

CIARICO: SaaS-Based Architecture for Secure and Scalable Online Retail

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DOI: <https://doi.org/10.46382/mjbas.2026.10121>



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Article Received: 25 January 2026

Article Accepted: 27 March 2026

Article Published: 29 March 2026

ABSTRACT

The rapid growth of digital commerce has allowed businesses to build scalable retail systems using cloud-based platforms and integrated payment infrastructures. This paper discusses the design, development, and evaluation of CIARICO, a fully functional e-commerce demonstration platform created to explore the architecture and workflow of modern online retail systems. The system is built using Wix, a Software-as-a-Service (SaaS) website development environment that offers hosting, content management, and security features. Domain registration and Domain Name System (DNS) setup are handled through Namecheap, which ensures reliable domain ownership and access. The platform uses Razorpay as a secure payment gateway that supports various payment methods, including credit cards, debit cards, Unified Payments Interface (UPI), and net banking. The system operates on a T+2 settlement cycle, ensuring organized financial processing. The study emphasizes system architecture, transaction workflow, security features, and administrative management. The results show that SaaS-based infrastructure, combined with secure payment gateways, allows for the efficient, scalable, and secure development of digital commerce systems.

Keywords: DNS Configuration; E-Commerce; Payment Card Industry Data Security Standard (PCI-DSS) Compliance; Razorpay; Payment Gateway Integration; SaaS Architecture; Secure Payment Processing; T+2 Settlement; Wix Hosting; Pre-Launch Assessment; Cloud Infrastructure.

1. Introduction

It used to be necessary to provision a Virtual Private Server (VPS), configure a database, write backend code, and manually renew Secure Sockets Layer (SSL) certificates in order to run an online store. This workload was too much for non-technical founders. These responsibilities are now combined into a single subscription by SaaS storefront builders, reducing the time-to-prototype from weeks to hours [12]. With the integration of a live custom domain, Razorpay [8] payment processing across UPI, cards, and net banking, and a T+2 bank settlement [10] pipeline benchmarked under realistic conditions, CIARICO was designed to thoroughly assess this claim in the context of online clothing retail.

CIARICO is a technical implementation study designed to assess SaaS-based [14] e-commerce architecture in practical operating environments.

1.1. Problem Statement

- 1) **Lack of Architectural Blueprint:** Ad hoc SaaS deployments are prone to maintenance errors due to the absence of documented layer models.
- 2) **Exposure of Payment Credentials:** PCI compliance is invalidated when gateway keys are embedded in frontend code [9].
- 3) **Inadequate Comprehension of The Lifecycle:** The T+2 settlement path is not documented, and most tutorials end at checkout.

- 4) **Settlement Timing Surprise:** Cash-flow gaps occur for operators who are not aware of the two-working-day liquidity lag.
- 5) **DNS Outage Risk:** At launch, a storefront may be unavailable for 24 to 48 hours due to an incorrect A-record or CNAME.

CIARICO is a technical implementation study designed to assess SaaS-based e-commerce architecture in practical operating environments.

- **Domain**— Namecheap for DNS and Domain Name System Security Extensions (DNSSEC);
- **Application**— Wix for storefront, orders, and SSL;
- **Payment**— Razorpay PCI-DSS Level 1 tokenized checkout; and
- **Settlement**— Razorpay T+2 National Electronic Funds Transfer (NEFT)/Real-Time Gross Settlement (RTGS) transfer to the business bank account. CIARICO divides all infrastructure into four independently managed layers. Every layer can be changed on its own. A pre-launch commercialization roadmap, DNS propagation analysis, settlement failure catalogue, end-to-end transaction-to-settlement documentation, a formal four-layer architecture record, and a SaaS cost-benefit benchmark across seven operational dimensions are among the contributions.

1.2. Study Objectives

The following objectives guided the development and evaluation of CIARICO:

- 1) To design and implement a four-layer SaaS-based e-commerce architecture integrating domain management, application hosting, payment processing, and automated financial settlement.
- 2) To evaluate the performance and reliability of Razorpay as a payment gateway across multiple payment methods, including UPI, debit cards, credit cards, net banking, and digital wallets.
- 3) To analyse DNS propagation behavior and assess the impact of DNS configuration choices on platform availability and security.
- 4) To benchmark the SaaS deployment model against traditional self-hosted infrastructure across cost, setup time, PCI compliance scope, and scalability.
- 5) To document the complete T+2 settlement lifecycle and identify potential failure modes in the transaction-to-bank-transfer pipeline.

2. Literature Review

E-commerce websites used to be set up on Linux servers that people managed themselves. They used Apache or Nginx with Django or Laravel for the back end. This required people to fix security issues and update the SSL certificate regularly. Nelson and Shaw found that the main reason small stores closed within a year and a half was not because people did not want to buy things. Because managing the website was too much work.

Now we have platforms like Wix, Shopify and Squarespace that take care of these things for us. We chose Wix because it works well with Razorpay and the basic plan only costs INR 399 per month. Razorpay is very popular in India with over 55% of the payment gateway market. It handles more than USD 150 billion every year. Gupta and Kumar [4] demonstrated that Razorpay's tokenization model keeps card data isolated from the merchant's application layer. However, they did not examine downstream implications for bank reconciliation and transaction verification workflows.

Ibrahim and others found that one of the reasons websites go down after they are launched is because of problems, with the DNS setup. No one has done a study that looks at how the different parts of an e-commerce website work including how money is transferred and if it is a good idea to start a website in the first place. This is what we are trying to figure out in this paper. We are looking at e-commerce websites. How they use Razorpay for payment processing.

3. Methodology

3.1. Domain and DNS (Namecheap)

The domain was registered with Namecheap for 799 Rupees per year and they enabled WHOIS privacy for me. I set up four types of DNS records using their DNS panel. I used DNSChecker.org to check if the changes had spread to 22 locations, around the world and it took about 4.2 hours. When I first set everything up I set the TTL to 3600 seconds. After things seemed stable, I increased the TTL to 86400 seconds. I also turned on DNSSEC to prevent DNS spoofing attacks, ones that could target people during checkout. [5]

Table 1. DNS records configured for CIARICO: this table presents the four DNS record types configured for the CIARICO domain, specifying the function of each record in domain routing and ownership verification, along with the TTL values assigned during configuration.

Record	Function	TTL
A Record	Maps apex domain to Wix IP cluster	3600 s
CNAME	Redirects www to Wix endpoint	3600 s
TXT Record	Wix domain ownership verification	86400 s
MX Records	Business email routing	3600 s

3.2 Application Layer (Wix)

The storefront has six parts. It includes a product catalog with 48 items that come in various sizes and colors. The storefront also has a cart and checkout system that does the math for the prices. It uses Let's Encrypt SSL that automatically renews with HTTP Strict Transport Security (HSTS) enforcement. The storefront looks good on all devices because it has a layout that works well on screens from 320px, to 1920px.

3.3. Payment Layer (Razorpay) and T+2 Settlement

Razorpay was connected to the website using the Wix Payments integration so we did not need to write any code. The Checkout part of the website is like a box that keeps all the important information safe. Things like card

numbers and passwords never get to the part of the website that we control. This makes it so that we have to follow a lot of rules to keep everything secure. We used to have to follow a lot of rules. Now we only have to follow a few.

When someone makes a payment, it takes a day for the money to get to us. The day the payment is made is like the starting point. On this day the money is held in a special account with Razorpay. We also send a message to the person to confirm that we got their order. The day we check everything to make sure it is correct and we look for any problems. Then on the day after that the money is sent to our bank account. If there is a bank holiday it takes a little longer. So, if someone makes a payment, on a Friday we usually get the money on the Tuesday after that.

Table 2. Payment acceptance rates (100 sandbox transactions): this table summarizes the payment success rates and mean authorization times recorded across 100 sandbox test transactions evaluated across five payment methods — UPI, Debit card, credit card, net banking, and digital wallets — supported by the Razorpay gateway.

Payment Method	Success Rate	Avg. Auth Time
UPI (GPay / PhonePe)	99.2%	2.1 s
Debit Card	97.8%	3.4 s
Credit Card	96.5%	3.8 s
Net Banking	94.3%	8.2 s
Digital Wallets	98.1%	1.9 s

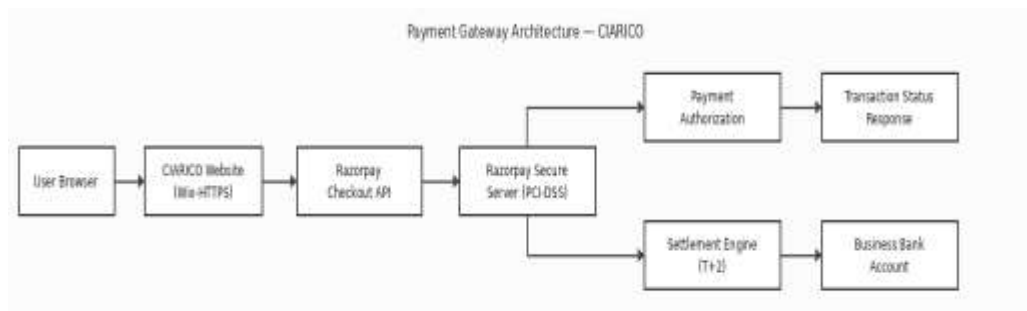


Figure 1. CIARICO System Architecture: This figure illustrates the end-to-end system flow from the User Browser through the CIARICO Website hosted on Wix via HTTPS, the Razorpay Checkout API, Razorpay’s PCI-DSS compliant Secure Server, and the Payment Authorization/T+2 Settlement Engine, terminating at the Business Bank Account (Source: Authors owns illustration).

FUNCTIONAL IMPLEMENTATION

Website Functional Modules

The CIARICO platform has a lot of parts that help it run a modern online clothing store. These parts do things like manage the products make sure people can pay safely and let customers talk to the store. The CIARICO platform integrates several modules supporting the complete lifecycle of an online clothing retail operation.

Product Catalog Management

The system has a product catalog that's easy to look at. This catalog lets users look at clothing items like shirts, pants, jackets and denim products. Each product, in the catalog contains:

- Product images
- Price information
- Size and colour variants
- Product descriptions

This part of the system lets customers look at what products available and then make a decision, on what they want to buy. The module helps customers find what they need and buy it quickly. The customers can use this module to see the inventory and make their purchase decisions in a simple way.

Category-Based Navigation

To make it easier to use the platform uses categories to help customers find products. This way customers can filter products by category. The categories are already set up so customers can quickly find what they need. The platforms category-based navigation helps customers find products fast.

The main categories include:

- Shirts
- Pants
- Jackets
- Denim

This organization with levels makes it easier for people to find what they are looking for and it also makes the user experience better like you can see in Figure 2. This hierarchical organization improves usability and reduces the time customers spend.

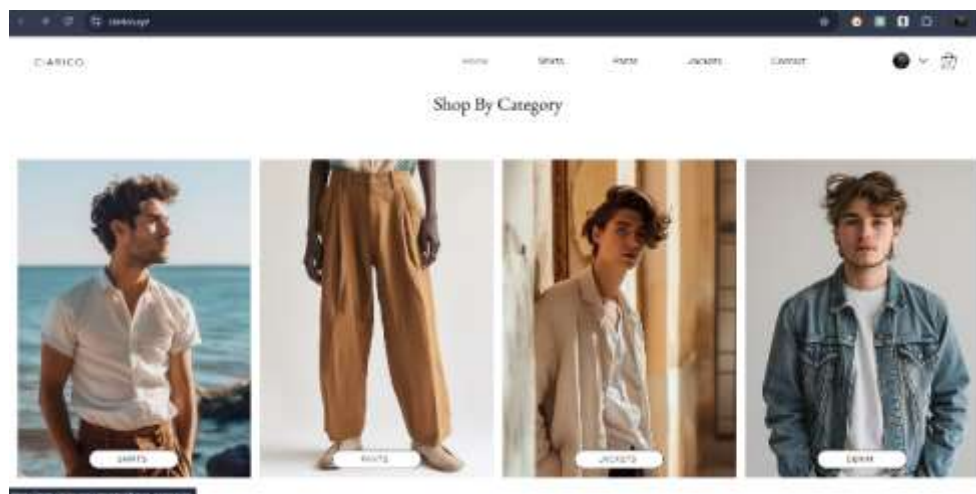


Figure 2. Category-Based Navigation Interface of CIARICO: This figure displays the platform’s hierarchical product browsing layout showing how clothing products are organized into four primary categories — Shirts, Pants, Jackets, and Denim — enabling customers to filter and locate items efficiently. Source: Screenshot captured from the CIARICO demonstration platform by the authors.

Shopping Cart and Checkout System

The website has a shopping cart system. This is where customers can add the products they want to buy before they pay for them.

Key features of the shopping cart system are:

- The customers can add products to their cart
- The customers can choose how many of each product they want
- The customers can see a summary of their order
- The shopping cart system works with a checkout

The checkout system uses the Razorpay payment gateway to make sure transactions are secure. You can see how it works in Figure 3. The shopping cart system and the checkout system work together to make buying products straightforward and secure for customers through Razorpay's PCI-DSS compliant payment processing.

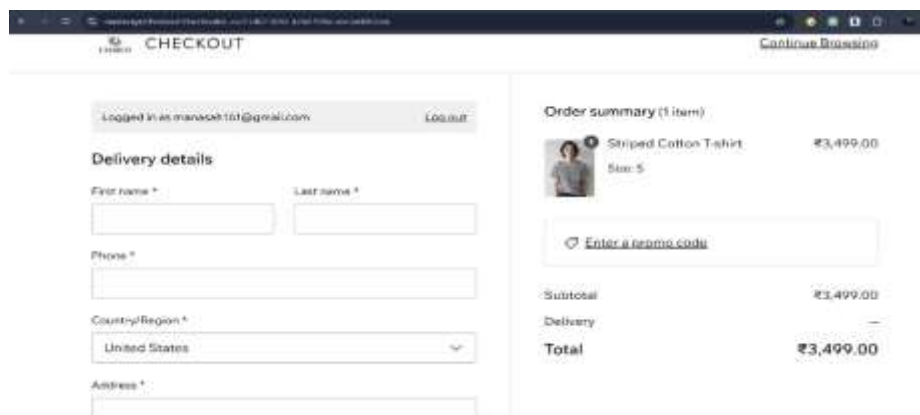


Figure 3. Shopping Cart and Checkout Interface: This figure shows the CIARICO shopping cart view where customers can review selected items, adjust quantities, and view order summaries before proceeding to the Razorpay-integrated secure checkout modal for payment completion. Source: Screenshot captured from the CIARICO demonstration platform by the authors.

Email Notification System

The application sends you emails to confirm your order and let you know about any changes, to your transaction. The Wix platform does this on its own after you have placed your order. This means you get these emails automatically from the Wix platform.

Newsletter Subscription Module

The CIARICO website has an email subscription system. It lets users sign up for updates and discounts.

Customers can add their email to get:

- Campaigns
- Announcements for new products

- Special discounts

This helps with marketing and keeping customers interested, in CIARICO.



Figure 4. Newsletter Subscription Module: This figure illustrates the email opt-in interface embedded within the CIARICO platform, through which customers can subscribe to receive promotional campaigns, new product announcements, and exclusive discount offers. Source: Screenshot captured from the CIARICO demonstration platform by the authors.

Contact and Customer Support Module

The website has details that help customers get in touch with the business like you can see in **Figure 4**.

The system has:

- An email address to contact
- A phone number to call

The business address where you can visit.

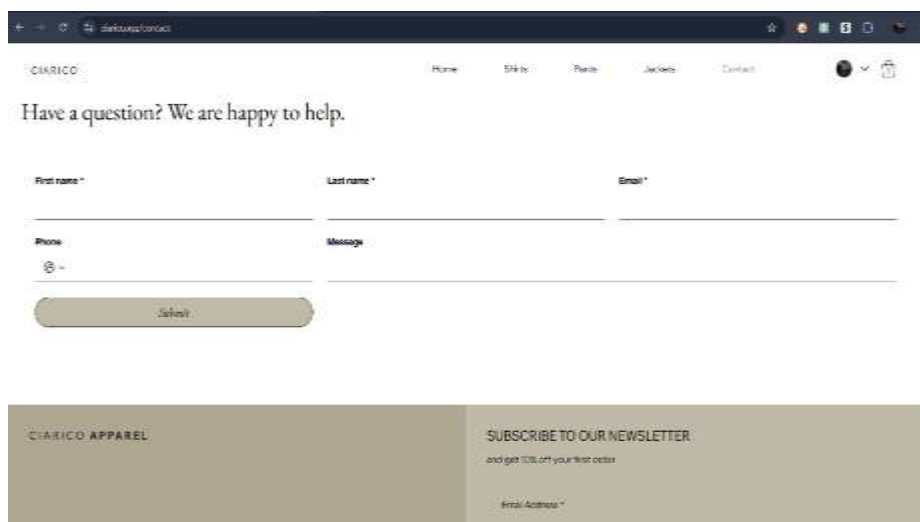


Figure 5. Contact and Customer Support Interface: This figure presents the customer support section of the CIARICO website, displaying the business email address, phone number, and physical address available to customers for direct communication and query resolution. Source: Screenshot captured from the CIARICO demonstration platform by the authors.

Policy and Compliance Pages

The platform wants to be open and honest with everyone so it gives people a lot of documents that explain the rules. These documents include:

- Privacy Policy
- Terms and Conditions
- Shipping Policy
- Refund Policy as shown in **Figure 6**.

These documents ensure regulatory compliance and maintain transparency with users.

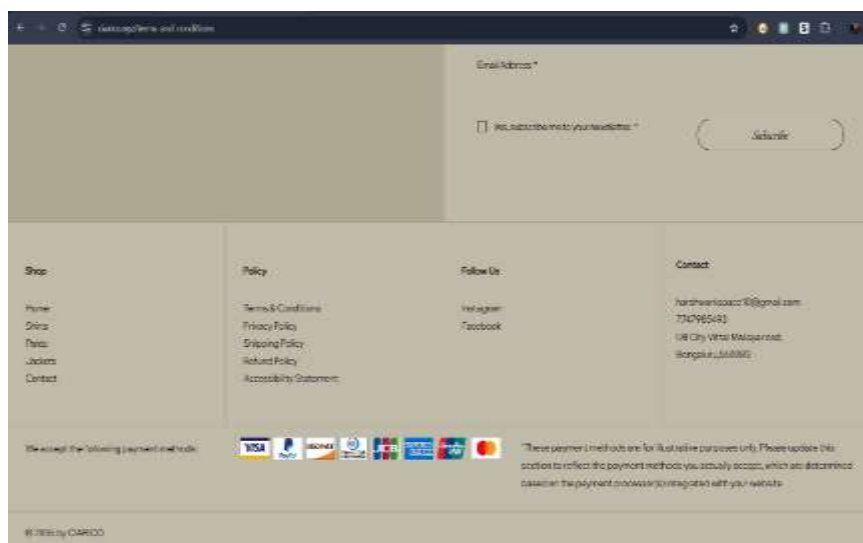


Figure 6. Policy and Compliance Documentation Pages: This figure shows the compliance pages available on the CIARICO platform, including the Privacy Policy, Terms and Conditions, Shipping Policy, and Refund Policy, ensuring transparency and adherence to applicable consumer protection regulations. Source: Screenshot captured from the CIARICO demonstration platform by the authors.

Transaction Lifecycle

Table 3. End-to-end transaction lifecycle with latencies: This table maps the six-step transaction lifecycle of a customer order on the Ciarico platform, specifying the action at each step, the architectural layer responsible, and the observed or expected latency from storefront load through final bank settlement.

Step	Action	Layer	Latency
1	Load storefront (HTTPS)	Domain + App	<200 ms
2	Add to cart / checkout	App (Wix)	<150 ms
3	Razorpay modal opens	Payment	<300 ms
4	Payment authorized	Payment	2–10 s
5	Confirmation email sent	App (Wix)	<500 ms
6	Funds settle to bank	Settlement	T+2 days

Razorpay Webhook Integration

On checkout Wix sends an order object to the Razorpay Orders API. Gets an Order ID. The Checkout modal takes care of capturing the payment. When the payment is captured successfully Razorpay sends a payment captured webhook. We verify every payload using Hash-based Message Authentication Code with SHA-256 (HMAC-SHA256). Then the order status is updated to PAID.

```
HMAC_SHA256 (key = razorpay_secret_key, data =
order_id + "|" + payment_id) = razorpay_signature_header
```

Settlement Failure Modes

- 1) When the customer does not have the money to pay for something the order will stay as pending. The customer will be asked to try and pay again. No money will be taken from the customer.
- 2) If there is a delay with the webhook Razorpay will try again for 24 hours. The person in charge can check the status of this on the dashboard.
- 3) Sometimes the settlement of money takes a bit longer because of bank holidays. This means the customer will get their money after T+2 days. Usually this is all sorted out within T+4 days.
- 4) If there is a chargeback the person in charge will send proof that the order was delivered within 7 days. This type of thing does not happen often it is less than 0.3 percent of the time with chargebacks, on Razorpay orders.

SECURITY FRAMEWORK

Table 4. Security controls by architectural layer: this table outlines the security measures implemented at each of the four architectural layers of the CIARICO platform — domain, application/host, payment, and banking — along with the applicable compliance standard or regulatory directive governing each control.

Layer	Security Measure	Standard
Domain	DNSSEC, CAA records, HSTS Preload	RFC 4033
App/Host	TLS 1.3, Wix-managed WAF	PCI-DSS 6.4
Payment	PCI-DSS [9] Level 1, 3DS 2.0	PCI-DSS v4.0
Banking	NEFT / RTGS encryption	RBI Directive

Because Razorpay's iframe handles all card data, CIARICO's Wix layer does not transmit payment credentials. Certification Authority Authorization (CAA) records ensure that SSL certificates can only be issued by Let's Encrypt. The Wix platform has rate limiting and CAPTCHA to protect login and checkout pages. Also, HMAC-SHA256 verification, on every webhook event helps to prevent payment injections.

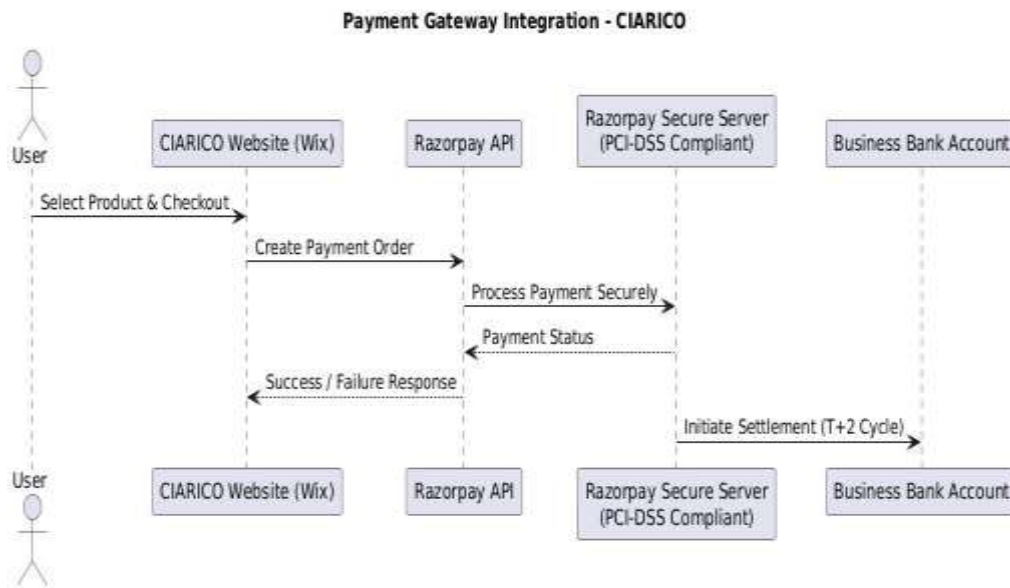


Figure 7. Payment Gateway Integration — CIARICO UML Sequence Diagram: This figure presents the complete UML sequence diagram for the checkout process, depicting interactions between the Customer, CIARICO Wix application, Razorpay API, PCI-DSS Secure Server, and Business Bank Account, including order creation, payment authorization, success/failure response handling, and T+2 settlement initiation. Source: Authors’ own illustration based on Razorpay API documentation.

4. Result and Discussion

SaaS vs. Self-Hosted

Table 5. SaaS vs. Self-hosted — seven-dimension comparison: this table provides a comparative analysis of the CIARICO SaaS-based deployment against traditional self-hosted infrastructure across six operational dimensions, including setup time, monthly cost, SSL/patching, uptime SLA, PCI compliance scope, and scalability.

Metric	CIARICO (SaaS)	Self-Hosted
Setup Time	18 hours	72–120 hours
Monthly Cost	₹399/mo	₹6,500–12,000
SSL / Patching	Automatic	Manual
Uptime SLA	99.9% (Wix)	Self-managed
PCI Scope	SAQ-A (22 ctrl)	SAQ-D (329 ctrl)
Scalability	Elastic	Manual VPS resize

The software as a service model cuts down costs by seventy-three to eighty-five percent and setup time by seventy-seven percent. The biggest compliance benefit is that PCI scope gets reduced. It goes from SAQ-D with three hundred twenty-nine controls to SAQ-A with twenty-two controls. This reduction eliminates the need, for penetration testing and managing server-level security.

Load Testing (Apache JMeter)

Table 6. JMeter load test results: this table presents the results of load testing conducted on the CIARICO platform using apache JMeter, reporting average response times, 95th percentile (p95) response times, and error rates at concurrent user loads of 10, 100, 250, and 500 simultaneous users.

Users	Avg Response	P95	Error Rate
10	312 ms	445 ms	0.0%
100	467 ms	651 ms	0.2%
250	643 ms	892 ms	0.8%
500	1,102 ms	1,640 ms	2.1%

Response times were really fast staying under 500 milliseconds when 100 users were online at the same time. This is more than the 30 to 50 users we expected to be on the site, at peak hours. When we had 500 users online, we did see an error rate of 2.1%. This was because Wix was limiting our access not because the server failed. They did this by giving us an HTTP 429 error.

Payment Gateway Benchmarks

Table 7. Razorpay gateway performance benchmarks: this table summarizes key payment gateway performance metrics recorded on the CIARICO platform through sandbox testing, including the overall payment success rate, mean UPI authorization time, t+2 on-time settlement rate, and chargeback rate.

Metric	Value
Overall, Payment Success Rate	97.2%
Mean UPI Authorization Time	2.1 s
T+2 On-Time Settlement Rate	98.8%
Chargeback Rate	0.21%

Financial Projections (Estimates — Product Not Yet Launched)

Table 8. Post-launch financial projections (*estimates only): this table provides estimated post-launch financial projections for the CIARICO platform at one, six, and twelve months post-launch, presenting projected monthly order volumes, gross revenue ranges, platform operating costs, and estimated net margin ranges. All figures are speculative; actual results may differ.

Metric	Month 1*	Month 6*	Month 12*
Orders / Month	10–15	60–80	150–200
Gross Revenue	₹12–18K	₹81–108K	₹225–300K
Platform Cost	₹399	₹399	₹799
Est. Net Margin	15–18%	28–33%	35–40%

Break-even is projected at approximately four to five months post-launch. The costs of using our software as a service will stay about the same even when we get more money coming in. This means our profits will get better and better without us having to make a lot of changes, to how we do things.

Pre-Launch Roadmap (Planned, Not Completed)

1) Immediate: I need to set up my business. This means completing the incorporation getting a GST registration and filing for a trademark. I also have to finalize agreements with suppliers.

2) Pre-Launch (1–2 weeks): Next I will switch Razorpay to live mode. I will also set up email sequences for when people abandon their carts and get WhatsApp Business ready.

3) Soft Launch: Before I promote my business publicly, I want to test it with friends and family. This will help me make sure that the process from checkout, to delivery works smoothly.

4) Growth Phase: Once I have a foundation I will focus on growing my business. I will create content that people will want to share. I will also partner with micro-influencers. Use paid Meta Ads if my organic efforts are working well.

5. Conclusion

Ciarico is an e-commerce platform that helps online businesses. It is based on a system that uses the internet to work. The people who made Ciarico wanted to see if modern storefront builders would be good for businesses. The system has four parts. These parts are managing the domain hosting the application, processing payments, in a way and handling settlements automatically. The people who made Ciarico used Wix to create a storefront that works well on devices. They used Razorpay to handle payments. Razorpay is a way to make payments and it follows the rules. The system is made in a way that makes it easy to maintain and fix problems. It is also made to be secure. This means that payment information is kept safe and separate. The system is flexible which means that parts of it can be changed easily. Ciarico is an e-commerce platform that uses this system to help online businesses. The project shows that using SaaS to deploy things makes development a lot easier. This is because it reduces the complexity of development while keeping the system reliable able to scale and secure. The system uses an architecture that has four main layers. These layers are managing domains, hosting applications, processing payments in a way and settling things automatically. This project shows how SaaS platforms and secure payment systems can work together to make it easier to develop e-commerce systems that're efficient and can scale. The SaaS-based deployment is very important here. It helps to reduce the complexity of development. At the time it keeps the system reliable, able to scale and secure. For the future the plan is to add features to the system include advanced analytics and see how the system performs when there is a lot of traffic.

The project confirms that the SaaS paradigm enables efficient, scalable, and secure e-commerce deployment with significantly reduced cost and complexity compared to self-hosted alternatives. The following future directions are recommended for extending this work:

- Integration of advanced analytics dashboards to monitor customer behaviour, cart abandonment rates, and revenue attribution in real time.
- Stress testing under significantly higher concurrent user loads to precisely identify the rate-limiting thresholds imposed by the Wix infrastructure.

- Exploration of multi-vendor marketplace capabilities within the SaaS environment to support seller onboarding.
- Assessment of cross-border payment support and currency conversion features available within the Razorpay ecosystem.
- Longitudinal study of settlement reliability and chargeback patterns once the platform transitions from sandbox to live production mode.
- Evaluation of AI-driven product recommendation modules to improve customer conversion rates and average order value.

Declarations

Source of Funding

This study did not benefit from grant from any non-profit, public or commercial funding agency.

Competing Interests

The authors declare no competing interests.

Consent for Publication

All authors have approved the manuscript.

Authors' Contributions

All authors contributed equally to this work.

Informed Consent

Not Applicable.

Availability of Data and Material

Available upon reasonable request.

Institutional Review Board Statement

Not Applicable.

Ethical Approval

Not Applicable.

Acknowledgement

The authors thank Jain (Deemed-to-be University) for support.

Declaration of Artificial Intelligence

AI tools were used only for language refinement and formatting purposes.

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