

“Rolance” A Web-Based Platform Connecting Local Printing Shops with Customers for Customized Print Solutions

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Abstract— This paper introduces Rolance, a web-based marketplace platform that bridges the gap between local printing shops and customers, enabling personalized and cost-effective print-on-demand services. Unlike global platforms that prioritize local printing shops to provide their services to mass customer base locally. Rolance integrates local businesses, reducing shipping costs and delivery times while supporting small-scale entrepreneurs. Another specialty is there are two options to customer as sell their own design publicly through is platform or use their designs to personal scenarios. So, there is an opportunity for customers to earn extra income by selling their designs online. If customers need to print their design for their personal purpose, users can directly connect with local printing shops and place order online. This system has three types of user roles those are admin, customer and shop owner. As an extra feature there is a design canvas that allows us to make designs though the platform while collaborating with others by giving permissions to join the designing process for selected users. Each role has a separate dashboard with role specific set of operations. System testing was done by using Google lighthouse, Semgrap, Trivy, user feedback and manually testing through test case report to ensure system met required performances, security strands and system functional requirements and objectives. The final deployed system successfully met all system objectives while ensuring system useability, scalability, maintainability and performance.

Keywords— Print on demand, E-commerce, local printing shops, custom merchandise, Digital entrepreneurship

I. INTRODUCTION

The print on demand (POD) model has revolutionized the personalized product industry by elimination the need for inventory and enabling product customization upon order. Existing platforms like Redbubble and Printful offer global access but often overlook local market needs and design privacy, leading to high delivery cost and limited usability for personal or small-scale users.

This paper presents Rolance, a localized pod web solution developed using modern web technologies such as React with Next js, Node js, Tailwind and PostgreSQL. This platform empowers customers to connect directly with

nearby printing shops and supports features such as public/private design option, real time design collaboration and flexible order placement. It aims to offer a consumer centric new on demand ecosystem focus on community driven production and helps to growth of local economies by helping small businesses.

II. LITERATURE REVIEW

A. Existing platforms and Services

Printful is leading platform in print on demand United States companies established in 2013 globally and some of the not available to all countries.it makes a connection between artists and online store owners and customers and mainly focused on drops hoping methods by integration with multiple e-commerce platforms like Shopify, WooCommerce, and Amazon which allows to allow sellers to sync their other platforms with Pointful [4]. next specialty is providing tools such as mock up generators and allow customer to view their designs with different products such mish, phone cases and T-Shirts [4]. print provides mobile app to manage order through app. Redbubble is Australian global company that popular as Print on demand online platform since 2012.It is based on user gigs, mainly the poses is there two types of account s one for customers and another type for sellers. This system works as a service provides rather than a direct seller, it affects some legal problems such as copyright law under Australian law [2]. Next problem is this platform focused on global production it does not include private needs, local printing shops contribution moreover it does not have design visibility control options that means users cannot keep their designs private.

B. Print industry challenges

With the growth of digital marketing traditional print media such as books newspapers and magazines demment was getting decrease. Development of digital media platforms reduce the usage of traditional media printed materials. Peoples adaptative to those digital media because of those

rateability and cost effectiveness [10]. The lack of digital marketing knowledge slowdown their adaptability for the digital media. When the adaptation to digital media and information technology it makes need of skilled workers to the industry but many of existing employees does not have knowledge to work with modern technologies and software.

C. Future of e-commerce industry

In future e-commerce application provide more customization option for customers to give more personalize shopping experience through the platform by analysing customers behavior pattens and user preferences using advanced algorithms. with this concept the platform provides targeted advertising, location-based services and personalize product suggestions [9]. This also helps to improve customer user experience and high conversion rate for products with customer loyalty.

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III. MARKET RESEARCH

For the market research the researcher conducts a survey by using google forms and share for diverse groups to gather user required features, feedback about existing print on dement platforms and user behaviour pattens in platforms that helps to increase useability factors of the proposed project.

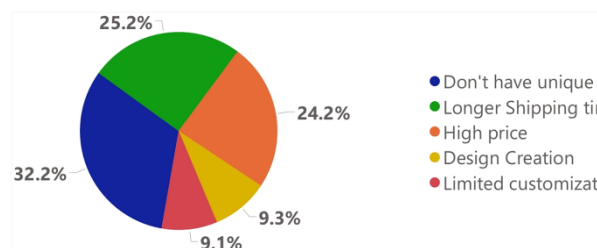


Fig. 1. Existing platforms problems competition

Fig. 1 pie chart shows problems of existing platforms according to user experiences.32% of user unique design problem of the platform. almost equal percentage shows for shows for long shopping time problem as 25% and high price as 24% problems. Moreover, design creation

and limited customization options shows almost shows equal percentage as 9%.so the researcher can conclude high price and longer shipping time and unique designs problems as major problems existing print on demand platforms.

IV. PROJECT DEVELOPMENT METHODOLOGY

in the development process the Rolance project fallows spiral methodology as a risk manageable and iterative method because of the complexity of development .the advantages of the use of spiral methodology in this project was it allows project risk mitigation, continuous refinements and scalable development that supports address to align project innovative scope and full fills user centred goals .according to this approach the entire project divided into four main Cycles those are Cycle 1: main features development, Cycle 2: shop listing and design visibility, Cycle 3: order management and Cycle 4: testing, deployment, and feedback.

V. SYSTEM DESIGN

The frontend implementation of the Rolanse print on demand web site provides user cantered design with responsive interfaces that enabled user authentication, design customization, shops browsing, designs browsing, role based dashboards, order management, that addresses the platform objectives of build seamless connection with local printing shops and customers .build with Next js , Tailwind CSS, React Konva, Shadcn UI, Framer motions and Lucide react The backend implantation of the Rolance print on demand web site power the platform data management process by API services, user authentication using java web tokens, external integrations, shop listing, order processing email notification using Nodemailer and design uploads that build with express, Prisma with neon database and uplordthing.

Fig. 2 shows Rolance system architecture diagram. The platform fallows client server architected design and standard web application designing principals to ensure modular, efficient and scalability of the connection between user and system. The mainly fallows 3 layers those are client-side server side and external services as illustrated

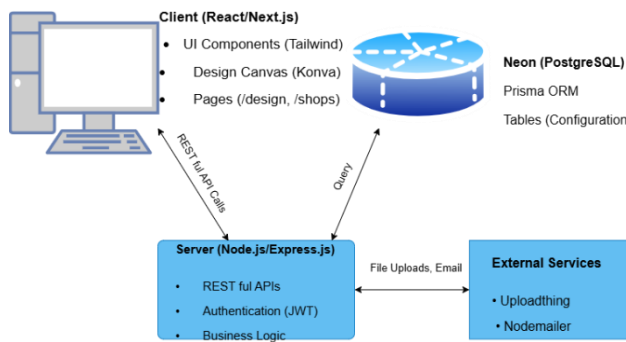


Fig. 2. Rolanse system architecture

Fig. 3 shows shop listing pages list downs all local printing shop of logged customs county after choose shop button in design previous page as next step of placing order peocesces.it features filterable list of shops from all registered shops in the system precent as cards with details like shop name shop rating and shop country with place order button. The design uses a grid layout for make page responsive that ensure accessibility across any devices

When we discus about functions of this page this page has filtering slider to filter shops by star rating by 0 to 5 .and users can give rating to selected shop by clicking star. The page only list down local shops of the logged customers country and it will show as text in header section of the page with country name. After user chose the shop, the customer can click places order button to send order details to shop owner to approval. This page address Rolanse goal of local shop integration with a clean and minimalist design that reduce cognitive load time.

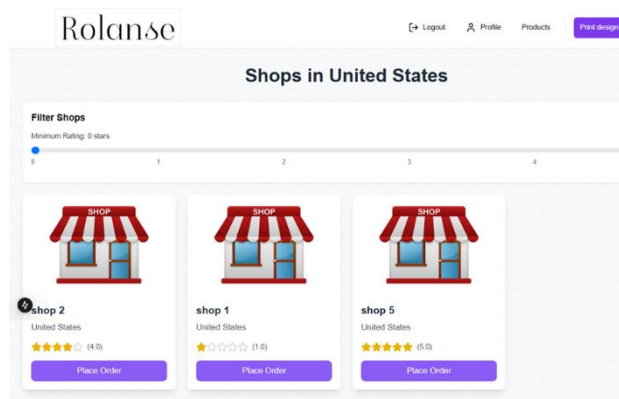


Fig. 3. Shop listing page

Fig. 4 shows the admin dashboard that can use to represent all role-based dashboards user interfaces that focused simple minimalistic design with user friendly workflow. when consider this dashboard it shows 4 main functionalities that can use only for system admin as grid

layout as cards with visual represents images that describes what this function about.

Shop management – this will list down all shops that allow to admin to view registered shops details such as username, shop name, Email address, contact number, country, address and joined date. The admin can have two action to manage shops those are edit shop details and delete shop by the system

Users’ management – this will list down all users that allow to admin to view registered users details such as username, Email address, country and joined date. The admin can have two action to manage users those are edit shop details and delete shop by the system

manage designs – this will list down all design that submitted by customers to sell publicly. Each design shows design title design description and design states with approve, reject view details and view configuration buttons. The design has three dynamic status those are pending approved and rejected. If admin approved the design the states changes to approved it will visible in product page also if admin reject the design the will changes to reject and design will remove form database .each states changes should notify the design owner by email.to make those decisions admin has another two buttons called view details button that allows to view design details like final product view, design title, description design tags and commission rate and view configuration button that allows to view design configuration details such as model name ,material ,finish method ,colour and design dimensions to get complete idea about the design before accept or reject that design.

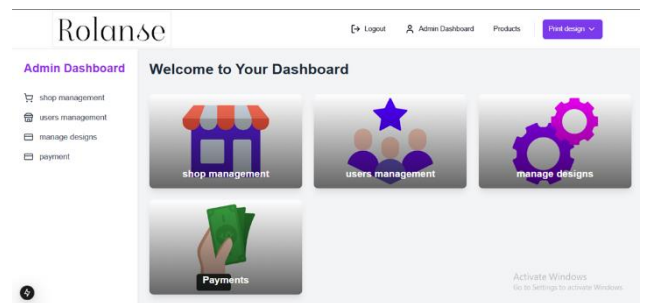


Fig. 4. Admin dashboard page

Fig. 5 shows the design canvas allows users to create personalize printable designs with real time preview. all the tools and options divided to five main section to improve usability first one is tools tab that provides four types of brushes, two Shapes, text tool, Erase, cut tool, Move tool Width slider and Opacity sider. Seconded one is colours tab that provides change stoke colour option, change background colour option, colour Gradient option and change shapes fill colour option. Third one is text tab that provides customer to add texts. Fourth one is action tab that contains all action buttons such as undo button, redo button, clear button, upload button, save new design button, export and save design buttons

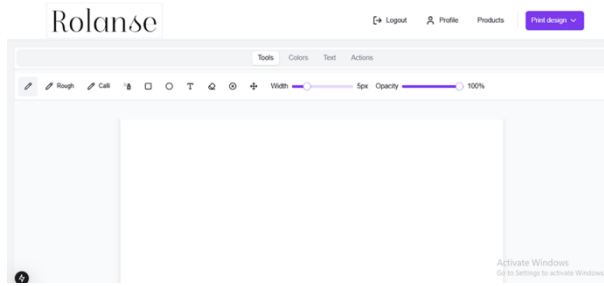


Fig. 5. The design canvas user interface

VI. TESTING AND EVALUATION

The testing process includes a combination of manual testing and automated testing by conducting unit testing, integration testing and system testing to refine individual functions and model behaviour. Additionally, user acceptance testing was conducted with a low sample size of 5 shop owners and 10 general customers to get an idea about system usability, clarity and business opportunities for both parties of the platform.

For the system performance testing conducted by Google Lighthouse as widely recommended standard tool used to test website performance and responsiveness across mobile and desktop devices.

The complete test case document was marketed to check all project manually and make a record that works as expected and identify any issues during the testing. Also, the full system was tested manually with cross browsers and mobile devices to ensure cross-platform compatibility and responsiveness.

Google Lighthouse test was performed to refine SEO score, site performance, accessibility and best practice through eight main site pages.

TABLE I
GOOGLE LIGHT HOUSE RESULTS SUMMARY TABLE

Page	Performance	Accessibility	Best Practices	SEO
Home page	99	94	96	100
Login page	100	96	100	100
Product page	87	87	100	100
Shops page	100	81	100	100
Design canvas page	100	81	100	100
Design configuration page	99	59	93	80
Upload page	100	82	100	91

The Semgrep is used as automated testing in a GitHub action that automatically triggers on every commit. It uses p/security-audit, p/xss, p/javascript, p/react, and p/typescript rules to find security vulnerabilities such as SQL injections, cross-site scripting and insecure React patterns.

The Trivy is used as automated testing in a GitHub action that automatically triggers on every commit. The scan tests the system files, Node.js dependencies and configuration files, and the found vulnerabilities are filtered as critical and high severity vulnerabilities. The scan result is exported as JSON format and results are shown in the README section.

During the general customer feedback session, all participants completed all tasks successfully and most of the customers gave positive feedback with some recommendations. These included adding more design tools, a shop rating system, a color picker box instead of using 3 color selectors in the design configuration page and adding more product categories.

During the general shop owner feedback session, all contributions completed all tasks successfully and as recommendations, shop owners asked for a defined discount and promo code method and shop owners defined price tags for each product and automated SMS notification for each new order.

VII. CONCLUSIONS

The development of the Rolanse print-on-demand platform has become a highly valuable experience that supports me to enhance my technical skills, critical thinking and project management skills. From project planning to implementation, I conducted market research, chose suitable technologies, overcame technical limitations and aligned project work with user needs and supervisor feedback.

The Rolanse platform successfully addresses limitations in current POD platforms by integrating local printing shops, enhancing design privacy and customization, and enabling user collaboration. This approach has motivated me with confidence and capability to develop scalable, useful digital solutions to support local businesses and serve the printing industry.

In summary, this project gives a strong starting point for fully functional digital solutions that support designers, the printing industry and customers looking for personalized merchandise. With future work and real-world implementation, this project can make meaningful contributions to the digital ecosystem.

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