

Usability Testing TEE
Physical Prototype

Physical Prototype Usability Testing Report

Evaluation of prototype performance with flower vendors in contextual scenarios

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Usability testing was conducted to evaluate the practicality, ease of use, and workflow compatibility of the proposed portable workstation in real-world flower vending contexts. A physical prototype was tested with flower vendors performing representative tasks such as sorting, mending, and garland-making. The objective was to assess how effectively the workstation integrates into existing work practices while identifying usability issues, behavioural patterns, and opportunities for refinement through observation, questionnaires, and System Usability Scale (SUS) evaluation.

Prototype Overview

The portable workstation prototype was developed as a physical model to evaluate ergonomic suitability, workflow integration, and usability in real-world flower vending contexts.

Observed Existing Work Conditions

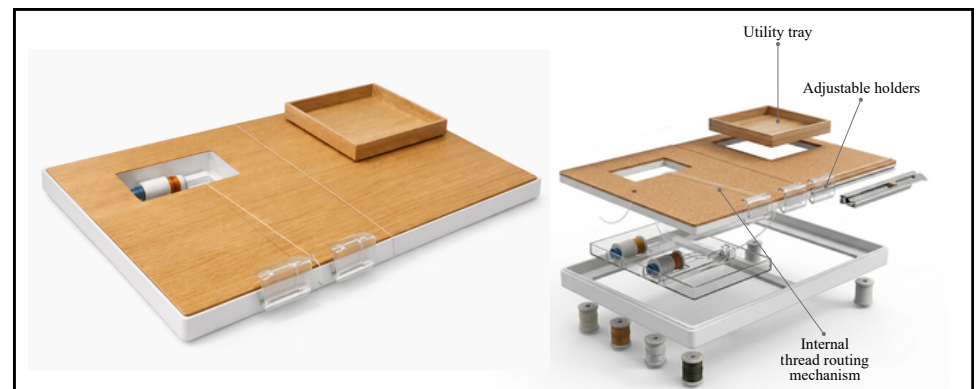
Field observations revealed recurring posture strain, improvised support mechanisms, and unstable working setups during flower sorting, mending, and garland-making tasks.



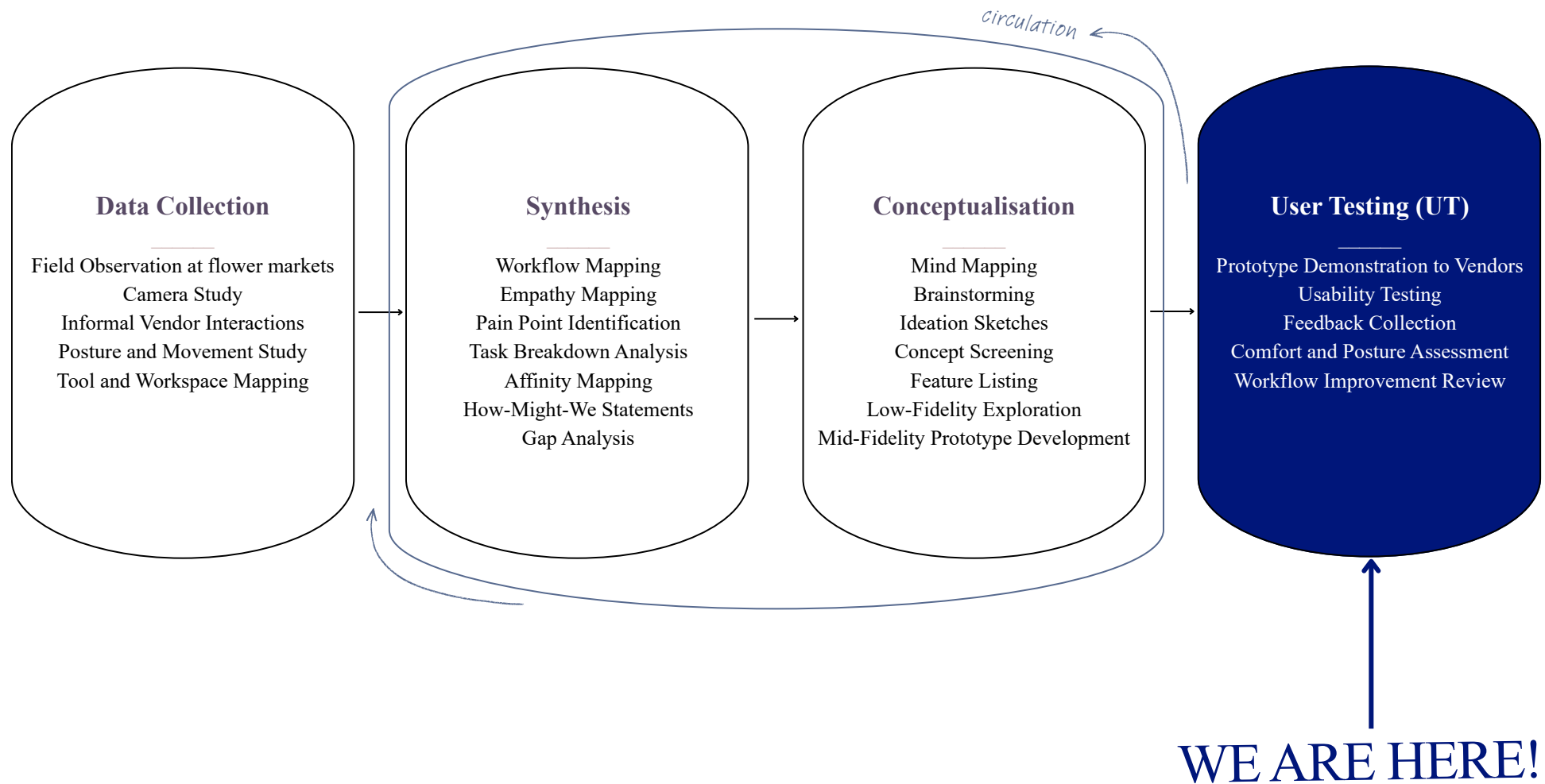
Observed Vendor Working Postures and Improvised Support Mechanisms

Prototype Design Translation

Insights from field observations were translated into a portable workstation concept that addresses posture support, workspace organisation, and workflow stability while maintaining familiarity with existing vendor practices.



Methodology



Participant Demographics

A total of **4 participants** took part in the usability testing sessions.

The sample included active flower vendors representing varied working conditions and vending formats to capture diverse workflow behaviors and ergonomic needs.

Age Distribution:

- **25-35 years:** 1 participant
- **35-45 years:** 2 participants
- **45-55 years:** 1 participant

This distribution helped include both experienced and relatively younger working vendors across different stages of practice.

Gender Distribution:

- **Women:** 3 participants
- **Men:** 1 participant

The participant pool reflects the female-dominant nature of flower vending and garland-making tasks observed during field research.

Vendor Type / Work Setting:

- **Market-based stationary vendors:**
2 participants
- **Mobile / Semi-mobile vendors:**
2 participants

Experience Level:

- **5-10 years of vending experience:**
1 participant
- **10+ years of vending experience:**
3 participants

Participants had substantial experience with traditional flower vending workflows, enabling informed feedback on workflow integration and usability.

Task

Participants were asked to use the prototype workstation while performing representative flower-vending tasks to simulate real working conditions. Each participant interacted with the workstation during sorting, mending, and basic garland-making activities, using their own tools and flowers where possible. The objective was to observe natural workflow adaptation, comfort levels, and interaction patterns while assessing how effectively the workstation integrated into existing practices.

Questionnaire Framework

Following task completion, participants responded to a structured questionnaire designed to evaluate the prototype across key usability and adoption parameters. The framework combined custom evaluative questions with the System Usability Scale (SUS) to gather both qualitative and quantitative feedback.

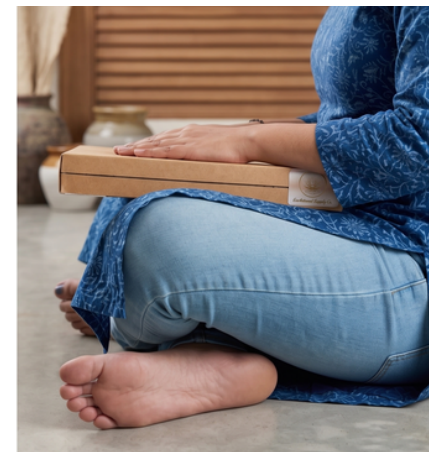
The questionnaire assessed the following dimensions:

- **Ease of Use:** Simplicity of understanding and operating the workstation
- **Comfort:** Perceived physical relief and posture improvement during use
- **Workflow Compatibility:** Alignment with existing flower-vending processes
- **Desirability:** Overall appeal and willingness to continue using the product
- **Adoption Intent:** Likelihood of integrating the workstation into daily practice
- **Perceived Value:** Usefulness relative to existing working methods
- **System Usability Scale (SUS):** Standardised usability benchmarking through 10 SUS items

Observational Analysis

During usability testing, participants interacted with the prototype in simulated flower-vending scenarios involving sorting, mending, and garland-making. Observations focused on posture, workflow adaptation, tool interaction, and workspace organization.

Participants were able to naturally integrate the workstation into their existing hand movements and task sequence with minimal guidance. The elevated working surface improved hand positioning and reduced the need to bend excessively during repetitive tasks. Users effectively utilised the utility tray and holders for temporary flower/tool placement, indicating improved organisation and reduced workspace clutter. However, minor adjustments in reach zones and holder placement were observed based on individual working styles, suggesting a need for greater modularity in component positioning.



User Journey Map

User Goal: To efficiently sort, mend, and create flower garlands with reduced physical strain, improved organisation, and smoother workflow in constrained market environments.

	PREPARING MATERIALS	SETTING UP WORKSPACE	SORTING / MENDING FLOWERS	GARLAND MAKING	STORING / SHIFTING SETUP
ACTIONS	Collects flowers, thread, needles, tools	Positions workstation on lap / basket / ground	Segregates flowers and removes damaged parts	Threads and assembles garlands using holders/supports	Packs materials and folds workstation after use
THOUGHTS	"I need everything within reach."	"Will this fit comfortably here?"	"This should make sorting easier."	"Can this support my hands while threading?"	"Hope this is easy to carry/store."
EMOTIONS	The emotional arc is a line graph showing the user's emotional state across the five stages. It starts with a 'Happy' emoji (😊) in the 'Preparing Materials' stage, dips to a 'Thinking' emoji (🤔) in the 'Setting Up Workspace' stage, rises to a 'Satisfied' emoji (😌) in the 'Sorting / Mending Flowers' stage, reaches a 'Happy' emoji (😊) in the 'Garland Making' stage, and peaks at a 'Very Happy' emoji (😄) in the 'Storing / Shifting Setup' stage. The background is divided into three horizontal bands: 'DELIGHTED' (dark blue) at the top, 'NEUTRAL' (medium blue) in the middle, and 'FRUSTRATED' (light blue) at the bottom. The line starts in the 'NEUTRAL' band, dips into the 'FRUSTRATED' band during setup, and then rises through the 'NEUTRAL' band into the 'DELIGHTED' band for the remainder of the process.				
PAIN POINTS	Materials often scattered / disorganised	Difficulty finding stable work surface	Repetitive bending and awkward wrist posture	Thread tangling / material slipping during work	Existing setups are bulky / inconvenient to pack
OPPORTUNITIES	Integrated storage for tools/materials	Multi-surface compatibility for flexible setup	Raised surface for posture support	Holders/thread routing to stabilise workflow	Foldable and portable design for transport

Design Issues

Ergonomics

- Some participants continued leaning forward during prolonged tasks despite raised platform support.
- Platform height did not equally suit all sitting postures and body types.
- Extended use revealed the need for improved wrist/forearm resting support.

Feature Usability

- Adjustable holders required minor familiarisation before effective use.
- Some users did not immediately understand optimal tray/holder placement.
- Thread outlet mechanism needed clearer guidance for first-time use.

Workspace Organisation

- Utility tray size was limiting for users handling larger flower quantities.
- Some participants desired more segmented storage for different materials/tools.
- Reach distance to accessories varied based on user posture and setup.

Stability & Portability

- Prototype stability varied slightly across different support surfaces (lap, stool, basket).
- Folding/locking mechanism could be improved for quicker deployment.
- Users expressed need for lighter construction for daily transport.

VIMM Model - Cognitive Loads

Visual

- Users quickly identified the main work surface and core functional areas of the prototype.
- Some participants required visual cues to understand holder placement and tray positioning.
- Thread outlet visibility was adequate but could benefit from stronger visual indication.

Intellectual

- Participants understood the prototype's intended workflow after brief demonstration.
- Initial interpretation of adjustable components required minor cognitive effort.
- Users mentally mapped the prototype to their existing working habits with ease.

Memory

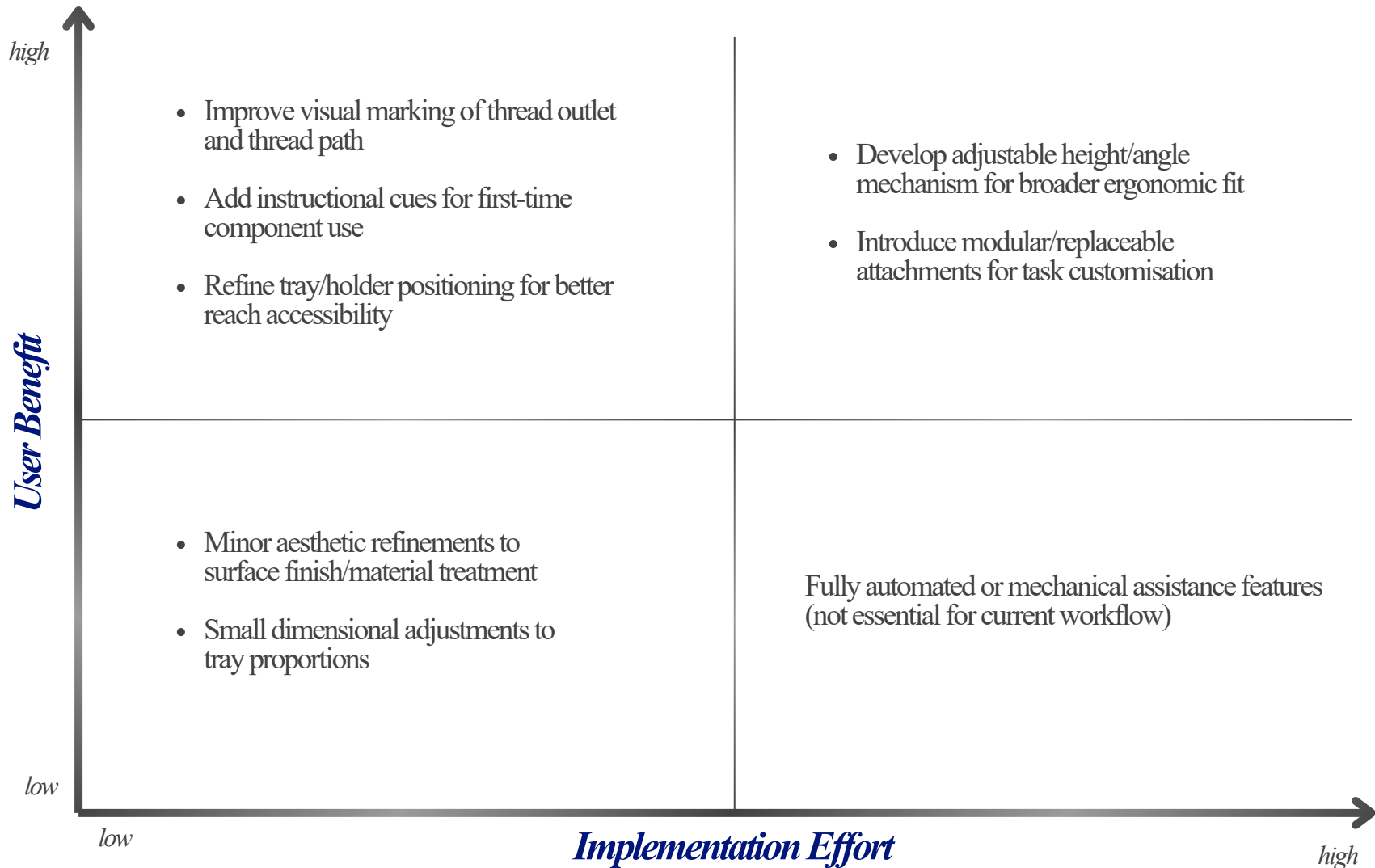
- Familiar task structure reduced learning burden during use.
- Users relied on prior flower-vending habits to adapt tool/material placement.
- Repeated use improved understanding of component arrangement and workflow integration.

Motor

- Prototype supported natural hand movements during sorting and garland-making tasks.
- Raised platform reduced excessive reaching and awkward wrist positioning.
- Some users adjusted sitting posture or repositioned the prototype to suit personal comfort.

Feasibility Matrix

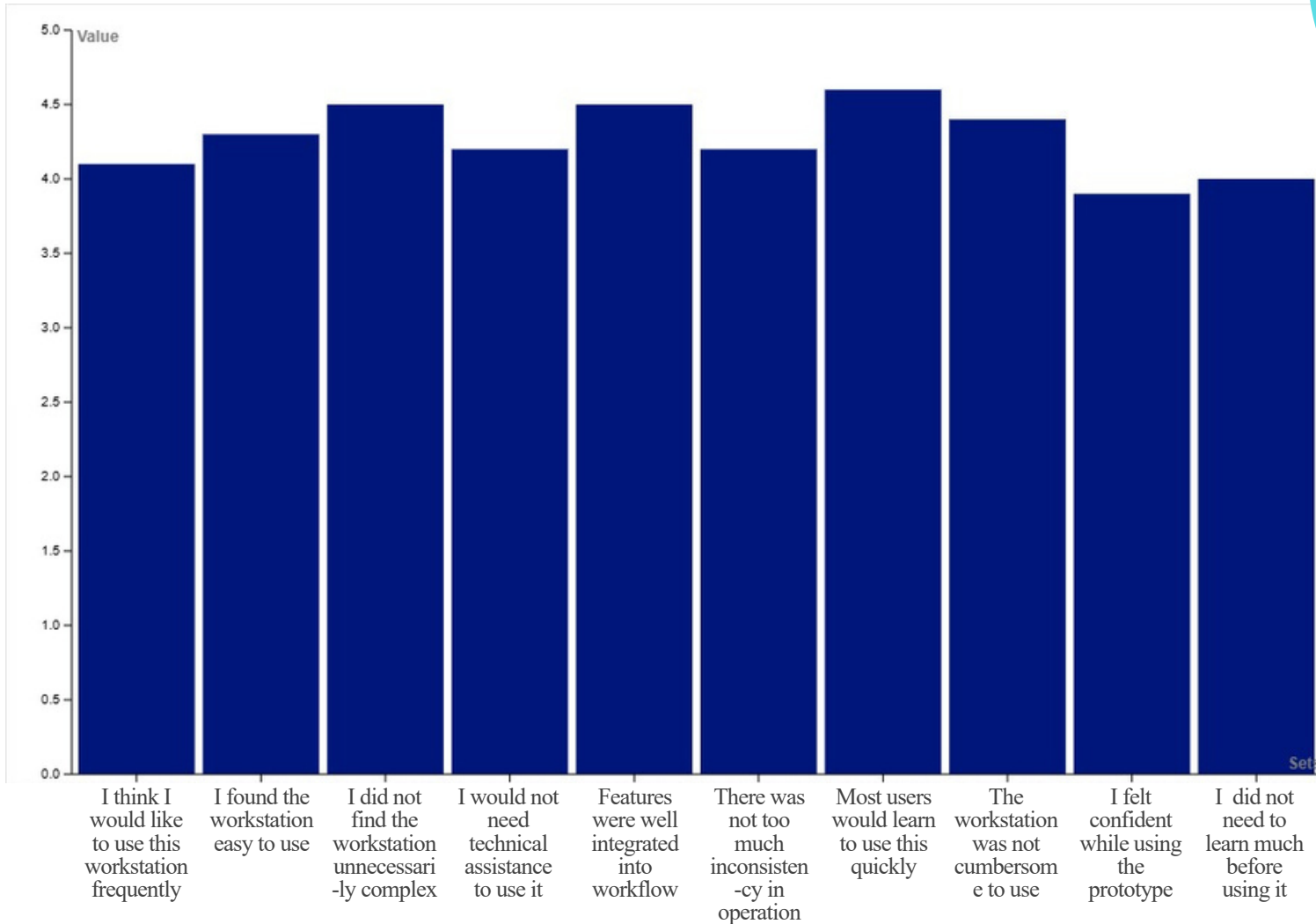
(User Benefit vs Implementation Effort)



Overall Impressions (Ratings)

Overall Mean
Usability Rating

4.27 / 5



Quantitative Findings

Quantitative analysis of questionnaire responses and observational scoring indicates generally positive user acceptance of the prototype across usability, comfort, and workflow integration parameters.

Metric	Result	Interpretation
SUS Score	89.4 / 100 (4.27 / 5)	Excellent usability; above average acceptance
Mean Ease-of-Use Rating	4.4 / 5	Users found the prototype intuitive to operate
Mean Comfort Improvement Rating	4.2 / 5	Participants reported noticeable posture/work comfort benefits
Mean Workflow Support Rating	4.5 / 5	Prototype integrated well into task process
Adoption Willingness	75%	Majority expressed willingness for regular use if manufactured
Task Success Rate	93.80%	Most participants completed tasks without assistance

Preference Rankings:

Feature	Average Rating (/5)	Rank
Adjustable Holders	4.6	1
Raised Work Surface	4.5	2
Utility Tray	4.3	3
Thread Routing Mechanism	4.1	4
Foldability / Portability	4	5

Summary Insight

The highest-rated aspects of the prototype were its support for repetitive hand-based work and improved material organisation. Participants particularly valued the adjustable holders and elevated working platform. Lower-rated aspects primarily related to learning curve and desired refinement in feature adjustability, suggesting strong foundational usability with scope for ergonomic and modular enhancements.

What Worked

- Prototype integrated smoothly into existing flower-vending workflow
- Raised platform improved working posture and reduced excessive bending
- Adjustable holders effectively assisted in stabilising flowers/garlands during tasks
- Utility tray improved organisation and accessibility of materials
- Users adapted to the prototype quickly with minimal instruction

What Did Not Work

- Prototype dimensions did not suit all body postures equally
- Some participants required time to understand holder/tray placement
- Thread routing mechanism needed stronger visual/functional cues
- Stability varied across different support surfaces
- Current prototype lacked structural refinement for prolonged real-world use

Next Steps

- Refine ergonomic dimensions based on posture observations
- Improve modularity/adjustability of holders and tray positioning
- Enhance thread outlet visibility and usability
- Develop higher-fidelity structural prototype with durable materials
- Conduct extended real-world field testing with larger participant sample

Thankyou.