

Supporting Small Businesses through Collaborative Online Platforms:
Experimentation in Crowdsourcing for Marketing and Publicizing

A Technical Report
presented to the faculty of the
School of Engineering and Applied Science
University of Virginia

by

Alexander White

with

Catlinh Nguyen
Maggie Bujor
Andrew Nguyen
Tyler Willis

May 9, 2023

On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

Alexander White

Technical advisor: Briana Morrison, Department of Computer Science

Supporting Small Businesses through Collaborative Online Platforms: Experimentation in Crowdsourcing for Marketing and Publicizing

CS 4991 Capstone Report, 2022
Alexander White
Computer Science
The University of Virginia
School of Engineering and Applied Science
Charlottesville, Virginia USA
adw5ke@virginia.edu

Abstract

Small businesses have often faced more hardships compared to larger companies and multinational corporations, and the COVID-19 pandemic made this dichotomy even more apparent as many small businesses were forced to close. During one semester at UVA, our team created a web application entitled OpenNow that allows individuals to gather information about local businesses in the Charlottesville area, in order to publicize and promote visibility for those businesses. Our team followed agile software development methodologies both to elicit requirements for the application using testimonies from potential users and to design a scalable and extensible platform that maintains high usability and accessibility. Using the Django web framework, we adopted an iterative development process to constantly revise and improve upon existing features while integrating new features into the application. The completed project provided a successful proof of concept for experimentation with crowdsourced information to benefit Charlottesville-area businesses. Though developed specifically during the COVID-19 pandemic, the application could be easily adapted and released to the UVA or Charlottesville community, and possibly other communities in different cities, to help publicize and promote local businesses.

1. Introduction

The emergence of the COVID-19 pandemic completely shifted societal norms in a way that was previously unimagined. Economies were shut down, as governments around the world implemented stay-at-home orders to curtail the spread of the virus. At the same time, companies

scrambled to adopt sustainable business practices that could support their enterprises in a time where the future outlook of the world was uncertain.

Many industries were able to assume virtual business models quite effortlessly, but small businesses and enterprises were not so fortunate. Small businesses, particularly those in the food service and retail industries, rely heavily on pedestrian traffic. With this demographic no longer active, small businesses were forced to seek alternative practices to stay afloat. Perhaps one of the more effective strategies for small businesses was increasing their online presence to engage with customers and to keep pace with the quickly changing market.

While there are several methods to establish and maintain an online presence—social media being one—our team sought to explore websites that support crowdsourced initiatives as a possible business strategy. Zogaj et. al. (2020) identifies crowdsourcing as any activity in which an independent body of people collectively take over certain tasks. The ubiquity of the internet has made crowdsourcing exceedingly popular in recent years, and several organizations have sponsored a variety of crowdsourced-centric events such as innovation competitions and hackathons. While the COVID-19 pandemic has become less of a driving force in the global economy today, crowdsourcing as a means to support small businesses and building online platforms to enable this kind of collaborative effort could still prove to be a viable business model to promote connectivity and visibility.

2. Related Works

Several studies have examined early connections between the internet, crowdsourcing, and the benefits they provide to small businesses. Liguori (2020) posits that the internet has “democratized the marketplace” and enabled virtual channels of engagement between small businesses and their client base. He suggests that this is not only advantageous but even necessary if small businesses expect to survive incidents as disruptive as the COVID-19 pandemic.

Mansor et. al. (2018) expand on this idea to include crowdsourcing, which they characterize as a “web-based...peer production model” that allows individuals to generate new ideas and innovation. Their study goes in-depth to explore different methods of crowdsourcing in exchange for rewards in markets concentrated in Malaysia. Our project focuses more on voluntary contributions to collective information in small and domestic markets. However, the results of Mansor’s study corroborate the motivation for websites that support this method of collaboration, as one of the study’s main conclusions is that crowdsourcing practices on select websites offered many benefits to small businesses, including brand visibility and organizational innovation, among others. Finally, Lee et. al. (2008) identify web applications that enable controlled crowdsourcing methods as vital to the success of small businesses in the early days of the web. Though the internet has drastically evolved in the 15 years or so since this study, online platforms that rely heavily on user-generated content in a moderated capacity are still some of the most successful websites to date, and utilizing this model strategically can prove advantageous to small businesses.

3. Process Design

The overall design process involved three major phases: requirements elicitation, design and implementation, and testing. Each phase was conducted at length, and the outcome of one phase directly informed the methods and decisions that were considered in the next phase.

3.1 Requirements Elicitation

The requirements elicitation phase sought to formally articulate features that should be included in the application based on needs and preferences of the end users. Guidance from the now-defunct CS 3240 course website (Spring 2021) indicated that the goal of the final web application should be to make it easy for users to find small businesses that fit their needs. Our team created two different methods to elicit requirements from users: an interview and a questionnaire.

The goal of the questionnaire was to determine UVA students’ level of familiarity and comfort with local Charlottesville businesses. The results from 40 respondents indicated that about half were familiar with at least three local businesses, most of which were restaurants, and that a majority of students place some value in supporting small businesses. Our team reasoned that there should be some emphasis on including businesses other than restaurants, as respondents were not as familiar with retail or recreational businesses in the area.

Additionally, we interviewed five students to determine how our application could make small businesses more accessible. The respondents stated that they frequently visited websites such as Google and Grubhub to find the most up-to-date information about a business. Including features such as an interactive map or a discussion board that allowed users to communicate with each other and make recommendations would attract users to the application. At least one respondent noted that having information about multiple businesses on one platform would be very convenient, but that relying on user-generated information could deter users from the application if the information is inaccurate.

3.2 Design and Implementation

Following the requirements elicitation phase, our team created user stories. User stories are informal explanations of a project’s features that are written from the perspective of the user. These stories addressed every planned feature, as well as the technical requirements given to us by our professors. An example of a user story is:

“As a small business owner, I would like to be able to post my business on the site with details such as a description, pictures, and hours of operation to provide the most up-to-date information to potential customers.”

The final set of features included an interactive map populated with user-submitted businesses, a discussion board so users could interact with each other, could discover new businesses, and could submit businesses to the site with information such as the business’s name, description, and category. Each user story was assigned to a different team member to interpret and implement.

Two design challenges we had to consider were how to encourage users to submit businesses other than restaurants, and how to regulate submissions for inaccurate or misleading information. To address these concerns, our team decided to prepopulate the application with retail or other categories of businesses. Because our planned user base was relatively small, we decided to oversee submissions ourselves and delete or modify inaccurate information using administrative privileges.

3.3 Testing

Our team conducted beta and acceptance testing to assess how user-friendly the design was and how well our final application fulfilled its intended purpose. For beta testing, we presented the project to a small sample of individuals and guided them through interacting with different parts of the application. Their reactions were recorded to help decide what revisions were needed, and the results were analyzed in a user experience and user interface design report. The report described the application as generally intuitive and easy-to-use. Each business had an information panel on the “Discover” page which provided a clear way to explore new businesses. Additionally, the discussion board’s simple design helped facilitate conversation between multiple users. Final revisions were made to improve the design consistency between different pages before moving onto acceptance testing.

Acceptance testing aimed to determine the extent to which the final application met the project’s requirements and specifications. Our professors demo-ed the application themselves and provided specific feedback about their experience. The application’s database was deleted before the final demo, which raised questions about how the platform would be presented on its initial release. The concept of oversight for inaccurate information was also brought up. Our group affirmed that content would be moderated by the team itself. Overall, the professors deemed the application had met its intended purpose. It relied on user-generated information to provide an accessible way to publicize small businesses and for individuals to discover local businesses that fit their needs.

4. Results

The final application, named Open Now, provided a successful proof-of-concept for an application that utilized crowdsourced information to support small businesses. Though the application was never fully produced, a small release was provided to a number of UVA students who were involved in the requirements elicitation phase. They reported that consolidating information about several businesses into one location made exploring new businesses highly accessible. The interactive nature of the site as well as the ability for users to interact with each other via the discussion board made them excited to engage with the platform.

Each information panel also included links to the businesses’ website or social media pages, which further incentivized users to engage with businesses online. There were no reports of false information or abuse of the relatively easy process to publish information. And while issues such as this would need to be managed differently if the application was released to a wider user base, the benefits to small businesses could be significant based on the trial release.

5. Conclusion

Employing agile software development methodologies, our team successfully developed and tested a web application, Open Now, that benefits small businesses by employing

crowdsourced information. Taking advantage of user-generated content takes the onus off of the businesses to publicize themselves and promotes peer-to-peer collaboration from communities to support and patronize local businesses. It also allows Open Now to remain highly scalable and extensible. That is, businesses can maintain an online presence and command more traffic to their own websites as more and more customers visit. This is significant because maintaining some form of online presence can be vital to a successful business model in today's increasingly digitized world; and small businesses do not always have the time of resources to create websites or social media profiles of their own. Web applications such as Open Now could enable small businesses to survive through unprecedented events, such as the COVID-19 pandemic, or compete with larger, multinational corporations.

6. Future Work

Open Now demonstrated a successful proof-of-concept experimentation with crowdsourced information and digital platforms for marketing of small businesses. The final project was only released to a select group of students from the University of Virginia, but future applications could be released to wider user bases—in this project's case, the Charlottesville community at large. Moreover, Open Now lacks a permanent infrastructure for moderation and removal of inaccurate information. Possible options to address this include auto-moderation from the site itself or additional personnel to provide constant oversight of information that is posted. Finally, Open Now does not contain an outlet for small businesses owners and employees to interact with the site in a different way than consumers. Implementing additional features or providing a framework for small businesses owners and employees to engage with the application—possibly serving as content moderation personnel—would ensure that these stakeholders are represented.

7. Acknowledgments

Open Now was made possible by the help and support of the following student collaborators, who each fulfilled a specific role throughout the development process: Catlinh Nguyen as scrum

master, Maggie Bujor as requirements manager, Andrew Nguyen as user experience designer, and Tyler Willis as testing manager. This project was also made possible by the direct supervision of teaching assistant Sammie Chung as well as the guidance and instruction of Professor Mark Sherriff and Professor Will McBurney of the Department of Computer Science.

References

Lee, S., DeWester, D. and Park, S. (2008, July 31). Web 2.0 and opportunities for small businesses. *Serv Bus* 2, 335–345. <https://doi.org/10.1007/s11628-008-0043-5>.

Liguori, E. and Pittz, T. (2020, July 16). Strategies for small business: Surviving and thriving in the era of COVID-19. *Journal of the International Council for Small Business* 1(2), 106-110. <https://doi.org/10.1080/26437015.2020.1779538>.

Mansor, M.; Halim, H. and Ahmad, N. (2018, Feb.). Exploring Crowdsourcing Practices and Benefits: Validation from Small and Medium Enterprises (SMES) Business Owners. *Proceedings of the 2nd Conference on Technology & Operations Management (2ndCTOM)*, 240-248. https://www.researchgate.net/profile/Mohd-Fitri-Mansor/publication/327416611_EXPLORING_CROWDSOURCING_PRACTICES_AND_BENEFITS_VALIDATION_FROM_SMALL_AND_MEDIUM_ENTERPRISES_SMES_BUSINESS_OWNERS/links/5b8e313e92851c6b7ebab3e7/EXPLORING-CROWDSOURCING-PRACTICES-AND-BENEFITS-VALIDATION-FROM-SMALL-AND-MEDIUM-ENTERPRISES-SMES-BUSINESS-OWNERS.pdf

Zogaj, S.; Bretschneider, U. and Leimeister, J. (2014, Feb 20). Managing crowdsourced software testing: a case study based insight on the challenges of a crowdsourcing intermediary. *Journal of Business Economics* 84, 375–405. <https://doi.org/10.1007/s11573-014-0721-9>.