HCI 2026: Midsem Design Activity

Human–Computer Interaction

Department of Computer Science and Engineering

Usability Evaluation and HCI-Based Redesign of BSNL Telecom Portal

Application Domain: Any Online Cell Phone Subscription App

Portal: https://bsnl.co.in/en

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Contents

1. Domain Analysis: Mobile Subscription Applications

1.1. What Are These Applications?

Mobile subscription applications (such as My BSNL, Airtel Thanks, or MyJio) serve as a **Digital Service Gateway**. Their primary purpose is to bridge the gap between the complex infrastructure of a Telecom Service Provider and the end-user.

1.2. Core Applications of a Mobile Subscription Portal

(Applying the Pareto Principle)

According to the **Pareto Principle (80–20 rule)**, most users primarily use the portal for a small number of high-frequency tasks across services.

1.2.1. Primary (High-Frequency) Applications — Top 20%

1. Recharge / Plan Renewal (Mobile Prepaid)
2. Bill Payment (Postpaid & Broadband/Fiber)
3. Check Usage & Validity (Data, Calls, WiFi usage)
4. View / Upgrade Plans (Mobile & Fiber)
5. Service Requests (Internet not working / Network issues)

These tasks cover both mobile and broadband users and should be prominently displayed on the homepage.

1.2.2. Secondary (Low-Frequency) Applications

- New WiFi / Fiber connection booking
- SIM activation / KYC updates
- Profile management
- Value-added services
- Address change
- Customer care chat

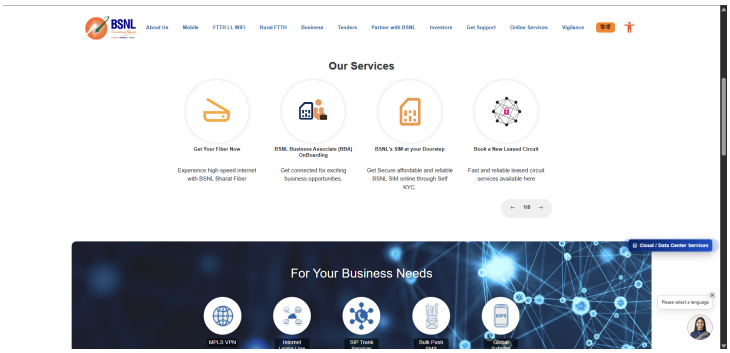
These can be grouped under "More Services" to reduce clutter.

1.3. Objective of the Redesign

The current BSNL web interface suffers from *"Legacy Debt"*—a term for systems that have grown cluttered over decades without a cohesive user experience strategy. The primary objective of this redesign is to transition the portal from a **document-heavy repository** to a **task-oriented service hub**.

2. Above-the-Fold Design Issues (Homepage Analysis)

Since most user attention is concentrated above the fold, high-priority content must appear in this region. However, the current homepage fails to optimize this space effectively.



Current BSNL homepage

2.1. No Prominent Account/Login Section

Violation: Mental Models, Consistency (Nielsen's Heuristics)

Users expect login access at the top-right. Its absence reduces usability for returning customers.

2.2. Poor User Segmentation

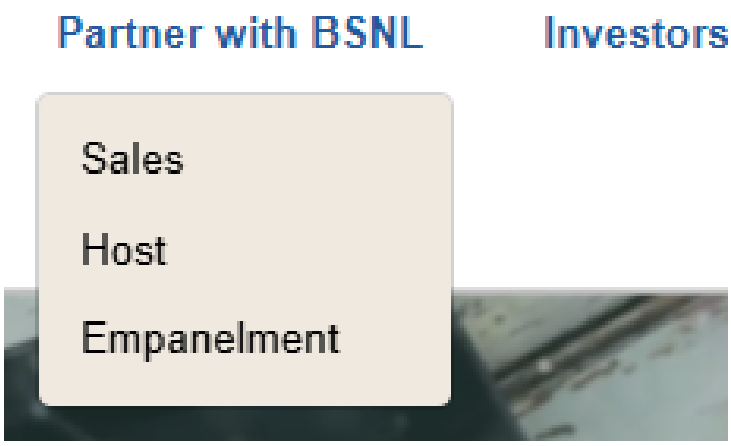
Violation: Hick–Hyman Law

Individual, Business, and Investor services are not clearly separated, increasing decision time and cognitive load.

2.3. Cluttered Information Structure

Violations:

- **Shneiderman's Rule:** Poor hierarchy forces users to process and remember multiple sections at once.
- **Visibility of System Status (Nielsen):** Interactive elements lack clear indicators (no arrows or button cues), making it unclear what is clickable.



2.4. Improper Navigation Order

Violation: Serial Position Effect, Pareto Principle

High-usage services are not prioritized in the top navigation.

2.5. No Search Option

Violation: Mental Model, Flexibility and Efficiency (Nielsen's Heuristics)

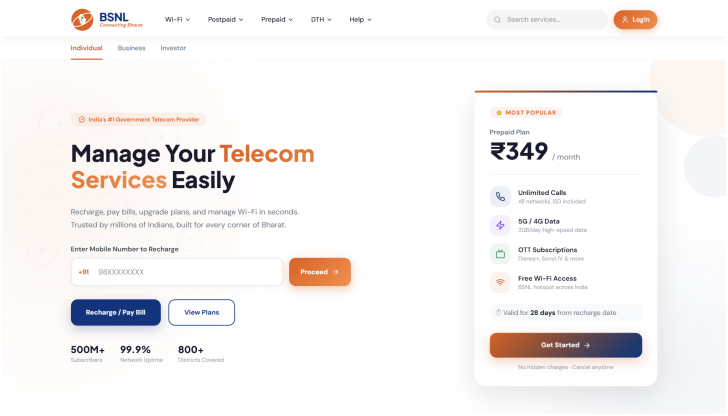
Lack of search reduces efficiency for experienced users. Many users are accustomed to search-driven navigation from prior experiences.

2.6. Irrelevant Hero Banner Content

Violation: Pareto Principle, Serial Position Effect, Aesthetic & Minimalist Design

The most visible area promotes non-core initiatives (e.g., social schemes) instead of high-frequency tasks like recharge and bill payment.

3. Proposed Above-the-Fold Redesign



3.1. Structured User Segmentation (Individual, Business, Investor)

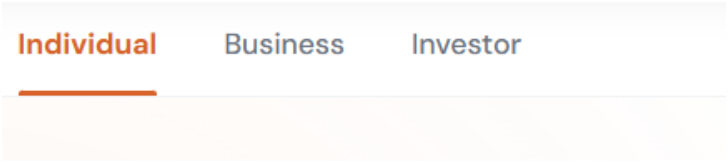
A clearly visible top-level segmentation bar is introduced with three tabs:

- **Individual** (default)
- **Business**
- **Investor**

HCI Justification:

- **Hick–Hyman Law:** Reduces decision complexity by filtering services based on user type.
- **Recognition over Recall:** Users immediately identify their category.
- **Mental Models:** Follows industry-standard telecom layout patterns.

This ensures that viewers only see relevant information, reducing context overloading.



3.2. Reordered Primary Navigation (Priority-Based)

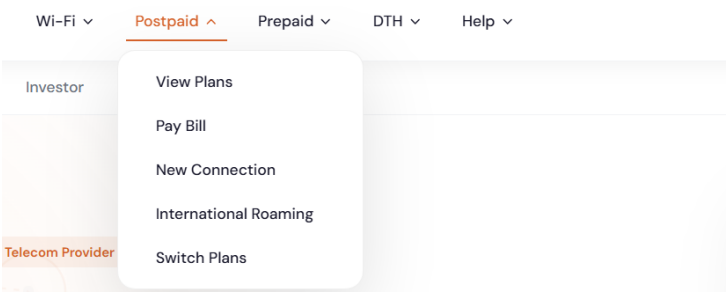
The main navigation is reorganized according to usage frequency:

Wi-Fi | Postpaid | Prepaid | DTH | Help

HCI Justification:

- **Pareto Principle (80/20):** High-frequency services are prioritized.
- **Serial Position Effect:** Important options are placed at the beginning.
- **Jakob's Law:** Matches common telecom website structures.

Dropdown arrows are added to indicate expandable menus, improving affordance and discoverability.



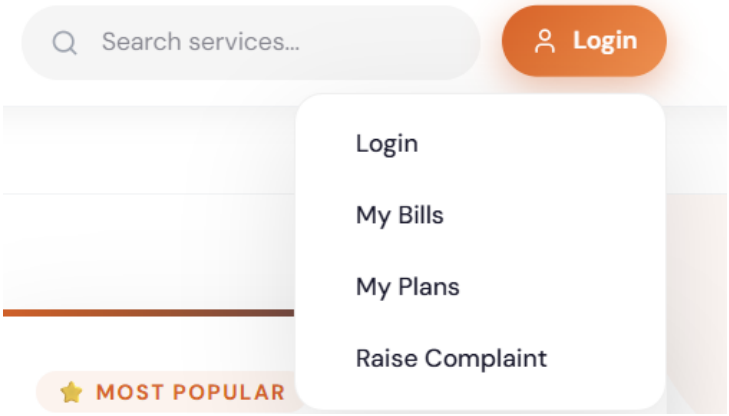
3.3. Prominent Account & Search Section

A clearly visible Search bar and Account/Login icon are placed at the top-right corner. The account dropdown includes:

- Login
- My Bills
- My Plans
- Raise Complaint

HCI Justification:

- **Mental Models:** Users expect login access at top-right.
- **Flexibility & Efficiency (Nielsen):** Search enables faster navigation.
- **Visibility Principle:** Important controls are immediately visible.



3.4. Task-Focused Hero Section

The redesigned hero section replaces cluttered banners with a focused **Action Center** placed on the left, aligning with natural F-Pattern scanning behavior.

Design Layout

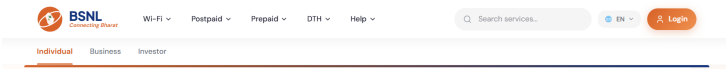
- **Left Column (Primary):** Clear headline with "Recharge Now" and "Pay Bill" buttons.
- **Right Column (Secondary):** A single clean "Trending Plan" card (e.g., Fiber 100 Mbps).

HCI Principles Applied:

- **Primacy Effect:** Primary actions placed on the left for maximum visibility.
- **Pareto Principle (80/20):** Focus on Recharge and Billing as core tasks.
- **Fitts's Law:** Large CTA buttons reduce click effort.
- **Hick's Law:** Limited choices reduce decision time.
- **Aesthetic & Minimalist Design:** Removes clutter to improve focus.

Clear Visual Hierarchy & Affordances

- Limited color palette
- Proper spacing and grouping
- Rounded buttons with shadows
- Clear dropdown indicators
- No auto-rotating banner carousel



4. Deeper Usability Gaps

4.1. Weak Visual Hierarchy in "Popular Plans"

Although recommended plans are present, there is no strong visual differentiation such as a "Most Popular" badge, "Best Value" highlight, contrast emphasis, or sorting by relevance.

HCI Violations:

- **Serial Position Effect:** No plan is visually prioritized.
- **Pareto Principle:** High-demand plans are not made dominant.
- **Zipf's Law:** Frequently chosen plans are not emphasized.
- **Visual Hierarchy Principle:** All cards look equally important.

Users must manually compare plans, increasing cognitive load.

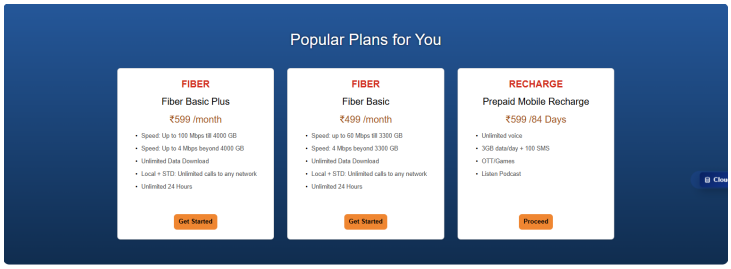
4.2. Poor Progressive Disclosure

Plan cards display full technical details immediately instead of summarizing key benefits first.

HCI Violations:

- **Shneiderman:** Reduce Short-Term Memory Load.
- **Tesler's Law:** Complexity is exposed instead of being layered.

- **Recognition over Recall:** Key highlights are not isolated.

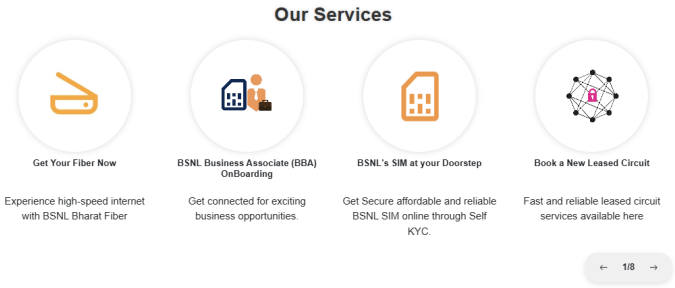


4.3. Vague Service Icons (Our Services Section)

The icons in the "Our Services" section are unclear and do not instantly communicate their purpose. Not all main services are shown at first glance. For example, the router icon is not easily recognizable as a Wi-Fi service, forcing users to read the label.

HCI Violations:

- **Skeuomorphism / Mental Models:** Icons do not resemble familiar real-world objects, reducing instant recognition.
- **Recognition Rather Than Recall (Nielsen):** Users must read text instead of understanding through visuals.
- **Affordance (Norman):** Service blocks do not clearly appear clickable (no hover cues or CTA).
- **Visibility Principle:** Lack of visual feedback reduces discoverability.
- **Pareto Principle (80/20):** Important services are not shown in the first glance without navigating through arrow buttons.



4.4. No Smart Personalization

Even though "Recommended Plans" exist, they are static and not tailored to user behavior.

HCI Violations:

- **Flexibility (Customizability):** The system does not adapt to user preferences or usage patterns.
- **Zipf's Law (Principle of Least Effort):** Frequently chosen or most relevant plans are not automatically highlighted, forcing users to compare manually.
- **2nd Law of Interaction (Don't Waste User Time):** Users must search and filter plans themselves instead of being guided intelligently.

4.5. Footer Exists but Lacks Strategic Grouping

Although links are available, they are not structured based on user intent or frequency.

HCI Violations:

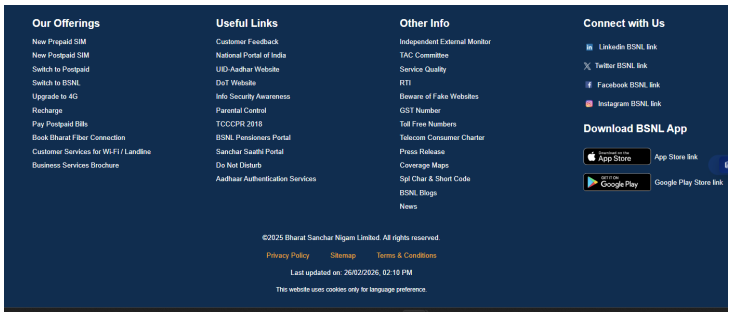
- **Chunking Principle (7±2 Rule):** Too many links without logical grouping increase memory load.
- **Recognition Rather Than Recall:** Users must scan and interpret long lists instead of recognizing clearly categorized sections.
- **Flexibility (Substitutivity):** Alternative navigation paths are not optimized to help users quickly reach common tasks.

4.6. No "Back to Top" Navigation

There is no quick way to return to the top after scrolling.

HCI Violations:

- **Fitts's Law:** Users must scroll a long distance, increasing effort and interaction time.
- **Efficiency (Usability Attribute):** Extra physical interaction reduces task speed.
- **User Control & Freedom (Nielsen):** Users lack a simple escape mechanism to navigate quickly.



5. Proposed Solutions for Redesign

5.1. Strengthen Visual Hierarchy in "Popular Plans"

- Add visual badges such as "Most Popular", "Best Value", and "New"
- Highlight one recommended plan with contrast emphasis
- Allow sorting by Relevance (Default) instead of random ordering

HCI Alignment:

- **Serial Position Effect:** Key plan visually prioritized.
- **Pareto Principle:** High-demand plans made dominant.
- **Zipf's Law:** Frequently selected plans emphasized.

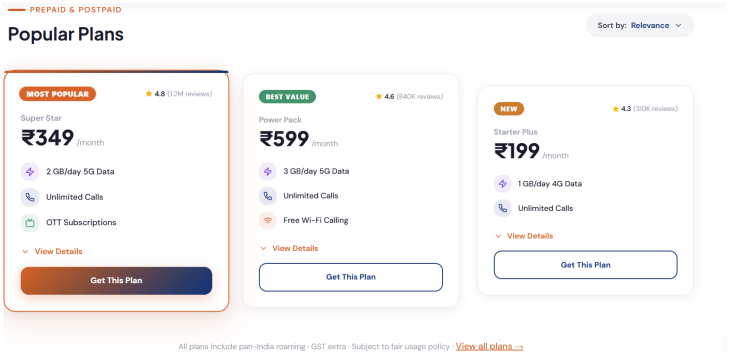
- **Visual Hierarchy:** Clear differentiation reduces comparison effort.

5.2. Apply Progressive Disclosure in Plan Cards

- Show only: Price, Speed/Data, 1–2 Key Benefits
- Add a "View Details" expandable section for technical specifications

HCI Alignment:

- **Shneiderman (Reduce Memory Load):** Minimizes visible complexity.
- **Tesler's Law:** Complexity layered, not exposed.
- **Recognition over Recall:** Key benefits highlighted clearly.

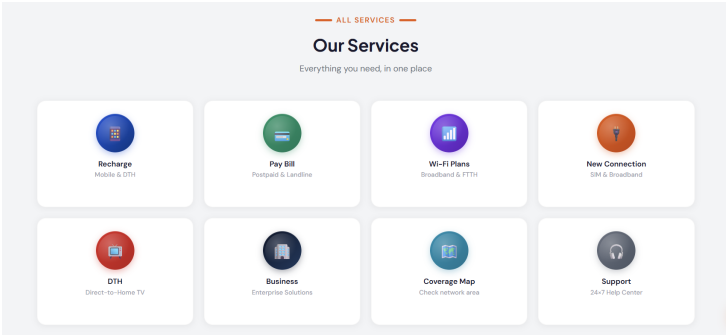


5.3. Redesign "Our Services" Section

- Replace vague icons with recognizable, semi-skeuomorphic icons
- Show Top 4–5 Most Used Services first (Recharge, Pay Bill, Wi-Fi, New Connection)
- Add hover effects and small CTA text like "Explore"

HCI Alignment:

- **Skeuomorphism:** Icons align with real-world mental models.
- **Recognition over Recall:** Users understand instantly.
- **Affordance:** Clear visual cues indicate clickability.
- **Pareto Principle:** High-usage services visible immediately.

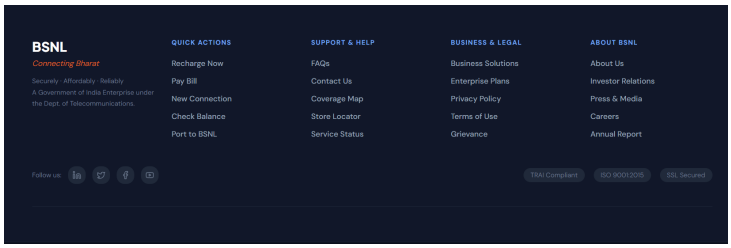


5.4. Restructure Footer with Strategic Grouping

Organize footer into clear chunks:

- **Quick Actions:** Recharge, Pay Bill, New Connection
- **Support & Help:** FAQs, Contact, Coverage, Store Locator
- **Business Solutions**
- **Legal & Policies**
- **About & Investor**

> **HCI Alignment:**
>
> - **Chunking Principle (7±2 Rule):** Reduced memory load.
> - **Recognition Rather Than Recall:** Logical grouping.
> - **Substitutivity (Flexibility):** Multiple paths to tasks.

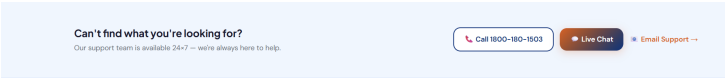


5.5. Add "Need Guidance? Contact Us" Section

Add a prominent support strip above the footer.

> **HCI Alignment:**
>
> - **User Control & Freedom:** Provides escape assistance.
> - **2nd Law of Interaction:** Reduces wasted effort.
> - **Robustness (Observability & Support):** Visible help channel.

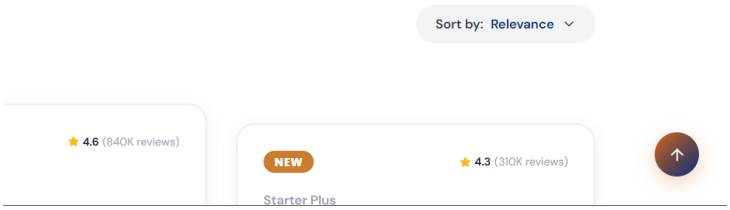
This ensures users who could not find their task above can directly seek assistance.



5.6. Add "Back to Top" Button

A floating button appears after scrolling 40% down.

> **HCI Alignment:**
>
> - **Fitts's Law:** Reduces movement effort.
> - **Efficiency:** Faster navigation.
> - **User Control & Freedom:** Easy return mechanism.



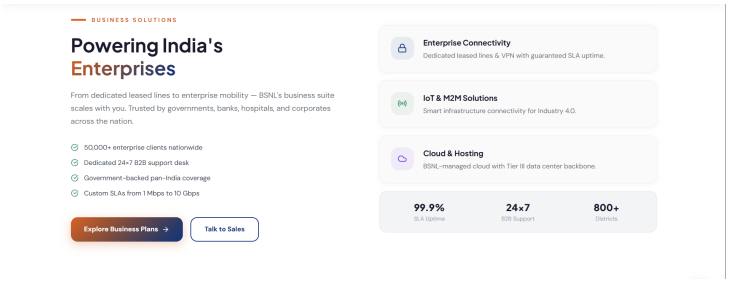
5.7. Reinforce "For Your Business" Section at Bottom

Even though user segmentation exists at the top, add a structured "For Your Business" section in the lower page.

HCI Alignment:

- **Jakob's Law:** Most telecom websites include Business links in footer.
- **Substitutivity:** Multiple entry points for enterprise users.
- **Recognition over Recall:** Users scrolling expect Business info at bottom.

This does not replace segmentation — it reinforces conventional navigation patterns.



6. Balance Between Tesler's Law and the Vital Few (Pareto Principle)

6.1. Simplifying the UI

High-frequency tasks such as Recharge, Pay Bill, and Wi-Fi Plans are prioritized. Visual clutter is reduced, plan details use progressive disclosure, and footer links are logically grouped. This lowers cognitive load and improves clarity.

6.2. Preserving Necessary Features

All services (Business, Investor, advanced plan details, support links) remain accessible but are structured more efficiently rather than removed.

6.3. Shifting Complexity to the System

Instead of users comparing everything manually, the system handles:

- Plan recommendations
- Sorting and highlighting
- Logical grouping of links

Thus, complexity is managed by the system, not the user, creating a cleaner yet fully functional experience.

7. Conclusion

The redesigned BSNL homepage significantly improves usability by prioritizing high-frequency tasks such as Recharge, Bill Payment, and Wi-Fi services. By applying the **Pareto Principle**, the interface focuses on the vital few features that drive the majority of user interactions.

Learnability is enhanced through consistent navigation, clear segmentation (Individual, Business, Investor), recognizable icons, and progressive disclosure of information. Users can quickly understand how to navigate the system without excessive cognitive effort.

Cognitive load is reduced by eliminating clutter, strengthening visual hierarchy, grouping footer links logically, and shifting complexity from the user to the system in accordance with **Tesler's Law**.

Overall, the redesign improves task efficiency, reduces decision time, and creates a more intuitive, user-centered telecom portal while preserving full functionality.

GitHub Link: https://github.com/Sohanuu66/HCI_mid_design_activity