

## Problems (n = 20) Revealed through Heuristic Evaluation

| Problem Type            | Problem  | Violated Heuristics         | Average Severity Rating |      | Vending Machine |
|-------------------------|--|-----------------------------|-------------------------|------|-----------------|
| Interface Accessibility | There is no way to interact with the vending machine using voice commands.   | H7, H8                      | 3.68                    | 3.32 | V1,V2,V3        |
|                         | There is no touchscreen for product selection and other functionalities.   | H3, H4, H5, H7, H8, H9, H10 | 3.92                    |      | V3              |
|                         | The money insertion option is in a high position.  | H2, H4, H7, H8              | 3.61                    |      | V3              |
|                         | There is no place for inserting the coin to purchase the product.  | H7                          | 3.63                    |      | V3              |
|                         | The number pad for selecting products is not visible in the absence of light.  | H4, H8                      | 1.78                    |      | V3              |
| Transactional Design    | After inserting the money for a product, there is no way to retrieve that money if we don't want the product anymore.                        | H3, H4, H7                  | 3.88                    | 3.58 | V1, V2, V3      |
|                         | There is no place from where returned coins can be collected.  | H4, H8                      | 3.72                    |      | V3              |
|                         | The cash button on the interface is absent.  | H4                          | 3.42                    |      | V1              |
|                         | No option is available for online payment.   | H7                          | 3.6                     |      | V3              |
|                         | There is no appropriate instruction about the accepted type of banknote.   | H9                          | 3.32                    |      | V1, V3          |
| Instructional Layout    | There is no alert message while discarding the item from the cart.   | H4, H5                      | 3.23                    | 2.90 | V2              |
|                         | After selecting the product, there is no instruction for inserting the money.  | H1                          | 2.45                    |      | V1, V3          |
|                         | No notification is given while releasing the product.  | H1, H9                      | 2.20                    |      | V2, V3          |
|                         | The instructions for using this machine are very small.  | H2, H4, H7, H8              | 3.02                    |      | V3              |
|                         | No option is available to discard any item.  | H3                          | 3.48                    |      | V3              |
|                         | No option for selecting multiple items at once.  | H3                          | 2.48                    |      | V2, V3          |
|                         | Ambiguity exists in the guidance of product purchasing.  | H10                         | 3.45                    |      | V1,V2,V3        |
| Visibility and Clarity  | The coin collection is a little below. So sometimes it is not noticeable, and no message is provided on the screen while returning the coin. | H1, H4, H8                  | 3.18                    | 2.91 | V1, V2          |
|                         | No instructions are given on which way to swipe or even need to swipe, and the arrow of the push sign is not appropriate.                    | H4                          | 2.32                    |      | V1, V2          |
|                         | The display size is small and blurry.  | H2, H8                      | 3.23                    |      | V3              |

## Problems (n = 14) Revealed through Cognitive Walkthrough

| Steps/<br>Questions  | Vending<br>Machine | Findings            |  | Usability<br>Problem Type                         |
|--|--------------------|---------------------|--|---|
|  |                    | Yes/No              | Usability Problems<br>(Why responded as No?)   |   |
| Step #1: Select the desired item from the touchscreen interface. (Applicable for both Task-1 and Task-2) |                    |                     |  |   |
| Q1: Will the user select the desired item from the touchscreen interface?                                | V1 & V2            | Yes(67%)<br>No(33%) | 1) Products are not categorized.<br>2) Voice command is not available.                     | Interface Accessibility &<br>Instructional Layout |
|  | V3                 | Yes(0%)<br>No(100%) | 1) The touchscreen interface and voice commands are not available.                         | Interface Accessibility                           |
| Q2: Are the items on the touchscreen visible?  | V1 & V2            | Yes(100%)<br>No(0%) |  |   |
|  | V3                 | Yes(0%)<br>No(100%) | 1) Absence of a touchscreen interface.   | Interface Accessibility                           |
| Q3: Will the user understand that the item needs to be selected from the touchscreen interface?          | V1                 | Yes(67%)<br>No(33%) | 1) Absence of appropriate instruction for product selection.                               | Instructional Layout                              |
|  | V2                 | Yes(100%)<br>No(0%) |  |   |
|  | V3                 | Yes(0%)<br>No(100%) | 1) No interface to select items in a categorized way.                                      | Interface Accessibility                           |
| Q4: Will the user understand that the item has been selected?  | V1 & V2            | Yes(100%)<br>No(0%) |  |   |
|  | V3                 | Yes(0%)<br>No(100%) | 1) No way to notify about product selection due to the absence of a touchscreen interface. | Instructional Layout                              |
| Step #2: Choose the online payment method (Applicable for Task 1)  |                    |                     |  |   |
| Q1: Will the user choose the online payment method?  | V1 & V2            | Yes(100%)<br>No(0%) |  |   |
|  | V3                 | Yes(0%)<br>No(100%) | 1) Not mentioned whether online payment can be accomplished or not.                        | Transactional Design                              |
| Q2: Is the online payment method available?  | V1 & V2            | Yes(100%)<br>No(0%) |  |   |
|  | V3                 | Yes(0%)<br>No(100%) | 1) No clear icon is provided for online payment.   | Transactional Design                              |
| Q3: Will the user recognize that products can be purchased by online payment?                            | V1 & V2            | Yes(100%)<br>No(0%) |  |   |
|  | V3                 | Yes(0%)<br>No(100%) | 1) The vending machine does not offer an online payment method.                            | Transactional Design                              |
| Q4: Will the user understand that the online payment has been successful?                                | V1 & V2            | Yes(33%)<br>No(67%) | 1) No notification about payment confirmation.   | Transactional Design                              |
|  | V3                 | Yes(0%)<br>No(100%) | 1) Due to the absence of online payment methods, no notification is provided.              | Transactional Design                              |
| Step #2: Choose the cash payment method (Applicable for Task 2)  |                    |                     |  |   |
| Q1: Will the user choose the cash payment method?  | V1, V2 & V3        | Yes(100%)<br>No(0%) |  |   |
| Q2: Is the cash payment method available?  | V1, V2 & V3        | Yes(100%)<br>No(0%) |  |   |
| Q3: Will the user recognize that products can be purchased by cash payment?                              | V1 & V3            | Yes(33%)<br>No(67%) | 1) No notification about inserting the bank notes.   | Transactional Design                              |

|   |         |                     |   |                      |
|---|---------|---------------------|---|----------------------|
|   | V2      | Yes(100%)<br>No(0%) |   |                      |
| Q4: Will the user understand that the cash payment has been successful? | V1 & V2 | Yes(100%)<br>No(0%) |   |                      |
|   | V3      | Yes(0%)<br>No(100%) | 1) No way to understand the payment confirmation until the product is released. | Transactional Design |