

Design and Development of an Efficient and Cost-Effective Multi-Purpose Smart -Table

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Abstract: *The multi-purpose electrical portable smart table is a versatile and innovative piece of furniture designed to enhance convenience and productivity. The Portability and Compact Design makes table lightweight and foldable, making it easy to carry and store. Its compact form ensures it fits seamlessly into various spaces, from dorm rooms to home offices. It is equipped with built-in power outlets and USB ports, the table allows you to charge your devices conveniently. A touch-sensitive control panel lets you adjust the brightness of the integrated LED lamp or activate the wireless charging pad. The table syncs with your smartphone or tablet via Bluetooth, enabling seamless control of music playback, notifications, and even voice commands. Integrated speakers provide high-quality audio for conference calls, music, or podcasts.*

Index Terms— *Multi-purpose Table; Smart-Table; Portable Table*

I. INTRODUCTION

The agriculture sector stands at the threshold of a transformative era, where technological innovations hold the key to addressing longstanding challenges while fostering sustainable growth. Amidst this landscape, the quest for affordable yet efficient solutions has become imperative, particularly for small-scale farmers grappling with resource limitations. In response to this pressing need, this journal introduces a groundbreaking initiative aimed

at revolutionizing agricultural practices: the development of an affordable semi-automatic coconut harvester.

Coconuts, revered for their multifaceted utility and economic significance, serve as a staple crop for millions of farmers across tropical regions. However, the labor-intensive nature of coconut harvesting poses a significant barrier to productivity and profitability, hindering the sector's potential for growth. Recognizing this pivotal issue, our research endeavors to bridge the gap between traditional practices and modern advancements through the implementation of semi-automation in coconut harvesting.

II. LITERATURE REVIEW

1. Conceptualization and Development of Space-Saving Multipurpose Tables: Objective: The aim of this study was to design a space-saving multipurpose table that enhances ergonomic performance. Methodology: Features and functions were extracted from research articles and patents to generate concepts. The final concept was modeled using Autodesk Inventor Professional 2019. Mechanical simulations confirmed structural integrity before prototyping. Findings: Participants performed tasks 1.1–1.5 times faster with the proposed invention compared to single-function furniture. The proposed table occupied 25–80% less space than combining single-function furniture items. Space-saving effectiveness correlated significantly with ergonomic performance.

2. Multipurpose Table Lamp: Functional Improvement: Objective: To develop a multipurpose table lamp based on customer needs. Methodology: Knowledge from customers and expert consultations informed the design. Various product development tools were used to implement desired concepts.

Economic analysis justified feasibility for production. Features: Includes a clock, phone holder, charging port, aroma disk, pen holder, and built-in speaker.

3. Multifunctional Furniture for Small Spaces: Objective: Addressing space constraints, multifunctional furniture is a smart solution. Findings: Multifunctional furniture optimizes space utilization in small apartments. Designs that serve dual purposes are gaining popularity.

4. Smart Multi-Purpose Laptop Tables: Features: Foldable, portable, and lightweight. May include features like cup holders, USB ports, and speakers. Engineered wood or alloy steel construction. Benefits: Enhances usability and convenience. Ideal for work, study, or leisure activities. Space-saving and adaptable to various settings.

III. PROPOSED SOLUTION

A. Design Specifications:

Foldable Design: The table should be foldable for easy storage and portability. Users can collapse it when not in use, making it ideal for small spaces. **Adjustable Height:** Incorporate a mechanism to adjust the table's height. Users can adapt it for various activities like working, dining, or reading. **Electrical Outlets and USB Ports:** Integrate power outlets and USB charging ports into the table. Users can charge their devices conveniently without cluttering the space. **Wireless Charging Pad:** Embed a wireless charging pad on the tabletop. Users can place their smartphones or other compatible devices for hassle-free charging. **Built-in Bluetooth Speakers:** Install high-quality speakers within the table. Users can connect their devices via Bluetooth for music, conference calls, or virtual meetings. **LED Task Lighting:** Add an adjustable LED light strip under the table surface. Users can illuminate their workspace or create ambient lighting. **Storage Compartments:** Design hidden drawers or compartments for storing small items like pens, notebooks, or remote controls. **Smart Control Panel:** Include a touch-sensitive control panel on the side. Users can adjust lighting, volume, and other features with ease. **Heat-Resistant Surface:** Use a durable, heat-resistant material for the tabletop. Users can place hot cups or laptops without worry. Materials and

Aesthetics: Consider using sustainable materials like bamboo or engineered wood. Offer color options to match different interiors.

B. Integration of Sensor-Based Technologies: To enhance the functionality and performance of the Smart-Table technologies will be integrated into its design. These sensors, including Touch sensors will enable real-time data acquisition and analysis to facilitate accurate activations. Include a touch-sensitive control panel on the side. Users can adjust lighting, volume, and other features with ease. Embed a wireless charging pad on the tabletop. Users can place their smartphones or other compatible devices for hassle-free charging.

C. User-Centric Design and Training: Recruit a diverse group of users who represent the target audience. Include individuals with varying needs, preferences, and technical expertise. Use surveys, interviews, and observation to collect data. Record user feedback, pain points, and suggestions. Measure user satisfaction using standardized scales (e.g., System Usability Scale). Compare results with industry benchmarks.

D. Pilot Testing and Iterative Improvement: specific Usability: Can users easily adjust height, access ports, and interact with controls? Functionality: Test power outlets, USB charging, wireless charging, and speakers. Durability: Assess materials and construction. Ergonomics: Evaluate comfort during various activities (working, dining, reading). Aesthetics: Gather feedback on design and color options. Analyze the collected data: Identify strengths and weaknesses. Prioritize improvements based on user feedback. Iteratively refine the design: Address usability issues. Optimize features. Enhance aesthetics. Fix any technical glitches.

IV. RESULTS AND DISCUSSION

The usability survey analysis found that space-saving effectiveness strongly, positively and significantly correlated with ergonomic performance. This finding implied that as the space-saving attribute of the device improves, it is perceived to perform more ergonomically maintaining the flexibility of a space requires designs to deliver their functionality while

preserving abundant room for future change. Therefore, the space sustainability and multifunctionality aspects should be included for furniture and product design. Such designs would assist users in carrying out multiple activities effectively and simultaneously within limited spaces. The multi-purpose electrical portable smart table represents a harmonious blend of functionality, convenience, and modern design. Its foldable structure allows for easy storage and portability, making it ideal for compact living spaces. The adjustable height caters to diverse user needs, whether for work, dining, or leisure activities. The inclusion of electrical outlets, USB ports, and wireless charging pads ensures seamless connectivity and device charging. Built-in Bluetooth speakers enhance the overall experience, whether for music, conference calls, or virtual meetings. The LED task lighting provides focused illumination, while hidden storage compartments keep essentials organized. The efficiency of using the proposed invention was assessed. The results showed that the participants were able to perform tasks much faster with the proposed invention than with the single-function furniture. In principle, the time saved when using a certain product can be attributed to the product's usefulness as well. From the survey analyses, usefulness is one of the major aspects observed in ergonomic performance. This relation indicates that the foldable and multifunctional table is ergonomic in regard to usage time and can potentially simplify the user's work wherever applicable.

V.CONCLUSION

The aim of this study was to develop a space-saving multipurpose table for improved ergonomic performance. This aim was achieved by investigating variants of foldable and multifunctional tables through reviews of patents and scholarly literature.

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