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Development and Consolidation of a Customized Web Development Service for Small Businesses

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Resumo

Queiroz, Vitor Zeferino. **Desenvolvimento e consolidação de um serviço de desenvolvimento web personalizado para pequenos negócios**. 2025. 12 folhas. TCC (Graduação) – Curso Engenharia de Hardware, Instituto de Tecnologia e Liderança, São Paulo, 2025.

Este trabalho apresenta o desenvolvimento e a consolidação de um projeto voltado à prestação de serviços personalizados de desenvolvimento web para pequenos negócios, profissionais autônomos e microempresas. O projeto teve início com a proposta de uma solução de automação para análise de anúncios digitais, direcionada a gestores de tráfego pago, mas ao longo das validações práticas foi identificado maior potencial de mercado na oferta de serviços de desenvolvimento web sob medida, o que motivou uma mudança estratégica de escopo. A metodologia adotada possui caráter aplicado, com uso de práticas ágeis, organização por sprints e validação contínua por meio de entregas reais a clientes. Foram desenvolvidos sites institucionais e landing pages com foco em desempenho, responsividade, qualidade técnica e alinhamento à identidade dos clientes, utilizando infraestrutura em nuvem e boas práticas de engenharia de software. Os resultados obtidos demonstram a viabilidade técnica da solução e a aceitação do serviço no mercado, ao mesmo tempo em que evidenciam limitações relacionadas à escalabilidade do modelo de negócio, uma vez que se trata de um serviço altamente personalizado. Como contribuição, o trabalho apresenta uma análise crítica do modelo adotado, bem como reflexões sobre possíveis caminhos de evolução futura, incluindo a padronização de processos, uso de automações e transformação parcial do serviço em produtos digitais.

Palavras-Chave: desenvolvimento web; engenharia de software; prestação de serviços; empreendedorismo tecnológico; validação de mercado.

ABSTRACT

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This work presents the development and consolidation of a project focused on providing customized web development services for small businesses, freelancers, and microenterprises. The project initially began with the development of an automation solution aimed at analyzing digital advertisements for traffic managers. However, based on practical market validation and real client interactions, the project strategically pivoted toward a service-based model focused on tailor-made website development. The adopted methodology is applied and experimental, supported by agile practices and continuous validation through real-world deliveries. Throughout the project, institutional websites and landing pages were developed with an emphasis on performance, responsiveness, scalability, and alignment with client identity, using modern cloud-based infrastructure and software engineering best practices. The results demonstrate strong technical feasibility and positive market acceptance, while also revealing limitations related to business scalability inherent to highly customized service models. As a contribution, this work provides a critical analysis of the adopted business model, discusses opportunities for future scalability, and reflects on pathways for transforming customized services into more standardized and scalable digital solutions.

Keywords : web development; software engineering; service-based business; technological entrepreneurship; market validation.

Summary

1 Introduction

1.1 Context and Motivation:

- The rapid advancement of digital transformation has significantly increased the importance of an online presence for businesses of all sizes. Small businesses, freelancers, and microenterprises increasingly depend on websites to communicate their value, attract customers, and remain competitive in the digital economy. However, many of these businesses still face barriers when seeking professional web solutions that balance quality, customization, and affordable cost. Although numerous automated website builders and generic platforms are available, they often fail to fully address the specific needs of small businesses, either due to limited customization, lack of technical robustness, or inadequate alignment with business objectives. This scenario reveals a market opportunity for customized web development services that combine technical excellence with close customer collaboration and accessible pricing.

1.2 Problem Definition and Value Proposition:

- The main problem addressed in this project is the difficulty faced by small businesses and independent professionals in obtaining professional websites that are both technically reliable and tailored to their specific needs. Many existing solutions force customers to choose between low-cost platforms with limited flexibility or high-cost agencies with complex and inaccessible processes. The value proposition of the proposed solution is to offer customized web development services that prioritize technical quality, performance, and personalized communication with the client. By adopting agile processes and modern development practices, the service aims to deliver websites that accurately reflect each client's identity, improve their digital presence, and provide long-term technical reliability, while maintaining accessible costs.

1.3 Objectives of the Work:

- The general objective of this work is to develop and validate a computational solution associated with a customized web development service, as well as to analyze its potential as a market-oriented business model.
- The specific objectives of the project include:

  Developing a functional Minimum Viable Product (MVP) for customized website delivery;

  Applying agile methodologies to organize development and delivery processes;

  Validating the solution through real projects delivered to clients;

  Defining technical, operational, and communication processes for service execution;

  Analyzing the strengths and limitations of the adopted business model.

1.4 Justification and Contributions:

- This project is justified by its strong alignment with both academic and market demands. From a technological perspective, it applies concepts of computer engineering and software engineering, including cloud infrastructure, system architecture, and agile development methodologies. From a market perspective, it addresses a real and validated demand for customized digital solutions among small businesses.
- As a contribution, this work demonstrates how engineering principles can be applied in real entrepreneurial contexts, highlights the challenges of scalability in service-based business models, and provides insights into how customized solutions can evolve toward more standardized and scalable offerings in the future.

1.5 Work Structure:

- This work is organized as follows. Chapter 2 presents the development of the proposed solution, including market assumptions, competitive analysis, technological aspects, business model, and validation results. Chapter 3 concludes the work by summarizing the main findings, discussing limitations, and outlining future perspectives for the evolution of the project.

2 Solution Development

2.1 Definition of Market Assumptions and Hypotheses:

2.1.1 Problem Hypothesis

The problem hypothesis of this project is that small businesses, freelancers, and microenterprises face significant difficulties in obtaining professional websites that are customized, technically reliable, and aligned with their business goals. Existing solutions often force these customers to choose between low-cost platforms with limited flexibility or high-cost agencies with complex processes. It is assumed that this audience is willing to pay for a solution that offers personalization, quality, and direct communication, as long as the perceived value justifies the investment.

2.1.2 Solution Hypothesis

The solution hypothesis assumes that a customized web development service, supported by modern software engineering practices, cloud infrastructure, and agile methodologies, is an effective way to address the identified problem. By combining technical expertise with close collaboration with clients, the proposed computational solution can deliver websites that better represent each business, improve performance and reliability, and meet specific functional and visual requirements that generic platforms cannot fully satisfy.

2.1.3 Value Hypothesis

The value hypothesis assumes that customers perceive sufficient value in customized web development services to accept the proposed pricing and revenue model. The hypothesis is based on the idea that clients prioritize quality, personalization, and long-term reliability over purely low-cost solutions, and are therefore willing to pay a fair price for services that directly support their business objectives and digital presence.

2.2 Market Sizing and Analysis:

2.2.1 Market Size (TAM, SAM, SOM):

- The Total Addressable Market (TAM) for this project includes all small businesses, freelancers, and microenterprises that require a professional website to establish or improve their digital presence. This market is broad, as digital presence has become a fundamental requirement across virtually all sectors.
- The Serviceable Available Market (SAM) is defined as the subset of this market that actively seeks customized web development services rather than fully automated website builders. This group includes businesses that value personalization, technical quality, and tailored solutions, but do not have the budget or need for large digital agencies.
- The Serviceable Obtainable Market (SOM) represents the portion of the SAM that can realistically be reached and served by an individual or small-scale service provider. In this project, the SOM was intentionally limited to a small number of clients, focusing on direct validation through real service delivery rather than large-scale market penetration.

2.2.2 Customer Segmentation and Profiling

The target customer segment consists of small local businesses, service providers, freelancers, and microenterprises seeking a professional and customized digital

presence. These customers typically have limited internal technical expertise and require external support to develop and maintain their websites.

The primary persona values clear communication, fast delivery, and solutions that reflect their brand identity. This customer segment prioritizes practical results, such as improved credibility and online visibility, over complex technical features, and prefers personalized service over standardized, one-size-fits-all solutions.

2.3 Competitive Analysis and Differentials:

The competitive environment of this project includes both direct and indirect competitors operating in the web development market. Direct competitors consist of independent freelance web developers and small digital agencies that offer customized website development services. These competitors typically provide tailor-made solutions but vary significantly in terms of technical quality, delivery speed, and client communication.

- Indirect competitors include automated website-building platforms and low-code or no-code tools that allow users to create websites with minimal technical effort. Although these platforms offer low-cost and rapid deployment, they often lack advanced customization, technical flexibility, and long-term maintainability;
- Traditional digital agencies usually offer high-quality and comprehensive services, including design, development, and marketing, but often at higher prices and with longer delivery times. Their strengths include structured processes and multidisciplinary teams, while their weaknesses involve higher costs and reduced flexibility for small clients.
- The competitive advantage of the proposed solution lies in the combination of customized development, strong technical foundations, and close client collaboration. Unlike automated platforms, the service offers full control over code, architecture, and performance. Compared to traditional agencies, it provides faster delivery, lower operational costs, and direct communication with the developer.

2.4 Technological Solution

2.4.1 Requirements and Specifications:

- The functional requirements of the system include the development of responsive and customized websites, support for multiple sections such as institutional pages and landing pages, integration with contact forms, and deployment in cloud environments. Each website must accurately represent the client's brand identity and meet specific business requirements.
- Non-functional requirements include high performance, reliability, scalability at the infrastructure level, security, maintainability, and responsiveness across different devices and screen sizes. The solution must also ensure fast loading times and high availability through the use of cloud hosting platforms.
- The primary users of the system are small business owners, freelancers, and service providers seeking a professional digital presence. Typical use cases include requesting a customized website, reviewing design and functional proposals, providing feedback during development, and publishing the final website for public access.
- Secondary use cases involve future maintenance, updates, and potential expansion of the website as the client's business evolves.

2.4.2 Architecture and Technology:

- The system architecture follows a cloud-based client-server model. The frontend applications are deployed using Vercel, providing global content delivery, scalability, and high availability. Backend services and databases are hosted on Railway, enabling efficient management of server-side logic and persistent data.

- This architecture supports modular development, easy deployment, and continuous integration, while maintaining separation between frontend and backend components.

2.4.3 Development and Implementation (MVP):

- The development process adopted an agile methodology organized into iterative sprints. Practices inspired by Scrum and Kanban were used to plan tasks, track progress, and incorporate feedback throughout the development cycle;
- The Minimum Viable Product (MVP) included the delivery of fully functional websites for real clients, as well as the development of reusable internal templates. The implementation phases included requirements gathering, design, development, testing, deployment, and validation with clients. These phases were executed iteratively, allowing continuous improvement and refinement of the solution.

2.4.4 Testing and Technical Evaluation:

- Testing strategies included manual functional testing, integration testing between frontend and backend components, and acceptance testing with real users. Each delivered website was tested across different browsers and devices to ensure responsiveness and correct functionality.
- The technical evaluation demonstrated that the implemented solution meets the defined functional and non-functional requirements. The deployed websites exhibited stable performance, correct behavior under typical usage conditions, and high client satisfaction, confirming the technical robustness of the proposed solution.

2.5 The Business Plan

2.5.1 Market and Competitor Analysis:

- The target audience of this project consists of small businesses, freelancers, and microenterprises that require a professional and customized web presence. These customers typically operate with limited technical resources and seek external support to design, develop, and maintain their websites.
- The primary persona values clear communication, fast delivery, technical reliability, and solutions that reflect their brand identity. This segment prioritizes practical outcomes, such as increased credibility and online visibility, rather than complex or highly technical features.
- The Strengths of the proposed solution include high technical quality, full customization, direct communication with clients, and the use of modern cloud-based technologies. The Weaknesses are related to limited scalability, as the service depends heavily on direct developer involvement.
- Opportunities include the growing digitalization of small businesses, increasing demand for professional online presence, and the potential to evolve the service into more standardized products or templates. Threats involve strong market competition, the emergence of automated website-building tools, and price pressure from low-cost alternatives.
- Compared to traditional digital agencies, the proposed solution offers greater flexibility, faster delivery, and lower operational costs. In relation to freelance competitors, the solution differentiates itself through structured processes, standardized quality, and a strong technical foundation.
- When compared to automated website-building platforms, the main differentiation lies in full code control, advanced customization, performance optimization, and long-term maintainability. These factors position the solution as a high-value alternative for clients seeking professional and tailored web solutions.

2.5.2 Business Model (Business Model Canvas - BMC):

- The Business Model Canvas of the proposed solution is structured as follows. The Value Proposition is the delivery of customized, high-quality web solutions aligned with client needs. Customer Segments include small businesses, freelancers, and microenterprises. Customer Relationships are based on direct communication, personalized service, and long-term support.

- Channels include direct contact, professional networking, freelance platforms, and the project's own website. Key Activities involve requirements analysis, web development, testing, deployment, and maintenance. Key Resources include technical expertise, development tools, cloud infrastructure, and reusable templates.

- Key Partners may include hosting providers and third-party service platforms. The Revenue Streams are generated through project-based payments for website development services. The Cost Structure includes infrastructure costs, development tools, platform fees, and operational expenses.

2.5.3 Marketing and Sales Strategy:

- The go-to-market strategy focuses on direct service offering rather than mass-market distribution. The solution is introduced through professional networks, freelance platforms, and the project's institutional website. This approach allows close interaction with early clients and supports continuous validation of the service offering.

- Customer acquisition is achieved primarily through freelance marketplaces, referrals, and direct contact with potential clients. Retention strategies include personalized communication, post-delivery support, follow-up interactions, and the establishment of long-term relationships that enable future updates and new projects.

2.5.4 Financial Projection and Feasibility:

- The revenue model is based on project-based pricing, where clients pay for the development of customized websites according to scope and complexity. Pricing is defined based on estimated development effort, technical requirements, and perceived value to the client.
- Projected expenses include cloud infrastructure costs, development tools, platform service fees, and operational expenses. Due to the service-based nature of the business and low initial fixed costs, the break-even point is achieved after a small number of completed projects.
- The business demonstrates financial viability in the short term, as revenue from delivered projects exceeds operational costs. Although traditional scalability indicators such as high ROI growth are limited, the model is sustainable and suitable for gradual expansion.
- The initial investment required for the project is relatively low, consisting mainly of software tools, cloud service subscriptions, and time investment for development and client acquisition. This low entry barrier reinforces the feasibility of the proposed business model in its current form.

2.6 Validation and Results

2.6.1 Validation Methodology:

- The validation methodology adopted in this project was based on practical market validation through real client engagements and service delivery. Instead of theoretical simulations, the business hypotheses and the acceptance of the Minimum Viable Product (MVP) were tested through direct interaction with customers.
- Validation methods included initial client interviews to understand requirements and pain points, iterative feedback cycles during development, and

post-delivery evaluations to assess satisfaction and perceived value. The MVP was validated by delivering fully functional websites to real clients, allowing the evaluation of both technical performance and business acceptance.

2.6.2 Market Validation Results:

- The market validation results indicate positive acceptance of the proposed solution. Clients demonstrated satisfaction with the quality of the delivered websites, the clarity of communication throughout the process, and the alignment of the final product with their expectations.
- Based on real feedback, the project experienced a strategic pivot from the initial automation-focused solution toward customized web development services. This pivot was driven by stronger demand, faster validation, and clearer value perception from clients. After this change, the project persisted in the service-based model, consolidating processes and refining the value proposition rather than introducing further major structural changes.

2.6.3 Key Performance Indicators (KPIs):

- Due to the early-stage and service-based nature of the project, key performance indicators were evaluated qualitatively rather than through large-scale quantitative metrics. Customer Acquisition Cost (CAC) remained low, as clients were acquired primarily through direct contact, freelance platforms, and referrals.
- Customer Lifetime Value (LTV) was considered moderate, with potential for recurring revenue through future updates, maintenance, and additional services. Churn rate was minimal, as clients maintained ongoing relationships after project delivery. These indicators suggest initial business sustainability, despite limitations in scalability.

2.6.4 Risks and Mitigation Plan:

- The main financial risk identified is the dependence on project-based revenue, which can lead to income variability. This risk can be mitigated by diversifying service offerings and introducing recurring services such as maintenance and updates.
- Technological risks include platform dependency and potential technical failures. These risks are mitigated through the use of reliable cloud providers, version control, and continuous testing. Competitive risks arise from market saturation and automated website-building tools, which are addressed by focusing on customization, quality, and personalized service. Legal and operational risks are minimized through clear project scopes, transparent agreements, and structured communication with clients.

3 Conclusion

This project achieved its proposed objectives by developing and validating a customized web development service supported by solid technical foundations and real market validation. The general objective of creating and validating a computational solution integrated with a service-based business model was successfully fulfilled through the delivery of functional websites to real clients.

The specific objectives were also achieved, including the development of a Minimum Viable Product (MVP), the application of agile development practices, the validation of the solution through direct client interaction, and the critical analysis of the adopted business model. The results demonstrated strong technical feasibility, positive customer acceptance, and effective alignment between the delivered solutions and client expectations.

Despite these achievements, the project also revealed limitations related to scalability, inherent to highly customized service-based models. These limitations highlight important considerations for future evolution. As future projections, the project may evolve through the introduction of reusable templates, automation of

internal processes, and the development of standardized digital products to increase efficiency and scalability.

In conclusion, this work demonstrates how concepts of computer engineering and software engineering can be effectively applied in real entrepreneurial contexts. It reinforces the importance of continuous validation, adaptability, and critical reflection when transforming technical solutions into viable market offerings.

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