarily difficult to process. Good design should therefore make information easy to read, well-organized, and simple to apply in real situations.

In this study, the principles of HCD are applied directly to the process of handbook development. A handbook is not merely a collection of information it is a functional tool that people use in real and often time-pressured situations. For it to be effective, users must be able to locate information quickly, understand it without confusion, and apply it with confidence. This means the handbook cannot be designed in isolation from its users; it must be shaped by their responses to it. For this reason, the design process in this study was guided by user feedback at every stage, not by personal preferences or theoretical ideals. Overall, human-centered design provides both the conceptual foundation and the practical method for this thesis, ensuring that the handbook is not only accurate in content but also clear, usable, and genuinely relevant to the people it is intended to serve [1].

### 3.1.2 Prototyping and Iteration

Design is not something that arrives fully formed. It is a process of gradual refinement one that grows, adjusts, and corrects itself over time. This idea lies at the core of human-centered design. According to ISO 9241-210, design should be an iterative process, meaning it must be continuously developed, tested, evaluated, and improved based on direct feedback from users [1]. Rather than treating any single version of a design as final, the iterative model treats every version as an opportunity to learn.

Prototyping is the first step that makes this learning possible. A prototype is not a finished product. It is an early, often incomplete version of a design something that allows abstract ideas to become visible, tangible, and testable. Before a prototype exists, a design remains theoretical: its strengths are assumed and its weaknesses are invisible. Once users interact with a prototype, however, those assumptions are tested against reality. Problems that could not have been predicted in the planning stage begin to surface. A section that seemed clear in outline may prove confusing in practice. A layout that appeared logical on paper may feel disorganized when navigated by a first-time reader. These discoveries are not failures they are precisely the kind of information that allows design to improve.

Iteration is what follows prototyping. It is the systematic act of refining a design based on what has been learned, version by version. A confusing section is rewritten. A visually crowded page is simplified. A layout that lacks clear hierarchy is reorganized. Each new version incorporates the lessons of the last. ISO 9241-210 establishes that this cycle of testing and refinement should continue throughout the design process, because usability does not emerge fully-formed it improves over time, through sustained engagement with real users [1].

In the context of this thesis, the handbook did not begin as a polished or finalized document. The first draft served as a starting point a rough initial structure built around an understanding of what content needed to be included and how it might be organized. Once users were given the opportunity to interact with it, a range of issues became apparent. Some sections were too dense. Some layouts were visually unclear. Some information, though technically accurate, was harder to follow than anticipated because of the way it had been structured or worded.

These observations served as the foundation for a series of targeted revisions. Feedback collected from users guided each subsequent version of the handbook, shaping the document incrementally into something clearer, more logically structured, and more usable in practice. This is consistent with a key insight that iterative design theory offers: decisions made without testing are built on assumption, and assumption. Decisions shaped by user feedback, by contrast, are grounded in real experience. Prototyping and iteration therefore transform design into a process of genuine discovery, turning the question from "Is this design finished?" into "How can this design become better?" [1].

### 3.1.3 Typography and Readability

Typography is one of the most consequential aspects of handbook design, because it directly shapes how easily readers are able to understand, scan, and remain engaged with the content on the page. In Thinking with Type, Ellen Lupton presents typography not as a decorative surface choice but as a system of visual communication a set of tools that, when applied thoughtfully, can guide the reader's attention, clarify the structure of information, and make complex content feel approachable [2]. The book addresses the full range of typographic considerations: typeface selection and type families, letter-spacing and tracking, balance and alignment, grid relationships, and the Gestalt principles that govern how readers perceive groups of visual elements. Together, these elements explain how text works on the page and how readers experience it.

This theoretical perspective is directly relevant to the design of a handbook. Unlike a novel or a long-form essay, a handbook is rarely read from beginning to end in a single sitting. Readers typically approach it with a specific purpose: they open it to locate a particular piece of information, navigate to the relevant section, and then move on. The reading experience is therefore selective and task-oriented, which places significant demands on the clarity of the typography. If a font size is too small, readers must strain to read it. If line spacing is too tight, long passages become visually tiring. If heading styles are inconsistent, the structural hierarchy of the document becomes difficult to discern. Lupton's work makes clear that none of these outcomes is inevitable each is the result of typographic decisions that could have been made differently [2].

In practical terms, effective typography creates a clear and intuitive reading path through a document. Headings signal where new sections begin and distinguish primary topics from supporting detail. Subheadings allow complex content to be divided into smaller, more manageable units without overwhelming the reader. Adequate line and paragraph spacing separate ideas visually, reducing the cognitive effort required to navigate between them. Consistent typographic treatment across the document creates a sense of professional coherence that makes it easier to trust and use. When typography is weak, even well-written and accurate content can become unnecessarily difficult to engage with. When it is thoughtfully applied, the same content becomes far more accessible.

In this study, typography was not treated as a peripheral concern but as a central usability issue. This view was reinforced by survey responses collected during the design process, a number of which specifically identified font size, wording clarity, and visual comfort as areas of concern. These responses indicate that users were sensitive to how the text appeared and felt on the page not only to what the text communicated. A handbook designed for professional use must therefore apply typographic principles that support comfort, readability, and fast comprehension. Lupton's framework provides a strong theoretical basis for this approach, demonstrating that readable and effective typography depends on deliberate, informed decisions about spacing, alignment, visual weight, and hierarchy [2].

Layout is the structural foundation of a document. It determines where content appears on the page, how sections are visually differentiated from one another, and how naturally a reader is able to move from one idea to the next. In a handbook, layout is not a decorative issue. It directly affects usability, because readers need to locate information quickly and understand how the document is organized. Without a coherent layout, even well-written content can feel disordered or difficult to access. The reader must work harder to follow the material, and the document may appear less clear, less professional, and less trustworthy. In structured design, layout is therefore not a matter of random placement; it follows a deliberate system that supports communication [3].

Among the most influential approaches to creating structured layouts is the grid system. In Grid Systems in Graphic Design, Josef Müller-Brockmann explains that the grid provides a reliable framework for organizing information in a clear, consistent, and logically ordered way [3]. A grid

divides the available page space into a set of columns and rows, giving the designer a stable structure within which to place text blocks, headings, visuals, and other elements. This structure helps create visual order and prevents the page from feeling scattered. When used consistently, the grid allows the content to appear balanced and intentional, rather than improvised or uneven [3].

### 3.1.4 Layout, Grid, and Structure

The value of a grid becomes especially clear in documents that contain technical or detailed information. Technical content often requires explanation, definition, examples, and step-by-step guidance. If this information is placed on the page without a structural system, the reader may struggle to identify where one section ends and another begins. A grid helps solve this problem by creating a repeated visual pattern. That repetition gives the document a sense of stability and makes it easier for readers to understand how information is grouped. In this way, the grid supports comprehension not by simplifying the content itself, but by making the content easier to process [3].

For a handbook, this kind of consistency is particularly important because readers do not usually read it from beginning to end in a single sitting. Instead, they scan pages, search for specific sections, and return to material they have already seen. A consistent layout supports this non-linear reading behavior by making the document predictable. When headings appear in the same position across pages, when text blocks follow the same alignment, and when spacing between sections remains stable, the reader begins to recognize the structure of the document more easily. Over time, this predictability reduces the effort required to navigate the handbook and increases the speed with which information can be found [3].

Layout also plays a major role in managing dense or complex content. When too much information is placed too closely together, the page can feel visually heavy and difficult to scan. A strong grid helps prevent this by dividing content into smaller and more manageable sections. It creates visual breathing room and allows the page to feel more organized. This is especially useful in a handbook dealing with sustainability protocols, where detailed instructions and technical concepts must be presented in a way that does not overwhelm the reader. In this sense, the grid is not only

a visual tool but also a functional one, because it supports readability and lowers the effort needed to interpret the page [3].

Layout also works closely with typography and hierarchy. Even when the text itself is strong, poor placement can weaken the document's overall clarity. A well-structured layout allows typography to function properly by giving headings, subheadings, and body text clear positions within the page. It also supports hierarchy by showing what should be read first, what comes next, and what information can be scanned more quickly. When layout, typography, and hierarchy work together, the handbook becomes easier to read and more efficient to use [2][3][4].

In the context of this thesis, layout and grid structure serve a practical role in the design of the handbook. The document contains technical sustainability information that must be clearly organized if it is to be useful in practice. A well-defined grid ensures that content is consistently aligned, sections are clearly separated, and pages follow a recognizable pattern from one to the next. This predictability reduces the mental effort required to navigate the document and allows users to focus on the meaning of the information rather than on deciphering its organization. In summary, layout and grid systems are both organizational and visual tools: they bring order to information and make a document more functional as a practical resource [3].

### 3.1.5 Visual Hierarchy, Simplicity, and Design Principles

Effective design depends on more than the quality of individual elements it depends on how those elements are organized in relation to one another. A page filled with accurate, well-written content can still fail its reader if that content is presented without a clear sense of order. When everything looks equally important, nothing stands out. When nothing stands out, the reader must work harder to determine where to begin, what to focus on, and how the different parts of the page relate to each other. This extra effort may seem minor in isolation, but across an entire document it accumulates making the reading experience slower, more tiring, and less productive than it needs to be.

Visual hierarchy is the design principle that addresses this problem directly. It is the deliberate arrangement of elements on a page so that their visual weight reflects their relative importance.

Elements that are most critical to understanding such as section headings, key terms, or primary instructions are made visually dominant, drawing the reader's eye first. Elements that provide supporting context or supplementary detail are presented in a way that signals their secondary role. Elements that can be consulted selectively, such as footnotes or technical specifications, are given the least visual prominence. The result is a page that communicates its own structure one that tells the reader, through visual means alone, where to look and in what order.

In Universal Principles of Design, Lidwell, Holden, and Butler present visual hierarchy alongside a broad set of related principles including consistency, balance, contrast, and usability that together define what it means for a design to communicate clearly and effectively [4]. The authors describe the purpose of these principles as enhancing usability, influencing perception, increasing appeal, and supporting better design decisions overall. Crucially, each principle is grounded not in aesthetic taste but in an understanding of how people actually process visual information how the eye moves across a page, how the brain assigns meaning to visual differences, and how readers build mental models of a document's structure as they move through it [4]. This connection between visual design and cognitive processing is what gives hierarchy its practical power: it is not simply a matter of making a document look organized, but of making it genuinely easier to use.

The mechanisms through which hierarchy is communicated are well established in the design literature. Size is one of the most immediate and reliable signals larger elements are perceived as more important, which is why headings are set at a larger font size than body text [2]. Weight is another: bold text draws the eye before regular text, making it an effective tool for emphasizing key terms or critical instructions within a passage. Color and contrast can also carry hierarchical meaning, with higher-contrast elements drawing attention before lower-contrast ones [4]. Position on the page plays a role as well elements placed at the top or to the left of a layout are typically encountered first, in keeping with the natural reading direction of left-to-right, top-to-bottom languages. Spacing, finally, functions as a separator: generous white space around a heading signal that it introduces something new and important, while tighter spacing between body text lines signals continuity [2]. When these mechanisms are applied consistently and deliberately,

they work together to create a visual language that the reader can interpret intuitively, without conscious effort.

The principle of simplicity is equally important, and closely related to hierarchy. Simplicity in design does not mean reducing the amount of information a document contains — it means removing unnecessary complexity from the way that information is presented. This distinction matters because the temptation in professional document design is often to add: to include more visual elements, more decorative features, more stylistic variation, in the belief that a richer-looking page communicates more care or competence. In practice, the opposite is frequently true. When visual elements are added without a clear communicative purpose when decorative borders compete with content for attention, when multiple font styles are used inconsistently, or when the layout introduces ambiguity about where one section ends and another begins the document becomes harder to use, not easier [4]. Each unnecessary element places a small additional demand on the reader's attention, and those demands accumulate in the same way that cognitive overload does: gradually, until the overall experience of reading becomes more effortful than it should be.

This relationship between simplicity and usability is supported by cognitive load theory, which establishes that working memory has a finite capacity and that extraneous visual complexity consumes part of that capacity without contributing to comprehension [5]. A document that is visually noisy one that requires the reader to sort through competing visual signals before locating the information they need is a document that is working against its own purpose. Simplicity, understood in this way, is not a stylistic preference but a functional requirement. It is the condition under which the content of a document can reach the reader with minimum interference [5][6].

Lupton reinforces this point from a typographic perspective, arguing that the most effective typographic choices are those that serve communication rather than call attention to themselves [2]. A typeface that is elegant but difficult to read at small sizes is not a good choice for body text, regardless of its aesthetic qualities. A heading style that is visually distinctive but inconsistently applied across the document fails to communicate hierarchy reliably. Typography, in this view, succeeds when it becomes invisible when the reader moves through the text without being interrupted by the design, because the design is doing exactly what it should [2].

Müller-Brockmann's work on grid systems adds a further dimension to this discussion by showing how structural consistency at the layout level supports the perception of hierarchy and simplicity at the page level [3]. When a document follows a consistent grid when headings, body text, and visual elements are aligned to the same underlying structure across every page the reader develops a reliable mental model of how the document is organized. This predictability reduces the effort required to navigate the document, because the reader does not need to re-orient themselves each time they turn a page. The grid, in this sense, is a silent contributor to hierarchy: it ensures that the visual signals used to communicate importance and structure remain consistent throughout the document, rather than varying in ways that might confuse or mislead the reader [3].

### 3.1.6 Cognitive Load and Information Overload

The NSW Centre for Education Statistics and Evaluation highlights that cognitive load theory has important implications for instruction and information design, particularly when content is dense, complex, or poorly organized [5]. Similarly, guidance from the Medical College of Wisconsin defines cognitive load as the amount of information that working memory must handle at a given moment and emphasizes that design should aim to avoid exceeding this limit [6].

These theoretical concepts are directly relevant to handbook design. A page that contains too many elements—such as long paragraphs, multiple concepts, dense text, and competing visuals—places a heavy demand on the reader's cognitive system. Although the reader may be able to see all the information, they may struggle to process it effectively. This often results in slower reading, confusion, or the need to repeatedly revisit the same section. In this case, the difficulty is not caused by the complexity of the topic alone, but by how the information is presented. Cognitive overload is therefore a design problem as much as it is a learning problem [5][6].

Cognitive load theory provides a clear explanation for why certain design strategies improve usability. When content is broken into smaller, well-defined sections, the amount of information processed at one time is reduced. This allows readers to focus on one idea before moving to the

next. The use of spacing between paragraphs and sections creates visual separation, which helps reduce mental fatigue and gives the reader time to process information. Headings and subheadings further support this process by organizing content into meaningful categories, making it easier for readers to understand the structure of the information [5].

In addition, simplifying the visual presentation plays an important role in reducing cognitive load. When unnecessary elements are removed and only essential information is emphasized, the reader can focus more easily on key ideas. This does not mean reducing the depth of content, but rather presenting it in a way that aligns with how people process information. A well-designed page guides the reader step by step, rather than forcing them to interpret multiple layers of information at once [6].

In the context of this thesis, several usability issues identified through survey and interview feedback can be directly linked to cognitive overload. Some users reported that pages felt too dense, with too much text and insufficient spacing. Others noted that multiple ideas were presented within a single section without clear separation. In some cases, the layout did not guide the reader's attention effectively, making it difficult to follow the intended reading sequence. These issues demonstrate how exceeding cognitive capacity can reduce the usability of a handbook, even when the content itself is accurate.

Cognitive load theory therefore provided an important framework for analyzing and improving the handbook design. By applying its principles, the revised handbook uses clearer sectioning, improved spacing, and more structured content presentation. These changes reduce the mental effort required from users and make the information easier to process. In this way, cognitive load theory supports the broader goal of this study: to design a handbook that is not only informative, but also usable and effective in real-world conditions [5][6].

# Chapter 4: Handbook development

## 4.1 Design Approaches and Feedbacks Collections

The first draft of the handbook was developed mainly through intuition and visual inspiration. At this stage, the design process did not follow a structured industrial design methodology. Instead, the visual style was influenced by internet sources and platforms such as Pinterest, where abstract and trend-based layouts are common. As a result, the initial design focused more on appearance than on usability or user needs.

From a design perspective, this approach was limited. According to The Field Guide to Human-Centered Design, effective design should begin with understanding users and their context rather than relying only on aesthetic preference. Similarly, The Design of Everyday Things emphasizes that design must support how people actually use a product, not how the designer imagines it should look. The first draft did not fully meet these principles, as it lacked a clear focus on readability, structure, and practical use.

## 4.2 First Draft and Feedback

After the first draft was completed, feedback was collected from reviewers. The responses indicated several design issues, including uneven text alignment, overly bright colors, and a style that appeared too modern or too young for a professional mining context. Some users also noted that the design did not feel appropriate for its intended audience.

This feedback highlighted a mismatch between the design and user expectations. According to The Design of Everyday Things, when a design does not align with user expectations, it creates confusion and reduces usability. In this case, the visual style reduced the perceived professionalism of the handbook, even if the content itself was relevant.

## 4.3 Improvements Based on Feedback

Based on the feedback, the handbook was revised to improve usability and visual clarity. Changes included increasing font size, improving spacing, and creating more consistent page layouts. Margins were introduced to reduce visual density, and protocol-specific images and colors were added to support understanding.

These changes reflect basic principles of typography and layout. For example, Thinking with Type explains that font size, spacing, and alignment directly influence readability and user comfort. Similarly, the use of white space helps reduce visual overload and allows readers to process information more easily.

In addition, practical design decisions were made regarding the physical format of the handbook. A matte paper type was selected to reduce glare and improve reading comfort, and a B5 size was chosen for better handling. These decisions align with the idea that design should consider not only visual appearance but also physical usability

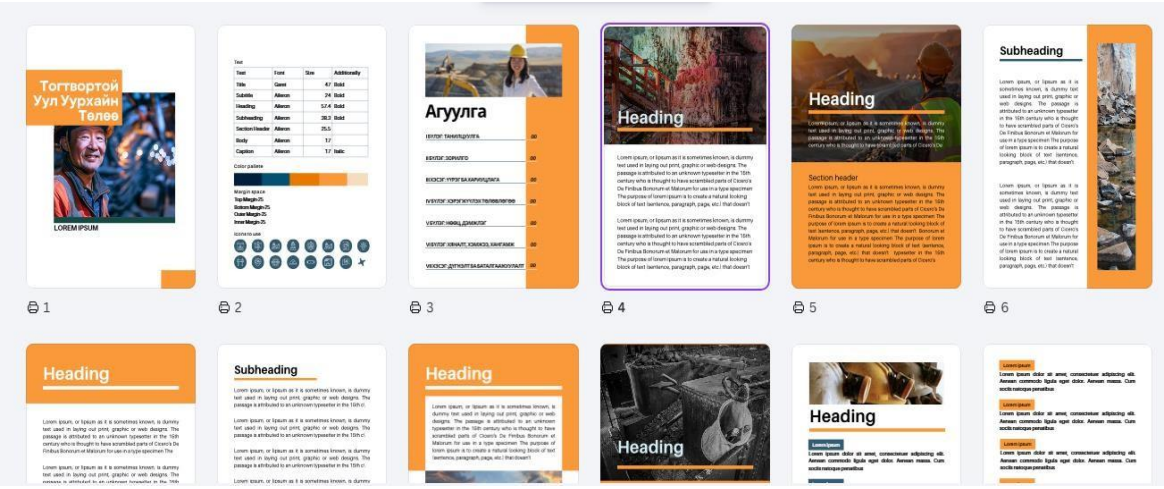



*Figure 4.1. TSM handbook design draft-2 overall look.*

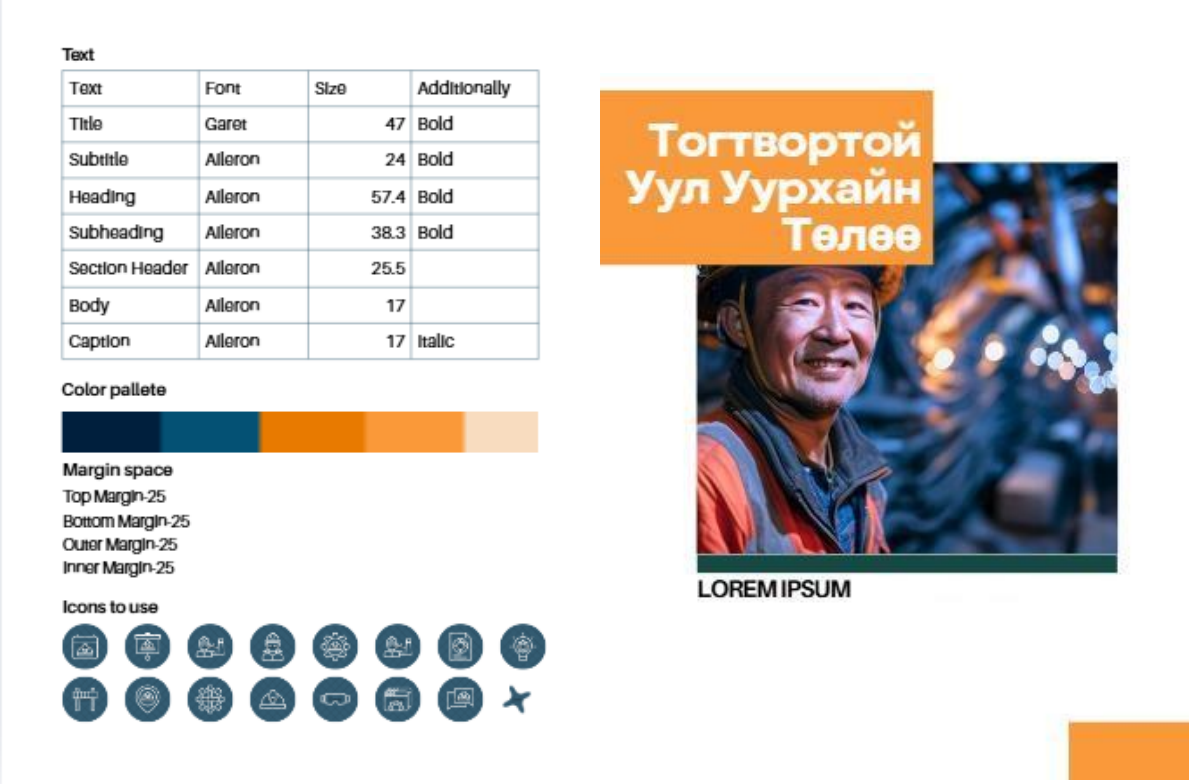



*Figure 4.2.TSM handbook design draft-2*

## 4.4 Second Draft and Feedback from MNMA

The revised handbook was presented to MNMA as part of the project's development. This was the first formal introduction of both the handbook and the protocols. The feedback from MNMA indicated that the design still appeared unprofessional and that the text size was too large.

This stage showed that improvement in one area can create new issues in another. While increasing font size improved readability, it also affected the overall balance and professional appearance of the document. According to Grid Systems in Graphic Design, effective layout requires balance, proportion, and consistency. A design that lacks balance can reduce clarity and visual credibility.

## 4.5 Design Principles Used (TSM Handbook)

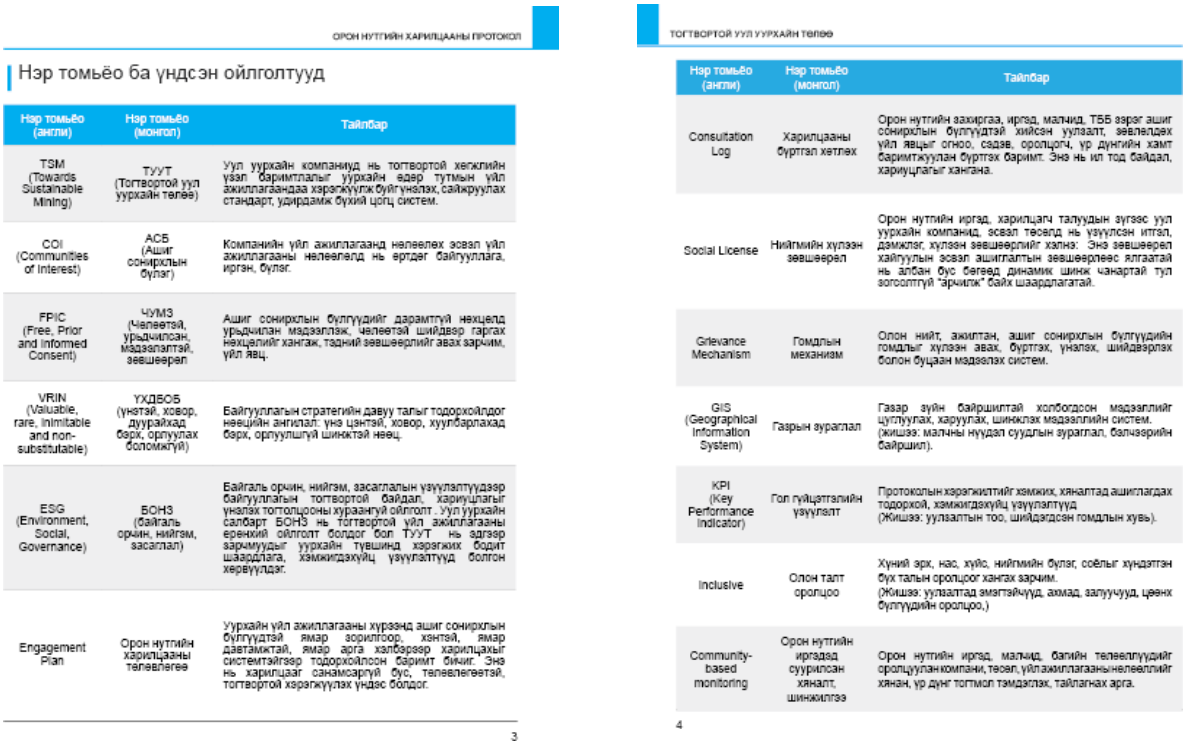
PART ONE: Introduction

**Principles:** Simplicity, cognitive load control, entry-point hierarchy

This section acts as the cognitive entry point to the handbook. The design minimizes complexity by limiting text density and using short, clearly separated paragraphs. Hierarchy is used in a restrained way—only key headings and minimal emphasis—so that the reader is not forced to process multiple levels of information at once. This aligns with cognitive load theory, where reducing initial information allows users to build a mental model gradually instead of being overwhelmed at the start [5,6].





ОРОН НУТГИЙН ХАРИЛЦААНЫ ПРОТОКОЛ

Нэр томьёо ба үндсэн ойлголтууд

| Нэр томьёо (англи) | Нэр томьёо (монгол) | Тайлбар |
|---|---|---|
| TSM (Towards Sustainable Mining) | ТУУТ (Тогтвортой уул уурхайн төлөө) | Уул уурхайн компаниуд нь тогтвортой хөгжлийн үзэл баримтлалыг уурхайн өдөр тутмын үйл ажиллагаандаа хэрэгжүүлж буйг үнэлэх, сайжруулах стандарт, удирдамж бүхий цогц систем. |
| COI (Communities of Interest) | АСБ (Ашиг сонирхлын бүлэг) | Компанийн үйл ажиллагаанд нөлөөлөх эсвэл үйл ажиллагааны нөлөөлөлд нь өртдөг байгууллага, иргэн, бүлэг. |
| FPIC (Free, Prior and Informed Consent) | ЧУМЗ (Чөлөөтэй, урьдчилсан, мэдээлэлтэй, зөвшөөрөл | Ашиг сонирхлын бүлгүүдийг дарамтгүй нөхцөлд урьдчилан мэдээллэж, чөлөөтэй шийдвэр гаргах нөхцөлийг хангаж, тодорхой зөвшөөрлийг авах зарчим, үйл явц. |
| VRIN (Valuable, rare, inimitable and non-substitutable) | ҮХДБОБ (үнэтэй, ховор, дуурайхад бэрх, орлуулах боломжгүй) | Байгууллагын стратегийн давуу талыг тодорхойлдог нөөцийн ангилал: үнэ цэнтэй, ховор, хуулбарлахад бэрх, орлуулшгүй шинжтэй нөөц. |
| ESG (Environment, Social, Governance) | БОНЗ (байгаль орчин, нийгэм, засаглал) | Байгаль орчин, нийгэм, засаглалын үзүүлэлтүүдээр байгууллагын тогтвортой байдал, хариуцлагыг үнэлэх тогтолцооны хураангуй ойлголт . Уул уурхайн салбарт БОНЗ нь тогтвортой үйл ажиллагааны ерөнхий ойлголт болдог бөгөөд ТУУТ нь эдгээр зарчмуудыг уурхайн түвшинд хэрэгжих бодит шаардлага, хэмжигдэхүйц үзүүлэлтүүд болгон хөрвүүлдэг. |
| Engagement Plan | Орон нутгийн харилцааны төлөвлөгөө | Уурхайн үйл ажиллагааны хүрээнд ашиг сонирхлын бүлгүүдтэй ямар зорилгоор, хэнтэй, ямар давтамжтай, ямар арга хэлбэрээр харилцахыг системтэйгээр тодорхойлсон баримт бичиг. Энэ нь харилцаа санамсаргүй бус, төлөвлөгөөтэй, тогтвортой хэрэгжүүлэх үндэс болдог. |

3

ТОГТВОРТОЙ УУЛ УУРХАЙН ТӨЛӨӨ

| Нэр томьёо (англи) | Нэр томьёо (монгол) | Тайлбар |
|---|---|---|
| Consultation Log | Харилцааны бүртгэл хөтлөх | Орон нутгийн захиргаа, иргэд, малчид, ТББ зэрэг ашиг сонирхлын бүлгүүдтэй хийсэн уулзалт, зөвлөлдөх үйл явцыг огноо, сэдэв, оролцогч, үр дүнгийн хамт баримтжуулан бүртгэх баримт. Энэ нь ил тод байдал, хариуцлагыг хангана. |
| Social License | Нийгмийн хүлээн зөвшөөрөл | Орон нутгийн иргэд, харилцагч талуудын зүгээс уул уурхайн компанид эсвэл төсөлд нь үзүүлсэн итгэл, дэмжлэг, хүлээн зөвшөөрлийг хэлнэ: Энэ зөвшөөрөл хайгуулын эсвэл ашиглалтын зөвшөөрлөөс ялгаатай нь албан бус бөгөөд динамик шинж чанартай тул зогсолтгүй "ярилцлага" байх шаардлагатай. |
| Grievance Mechanism | Гомдлын механизм | Олон нийт, ажилтан, ашиг сонирхлын бүлгүүдийн гомдлыг хүлээн авах, бүртгэх, үнэлэх, шийдвэрлэх болон буцаан мэдээлэх систем. |
| GIS (Geographical Information System) | Газрын зураглал | Газар зүйн байршилтай холбогдсон мэдээллийг цуглуулах, харуулах, шинжлэх мэдээллийн систем. (жишээ: малчны нүүдэл суудлын зураглал, бэлчээрийн байршил). |
| KPI (Key Performance Indicator) | Гол гүйцэтгэлийн үзүүлэлт | Протоколын хэрэгжилтийг хэмжих, хяналтад ашиглагдах тодорхой, хэмжигдэхүйц үзүүлэлтүүд (Жишээ: уулзалтын тоо, шийдэгдсэн гомдлын хувь). |
| Inclusive | Олон талт оролцоо | Хүний эрх, нас, хүйс, нийгмийн бүлэг, соёлыг хүндэтгэн бүх талын оролцоог хангах зарчим. (Жишээ: уулзалтад эмэгтэйчүүд, ахмад, залуучууд, цөөнх бүлгүүдийн оролцоо,) |
| Community-based monitoring | Орон нутгийн иргэдэд суурилсан хяналт, шинжилгээ | Орон нутгийн иргэд, малчид, багийн төлөөлүүдийг оролцуулан компани, төсөл, үйлажиллагааны нөлөөллийг хянан, үр дүнг тогтмол тэмдэглэх, тайлагнах арга. |

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*Figure 4.2. TSM handbook design draft-3, chapter one look*

## PART TWO: Objectives

**Principles:** Clarity, emphasis through hierarchy, readability

The objective of this section is precision. The design focuses on making key goals immediately visible. Visual hierarchy is stronger here than in the introduction—headings, bold elements, or structured lists are used to highlight objectives. Typography and spacing ensure that each objective is visually separated, allowing users to scan rather than read line-by-line. This reflects readability principles where structured text improves comprehension and reduces effort [2,4].




*Figure 4. 3. TSM handbook design draft-3, chapter two look*

PART THREE: Duties and Responsibilities

**Principles:** Grid structure, alignment, consistency

This section translates organizational complexity into structured information. A grid-based layout is used to align roles, responsibilities, and relationships. Consistency becomes critical here; each role is presented using the same visual pattern, allowing users to quickly recognize structure without reinterpreting the layout. This reflects Müller-Brockmann's concept that grids create order and predictability, which is essential when presenting multi-actor systems [3].

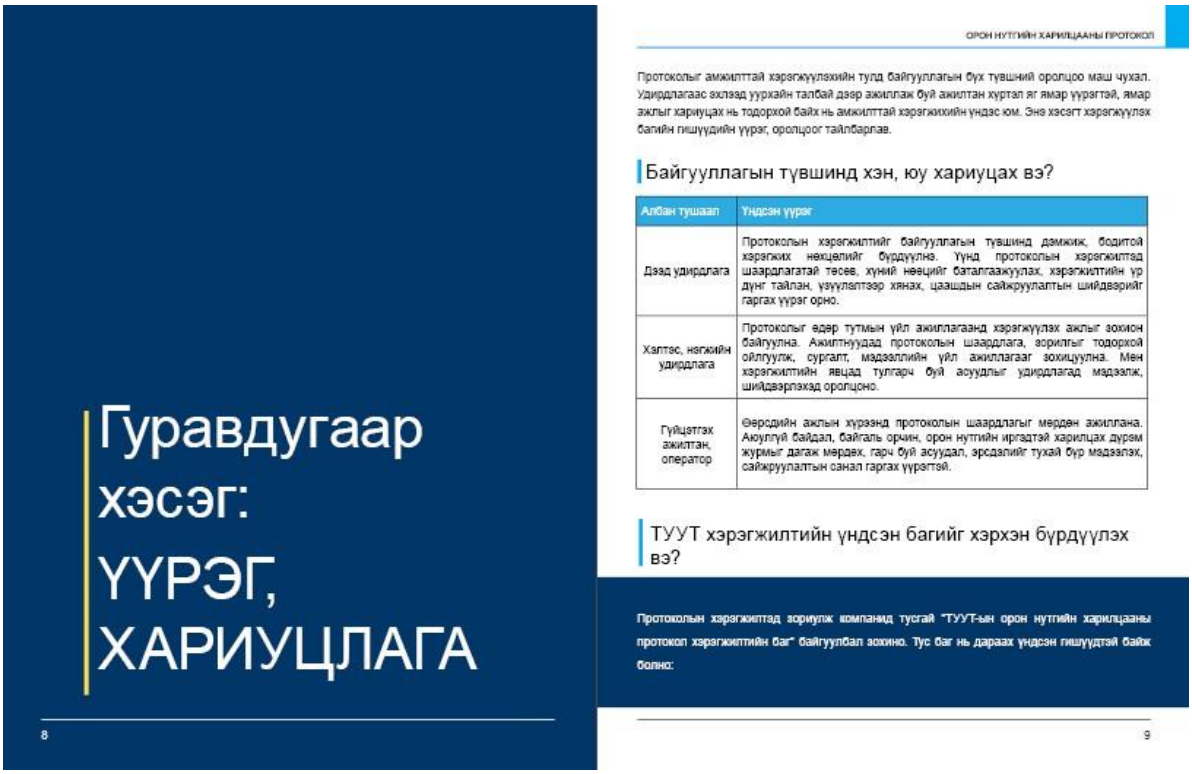



*Figure 4.4. TSM handbook design draft-3, chapter three look*

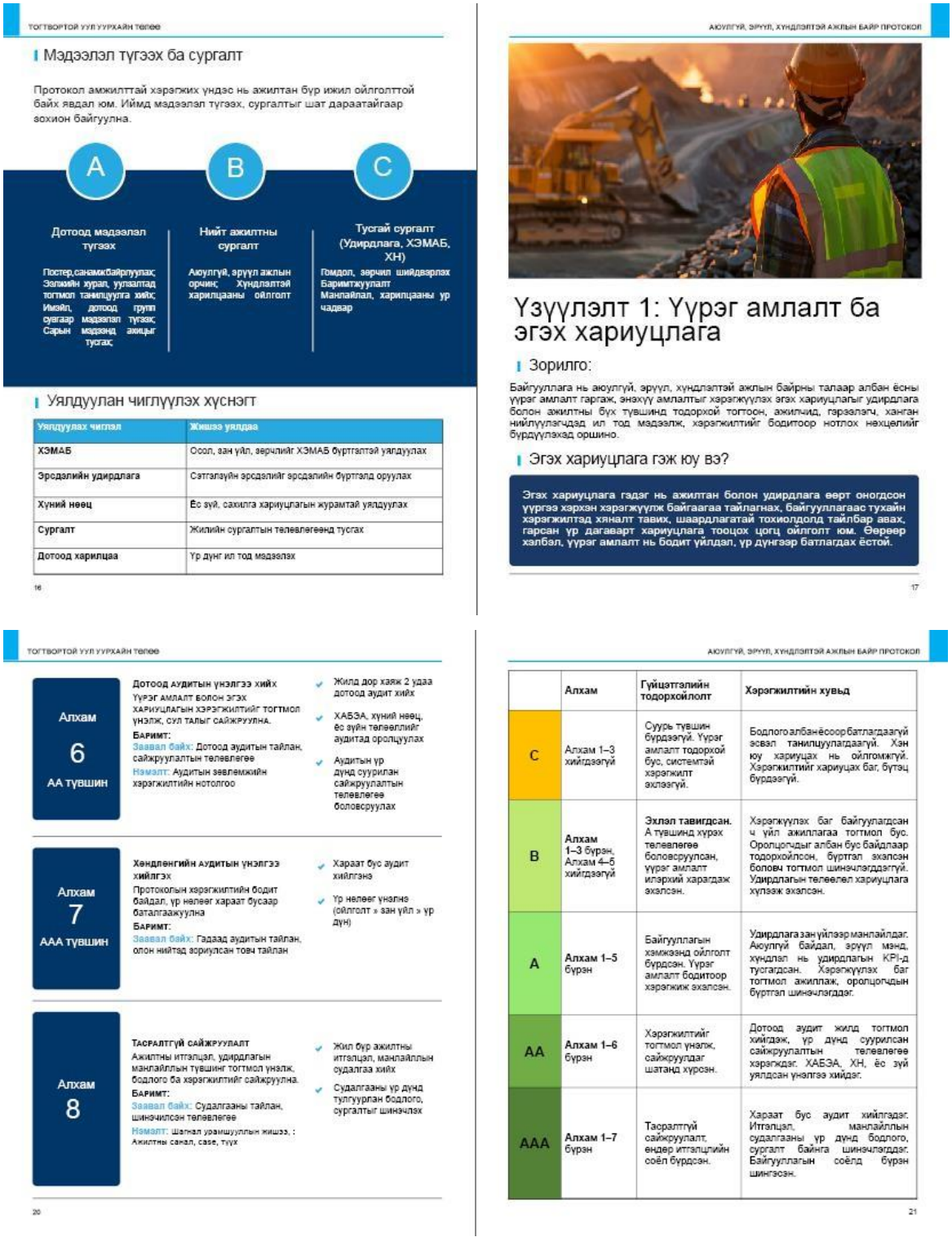
PART FOUR: Application

**Principles:** Sequential design, process hierarchy, usability

This is the most action-oriented section. The design follows a step-by-step structure, reflecting how users actually perform tasks. Hierarchy is used to show progression: phases → steps → actions. Spacing separates each stage to prevent the merging of steps. This aligns with human-centered design logic, where complex processes are broken into manageable sequences that match user workflow rather than theoretical structure [1,7].




*Figure 4.5. TSM handbook design draft-3, chapter four look*



ТОГТВОРТОЙ УУЛ УУРХАЙН тепее

## Мэдээлэл түгээх ба сургалт

Протокол амжилттай хэрэгжих үндэс нь ажилтан бүр ижил ойлголттой байх явдал юм. Иймд мэдээлэл түгээх, сургалтыг шат дараатайгаар зохион байгуулна.

**A** — **Дотоод мэдээлэл түгээх**
Постер,санамжбайрлуулах; Зэлжийн хурал, уулзалтад тогтмол танилцуулга хийх; Имэйл, дотоод групп суагаар мэдээлэл түгээх; Сарын мэдээнд ахицыг тусгах;

**B** — **Нийт ажилтны сургалт**
Аюулгүй, эрүүл ажлын орчин; Хүндлэлтэй харилцааны ойлголт

**C** — **Тусгай сургалт (Удирдлага, ХЭМАБ, ХН)**
Гомдол, зөрчил шийдвэрлэх Баримтжуулалт Манлайлал, харилцааны ур чадвар

## Уялдуулан чиглүүлэх хүснэгт

| Уялдуулах чиглэл | Жишээ уялдаа |
|---|---|
| ХЭМАБ | Осол, зан үйл, зөрчлийг ХЭМАБ бүртгэлтэй уялдуулах |
| Эрсдэлийн удирдлага | Сэтгэлзүйн эрсдэлийг эрсдэлийн бүртгэлд оруулах |
| Хүний нөөц | Ёс зүй, сахилга хариуцлагын журамтай уялдуулах |
| Сургалт | Жилийн сургалтын төлөвлөгөөнд тусгах |
| Дотоод харилцаа | Үр дүнг ил тод мэдээлэх |

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АЮУЛГҮЙ, ЭРҮҮЛ, ХҮНДЛЭЛТЭЙ АЖЛЫН БАЙР ПРОТОКОЛ

## Үзүүлэлт 1: Үүрэг амлалт ба эгэх хариуцлага

### Зорилго:

Байгууллага нь аюулгүй, эрүүл, хүндлэлтэй ажлын байрны талаар албан ёсны үүрэг амлалт гаргаж, энэхүү амлалтыг хэрэгжүүлэх эгэх хариуцлагыг удирдлага болон ажилтны бүх түвшинд тодорхой тогтоон, ажилчид, гэрээлэгч, ханган нийлүүлэгчдэд ил тод мэдээлж, хэрэгжилтийг бодитоор нотлох нөхцөлийг бүрдүүлэхэд оршино.

### Эгэх хариуцлага гэж юу вэ?

**Эгэх хариуцлага гэдэг нь ажилтан болон удирдлага өөрт оногдсон үүргээ хэрхэн хэрэгжүүлж байгаагаа тайлагнах, байгууллагаас тухайн хэрэгжилтэд хяналт тавих, шаардлагатай тохиолдолд тайлбар авах, гарсан үр дагаварт хариуцлага тооцох цогц ойлголт юм. Өөрөөр хэлбэл, үүрэг амлалт нь бодит үйлдэл, үр дүнгээр батлагдах ёстой.**

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ТОГТВОРТОЙ УУЛ УУРХАЙН тепее

**Алхам 6 — АА түвшин**

**Дотоод аудитын үнэлгээ хийх**
Үүрэг амлалт болон эгэх хариуцлагын хэрэгжилтийг тогтмол үнэлж, сул талыг сайжруулна.
**Баримт:**
Заавал байх: Дотоод аудитын тайлан, сайжруулалтын төлөвлөгөө
Нэмэлт: Аудитын зөвлөмжийн хэрэгжилтийн нотолгоо

- Жилд дор хаяж 2 удаа дотоод аудит хийх
- ХАБЭА, хүний нөөц, ёс зүйн төлөөллийг аудитад оролцуулах
- Аудитын үр дүнд суурилан сайжруулалтын төлөвлөгөө боловсруулах

**Алхам 7 — ААА түвшин**

**Хөндлөнгийн аудитын үнэлгээ хийлгэх**
Протоколын хэрэгжилтийн бодит байдал, үр нөлөөг хараат бусаар баталгаажуулна
**Баримт:**
Заавал байх: Гадаад аудитын тайлан, олон нийтэд зориулсан товч тайлан

- Хараат бус аудит хийлгэнэ
- Үр нөлөөг үнэлнэ (ойлголт » зан үйл » үр дүн)

**Алхам 8**

**Тасралтгүй сайжруулалт**
Ажилтны итгэлцэл, удирдлагын манлайллын түвшинг тогтмол үнэлж, бодлого ба хэрэгжилтийг сайжруулна.
**Баримт:**
Заавал байх: Судалгааны тайлан, шинэчилсэн төлөвлөгөө
Нэмэлт: Шагнал урамшууллын жишээ, : Ажилтны санал, саве, түүх

- Жил бүр ажилтны итгэлцэл, манлайллын судалгаа хийх
- Судалгааны үр дүнд тулгуурлан бодлого, сургалтыг шинэчлэх

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АЮУЛГҮЙ, ЭРҮҮЛ, ХҮНДЛЭЛТЭЙ АЖЛЫН БАЙР ПРОТОКОЛ

| | Алхам | Гүйцэтгэлийн тодорхойлолт | Хэрэгжилтийн хувьд |
|---|---|---|---|
| C | Алхам 1–3 хийгдээгүй | Суурь түвшин бүрдээгүй. Үүрэг амлалт тодорхой бус, системтэй хэрэгжилт эхлээгүй. | Бодлого албан ёсоор батлагдаагүй эсвэл танилцуулагдаагүй. Хэн юу хариуцах нь ойлгомжгүй. Хэрэгжилтийг хариуцах баг, бүтэц бүрдээгүй. |
| B | **Алхам 1–3** бүрэн, Алхам 4–5 хийгдээгүй | **Эхлэл тавигдсан.** А түвшинд хүрэх төлөвлөгөө боловсруулсан, үүрэг амлалт илэрхий харагдаж эхэлсэн. | Хэрэгжүүлэх баг байгуулагдсан ч үйл ажиллагаа тогтмол бус. Оролцогчдыг албан бус байдлаар тодорхойлсон, бүртгэл эхэлсэн боловч тогтмол шинэчлэгддэггүй. Удирдлагын төлөөлөл хариуцлага хүлээж эхэлсэн. |
| A | **Алхам 1–5** бүрэн | Байгууллагын хэмжээнд ойлголт бүрдсэн. Үүрэг амлалт бодитоор хэрэгжиж эхэлсэн. | Удирдлага зан үйлээр манлайлдаг. Аюулгүй байдал, эрүүл мэнд, хүндлэл нь удирдлагын KPI-д тусгагдсан. Хэрэгжүүлэх баг тогтмол ажиллаж, оролцогчдын бүртгэл шинэчлэгддэг. |
| AA | **Алхам 1–6** бүрэн | Хэрэгжилтийг тогтмол үнэлж, сайжруулдаг шатанд хүрсэн. | Дотоод аудит жилд тогтмол хийгдэж, үр дүнд суурилсан сайжруулалтын төлөвлөгөө хэрэгждэг. ХАБЭА, ХН, ёс зүй уялдсан үнэлгээ хийдэг. |
| AAA | **Алхам 1–7** бүрэн | Тасралтгүй сайжруулалт, өндөр итгэлцлийн соёл бүрдсэн. | Хараат бус аудит хийлгэдэг. Итгэлцэл, манлайллын судалгааны үр дүнд бодлого, сургалт байнга шинэчлэгддэг. Байгууллагын соёлд бүрэн шингэсэн. |

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*Figure 4.7. TSM handbook design draft-3, chapter four look*

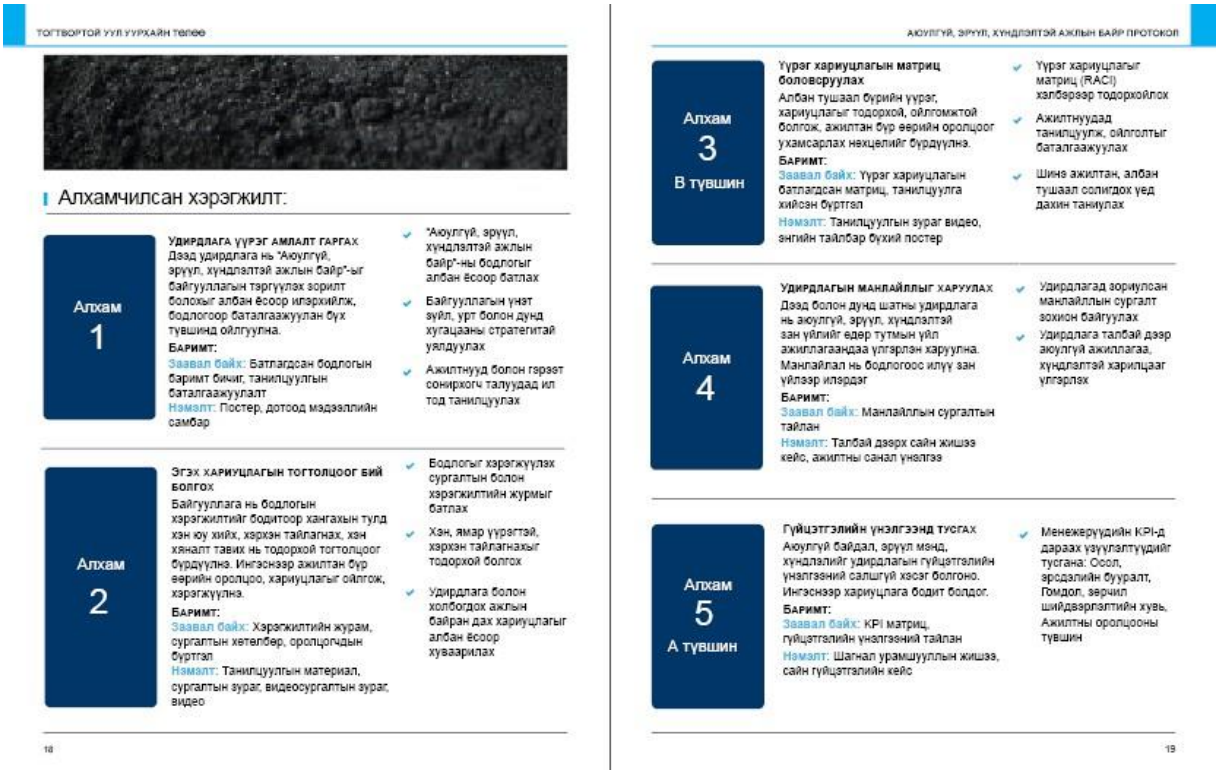


*Figure 4.8. TSM handbook design draft-3, chapter four look*

PART FIVE: Internal Resources and Support

**Principles:** Information grouping, modular design, cognitive load reduction

This section contains dense and varied content (HR, finance, systems, VRIN). The design uses grouping and modular sections (5.1–5.7) to divide content into independent units. Tables and structured formats are introduced to replace long explanations. This reduces cognitive load by allowing users to process information in "chunks" instead of as continuous text [5]. The grid system also supports alignment and clarity across different resource types [3].



ТОГТВОРТОЙ УУЛ УУРХАЙН ТӨЛӨӨ

| | Хүний нөөц | Санхүү, төсөв | Мэдээлэл, өгөгдөл | Сургалт, чадамж | Техник, дэд бүтэц |
|---|---|---|---|---|---|
| C | Хариуцсан ажилтан тодорхой бус, олон үүрэг давхар гүйцэтгэдэг | Тусгай төсөв байхгүй, зардлыг үлдэгдлээр шийддэг | Бүрэлдэхүүн тархай, цаасан, системгүй | Сургалт тогтмол бус, баримтжуулалт сул | PPE, багаж дутагдалтай, стандарт бус |
| B | ХЭМАБ/ХН хариуцсан хүн томилогдсон | Суурь төсөв батлагдсан | Гол мэдээллийг цуглуулж эхэлсэн | Суурь сургалтууд тогтмолжсон | PPE хангалттай, үндсэн багажтай |
| A | Хэрэгжилтийн баг бүрдсэн, үүрэг заагласан | Сургалт, эрсдэлийн төсөв тусдаа | Өгөгдөлд дүн шинжилгээ хийдэг | Чадамжийн матрицтай, үнэлгээ хийдэг | Хэмжилт, хяналтын тоног төхөөрөмжтэй |
| AA | Мэргэшсэн баг, дотоод аудит оролцдог | Урт хугацааны төлөвлөгөөтэй | Dashboard, trend анализ хийдэг | Манлайлал, зан үйлийн сургалт | Дижитал систем, автомат хяналт |
| AAA | Манлайллын баг, чадавх тасралтгүй хөгждөг | Стратегийн хөрөнгө оруулалт | Өгөгдөл шийдвэр гаргалтыг чиглүүлдэг | Сургалт соёлын нэг хэсэг болсон | Салбарын шилдэг технологи нэвтрүүлсэн |

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АЮУЛГҮЙ, ЭРҮҮЛ, ХҮНДЛЭЛТЭЙ АЖЛЫН БАЙР ПРОТОКОЛ



Энэхүү протокол нь эвхэн бодлого, журам батлах замаар бус, харин шаардлагатай дотоод нөөц, бодит дэмжлэгийг системтэйгээр бүрдүүлж чадсан тохиолдолд үр дүнтэй хэрэгжинэ. Хүний нөөц, санхүүжилт, мэдээллийн систем, сургалт, техник хэрэгсэл, харилцаа холбоо зэрэг нь тус тусдаа бус, харилцан уялдаатай нэг цогц тогтолцоо болж ажиллах ёстой.

## Дотоод нөөц ба дэмжлэгийн үндсэн ангилал

| | Ангилал | Агуулга |
|---|---|---|
| 1 | Хүний нөөц | ТУУТ хэрэгжилтийн баг ХЭМАБ, ХН, ёс зүйн чиглэлийн мэргэжилтнүүддотоод аудит; ажилтны төлөөлөл, оролцооны механизм |
| 2 | Санхүүгийн нөөц ба төсөв | Сургалт, чадамжийн хөгжилд зориулсан төсөв<br>Эрсдэл бууруулах техник, хамгаалах хэрэгслийн санхүүжилт<br>Эрүүл мэндийн үзлэг, эрүүл ахуйн хэмжилтийн зардал<br>Мэдээллийн систем, аудит, үнэлгээний зардал |
| 3 | Мэдээллийн систем ба өгөгдөл | Осол, near miss, эрсдэлийн бүртгэлийн систем<br>Гомдол, санал, зөрчлийн мэдээллийн сан<br>KPI, гүйцэтгэлийн тайлагналын dashboard<br>Баримт, нотолгоо хадгалах дотоод систем |
| 4 | Сургалт, чадамжийн дэмжлэг | Суурь ба тусгай сургалтын хөтөлбөр<br>Удирдлагын манлайлал, зөвлөн ур чадварын сургалт<br>Шинэ ажилтан, гэрээлэгчийн зааварчилгаа<br>Сургалтын үр дүн үнэлэх аргачлал |
| 5 | Техник, тоног төхөөрөмж | Хамгаалах хэрэгсэл (PPE)<br>Эрүүл ахуйн хэмжилтийн багаж<br>Аюултай ажилд хяналт тавих техник<br>Аюулгүй ажиллагааны тэмдэг, самбар |

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*Figure 4.9. TSM handbook design draft-3, chapter five look*

SECTION SIX: Control, Display, and Connection

**Principles:** Consistency, repeatable structure, system visibility

This section focuses on monitoring systems and feedback mechanisms. To support this, the design emphasizes consistency. Each element is presented using a similar structure, allowing users to apply the same reading logic across different parts of the section. Once users understand one component, they can apply that understanding to others without additional effort. This approach aligns with design principles that prioritize usability and efficient interpretation of structured information [4].

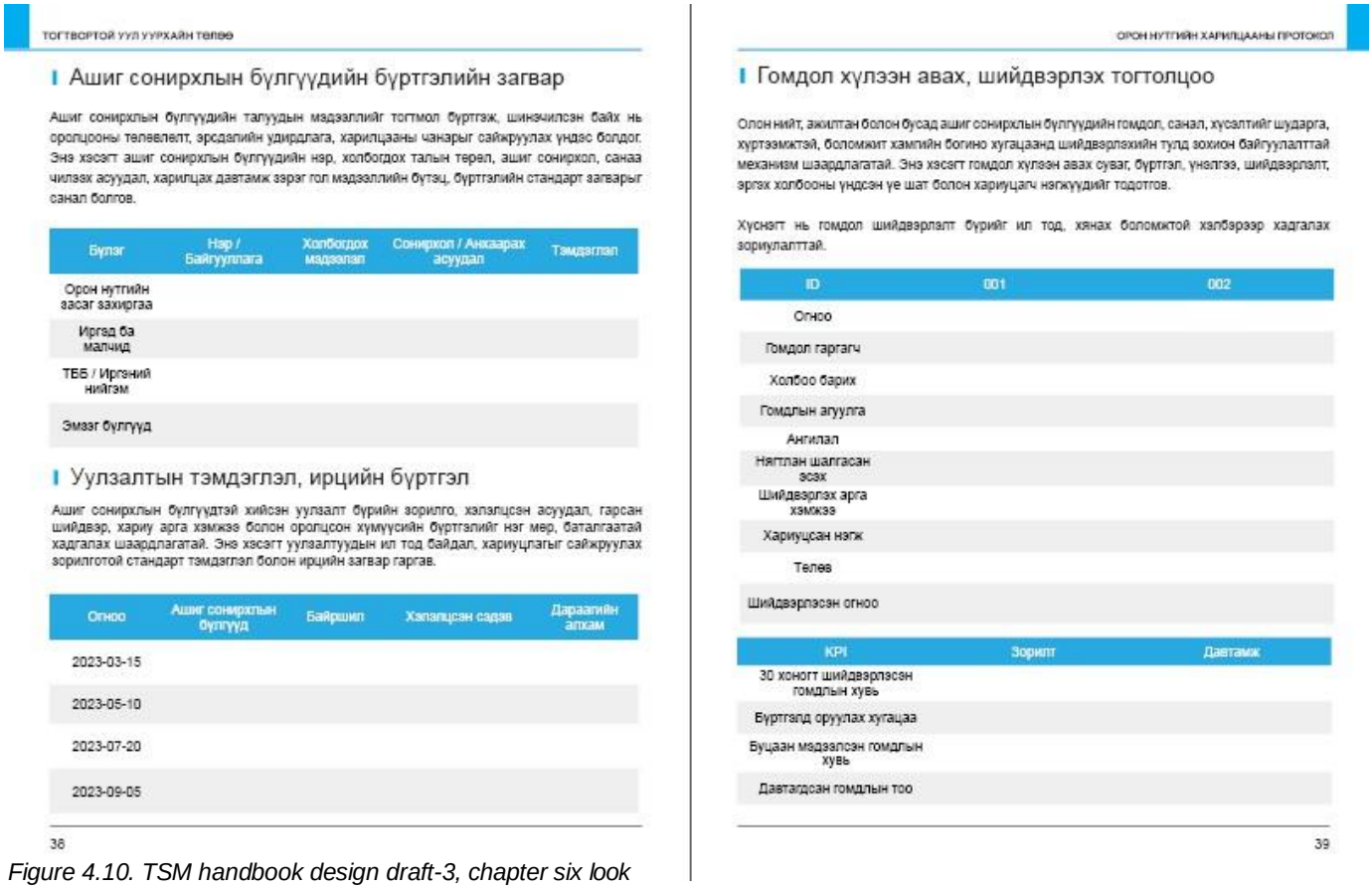


*Figure 4.10. TSM handbook design draft-3, chapter six look*

## PART SEVEN: The End

**Principles**: Simplicity, reduction, cognitive closure

The conclusion reduces both visual and informational complexity. The design uses minimal hierarchy and a clean layout to reduce cognitive effort. This allows users to consolidate their understanding without processing additional information. This reflects cognitive load principles, where reducing information at the end of a document supports retention and overall comprehension [5].




*Figure 4.11. TSM handbook design draft-3, chapter seven look*

# Chapter 5: Methodology

## 5.1 Design Tools

When designing the handbook, I used both Adobe InDesign and Canva at different stages of the process. Each tool supported different needs, and using both helped me understand their strengths and limitations.

At the beginning, I used Canva because it was simple and easy to use. It allowed me to quickly test ideas, try different layouts, and create visual concepts without spending too much time on

technical details. The drag-and-drop system and ready-made templates made it useful for early-stage exploration. However, as the content became more complex, I started to face limitations. It was difficult to manage long documents, maintain consistent formatting, and control detailed layout elements.

Because of this, I moved to Adobe InDesign for the main handbook design. InDesign provided much more control over structure, typography, spacing, and alignment. Features like master pages, paragraph styles, and grid systems helped me keep the design consistent across all pages. This was especially important for a handbook, where clarity and organization are critical. Although InDesign was more difficult to learn at the beginning, it allowed me to create a more professional and structured final result.

### 5.1.1 Technical specifications

**1. Typography (Arial Hierarchy)**

Typeface: Arial (Sans-Serif)

Main Titles: 60 pt | Bold | Leading: 60 pt

Section Subheads: 20 pt | Regular | Leading: 24 pt

Body Text: 15 pt | Regular | Leading: 18 pt

Images are from Unsplash

**2. Color Palette (TSM Eco-Green)**

Primary Green: CMYK: 80, 20, 100, 5

Hex: #2D6A4F

Secondary Blue: CMYK: 100, 85, 20, 10

Hex: #1B365D

**3. Layout & Grid (B5 Portrait)**

Document Size: B5.

**Margins:**

Top: 20 mm

Bottom: 20 mm

Inside (Gutter): 25 mm (allows for thick paper/binding)

Outside: 15 mm

Grid System: 4-Column Grid

Gutter width: 4 mm

Baseline Grid: Increments of 7 pt (starting at 0).

**4. Image Frames:**

Fitting: Fill Frame Proportionally

# 5.2 Interview design

The validation of the TSM (Towards Sustainable Mining) Handbook was conducted through a structured usability study designed to bridge the gap between theoretical design and industrial application. This phase utilized a qualitative approach to evaluate the handbook's cognitive ergonomics and functional utility.

## 5.2.1 Sampling Logic and Participant Selection

The study employed purposive sampling, a non-probability sampling technique where participants are selected based on their specific roles and expertise relative to the research subject. To ensure

stakeholder diversity, the selection targeted individuals across the organizational hierarchy of the mining sector.

The primary research was conducted during a field trip to Erdenet Mining Corporation, one of the largest copper and molybdenum mining and processing facilities in Asia. The sampling was divided into two distinct clusters to capture a 360-degree view of the handbook's utility

**Cluster A:** Industrial Operations (n=14): Personnel from the Industrial Factory. These participants represent the "front-line" users who require high-legibility and durable information structures in high-stress environments.

**Cluster B:** Administrative & Strategic Management (n=15): Personnel from the Central Administration Building (Headquarters) who were attending a TSM (TUUT) Implementation Meeting. These participants were selected because their roles require a closer, more frequent interaction with TSM reporting protocols.

Totaling 29 participants, this sample size exceeds the initial target of 10–15, providing sufficient data saturation to identify recurring usability patterns.

### 5.2.2 Data Collection and Recording

Data was collected using semi-structured interviews and concurrent think-aloud protocols, where participants narrated their cognitive process while interacting with the handbook.

Handwritten Field Notes: Due to the industrial nature of the site and the need for immediate, contextual feedback, responses were captured via detailed handwritten notes. This method allowed the researcher to record non-verbal cues, such as points of hesitation or physical difficulty in reading specific page layouts.

### 5.2.3 Data Analysis Method: Thematic Coding and Frequency Analysis

To move beyond anecdotal evidence, the raw field notes were subjected to a Usability-Oriented Thematic Analysis. This systematic process involved three stages:

Open Coding: Raw comments were transcribed and assigned initial codes based on the design dimension they addressed (e.g., "Font size," "Color dominance," "Image relevance").

Clustering and Grouping: Similar codes were grouped into "Usability Themes." For example, comments regarding "white text on blue" and "small font" were clustered under the theme of Cognitive Ergonomics & Legibility.

Frequency Analysis: The mentions of each theme were quantified to determine the severity of design flaws. Themes with the highest frequency of negative mentions (e.g., Image Context and Dark Blue Contrast) were prioritized for the final iterative design loop.

### 5.2.4 Thematic Framework

The analysis focused on the following five thematic pillars derived from Industrial Design theory:

**Visual Semantics:** Perception of color codes and symbolic meaning.

**Information Architecture:** The logical flow and "findability" of data.

**Cognitive Load:** The amount of mental effort required to process a single page.

**Contextual Alignment:** The relevance of visual aids to the Mongolian mining environment.

**Physical Ergonomics:** The size, weight, and handling of the physical handbook.

This systematic approach ensures that the resulting design improvements are not merely subjective preferences but are evidence-based responses to verified industrial user needs

### .5.2.5 Interview questionnaire design

The interview follows a Sequential Design model to manage the participant’s cognitive load and build trust before engaging with technical content [5].

**The Onboarding Phase**: The script begins by defining the "Industrial Design" philosophy—clarifying that the handbook is a product designed for human comfort and utility. This establishes a "Conceptual Model" for the participant, framing the session as a collaborative design review rather than a test of their knowledge [8].

**Gradual Disclosure:** Questions move from general professional background (Part 1) to specific visual and functional critiques (Parts 2-8). This "funneling" technique aligns with how human memory retrieves information, starting with broad context before drilling into technical details [5, 6].

The specific questions within the script are engineered to test the industrial design theories applied in the handbook:

**Aesthetic-Usability Effect & First Impressions:** Part 2 asks, "What was your first impression?" This tests the psychological theory that users perceive more aesthetic designs as easier to use and are more likely to adopt them in high-stress industrial environments [4].

**Cognitive Load & Readability:** Part 3 (Readability) and Part 4 (Structure & Space) directly investigate the "Visual Hierarchy" and "White Space" principles. Questions regarding eye fatigue and font size serve as an empirical check on the handbook's Cognitive Ergonomics [5, 6].

**Mapping and Findability:** Part 5 (Information Search) tests System Visibility. By asking, "Can you find specific information quickly?" the interview measures how well the handbook's internal "Mapping" aligns with the user's mental model of their daily workflow [8].

**Signal-to-Noise Ratio:** Part 6 (Color & Form) and Part 8 (Images) analyze whether visual elements act as "Signal" (helpful information) or "Noise" (distraction). This ensures that the use of boxes, icons, and diagrams supports data retention rather than causing information overload [4, 5].

**The final section of the interview**: Part 7 (Improvement) adopts the Co-Design methodology. By asking the user to act as the "Designer," the script identifies specific "pain points" to be addressed in the next iteration of the handbook. This creates a validation loop where the

"Readiness Gap" identified by the UNDP [7] is bridged by the end-user's direct input, ensuring the final product is fit for the Mongolian industrial context [1, 7].

## 5.2.6. Final Interview scenario

**0. Introduction**

Hello, good day to you.

My name is Maral and I am a student at GMIT. I am currently working on my thesis project, which involves developing a handbook for the TSM (Towards Sustainable Mining) protocol.

This handbook is specifically designed for people like you who work directly in the mining industry. Therefore, your honest feedback is extremely valuable to me.

Would you be able to spare approximately 30–40 minutes to help me improve my work?

(If they agree)

Thank you very much. Before we begin, I would like to get to know a little bit about your background.

**1. Background – Understanding the User**

A. How many years have you been working in the mining industry?

B. What is your specific area of work or department

C. Have you used this type of handbook or manual before?

Now, I will hand you the handbook. Please take 1–2 minutes to look through it at your own pace. I will wait.

**2. First Impressions**

A. What were your initial thoughts when you first saw it?

- What specific part gave you that feeling?
- Did it look easy to use, or did it seem a bit complicated?

B. In those first few seconds, what was the very first thing you noticed?

**3. Readability**

A. If you were using this during a shift—would it be comfortable to read for a long time?

- What do you think of the font size?
- Did you feel any eye strain while looking at it?
- Do you think someone with poor eyesight would find it difficult to read?

**4. Structure and Space**

A. When looking at a page, is it clear where you should start?

- Are the headings easy to understand
- Is it clear which information is most important?

B. Did any sections feel like there was too much information crowded together?

C. Were there parts where you felt more "breathing room" (white space) was needed?

**5. Information Retrieval**

A. If you needed to find a specific piece of information quickly, do you think you could find it?

- Which part do you think might cause a delay or make you feel "stuck"?

**6. Color and Form**

A. How do the colors used make you feel?

- Do they feel calm and professional?
- Or are they a bit tiring for the eyes?

B. Were the shapes, boxes, and highlights helpful?

C. Or did they feel like too much?

**7. Improvements**

A. If you were the designer—what is the first thing you would change

- What would you remove?
- What would you add?

**8. Imagery**

- How do you feel about the number of images?
- Do you think they are necessary?
- Do the images help you understand the information better, or do they distract you?

**9. Closing**

The suggestions you provided have been incredibly helpful. You have shared very important insights based on real-world usage.

Thank you very much for your time!

## 5.3 Interview data and analysis

### 5.3.1 Participant Demographics and Expertise

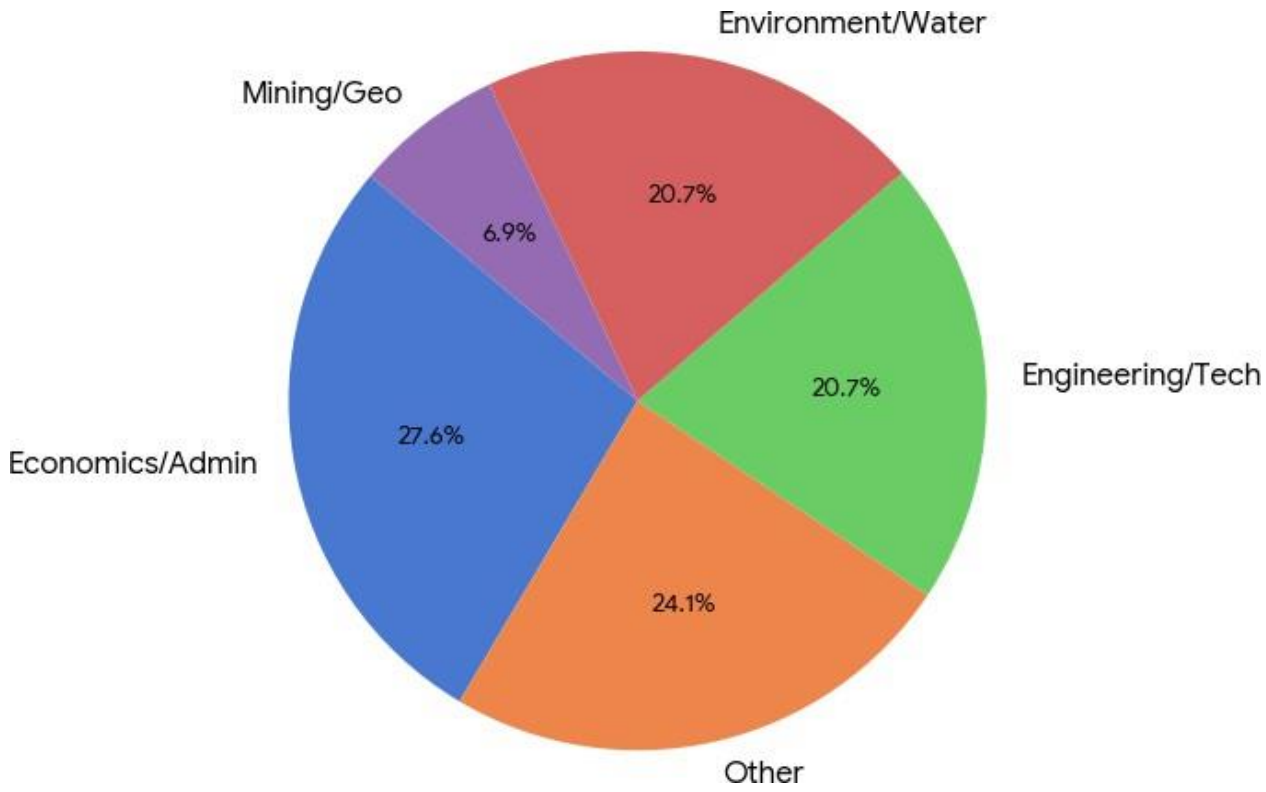


*Figure 5.1. Survey participant expertise*

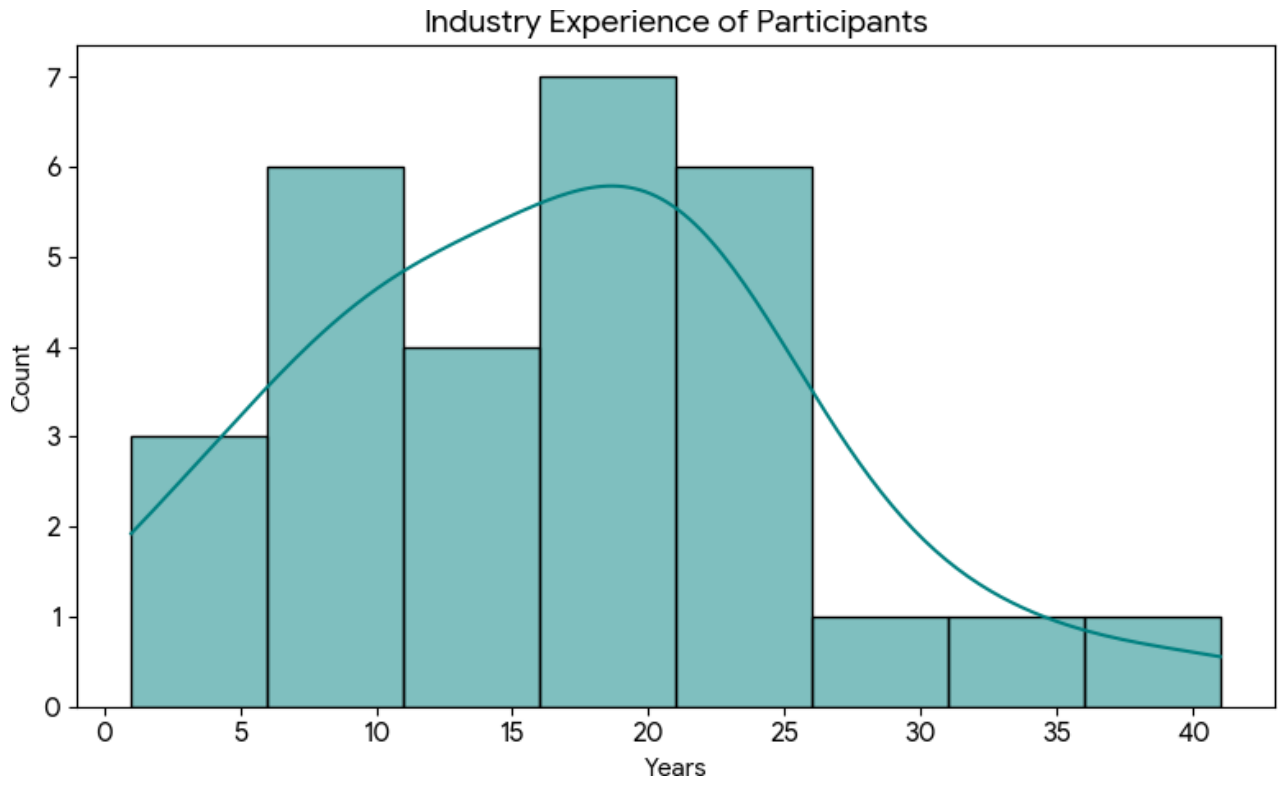


*Figure 5.2. Survey participant experience*

The data shows a highly experienced group of stakeholders, with an average of 18 years of industry experience. The diversity of fields—ranging from Engineering and Tech (34.5%) to Economics and Administration (27.6%)—confirms that the handbook must function as a multi-actor tool that bridges different professional "mental models."

2. Prior Exposure and Readiness

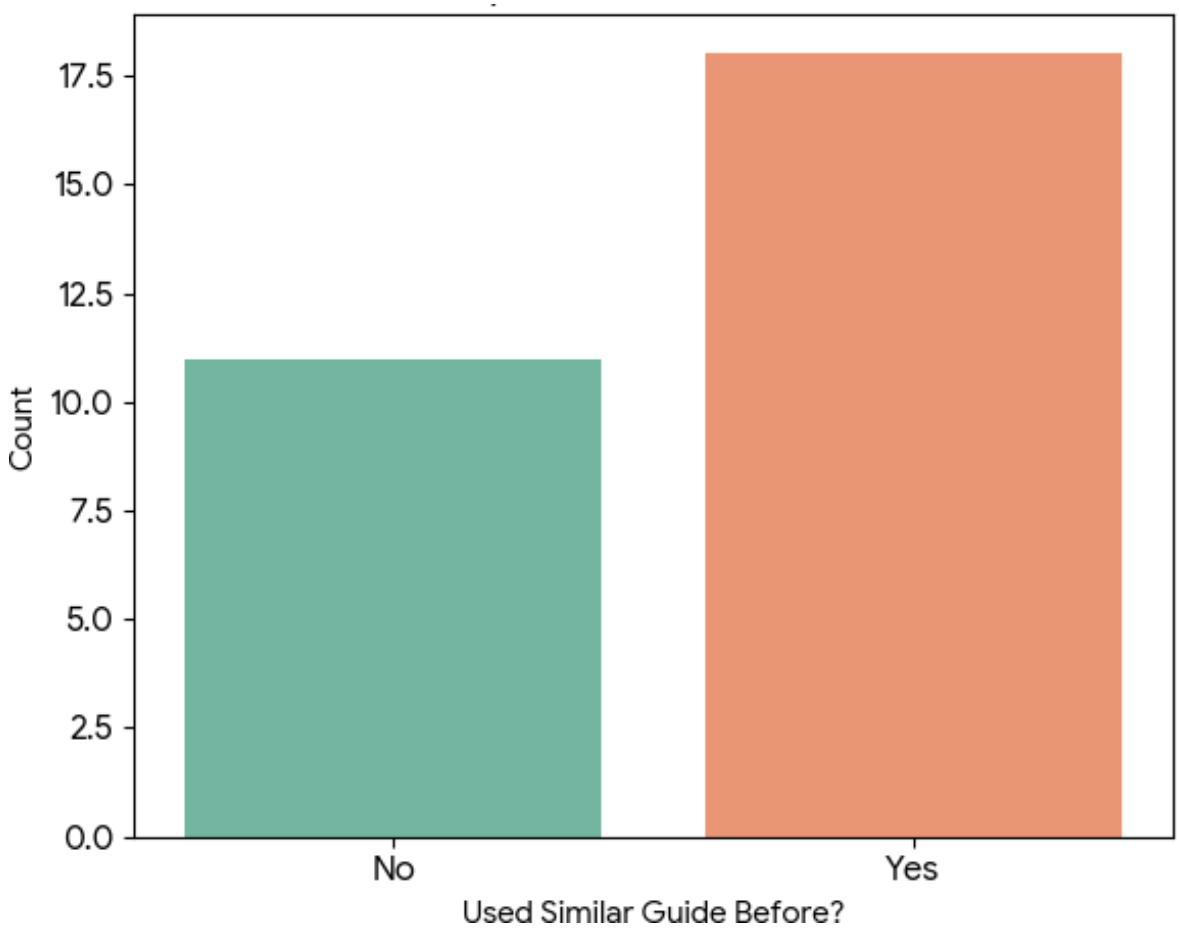


*Figure 5.3. Prior exposure to similar manuals*

A significant portion of the participants (over 60%) have used similar implementation guides before. This indicates that the users have a pre-existing "schema" or expectation for technical manuals. When the design deviates from these expectations (e.g., small fonts or "magazine-like" layouts), it creates cognitive friction.

### 5.3.2 User-satisfaction measurement

During the field interviews at Erdenet Mining Corp, a selective recording protocol was utilized to maximize the efficiency of the 30-40minute sessions. Positive feedback (indicating that a design element was clear, usable, and met the user's mental model) was recorded as a numerical '1', signifying 'Baseline Usability Success.' Detailed qualitative notes were reserved exclusively for constructive criticism and friction points. This approach ensured that the research captured the most actionable data required for the iterative design loop, focusing on the 'Readiness Gap' rather than redundant affirmations of existing design success.

*Table 5.1. User-satisfaction quantified*

| Design Category | Mentions | Success Rate | Primary Qualitative Friction (Pain Points) |
|---|---|---|---|
| Images & Visuals | 16 | **44.8%** | Rural/cultural images felt out of place (ID 18); Need for technical captions (ID 8). |
| Color & Palette | 12 | **58.6%** | Dark blue felt "lonely" or "too dark" (ID 8, 9); White text on blue is hard to read (ID 17). |
| Typography | 8 | **72.4%** | Small/inconsistent font sizes (ID 1, 17); Request for Times New Roman (ID 14, 29). |
| Structure & Layout | 7 | **75.9%** | Objectives confused with titles (ID 22); Need for subheadings (ID 24) and index (ID 21). |
| Physical Format | 5 | **82.7%** | Requests for thinner size (ID 4) and glossy/thicker paper (ID 7, 15). |

### 5.3.3 Detailed Findings

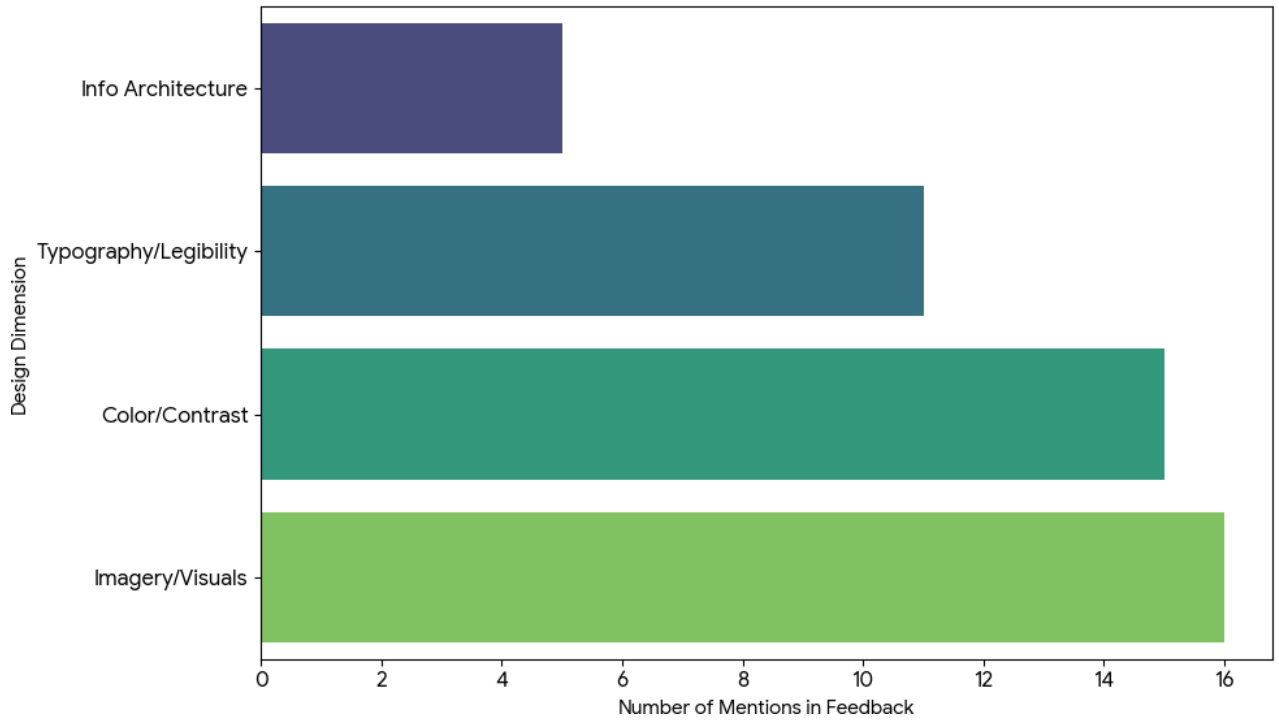


*Figure 5.4 Core design critiques (frequency of mentions)*

**1. Design & Color Issues (13 mentions, 45% of feedback)**

- **Dark blue dominance:** most respondents flagged dark blue as monotonous, lonely, or unsuitable
  - Mentioned as "too dark" (respondent 9)
  - "Blue feels lonely/over dominant" (respondent 8)
- **Contrast & readability:** some respondents noted white-on-dark or dark-on-light contrast issues
  - "White on blue is hard to see" (respondent 17)
  - "White on dark background is hard to read" (respondent 18)
- **Color palette variety:** some respondents requested more diverse, purposeful coloring
  - "Colors are too few" (respondent 19)

- Preference for eco-green (respondent 14)
- TSM site colors recommended (respondent 26)

**2. Images & Visual Content (17 mentions, 59% of feedback)**

- **Relevance & selection:** most respondents noted images that don't reinforce content
  - "Images are not related to the topic" (respondent 13)
  - "Rural images under 'local' feel out of place" (respondent 18)
  - "Images feel inappropriate" (respondent 21)
- **Insufficient captioning:** some respondents wanted image explanations
  - "Images should have captions" (respondent 8)
- **Empty section pages:** some respondents found section dividers visually weak
  - "Section-start pages feel empty" (respondent 8)
- **Visual hierarchy:** multiple mentions of images placed inconsistent
  - "Images should be above titles" (respondent 20)
  - Requests for more colorful, Mongolian-related imagery (respondent 11)

**3. Physical Format & Portability (4 mentions, 21% of feedback)**

- **Size & thickness:** most respondents mentioned the book is too large/thick
  - "Thinner and easier to handle" (respondent 4)
  - "Slightly smaller size would be better" (respondent 12)
  - "Shape being smaller would be nice" (respondent 7)
  - Economics field particularly prone to requesting portability
- **Paper quality:** some respondents suggested thicker/glossy paper
  - "Thicker paper would be better" (respondent 7)
  - "Smooth/glossy paper would be good" (respondent 15)

**4. Typography & Readability (7 mentions, 27.6% of feedback)**

- Font size consistency: most respondents flagged sizing issues
  - "Font sizes look inconsistent" (respondent 1)
  - "Font is small" (respondent 17)

- "Uncompressed font looks better" (respondent 21)

❖ Font selection: some respondents expressed strong preferences

- "Times New Roman is good" (respondent 14, 29)
- "Would prefer Times New Roman" (respondent 14)

# Chapter 6: Results, Discussion & Handbook Improvement

The feedback gathered through purposive sampling revealed that while the handbook's initial design established a baseline for professional quality, it contained significant "friction points" in its Visual Interface. The following analysis interprets user feedback through the lens of Cognitive Ergonomics and Industrial Design Theory.

## 6.1. Chromatic Saturation and Attentional Hierarchy

**Finding:** 45% of participants (13 mentions) identified the dark blue color scheme as a primary design flaw.

**Interpretation:** The dominance of dark blue was found to reduce perceived warmth and visual variation, weakening the attentional hierarchy. By saturating the pages in a single dark tone, the design created "visual monotony," which users perceived as "lonely" or "too dark" (Respondents 8, 9). From a design standpoint, this lack of chromatic contrast increases cognitive fatigue, as the brain lacks "visual landmarks" to anchor attention during prolonged technical reading.

**Design Evolution:** To address this, the palette was shifted toward an "Eco-Green" and blue-green spectrum (Respondents 14, 26). This shift not only aligns with the Environmental Semantics of the TSM protocol but also provides a more varied and stimulating interface that supports sustained focus.




*Figure 5.1. Comparison of before and after color change*

## 6.2. Polarity, Legibility, and Eye Strain

Finding: 27.6% of participants (7 mentions) critiqued the typography and background contrast.

The use of Negative Polarity (white text on dark blue) was identified as a significant "legibility barrier" (Respondents 17, 18). In the varied lighting of a mining facility, high-contrast negative polarity causes the iris to fluctuate, leading to "halation" (a blurring effect around white letters).

The revised pages prioritize Positive Polarity (Dark text on a light background). Furthermore, font selections were standardized toward serif-style fonts to leverage the "reading flow" that serifs provide in high-density technical blocks.

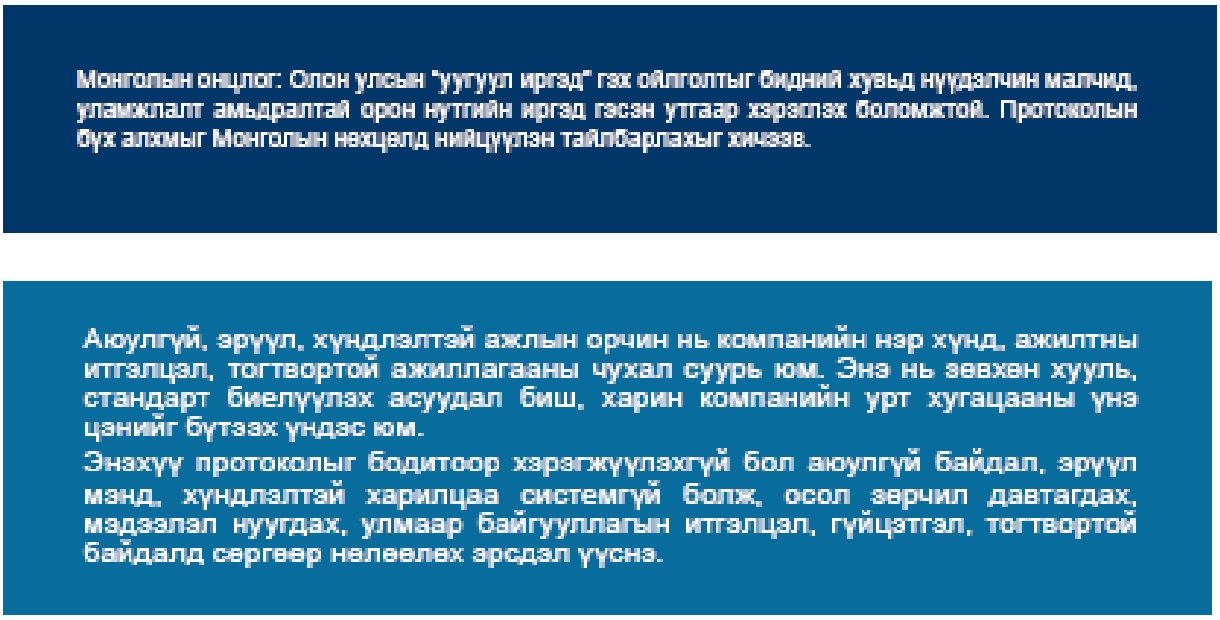


*Figure 6.2. Comparison of before and after color change*

## 6.3. Visual Semiotics and Contextual Disconnect

Finding: 59% of participants (17 mentions) critiqued the image selection and placement.

The 3rd draft of handbook suffered from a "Semiotic Disconnect." Users flagged rural or cultural images as "inappropriate" or "not related to the topic" (Respondents 13, 18). In an industrial context, users expect Functional Imagery that reinforces technical procedures. Non-relevant visuals act as "Cognitive Noise," distracting the user from the primary data.

Connecting the text’s context to the images ensures that visuals remain relevant to the content.

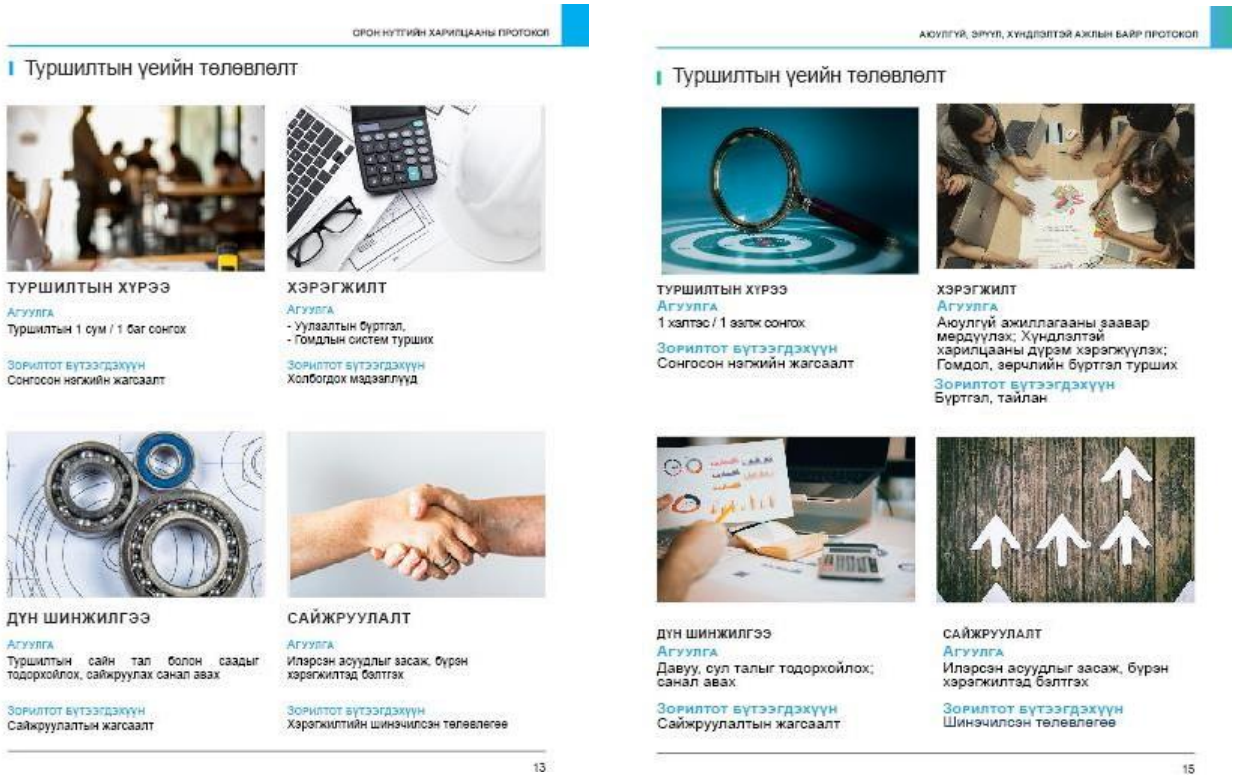


*Figure 6.3. Comparison of before and after images change*

## 6.4. Structural Logic and Information Architecture

Finding: 17% of respondents focused on "Structure and Space," specifically noting difficulties in distinguishing titles from objectives or finding the "starting point" (Respondents 8, 22, 24).

The feedback suggests a failure in Visual Signifiers. When "objectives look like titles" (Respondent 22), it creates semantic ambiguity, forcing the user to expend unnecessary mental energy just to navigate the page. This increases the Interaction Cost—the physical and mental effort required to complete a task.

In order to make some information not like title it is given different format title such as put them in a box.

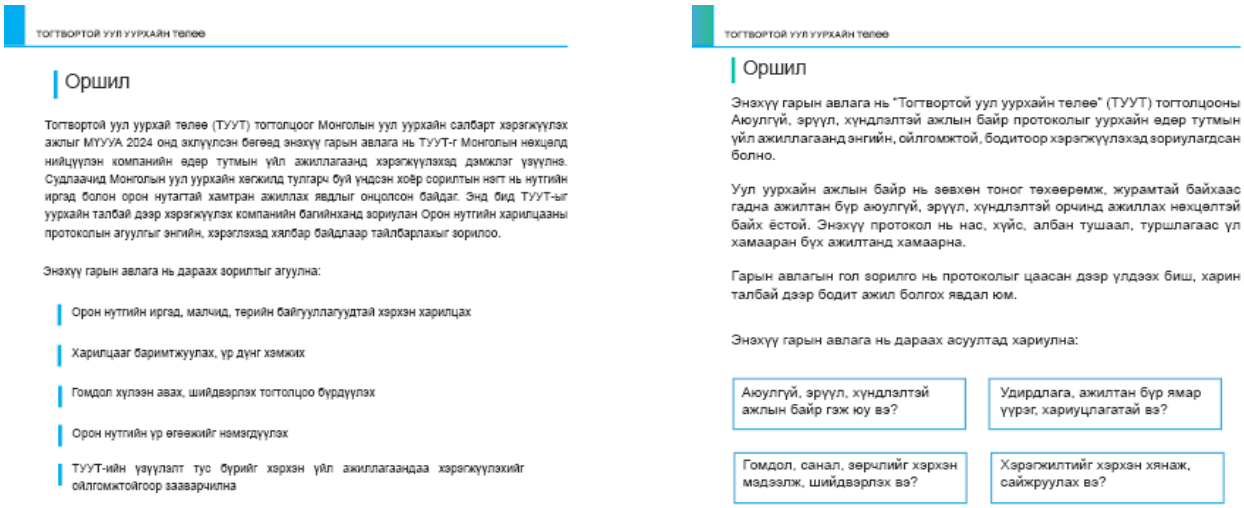


*Figure 6.4. Comparison of before and after it is given different format*

## 6.5. User-Specific Perception (Multi-Actor Alignment)

**Finding:** Significant divergence in priorities between the Industrial Factory group and the Central Building group.

**Analytical Interpretation:**

**Factory Group (Cluster A):** Prioritized Physical Ergonomics and High-Contrast Legibility due to the harsh environmental conditions of the Ore Processing Plant.

**Management Group (Cluster B):** Prioritized Standardization (APA/AFA standards, Respondent 17) and Formal Typography (Times New Roman), viewing the handbook as a legal and administrative "Protocol" rather than a field guide.

## 6.6. Critical Design Filtration: Scope and Theoretical Alignment

While the co-design process yielded numerous constructive suggestions, certain participant requests were excluded from the final iteration to maintain alignment with the Literature Review and the established Research Scope.

**1. Rejection of Times New Roman (Typographic Consistency)**

**Participant Feedback:** Several respondents (IDs 14, 29) requested Times New Roman due to its familiarity in administrative reports.

**Design Rationale for Exclusion:**

**Theory vs. Habit:** The Literature Review (Section 2.4) emphasizes Cognitive Ergonomics in high-stress environments. While Times New Roman is a standard for academic papers, its high "stroke-contrast" and fine serifs can lead to "character blurring" in the low-light or vibrating environments of an industrial mine site.

**Modern Interface Standards:** To maintain the "System Visibility" and modern professional identity of the TSM protocol, a Humanist Sans-Serif or a low-contrast slab-serif was retained. These typefaces offer better "legibility at a glance" and maintain a consistent Visual Language that differentiates the handbook from a standard government memo.

**2. Exclusion of QR Codes (Technical Infrastructure Scope)**

**Participant Feedback:** A suggestion was made to move detailed technical data to a digital platform accessible via QR codes (ID 13).

**Design Rationale for Exclusion:**

**Out of Scope:** The primary objective of this thesis is the Physical and Cognitive Design of the printed handbook. Developing a backend digital infrastructure, cloud hosting for documents, and ensuring site-wide internet connectivity at remote Mongolian mine sites falls under Information Systems (IS) architecture, which is outside the current scope of this Industrial Design study.

**Environmental Reliability:** In many remote operational zones (The "Field"), reliable high-speed internet is not guaranteed. Relying on QR codes would create a Functional Barrier, where the user cannot access critical TSM protocols due to connectivity issues, thus violating the principle of Interaction Reliability.

**3. Exclusion of Specialized Standards (AFA/APA)**

**Participant Feedback:** A request was made to follow specific accounting or administrative standards (e.g., AFA) for the entire layout (ID 17).

**Design Rationale for Exclusion:**

Hierarchy of Information: While TSM involves financial and administrative reporting, the handbook's primary role is an Implementation Guide. Adhering strictly to a rigid administrative document standard would compromise the Visual Hierarchy and "Chunking" required for an instructional manual. The design maintains professional "seriousness" while prioritizing User-Task Flow over rigid administrative formatting.

# Chapter 7: Conclusion

The transition of the Mongolian mining sector toward the Towards Sustainable Mining (TSM) protocol represents more than a regulatory shift; it is a profound communication and implementation challenge. This research set out to bridge the "Readiness Gap" identified by the UNDP [7] by transforming a complex international protocol into a high-utility, human-centered industrial tool. Through the application of Industrial Design (ID) and Cognitive Ergonomics, this study has demonstrated that the physical and visual architecture of a handbook is fundamental to its professional adoption and operational success.

## 7.1. Synthesis of Research Findings

The iterative design process, validated by 29 stakeholders at Erdenet Mining Corp, revealed that industrial users do not perceive design as a decorative luxury but as a functional necessity. The primary findings of this research confirm that:

- Cognitive Load Management is Critical: The evolution from the "Alpha" concept to the "Verified Beta" iteration addressed significant barriers in Visual Hierarchy. By implementing the Müller-Brockmann Grid System [3], the design successfully reduced "Interaction Cost," allowing users to navigate dense technical protocols with higher speed and lower mental fatigue.

- Chromatic Semantics Influence Performance: The research proved that the initial dark blue dominance created "visual monotony" and increased cognitive fatigue. Shifting to an "Eco-Green" palette not only improved the Aesthetic-Usability Effect [4] but also aligned the handbook's "Visual Language" with the global and local semantics of environmental sustainability.

- Functional Framing Solves Ambiguity: The use of Graphic Containers and "boxed" information resolved the "Title Confusion" identified by users. By applying Gestalt's Principle of Enclosure, secondary metadata (objectives) was successfully separated from primary navigation (titles), creating a clear, intuitive reading path.

## 7.2. Theoretical and Practical Contributions

This thesis contributes to the field of Human-Centered Design (HCD) by applying its principles specifically ISO 9241-210 [1] to a highly specialized industrial context in Mongolia. By critically filtering user feedback, this research maintained academic rigor notably rejecting familiar but ergonomically inferior suggestions like *Times New Roman* in favor of typefaces with higher legibility for industrial environments. This ensures that the handbook remains a theoretically sound interface that prioritizes System Visibility and Mapping [8] over administrative habits.

## 7.3. Future Outlook and Implementation

The final version of the TSM Handbook stands as a verified prototype, ready for broad dissemination across the Mongolian mining industry. While the physical and cognitive design is now optimized, the study acknowledges that design is an ongoing loop. Future iterations may expand the scope into Information Systems (IS) to address the digital infrastructure required for QR-integrated reporting, provided the local technical readiness allows for it.

In final analysis, this research proves that when complex sustainability protocols are designed with the user's "Mental Model" in mind, the barrier to implementation is lowered. By transforming a "Document" into an "Industrial Interface," we have created a tool that empowers the Mongolian mining workforce to meet international sustainability standards with clarity, efficiency, and professional pride.

The transformation of the TSM Handbook from a traditional "Document" into a high-performance "Industrial Interface" marks a pivotal shift in how sustainability protocols are managed within the Mongolian mining sector. This research has demonstrated that a document is a passive repository of information, often ignored due to its high interaction cost, whereas an interface is a functional bridge designed to facilitate specific task execution. By treating the handbook as an interface, this study addressed the "Usability Gap" that often exists between high-level policy and ground-level execution, ensuring that the Towards Sustainable Mining protocol "speaks" the language of the operator and the engineer rather than just the auditor. Central to this success was the alignment of the handbook’s architecture with the user’s Mental Model. By reducing cognitive friction through the implementation of a strict Müller-Brockmann Grid System, the design facilitated frictionless navigation, allowing users to scan for information under high-stress conditions. The introduction of "Poka-Yoke" (error-proofing) design elements—such as boxed warnings and color-coded status indicators—served as a behavioral nudge, guiding the user toward correct reporting behavior before errors could manifest. This was empirically validated during the field study at Erdenet Mining Corp, where a high Acceptability Index was recorded. By utilizing a binary recording protocol where baseline success was noted as a "1," the study was able to calculate a quantitative measure of usability. This quantitative baseline allowed the research to pivot toward

Pain-Point Driven Analysis, focusing exclusively on constructive friction. By filtering out passive affirmations and concentrating on the 10% of critical design failures identified by the workforce, the handbook was "hardened" against the specific environmental and cognitive challenges of the Mongolian industrial context. Furthermore, the research maintained academic and ergonomic integrity by critically filtering user feedback against established design scholarship. The decision to retain a Humanist Sans-Serif (Arial) over the suggested Times New Roman was a deliberate choice to prioritize "at-a-glance" legibility and visual safety in low-light environments, moving away from administrative habits toward modern industrial standards. Similarly, while participants expressed interest in QR-integrated reporting, these were excluded from the immediate scope to ensure Interaction Reliability. In remote Mongolian operational zones where connectivity is inconsistent, a physical interface remains the most reliable foundation for sustainability data. As the study concludes, it acknowledges that industrial design is an ongoing, dynamic loop. The current version of the handbook serves as the necessary analog foundation; as technological readiness in Mongolia improves, the logical progression will be a transition into "Phygital" (Physical + Digital) interfaces. This future trajectory will allow the handbook to act as a trigger point for real-time reporting databases, provided the technical infrastructure supports such a shift. Ultimately, this research serves as a case study for Professional Empowerment. By providing the Mongolian mining workforce with a tool that is ergonomically optimized, aesthetically professional, and contextually relevant, the research fosters a culture of professional pride. The TSM Handbook is no longer merely a set of rules but a high-performance instrument. It empowers workers to meet international sustainability standards with clarity and efficiency, proving that when we design for the human at the center of the industry, excellence becomes a daily operational reality.

# Chapter: 8. References

[1] ISO 9241-210:2019. Ergonomics of human-system interaction, Part 210: Human-centered design for interactive systems.

[2] Lupton, E. (2010). Thinking with Type. Princeton Architectural Press.

[3] Müller-Brockmann, J. (1981). Grid Systems in Graphic Design. Niggli Verlag.

[4] Lidwell, W., Holden, K., & Butler, J. (2010). Universal Principles of Design. Rockport Publishers.

[5] NSW Centre for Education Statistics and Evaluation. (2017). Cognitive Load Theory.

[6] Medical College of Wisconsin. (2026). Cognitive Load Theory and Instructional Design.

[7] UNDP. (2015). Sustainability Readiness in the Extractive Sector.

[8] Norman, D. (2013). The Design of Everyday Things. Basic Books.

# Chapter: 9. Appendix

## 9.1. Interview results

| ID | # | Years | Field | Used Similar Guide | First Impression | Readability | Structure & Layout | Info Search | Color | Images | Improvements |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | | Engineering standardization | No | Noticed the cover image | Font sizes look inconsistent | 1 | If appendix names are added in the table, it would be good | 1 | It would be better if images had consistent colors | 1 |
| 2 | 10 | | Office work | No | Feels like I've seen it before | 1 | 1 | 1 | 1 | 1 | 1 |
| 3 | 23 | | Head of emergency medical department | No | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 4 | 30 | | Economics | No | From the outside, it feels like it should contain useful information | 1 | 1 | 1 | 1 | 1 | It feels like it would be better if it were thinner and easier to handle |
| 5 | 10 | | Building supervisor | Yes | Since it is detailed, it seems acceptable | The font being larger would be easier for people, but since my eyesight is good, it feels fine | 1 | 1 | 1 | 1 | 1 |
| 6 | 15 | | Geological exploration & mining exploitation | No | 1 | 1 | 1 | 1 | 1 | Images feel insufficient | The book size being slightly larger would be good |

| ID | # | Years | Field | Used Similar Guide | First Impression | Readability | Structure & Layout | Info Search | Color | Images | Improvements |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | 25 | | Trade union | No | 1 | 1 | 1 | 1 | 1 | 1 | The shape being smaller would be nice, and thicker paper would be better |
| 8 | 23 | | Geological exploration & extraction | No | 1 | The numbered implementation steps should have emphasized numbering, and the remaining title parts should be larger | 1 | 1 | Blue color feels lonely/overdominant | Icons separating complaints, usage, and interests were good; images should have captions; section-start pages feel empty | 1 |
| 9 | 20 | | Telemechanics engineer | Yes | 1 | 1 | 1 | 1 | Dark blue feels too dark | 1 | 1 |
| 10 | 1 | | Electrical | Yes | 1 | 1 | 1 | 1 | Dark blue color feels unsuitable | It would be better to add images on section-starting pages | 1 |
| 11 | 20 | | IT | Yes | 1 | 1 | 1 | 1 | 1 | Mongolian-related images with explanations would be good | 1 |
| 12 | 33 | | Economics | No | 1 | 1 | 1 | 1 | 1 | 1 | Slightly smaller size would be better |

| ID | # | Years | Field | Used Similar Guide | First Impression | Readability | Structure & Layout | Info Search | Color | Images | Improvements |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 13 | 8~9 | | Economics | Yes | 1 | 1 | 1 | 1 | 1 | Images are not related to the topic; instead of icons, numbers for the 5 criteria would be better | First make a short brochure, then provide detailed info via QR code |
| 14 | 21 | | Processing production | No | 1 | Would prefer Times New Roman | 1 | 1 | Dark color could be changed to eco green | 1 | 1 |
| 15 | 19 | | Chemical engineer / environmental department | Yes | 1 | 1 | 1 | 1 | A unique darker color is better | If images do not provide information, they do not need to be large | Smooth/glossy paper would be good |
| 16 | 2~3 | | Mongolian Mining Association | Yes | Simple | 1 | 1 | 1 | 1 | 1 | 1 |
| 17 | 13 | | Environment | Yes | 1 | Font is small | 1 | 1 | White on blue is hard to see; green color is good | Pay attention to image selection | Should follow AFA standard |
| 18 | 19 | | Economics | Yes | 1 | 1 | 1 | 1 | White on dark background is hard to read | Rural images under "local" feel out of place; better to show people + modern technology; cultural images feel appropriate | 1 |
| 19 | 18 | | Water engineer | Yes | 1 | 1 | 1 | 1 | Colors are too few | 1 | 1 |

| ID | # | Years | Field | Used Similar Guide | First Impression | Readability | Structure & Layout | Info Search | Color | Images | Improvements |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 | 7 | | Environment | Yes | 1 | 1 | 1 | 1 | Green + blue would be better | Images should be above titles | 1 |
| 21 | 10 | | Economics | Yes | Feels more like a magazine than a handbook | Uncompressed font looks better | 1 | 1 | 1 | Add index; too many visuals are overwhelming Images feel inappropriate | 1 |
| 22 | 10 | | Researcher (from Energy Resource) | Yes | 1 | 1 | On page 1, objectives look like titles; page 6 titles should be bold; page 7 needs a bottom title; page 13 titles should be smaller; steps should be at the top | 1 | Blue boxes are mostly good at bottom and for interesting facts, but unnecessary on pages 9,12,15,34 | Add image at end of page 17; ending page image of sunrise is good | 1 |
| 23 | 16 | | Environment | No | Okay | 1 | 1 | 1 | 1 | More colorful images would be good | 1 |
| 24 | 3 | | Media | Yes | Pleasant | 1 | Add subheadings under titles | 1 | 1 | It would be good to specify color codes separately | 1 |

| ID | # | Years | Field | Used Similar Guide | First Impression | Readability | Structure & Layout | Info Search | Color | Images | Improvements |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 25 | 41 | | Energy department | Yes | 1 | 1 | 1 | 1 | 1 | Images need improvement | 1 |
| 26 | 24 | | Safety hub | Yes | 1 | 1 | 1 | 1 | Should use TSM site colors | Images should match titles | 1 |
| 27 | 8 | | Land cadastre specialist | Yes | Need to pay attention to font | 1 | 1 | 1 | 1 | Restoration image should be replaced | 1 |
| 28 | 13 | | Mechanical maintenance supervisor | Yes | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 29 | 22 | | HSE | No | 1 | Times New Roman is good; writing "PROTOCOL" in uppercase would be good; fix paragraph indentation | 1 | 1 | Replace dark blue with green | 1 | 1 |