

Expanding VIABLE Employment for Adults with Autism: A Systems Approach to Increase Nonprofit Sales

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Abstract— Across industries, people with disabilities face barriers obtaining and maintaining employment. Our project addresses this issue through a partnership with VIABLE Ventures, a microbusiness run by the VIA Centers for Neurodevelopment. VIABLE Ventures sells spa products like candles and bath salts, all of which are made by artisans with autism. The program provides on-site job training and a source of income for adults with intellectual and developmental disorders. The goal of this work was centered on increasing VIABLE Venture sales to expand employment opportunities for autistic adults in the local Charlottesville area. Currently, sales depend heavily on availability and seasonality of in-person sales and limited online sales. Our team used a systems approach to increase online sales on VIABLE Venture’s website by: (1) analyzing past transactions, and (2) redesigning the website. Using data analytics, we projected top selling scents seasonally and identified high margin products that VIABLE Ventures could prioritize to increase profits. Additionally, our team conducted focus group testing on the navigation of their original website to identify pain points, notably the salience of navigational tools and clarity of the company mission. These findings guided the final redesign of the new Square website. By increasing production during currently lower sale months and streamlining the online user experience, VIABLE Ventures could increase sales and thus increase the number of adults with autism employed.

I. INTRODUCTION

There are several factors, that make finding and maintaining stable employment difficult for adults with intellectual and developmental disabilities (IDDs) that include challenges with social communications, sensory sensitivities, and stereotypes and stigmas. One emerging solution to this problem is the adoption of microenterprise models. Microenterprises (or microbusinesses) are small businesses that employ few people and have relatively low startup costs. Their small size and low costs afford these organizations the flexibility to set schedules and assign tasks to match the unique needs of neurodivergent individuals, making this model both an attractive alternative to traditional employment for individuals requiring higher levels of support. Microbusinesses may also serve as a means for higher-functioning individual adults with IDD to receive vocational training in order to transition into the workforce [1], [2].

The latter is the model adopted by VIABLE Ventures; a microbusiness run by the VIA Centers for Neurodevelopment. Through the production and sale of candles and other home products, VIABLE Ventures provides

work training and meaningful employment to adults with autism in the Charlottesville, VA community. Our work centered around addressing the issues of unemployment among individuals with IDDs by increasing VIABLE Ventures’ capacity to employ neurodivergent adults. As a self-sustaining business, all of the funds VIABLE Ventures uses to pay their employees come directly from the sale of their products. Therefore, in order to meet its goal of expanding employment opportunities for adults with autism in the area, the company must increase its gross profits through higher revenue and/or decreased costs. The team applied a systems engineering approach to increase online sales on the company’s website, <https://shopviable.org/>, with two main areas of focus: (1) analysis of online transactions and (2) website design. We first analyzed historical online and in-person sales data to gain a better understanding of the company’s best selling and most profitable products as well as identify any seasonality in product sales. Next, we conducted user testing to determine the strengths and weaknesses of the current website design. The findings informed a redesign of the website aimed at promoting the bestselling and most profitable products and improving the online customer experience.

II. LITERATURE REVIEW

A. Sales Data Analysis

There are several ways to analyze sales data that include enterprise research planning, revenue management, and seasonal forecasting [3-6]. With respect to sales data, enterprise research planning identifies different stages of data that need to be collected and managed to improve business performance long term and ability to manage operations: pre-sales data, sales data, and payment out data [3]. Revenue management is a similar concept, which outlines a strategy of data management to help with capacity planning. [4]. Lastly, specifically for businesses with seasonal product offerings, seasonal modeling and forecasting can aid determine expected sales, which is the foundation for capacity planning [5]. This includes modeling consumer choice behavior and the impacts of scarcity for seasonal products [6].

Many of the aforementioned techniques are widely implemented in large businesses, but small- and medium-sized businesses face unique challenges that by and large pertain to data. One challenge is accounting for the variety of sources of data, including production costs, in-person versus online sales, and inventory planning across different sources [3]. Additionally, forecasting capabilities are very limited with incomplete or limited data. There are two

techniques commonly used for forecasting, either companies use their own historical data or they anticipate the share of the national market they can capture and then model using the national market data. With limited historical data, accurate forecasting is difficult, and for small businesses, predicting using national market data is likely less accurate [5]. Without the proper data modeling capabilities of microbusinesses can be limited.

B. Website Design

Taking advantage of e-commerce and website sales opportunities are essential to growing any business, particularly small ones, as it gives businesses the opportunity to make sales anywhere and anytime [7]. This increases the opportunities for sales compared to only in person venues, especially with seasonal or limited hours. Additionally, in building a brand through the website, it is important to focus on the credibility, clarity, consistency, and uniqueness of the website to develop trust with customers. Similarly, it is recommended to help connect with customers using mission statements or “About Us” descriptions, even if it does not directly increase sales [8]. Viable Ventures already has a strong mission statement and customer relationships with their customers from the in-person farmers market sales, but those values need to be translated to the website. There are also numerous identified strategies specifically to increase both website traffic and sales. Both having more products in the store as well as having an available FAQ section to easily address problems have been found to increase online store traffic. To increase sales specifically, a main factor was having a better product list, including enhanced browsing and navigation as well as more clarity in product descriptions. Lastly, having a greater number of store entrances, or ways to find the online store, also helps increase sales [9]. Thus, website design should focus on these factors to help increase business profitability by providing a year-round method of product sales.

III. METHODOLOGY

To structure our approach to improving nonprofit sales for Viable Ventures, we used the Five Planes Method outlined by user experience designer Jesse James Garrett in his book *The Elements of User Experience* [10]. This approach involves starting with abstract steps based on organizational goals and gradually building to a final design. The Five Planes are, in order, strategy, scope, structure, skeleton, and surface. Each is built on the one before it and allows for a final design to reflect the client’s needs and root issues. We used this method for our work with Viable Ventures, both in redesigning the website and in making business recommendations. Every decision and design were rooted in the overall strategy and scope that was established early in our data collection phase.

IV. STRATEGY & SCOPE

Based on the goals expressed by the Viable Ventures team in our early meetings, a clear, two-pronged strategy for the new website emerged: (1) increase online traffic and

transaction volume and (2) improve user experience. With this strategy in mind, we then engaged in an exploratory analysis of the company’s sales data and user testing to determine the scope of the website.

A. Data Exploration

To analyze the Viable Ventures sales trends, we started by analyzing the historical sales data. Because the company managed in-person and online transactions on different platforms (Square for in-person sales and Shopify to host the website), they used a third software program called Craftybase to merge sales data from the two platforms and track material costs and pricing across all of their products. From Craftybase, the client was able to export a CSV file containing the company’s sales data from June 2021 to September 2023, which they then provided to us in its raw form.

In the original dataset, all of the products purchased in a transaction were stored in a single column (called “Order Items”). To analyze sales by product type, we first broke each individual product into separate columns, then pivoted these columns into rows. This gave us one row corresponding to each distinct product purchased in a transaction. However, some transactions included multiple units of the same product type, indicated by a number in parentheses after the product and a subsequent value representing the total price of the products. To account for this, we extracted the quantity and revenue data from each product into separate columns. The gross revenue column was created by dividing the total price by the quantity and multiplying by a constant to account for sales tax. We then imported unit cost data provided by the Viable Ventures team and used it to create another column representing profit for each product. Finally, to classify each product by the means by which it was sold, we sorted products into one of five categories: “Wholesale”, “Custom”, “Farmer’s Market”, “Website”, or “Other In-Person.”

After preprocessing that data, we then proceeded to conduct an exploratory analysis to identify general sales and whether there was sales seasonality. To gain a more complete picture of sales overall, we graphed gross revenue by year and sales category (Figure 1a). This supported the team’s hypothesis that in-person sales, from the farmers market and other events, accounted for the vast majority of sales. To identify any seasonality in sales, we graphed unit sales of some of the company’s more popular products by month against unit sales of all other products. This revealed clear seasonal trends in the sale of products such as the “Sea Salt & Orchid” scented candle (Figure 1b), which saw an increase in sales during the summer months, and the “Winter Sample Pack” (Figure 1c), which saw an increase during the late fall and winter months. Finally, we wanted to examine potential ways to increase profitability, so we created a series of charts showing the unit sales, gross revenue, and gross profit broken down by product category (Figure 1d).

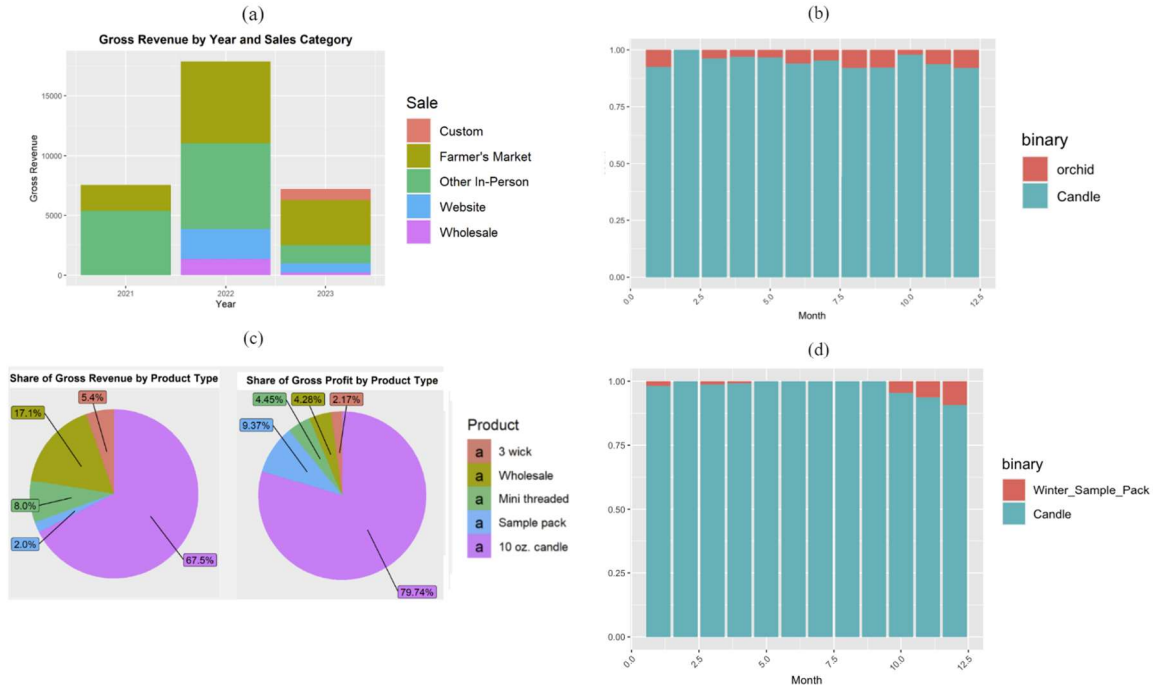


Figure 1. (a) Bar Plot of Gross Revenue broken down by Year and Category, (b) Seasonality trends for “Sea Salt & Orchid” Candle, (c) Seasonality Trends for Winter Sample Pack, (d) Measuring Profitability by Product Type

B. User Testing

A major focus of this work was user testing of the previous VIABLE Ventures website. User testing provides context on usability issues, validates design decisions, optimizes call to actions, and reduces costs [11]. Our goal was to gather user feedback on the website’s aesthetic and function by investigating a variety of navigational paths and tools within the previous website design. The feedback generated would later be used to generate suggestions for improvement to the client. We conducted user testing with UVA peers (ranging from the ages of 19 to 22) and family members (45- to 50-year-olds) to have a diverse range of feedback and input.

In general, the process for conducting user testing followed the format of providing the user with a stream of tasks/pages that we wanted them to access. All users completed the same stream of tasks that started with them on the main VIABLE Ventures page and prompted them through a few pages before finally having the user “purchase” a product. The only difference between each user testing was what product we had them purchase in the end. Throughout this process we made note of all general observations as well as the main challenges that users experienced. The process and observations generated from our user testing and subsequent questions allowed us to identify key areas of focus for the website redesign. Looking at the breakdown of this process, the first navigational element that we investigated was having the users navigate through the homepage of VIABLE Ventures (www.shopviable.org). To prompt this stage of navigation, we presented them with a variety of questions which included, “Summarize what the mission of VIABLE Ventures is. Where can you purchase their products in

person? What products do they offer?” The users were given five minutes to find answers to all these prompts. The first observation we noted was right after the users accessed VIABLE Venture’s homepage. The initial impression of most users was the lack of visuals of candles and artisans throughout the website. Additionally, users found the layout of information to be overwhelming at first. Although this feedback was insightful, the guided exploration proved to generate the most valuable observations and challenges. Users were able to state the mission of VIABLE Ventures but noted that it did not invoke an emotional response due to lack of personability. Therefore, the first consideration for the redesign was to address the issues surrounding the clarity of the brand’s mission and lack of emotional response. Regarding the questions about in-person purchasing and product offerings, users had a shared experience of having a difficult time finding this information as it was embedded within larger sections that did not intuitively flow from one another. Another common challenge was that there was a lack of consistency between pages, which made it difficult to proceed efficiently throughout the website and answer all those questions in the time allotted. This feedback led to our second consideration for redesign which is to improve the saliency of key information, most notably alternative purchasing methods and product offerings, and establish a consistent page layout.

Following the prompted navigation, users were then presented with a second set of questions aimed at getting feedback on their experience thus far. These questions included, “How intuitive is the current navigation bar? How many times did you have a failed click (clicked a button that

did not take you where you wanted to go) while investigating these questions?” When asked about the navigation bar, we found that the main tabs on the top of the website were intuitive; however, the dropdown options within each were redundant and a source of confusion for users. As a result, our third consideration for redesign is to ensure each dropdown and general navigation option is mutually exclusive and clearly defined. In terms of failed clicks, there was a consistent challenge of users clicking a navigational button with the assumption it would take them to one page and take them somewhere else. This resulted in a high number of clicks required to reach a specific piece of information. This led to our fourth focus for redesigning clear verbiage and links between pages to facilitate easy and intuitive navigation.

The final task that we had the users complete was “purchasing” a specific product which was selected by the facilitator which was succeeded by two final questions. These questions were, “On a scale of 1-10 (1 being the worst) how would you rate the overall experience? What suggestions do you have to improve the current website design?” The final task of purchasing a product mainly verified all of the challenges previously presented; however, the two concluding questions resulted in useful feedback on areas for improvement both aesthetically and functionally. Users reported that the overall navigation through the website had too many “clicks” required to purchase a product because the drop-down options were not intuitive and there was a lack of product visibility. Furthermore, they expressed a need for more visuals of seasonal and day spa offerings as these got lost in the current website layout. This feedback prompted our fifth and final consideration for redesign. This consideration is to improve the overall aesthetic of the website to accurately reflect all product offerings through an increase in images and distinct sections.

V. STRUCTURE AND SKELETON

A. Information Architecture

One component of the structure and skeleton planes focuses on information architecture and design. Our exploratory analysis revealed several potential changes to this architecture to improve online traffic and increase revenue. The first of these recommendations was increasing the price of the mini threaded candles. These clearly had the lowest profit margins but was one of their highest selling product types. We suggested that by slightly increasing their price even by \$1-2 would offset the production cost greatly enough to make a sizable impact on profit. Initially the client was hesitant; however, they did eventually decide to raise the price of the mini candles to \$7.50. Also, our investigations into the data showed that the actual best-selling candles were not actually what the Viable Ventures team had posted on their “Best Sellers” page of their current website. We suggested a more regular update to this or even some kind of automation so that they wouldn’t have to remember to change the best sellers seasonally. Each of these recommendations affected the way we structured the

website and prioritized what navigation elements were the most salient.

B. Interactive Design

The second component of the structure and skeleton planes deals with interactive design, with an emphasis on interface and navigation. We used insights obtained from the user testing phase to inform interface and navigation elements in the subsequent wireframing stage. First, we began with sketches regarding potential options for the homepage and then progressed to individual tabs within the website. One major change for the wireframes was to improve upon the current design to minimize the number of “clicks to purchase” and improve product visibility. The homepage was sketched with different tabs based on our user testing of issues and confusion the user faced. We also produced the idea of the ability to see the different sizes of candle for each individual candle product.

After we configured sketches that gave a good understanding of our ideas, we used Figma (a design tool) to create digital wireframes. Again, we worked to implement a new outlook on the header of the website as shown in Figure 5. For this header, we broke up the original “Shop” tab into categories of candles and then day spa, so the customer has distinct areas to click based on what they are looking for. As we worked and brainstormed changes within the website, we created new elements based on team conversations and data findings. To build a direct line of communication with potential and current customers, we designed a 10% off coupon for the customer’s first purchase that can only be redeemed after they enter their email. Our wireframes also created the notion of all three candle sizes on one order page so the customer can select the size as they are already on the scent candle they want. This will decrease the number of clicks and confusion the user can have. These wireframes were crucial for planning and designing the website we were working to implement. After meeting with the client, we identified the final page layout being a combination of multiple wireframe elements and received approval for all new elements proposed.

VI. SURFACE

The top of the five planes is surface, which involves building out the skeleton developed in the wireframes into a full-fledged, consumer-facing product. To enable this process, we decided to transition from the Shopify platform the company was previously using to organize and fulfill all online orders to the Square platform that they had only been using to process in-person purchases. This allowed us to consolidate the management of various processes into a single database (i.e., online orders, in-person orders, and inventory stock). Once the transition was complete, we began implementing our redesigned website. The process of publishing a fully functioning website from start to finish required a multifaceted and iterative approach in order to ensure the success of its implementation and future impact on product sales.

A. Establishing a Consistent Page Layout

Following the presentation of our preliminary findings, VIABLE Ventures granted our team access to all log-in information needed to edit the Square site. The first course of action was to create a homepage as detailed out in the client meeting. This included an updated heading, appropriate footer, and sections emphasizing product offerings, the company mission, and other places to purchase their products. The heading of the homepage is centered around a navigation bar and dropdown menu that were designed based on the goals to promote product visibility and reduce user clicks as shown via the wireframes previously communicated. These were used as a guideline to develop all associated web pages and establish clear navigational links so that users can easily locate the product offerings or information they are looking for. Moving our attention to the bottom of the homepage, we decided that the footer would be the ideal place to centralize all logistical and legal information that were still mandatory to complete the user experience but did not need to be the center of VIABLE Venture's website design such as a shipping & return, privacy, and copyright policies as well as contact page.

B. Populating Product Information & Inventory

The team wanted to address the user complaint of "consistency" during this step by ensuring that all product pages were uniform in their layout regardless of category. Therefore, we agreed on one general layout that included a main banner as well as placeholders for individual product images. The main banner of all pages begins with a horizontal strip spanning the width of the screen where an identifying image was placed in order to indicate which product is being displayed and an area for two lines of text that we populated with product descriptions. We found that short, catchy taglines are the most impactful way to communicate product information to users, so we devised a variety of short sentences designed to highlight how the products can be used as well as what it is made out of. These were then shared with the team before uploading them to the site. The next step towards finalizing all product pages was to update the size options for all candle scents so that users can choose between, "Mini (3.7oz), One-Wick (10oz), or Three-Wick (16.8oz)" before adding a candle to their cart. Finally, we needed to link the company's inventory with the website so that all available products could be displayed on their respective pages. However, we found that VIABLE Ventures only marks products as "available" when they are in stock despite their current "made to order" process. This resulted in our team only being able to include a fraction of the actual products on the website, which was an issue we addressed later in the process.

C. Incorporating Client Input and Requests

As the website was progressing, our team naturally ran into some roadblocks around questions and potential new ideas that required client approval before further progress could be made. Most of these roadblocks were due to missing information that came to light as new elements were being added to the website design. Therefore, our team

compiled a cohesive list before contacting the client to retrieve all additional information which is detailed below.

One of the most common question categories from customers was about candle care and specifics, leading our team to add a "Candle Care" link within the navigation dropdown. Therefore, the first additional piece of information that we requested was the care instructions they handed out to in-person customers at the farmers market so that all customers could easily find these instructions.

Moving forward, one of the main sections of the website is the "Our Story" page which can be accessed via the navigation bar. VIABLE Ventures has an extremely unique business model that has a strong conviction when communicated effectively as seen with customers at the farmers market. Therefore, the goal of this page and its subpages was to recreate that conviction so that any potential customer who visits the VIABLE Ventures website can understand the values on display and feel obliged to place an order. We felt that the most impactful way to do this would be to get a general statement about VIABLE Ventures from the client themselves as well as personal statements from the main coordinators as they are the people working directly with the artisans and are closest to the mission of the company. Additionally, we interviewed some of the artisans at VIA Centers for Neurodevelopment, asking questions about what they enjoy most about their job, what it means for them to receive a paycheck, and even what their favorite candle scent is. All this information was integrated into the website under the "About Us" and "Meet the Team" page.

To resolve the client complaint of not having a streamlined way to deliver and receive feedback about products and services, we created a "Contact Us" page. The link within the footer directs users to an online form where they simply enter their name, email, and message before it is sent to a designated client email address.

Other changes from the previous website design were the introduction of custom ordering and a welcome discount code. To build a direct line of communication with potential and current customers, we designed a 10% off coupon for customers' first purchase that can only be redeemed after they enter their email. This feature will allow VIABLE Ventures to create an email list that can be used to send targeted marketing campaigns, share updates, promote product offerings, and foster customer engagement. Through further discussion, we also implemented custom ordering to the website as this is a revenue stream that was not advertised on the previous website. Custom ordering is a unique offering where VIABLE Ventures allows customers to request specific scents and product sizes tailored to their preferences, creating personalized products for large events. To streamline all requests, we designed an order form around client specifications such as the minimum order quantities, products that will be offered, necessary customer information, etc. All the requests are streamlined to the same email address that the "Contact Us" page is linked to.

Finally, our team requested access to all professional product images that had been taken to further the goal of

uniformity across the site and to ensure all visuals were of the highest quality possible.

D. Finishing Touches & Publishing the Site

This step is currently still in progress; however, once we gain access to the professional pictures, we plan to update all product images. Next, our team plans on verifying the path of all navigational tools to ensure customers are directed to the correct page when exploring the site. Once these elements have been checked, the website will be published and available to the public to purchase products from VIABLE Ventures online.

VII. LIMITATIONS

Although our end result was well received, this project did have some limitations. For the data modeling portion, we initially intended to design and implement a system to forecast seasonal product demand in order to better manage inventory. However, this was not feasible for two main reasons: (a) we discovered that VIABLE Ventures fulfills online sales on a made-to-order basis, meaning that they carry little to no inventory for their online store and, therefore, have little need for inventory management and (b) we found that the two years of limited sales data was insufficient to build a robust forecasting model.

Furthermore, while the website redesign was completed within our project term and was in line with our initial scope, there is a potential for continued work with VIABLE Ventures. Because of the nature of the website transition and the fact that we were not able to implement our recommendations and designs until April 2024, we were not able to observe the changes in sales before and after the switch. We believe traffic and sales will increase because of our updates, but we are unable to conclude that with confidence. This is especially due to the seasonal nature of their sales numbers. For an accurate evaluation of the work we did, another team could track sales changes over a year compared to the year prior and see which seasons had the greatest increase and continue to make updates accordingly.

VIII. CONCLUSION

Our initial objective from the client, VIABLE Ventures, was to revamp and promote their online sales platform so that the company could make more profit with the end goal of hiring more neurodivergent artisans. To do this, we started with analyzing their current work. This involved analysis of their data and any trends or seasonality located in their product sales, as well as a deep dive into what pain points existed in their old website from a user experience design perspective. We took these findings back to the client and worked with them at every step along the way of implementing a new website on an entirely new website hosting platform.

Considering the small team behind VIABLE Ventures and the many other hats that each employee wears around VIA, it was unrealistic to expect them to make these necessary updates and modernize their website without outside help. The best support we were able to give was pushing them on

what we found to be the essential tasks for increasing their profit margins and keeping them on a schedule to get them done through regular meetings and questions. The implementation process took longer than we expected due to outside stakeholders and slow exchanges of information. However, our team still met the broad goals that we set out to accomplish at the beginning of the year.

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REFERENCES

- [1] T. Reddington and J. Fitzsimons, "People with learning disabilities and microenterprise," *Tizard Learn. Disabil. Rev.*, vol. 18, no. 3, pp. 124–131, Jul. 2013, doi: 10.1108/TLDR-02-2013-0013.
- [2] M. Ouimette and L. H. Rammner, "Entrepreneurship as a means to Employment First: How can it work?," *J. Vocat. Rehabil.*, vol. 46, no. 3, pp. 333–339, Jun. 2017, doi: 10.3233/JVR-170870.
- [3] D. Wasiat, Y. Ruldeviyani and P. Sandhyaduhita, "Analysis and Design of Enterprise Resource Planning (ERP) system for Small and Medium Enterprises (SMEs) in the Sales Business Function Area," 2013 International Conference on Advanced Computer Science and Information Systems (ICACSIS), Sanur Bali, Indonesia, pp. 255–260, 2013. doi: 10.1109/ICACSIS.2013.6761585.
- [4] J. Shields, "Revenue Management: A Strategy For Increasing Sales Revenue In Small Businesses," *Journal of Small Business Strategy*, vol. 16, no. 2, pp. 43–43, 2005.
- [5] I. Stancu, D. Stancu, D. Dumitrescu, and A. Tinca, "Sales Forecasting in the Context of Seasonal Activities and Company Sustainable Growth," *Amfiteatru Economic Journal*, vol. 17, no. 40, pp. 1054–1057, 2015.
- [6] G. P. Soysal and L. Krishnamurthi, "Demand dynamics in the seasonal goods industry: An empirical analysis," *Marketing Science*, vol. 31, no. 2, pp. 293–316, Mar. 2012. doi:10.1287/mksc.1110.0693
- [7] I. Pangaribuan, M. Zaka, and R. Yunanto, "Design of Web-based Online Sales : as an Entrepreneurship Strategy," *International Journal of Entrepreneurship & Technopreneur*, pp. 33–38, 2021.
- [8] M. Robinson Beachboard, "Small business conformity with quality website design criteria in a marketing communication context," *Informing Science: The International Journal of an Emerging Transdiscipline*, vol. 20, pp. 195–214, 2017. doi:10.28945/3852
- [9] G. L. Lohse and P. Spiller, "Internet retail store design: How the user interface influences traffic and sales," *Journal of Computer-Mediated Communication*, vol. 5, no. 2, Jun. 2006. doi:10.1111/j.1083-6101.1999.tb00339.x
- [10] Garrett, J. J. (n.d.). *The Elements of User Experience: User-centered design for the web*. Pearson Education, pp. 20–36.
- [11] "What Is the Purpose of User Testing: Benefits of User Testing: Ui Ux." *UserTesting*, www.usertesting.com/resources/topics/what-is-purpose-user-testing. Accessed 9 Apr. 2024.