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Design and Implementation of a Localized E-Commerce Platform for Home Appliances in Bantayan Island using Rapid Application Development (RAD)

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Abstract: The Bantayan Island Appliances E-Store was developed to address the growing demand for a localized digital marketplace within the unique geographical context of Bantayan Island. For years, residents and visitors faced significant logistical hurdles, often being forced to travel to mainland cities to procure household appliances, a process that was both time-consuming and financially burdensome due to high transportation costs and delivery risks. Recognizing this critical gap in the local supply chain, this study aimed to design and implement a web-based e-commerce platform specifically tailored for the island's community to bridge the gap between traditional retail and modern online shopping paradigms.

The development of the system followed the **Rapid Application Development (RAD)** model, a choice justified by the need for an iterative design process that could rapidly adjust to the evolving requirements of local stakeholders. This methodological approach ensured that the software remained user-centric through constant prototyping and feedback loops. Architecturally, the platform supports three distinct user roles: the **Administrator**, who oversees system security and seller verification; the **Seller**, who is empowered to manage digital inventory and generate automated sales reports; and the **Customer**, who can browse, compare, and order products through an intuitive interface.To ensure technical excellence and industry-standard performance, the system was rigorously evaluated using the **ISO/IEC 25010** software quality model and the **SQuaRE framework**. Results from the evaluation phase were highly positive, yielding an overall mean score of **4.67**, which corresponds to a verbal interpretation of **"Agree"** regarding its comprehensive usability and functional suitability. Notably, customer interaction features, such as the feedback and review modules, received an **"Excellent"** rating with a perfect mean of **5.0**, highlighting the system's effectiveness in fostering community trust.

Keywords: Bantayan Island, E-Commerce, Cash on Delivery (COD), Home Appliances, ISO/IEC 25010, Rapid Application Development (RAD), SQuaRE Quality Model.

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I. INTRODUCTION

The Bantayan Island Appliances E-Store was established as a strategic response to the pressing logistical demands for reliable and convenient access to household appliances on the island, where residents have traditionally struggled with the geographic isolation from major urban commercial centers. For many years, the community faced the significant inconvenience of traveling to mainland cities to procure essential home goods, a process that was not only time-consuming but also fraught with high transportation fees and frequent delivery delays [4]. This study recognizes the critical need for a localized "one-stop market" that leverages digital technology to bridge the gap between traditional physical retail and the modern digital economy. By providing a secure web-based platform, the project enables residents to browse, compare, and purchase high-quality appliances from the comfort of their homes, thereby enhancing the overall quality of life on the island. Utilizing the **Rapid Application Development (RAD)** model ensured that the system remained flexible and responsive to the specific needs of local sellers and buyers, allowing for an iterative design that prioritized user experience and functional suitability. Ultimately, this research seeks to foster a secure, localized ecosystem where local businesses can thrive digitally, and where the human connection between the seller and the customer remains intact despite the transition to a digital marketplace [11].

Objectives of the Study

The study aims to develop a localized E-Store that enables Bantayan Island residents to purchase appliances conveniently from their homes [12].

1. Design an **Admin Dashboard** for user verification and product management.
2. Implement **Reporting Tools** for daily and yearly sales tracking.
3. Provide **Seller Tools** for inventory uploading and automated invoice printing [5].
4. Enable **Customer Interactions** including account management and rating systems [6].
5. Validate the system against **ISO/IEC 25010:2011** quality standards [2].
6. Conduct **usability testing** guided by ISO/IEC 25010 to ensure usefulness, satisfaction, ease of use, and learnability[13][14].

II. METHODS

This study employed a **developmental research design**, defined as the systematic study of designing, developing, and evaluating products that meet criteria of internal consistency and effectiveness [13]. Following the framework established by **Seels and Richey (1994)**, the research focused on product development and the analysis of conditions that facilitate successful implementation [13].The project specifically utilized the **Rapid Application Development (RAD)** lifecycle to ensure flexibility and speed [7][8].

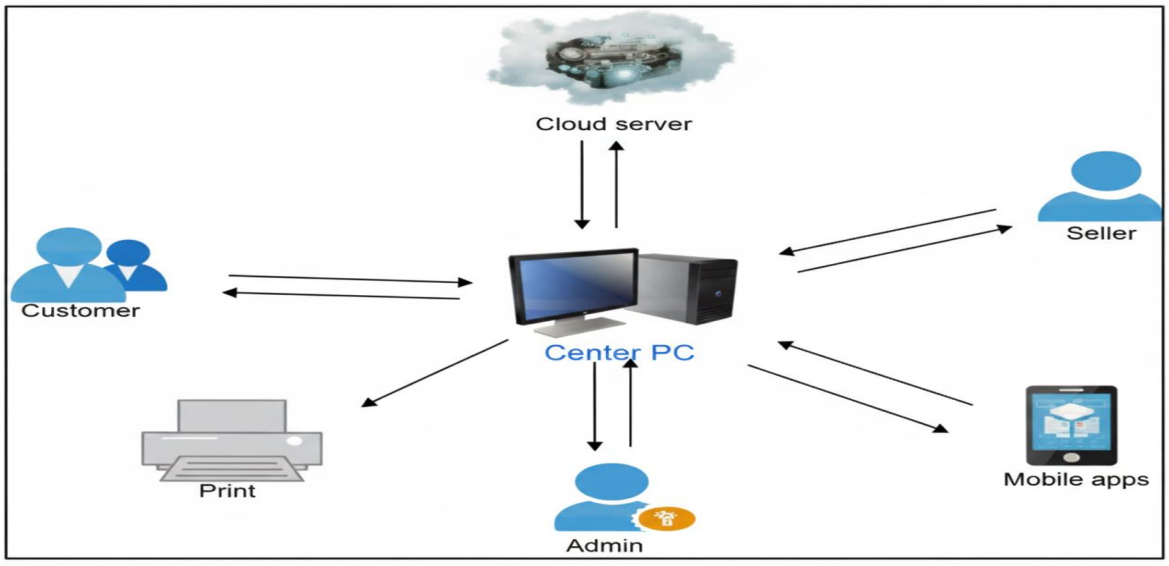

Figure 1.1 System Architecture

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Figure 1.1 shows The system architecture for the Bantayan Island Appliances E-Store is designed as a centralized, multi-user web ecosystem that bridges the logistical gap between local merchants and residents. At its core, the architecture follows a structured flow where the Web Server acts as the primary gateway, directing traffic based on three distinct permission levels: the Administrator, who manages system security and seller verification; the Seller, who utilizes automated tools for inventory and invoice generation; and the Customer, who interacts with a user-friendly storefront for browsing and ordering. This logic is supported by a robust Database Layer that tracks real-time inventory and sales metrics, enabling the "Reporting Tools" highlighted in the study to provide daily, monthly, and yearly analytics. By integrating specific modules for Cash on Delivery (COD) and a Feedback/Review System, the architecture successfully translates the Rapid Application Development (RAD) prototypes into a functional digital marketplace that maintains the trust and convenience necessary for a localized island economy.

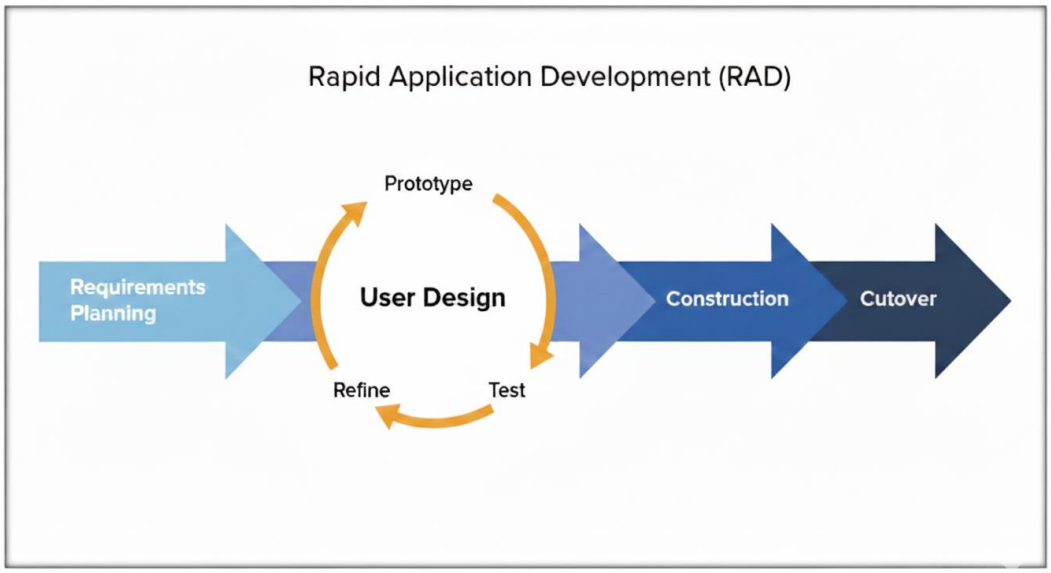

Figure 1. 2 Rapid Application Development Model

Figure 1.2 shows the **Rapid Application Development (RAD)** model is a high-speed software development methodology that begins with **Requirements Planning**, where developers and users define the project scope and system needs. This is followed by an iterative **User Design** phase, where a **Prototype** is built, **Tested** for functionality, and **Refined** based on direct user feedback to ensure the system meets requirements. Once the design is perfected, the process moves to **Construction** for the final development of the complete product, eventually leading to the **Cutover** phase, which involves data conversion, user training, and the final deployment of the system into production.

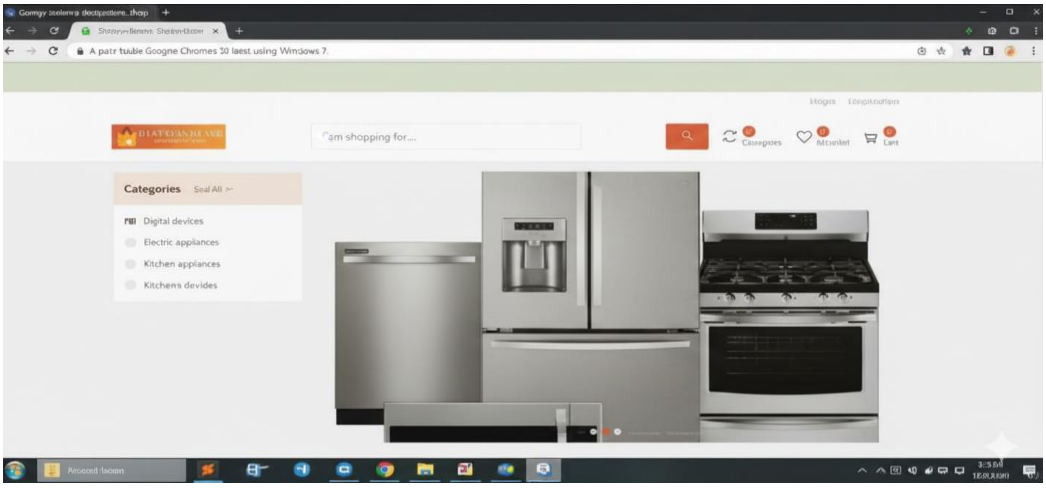

Figure 1.3 In terms of accessing our system online

Figure 1.3 above shows the Bantayan Island Appliances g-store the accessible system through online.

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III. RESULTS

The system evaluation yielded highly positive metrics:

- **Seller Efficiency:** Features for invoicing and reports scored a mean of **4.62** [5].
- **Customer Experience:** Account creation and ordering functions scored a mean of **4.7** [6].
- **System Quality:** Experts rated the software characteristics at **4.66** (Good) based on ISO 25010 [9].

Usability: The system achieved a mean score of **4.67** (Agree) [9].

TABLE I
In terms of providing an option for seller

Description	Mean	Verbal Interpretation
Register/Login	5.0	Very Satisfactory
Upload Products	5.0	Very Satisfactory
View Orders	4.66	Very Satisfactory
Print Invoice	5.0	Excellent
Sales report	4.91	Very Satisfactory
Average of the mean values	4.91	Very Satisfactory

Table 1 shows the outcome of register and log in, seller upload product, and also can view order details of the customer, and print invoice taken by the customer and the sales report. The table above the overall mean, 4.62 is considered to be very satisfactory.

TABLE III
In terms of displaying the admin dashboard

Description	Mean	Verbal Interpretation
View Customer List	5.00	Excellent
Available Appliances	5.00	Excellent
Create, View, Add, Delete and update products	4.80	Very Satisfactory
Sales Reports	4.30	Very Satisfactory
View All Orders	4.60	Very Satisfactory
TOTAL	4.74	Very Satisfactory

Table 2 displays the outcome of viewing customer list and seller store list as well as viewing available appliances products. It gives administrators the option to create, viewing, adding and delete information as well as daily, weekly, monthly, yearly and viewing all orders details. The table above the overall mean, considered to be very satisfactory.

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TABLE IIIII
In terms of the characteristics set in the ISO 25010 Software Quality Model

Description	Mean	Verbal Interpretation
Functional Suitability	4.60	Very Satisfactory
Performance Efficiency	5.60	Excellent
Compatibility	4.70	Very Satisfactory
Reliability	4.70	Very Satisfactory
Security	4.70	Excellent
Average of the Total Mean	4.66	Very Satisfactory

Table 3 shows the result the IT experts feedback's evaluation, using the ISO 25010 Software quality model. It received a mean score of 4.66 for Functional Suitability, Performance Efficiency, and Compatibility, which considered to be Good verbal interpretation. It received a means rating of 4.66 for Reliability and security, which is considered to be a verbal interpretation of Good.

IV. DISCUSSION

The results indicate that the E-Store effectively bridges the geographical gap for Bantayan residents. The high satisfaction score (4.8) for "Usefulness" suggests that a localized e-commerce model is more effective than general national platforms for island-specific logistics [3]. This aligns with global research suggesting that tailored product cards increase customer trust [7]. However, the system's current limitation to **Cash on Delivery (COD)** and the requirement for a stable internet connection highlights a digital divide that remains a challenge for remote areas [8].

V. CONCLUSIONS

The Bantayan Island Appliances E-Store is a dependable tool that streamlines the local appliance market. It successfully provides a running dashboard for real-time inventory and sales tracking, which was previously unavailable to local merchants [11]. The researchers conclude that the platform is a vital innovation for the community, improving time management for customers and operational efficiency for sellers.

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