Zapp

Business Report

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Executive Summary

Zapp is a tool for small business owners that allows them to answer customer queries automatically on WhatsApp using generative AI.

Businesses across Ireland and the world use WhatsApp to communicate with customers. It is convenient, simple, and intuitive. Unfortunately, answering messages from customers every day can be tedious and takes up valuable time and energy. Zapp is a tool that allows business owners to automatically respond to their customers queries using natural language. It takes in data from your business, such as menus, product images, descriptions, or location, and uses that contextual information to generate human-like responses.

We believe we are the best people to deliver this business because of our experience in technology- and enterprise-focused competitions, such as SciFest and BT Young Scientist Technology Exhibition. We are also both part of the Irish start-up ecosystem, attending events like First Fridays and Mentor Hours in Dogpatch Labs. Throughout our project we have built products and solved problems together, allowing us to work off each other's talents and skillsets. These last two years working on these competitions and projects have helped us develop our time management, customer discovery and exploration, and programming skills.

Through personal experience and competitive analysis, we found that other automated messaging services use a rule-based conversation system. This means that the conversation only consists of a set of pre-determined questions, resulting in a customer experience that is unnatural, unintuitive, and boring. Zapp allows customers to ask any question they may have, delivering responses in natural language and supplying the relevant information to the customer. Small business owners can customise the conversation to fit their AI, and easily deploy and connect Zapp to their messaging platforms. Zapp primarily supports WhatsApp, but we hope to expand it to other platforms like Instagram in the future.

Zapp is innovative as it enables a new way for business owners to interact with their customers, using a recent technology called generative AI. Generative AI is artificial intelligence that can create content independently. It uses large language models (LLMs) such as ChatGPT, which are a type of generative AI that uses large sets of data to parse and generate natural language.

Below is a simple outline of our income and expenses to date. See the *Finances & Pricing* section for more details.

Income	Expenses	Profit
€60	€7.42	€52.58

Idea Generation

In the beginning, we tried to search for a problem that people were facing. However, we later learned that was dangerous as it is one of the main reasons for start-ups failing. After idea iteration, market research, and customer discovery surveys, we ended up settling with an idea that was completely different to our original concept. This new idea was much better as we knew that the problem was real from talking to people, and they confirmed that there would be demand for a solution.

During an enterprise class, we took part in the paperclip exercise with our enterprise teacher. The paperclip exercise involves taking a paperclip and thinking of as many innovative, out-of-the-box uses for it as possible, such as using it as a lockpick, a ruler, or a hair pin. This showed us how to generate ideas effectively on the spot.

The idea for Zapp evolved over time, originally stemming from a brainstorm within the classroom. One of the ideas we thought of was to make an AI model that, based on an image of your old electronic device, could accurately value it based on the live prices on marketplaces such as eBay or Amazon. We both loved this idea. We created a name and a basic overview of how it would work, but unfortunately, we quickly realised it was technically unrealistic.

The main reason for our valuation service not meeting our constraints was that it was simply not possible to create given our time limit and circumstances. We had difficulty finding demand and legitimate use cases for this product. Because the valuation service would not perform any sales directly, rather enabling sales between two other parties, we decided that it was too difficult to generate revenue from it and that it was impractical.

We had differing ideas about the change from our valuation service to our AI software-as-a-service (SaaS) chatbot, but we both eventually concluded that this was a better choice.

We believe that getting opinions and views from a wide range of people is the best way to brainstorm, and the Student Enterprise Programme was no exception. We talked to classmates and teachers, parents and siblings, and Irish founders who we met in Dogpatch Labs. Talking to this many people allowed us to get a diverse range of thoughts, views, alternative ideas, and questions, which we found incredibly valuable.

Market Research

Our primary target market focuses on small businesses with fewer than fifty employees who rely on WhatsApp as their primary means of communication with their customers.

As part of our desk research, we investigated solutions that already exist and would serve as our competition. For example, Payemoji is a company that creates chatbots for businesses and their customers across messaging platforms. We conducted a SWOT analysis of Payemoji and found that they tend to target enterprises, rather than small businesses, usually confine themselves to a specific industry, and their product uses older and less advanced AI technology. This was a valuable exercise for us as it allowed us to find our unique selling points.

As part of our field research, we attended First Fridays for Startups in Dogpatch Labs. Here, we got one-on-one mentorship from successful start-up founders, including Menno Axt, Lizzy Hayashida, and Lorraine Curham. They highly recommended that we should read the book *The Mom Test*, which is a popular choice in the start-up community. This book explains that an effective way to discover customers is to continually ask them questions, prompting them to talk as much as possible. This enables the interviewer to get to the root of problems that the business may meet and understand how to approach them.

We got the opportunity to talk to our target market at a small business event hosted by the Brazilian-Irish Chamber of Commerce (BICC). This enabled us to meet over ten small businesses in various industries ranging from accounting to baking. Through these conversations, we got feature suggestions, like customising the bot or expanding to other platforms and integration with existing customer support tools. We got insights into the current tools that businesses use and how much they pay for these services; this gave us a thorough understanding of how we should approach pricing our SaaS product.

One thing that surprised us from talking to these business owners was how open they were about discussing their strategies for communicating with customers. After talking with these businesses, we learned that many cafés already use WhatsApp and Instagram, meaning our idea would help them specifically.

This was fantastic feedback, so we decided to reach out to cafés in and around Dublin 6. In late January, we contacted a total of twenty-four cafés, sending ten emails at first to see what our success rate would be. However, none of them responded. We decided to reach out to the businesses via Instagram instead, in hopes of achieving more success. We sent fifteen messages on Instagram and got four responses, with two of the cafés explicitly voicing their interest in meeting with us.

We then had a 20-minute meeting with these two cafés. We went into the meetings with a list of general open-ended questions, per *The Mom Test*. We then expanded on these questions based on their answers to get a better understanding of problems they have. *The Mom* Test also recommends against mentioning or going into detail about the product until the very end of the conversation, as that could introduce bias – we just wanted to understand the business at first. Overall, these

meetings went well. We verified some of the problems that we outlined in our market research, such as dealing with customers' queries.

Although these cafés were interested in our proposition, they mentioned that their customers are usually already familiar with their menu, meaning that specific use case would not work. They also said that since their operations are quite small, they can manage queries easily. However, they recommended we talk to larger cafés and other businesses, like bookshops or vinyl shops, as they have a wider range of items for a customer to explore. We have already reached out to these businesses and are waiting on a response.

Fortunately, one of the cafés said they would be willing to pilot with us. We brainstormed some features with them that would add more value to their business. Some ideas included a walk-in ordering system and a way for the business to promote their products and deals. We plan to work closely with the café within the coming weeks to see what we can realistically develop for them.

Shortly after these meetings, other people contacted us expressing their interest. This included a finance business and a personal coaching business. In the end, we have secured three pilots along with one paying customer – see *Finances & Pricing* for details about our first sale.

Intellectual Property

We have checked the licences of the software that Zapp uses to ensure that they allow us to use it in the way we want. Certain pieces of software are only free for personal, not commercial use, or might require us to make the source code available online.

The licence agreements that apply to software are often available while downloading or installing it – for example, a program might be in the public domain, under a permissive licence like the General Public license (GPL) , or under its own proprietary licence agreement.

Although software is notorious for being difficult to copyright and protect, especially if it is the work of an individual or small business, we have reviewed various common licences and the impact that they would have on us and our users.

That said, there is much more to a software product than its code. Logos, branding, UI design, advertising, and slogans are all an essential part of the development process. These tend to be much more straightforward to patent and otherwise protect, which our enterprise teacher explained to us. Copyrighting our logo is something we intend to explore.

Production & Service Provision

During the development of Zapp, we considered various technologies to build a prototype. To build Zapp we opted for JavaScript, a versatile programming language commonly used in web development. Zapp uses application programming interfaces (APIs); these allow different tools to communicate with each other and enable Zapp to integrate with WhatsApp and OpenAI. Zapp uses a special version of the ChatGPT API that allows businesses to fine-tune their chatbot to respond in a specific manner. Retrieval-augmented generation (RAG) allows an LLM to build context around relevant data – menus, contact details, prices, and so forth – that the business supplies.

While researching how to build our product, we looked at how we would integrate AI into a WhatsApp message. It was significantly more difficult to do this than we expected. WhatsApp does not give individual developers access to their business API; it only offers this to small- to medium-sized enterprises. We then pivoted to Twilio, which is a scaled-down version of a WhatsApp API that allows smaller businesses to access it. This was a brilliant solution.

After deciding on a toolset, we ran into another problem. When sharing code among collaborators, it is important not to inadvertently expose confidential details that might be in the code. However, we neglected this and accidentally published a version of our code that had sensitive information on the Internet. Luckily, we reacted fast enough to mitigate any damage whatsoever.

When building a SaaS product, it is important to keep the quality of the code consistent. One way in which we ensured quality during development was that we created a GitHub repository, allowing us to share code between each other. This meant that we could cross-check each other's code and correct it if necessary. Whenever we would come across an issue, we would share it and find a way to resolve it.

Towards the end of the development process, we shifted our focus to testing Zapp and its capabilities. For example, when we were assessing Zapp with WhatsApp, we wanted to understand how far we could push it, intentionally trying to break it. This enabled us to fix bugs quickly, ensuring quality of the final product.

Marketing & Promotion

For Zapp, we looked at other SaaS products that were like ours and tried to understand how companies would market them. We saw that our main competitor was using Instagram, which we learned is the second-largest communication tool for businesses in our target market after WhatsApp, to give updates to their community about where they were in terms of sales, new deals, and investments. We found this interesting because we would never typically see such a big business using Instagram as their main channel to reach customers.

Another thing we noticed during customer discovery was that word of mouth can be an immensely powerful marketing tool. We know this because, after talking to a few of these businesses at the event hosted by BICC, they started referring us to other businesses, with whom we could talk about Zapp.

For our marketing mix, we settled on two things. We first decided to use Instagram to talk to a larger audience, which would hopefully enable us to build a user community over time. We used Instagram to post regular updates about our plans for Zapp. Secondly, we used word of mouth to promote Zapp, all the way from ideation. We went back to some of the people we talked to at the start about how far we had come with Zapp, and some of these people offered to set up meetings with people they know who might be interested in our product.

The 5 Ps of marketing – product, price, place, promotion, and people – are a cornerstone of successfully promoting your product. We applied them to Zapp in the following ways:

- **Product:** We developed and refined Zapp over time. In our marketing, we intended to highlight the major features of Zapp, such as easy set-up and customisation. We displayed a live demo of how a customer would talk to the Zapp bot on our Instagram.
- **Price:** Based on our desk research, we looked at how much our target market spends on SaaS products, specifically on chatbots. For example, Intercom prices their product on a per-message basis. This influenced the pricing model we used.
- **Place:** The main place we intend to distribute Zapp when we scale up is through our website. We currently distribute Zapp by going to our customers and deploying it manually for them, but we have plans to automate this in the future.
- **Promotion:** As mentioned earlier, we are using Instagram and word of mouth to promote Zapp. We continue to post content on our page, including short-form content (reels). In the future, we would like to host an event that would include live demonstrations of Zapp to our target market on Instagram.
- **People:** From our customer discovery, we have pinpointed our target market. As we talked to more people, we have shifted our focus to specific groups within our target market, like cafés.

Sustainability

Because Zapp is a digital product, the environmental impact is significantly smaller compared to that of a physical product. However, this does not mean that Zapp has zero environmental impact.

Web development requires servers to host the service. These are typically in data centres, which are notorious for their high energy usage. According to the Irish Times, data centres make up 18% of the total electricity Ireland consumes. We offset this by hosting Zapp on a local machine but acknowledge that we must investigate more sustainable solutions.

When we deliver our product to our customers, we are looking into using older hardware and recycling it into a server. People often dispose of computers as they upgrade to newer ones – however, these older machines often still have potential to thrive in a modern environment. Lightweight operating systems such as certain Linux distributions help to make these computers usable again and create a more cost-effective and sustainable solution. This also links to our earlier idea and supports our belief that older technology deserves a second life to make it more sustainable and reduce unnecessary waste and expenses.

We do realise that as we scale Zapp, older hardware will not be able to meet increasing demands. We have been looking into data centres that place an emphasis on their environmental impact. Although these will be more expensive, it is important to consider the environment when building a product. Placing an emphasis on environmental impact may also resonate with customers who may be more environmentally conscious, potentially giving us another unique selling point.

Finances & Pricing

We realised that there would be a multitude of different costs involved in developing Zapp. OpenAI credits, needed to generate replies, would be the most expensive. We decided to take advantage of publicly available credit grants and used some of our personal funds at the very start of the development process to cover these costs. Continually relying on grants, however, is not sustainable. We intend to reinvest the profits from our original sales directly back into the business and use them for more credits and marketing.

We secured a generous upfront payment for 3 months' worth of a Zapp subscription from a family friend who wanted to pilot Zapp for their own finance business. We intend to work closely with the business owner throughout the three months, so that they can give feedback with which we can improve Zapp.

For our pricing, we looked at our competitors' pricing, our costs, and public data from other SaaS products that our target market currently uses. This is something we are still working on as we continue customer discovery.

Finding the cost to produce each unit of software in a SaaS product is difficult as it often costs little compared to one-time licences. SaaS products often have thousands or millions of users at any given time, making it much more difficult to find a cost per unit.

Projected Cashflow

Income	
Sales	€100 (5 subscriptions)
Subtotal	**€100**
Expenditure	
Electricity	€2/10 kWh
OpenAI Credits	€20/200,000 tokens
Twilio Credits	€15/2,000 requests
Cost of Goods Sold	€37
Net Cash Flow	**€63**

Actual Cashflow

Income	
Sales	€60 (3 months prepaid)
Subtotal	**€60**
Expenditure	
Electricity	€2.50/10 kWh
OpenAI Credits	€4/200,000 tokens
Twilio Credits	€15/2,000 requests (trial)
Depreciation on Computers	€0.92/20 h
Cost of Goods Sold	€7.42
Net Cash Flow	**€52.58**

As these cashflows show, we overestimated two major things – the number of sales we would get, and how much we would spend. We ended up spending significantly less than originally expected, meaning we had a much higher profit margin. We are still in contact with businesses who we talked to during customer discovery.

We want to experiment with another pricing model over the next few weeks for new subscriptions, which would decrease the cost of a subscription. It would charge a small, flat fee based on each question that our chatbot answers successfully.

Use of Technology

Zapp is a fully digital service, which means that technology is a key part in creating it. Zapp currently has no plans to release any physical products, making technology even more necessary.

Zapp is entirely in JavaScript, which is the most common and versatile language in the field of web development. A framework called Node.js allows JavaScript code to run locally on a machine without the need for a web server. Zapp uses Ngrok to expose itself to the Internet, allowing it to use WhatsApp and OpenAI APIs and take advantage of server technology while still being able to run on a local machine.

Zapp uses a Twilio sandbox to create an instance of itself on WhatsApp. Users can talk to this sandbox as if it were a business. Zapp parses the user's input and sends it to an OpenAI assistant, which then generates a reply and sends it back to the user.

While Zapp is not yet commercially ready, we have developed an app prototype that is already fully functional. We have hard-coded this prototype to fetch data about one business. However, it can accept any prompt and answer any question that the user asks.

Zapp also has a digital presence aside from the product itself. It has an Instagram page for marketing, promotion, and customer care.

Personal Development

Working on a team has taught us that when building something with a time constraint, communication and time management are key. We learned valuable lessons about collaboration, like transparent communication, and ensuring that everyone was contributing as much as they could without overworking themselves. Anyone working in a group must be honest and transparent about the amount of time and effort they are able to put in on any given day.

The experience of being an entrepreneur was completely different to our existing idea of what it would be like. Initially, we thought that being an entrepreneur would be a straightforward endeavour. However, it turned out that, to build a successful business, there is an extreme amount of labour involved even from the very beginning. Going through the process of discussing ideas and later building a profitable business is difficult and requires considerable effort. That said, we found this effort to be extremely rewarding as our product was closer to completion.

Throughout our project, there were countless challenges, both technical and business-related. For example, in our earlier idea, we could not find out a way for it to make us any revenue.

Another difficulty was time management. Both of us were also working on another major project for BT Young Scientist at the same time, which made it difficult to find a balance between these two projects.

We will continue trading and offering Zapp as a commercial product. We will continue talking to potential customers and fulfil prepaid subscriptions over the next few weeks. We believe that Zapp has potential to scale near-infinitely to businesses of diverse sizes. As we release Zapp officially, we will take feedback from our customers and take a customer-centric approach to make Zapp the best product that it can be.

The most important lesson that we learned while working on Zapp is to do things that do not scale. This may seem counter-intuitive, but it was an important piece of

advice to us. An example of something we did that was not scalable was to interview businesses in real life. Another thing we intend to do that we know will not scale is to visit business headquarters and set up Zapp for them on-site. This approach is like what the Collison brothers did when founding the payment company Stripe.

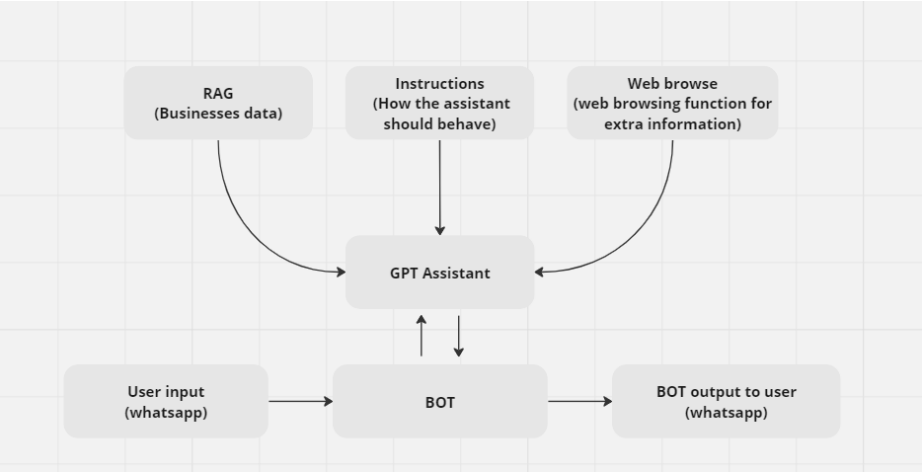
Taking part in the Student Enterprise Programme has helped us to approach problems carefully and efficiently, which is something we can both apply to future projects and other areas of life.

Appendices

Profit & Loss Account

	€	€
Sales		60
Cost of Sales	0	
Other Direct Costs	7.42	
Gross Profit		**52.58**

Workflow

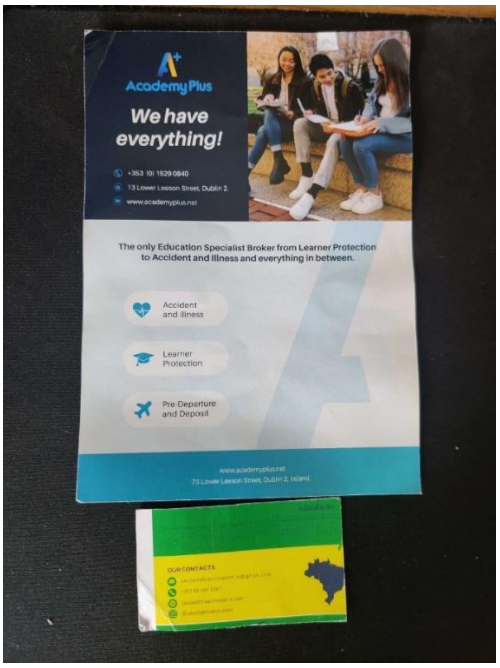


Customer Discovery Questions

1. Do you use WhatsApp to communicate with your customers?
2. If you were to put an estimate, how much time would you spend answering messages from customers?
3. How much detail would you put into the response of a message?
4. What AI tools do you currently use within your business?
5. What challenges or frustrations have you met when communicating with your customers via WhatsApp or other methods?
6. Have you ever considered using AI or automation to help manage customer inquiries on WhatsApp? If yes, what sparked your interest in this?
7. I would like to introduce you to Zapp, an AI tool designed to automatically respond to customer queries on WhatsApp. How open would you be to exploring a solution like Zapp for your business?
8. To give more tailored responses, Zapp uses contextual information from your business, such as menus, product images, and location. How comfortable are you with sharing this kind of information with an AI tool?
9. How important is it to you that responses generated by an AI tool like Zapp sound natural and human-like when communicating with your customers?

10. In your opinion, how could a tool like Zapp improve your business's competitiveness or efficiency in the market?
11. In the future, what other features or capabilities would you like to see in an AI tool like Zapp to enhance your customer communication?

Business Cards Received from BICC



Pilots & Testimonials

Finance Company: https://www.linkedin.com/company/revive-finance-ltd/

Caitríona Farrell Coaching: https://coachcaitriona.com/

Revive Finance Testimonial:

“Hey Lads,

Great to hear from you.

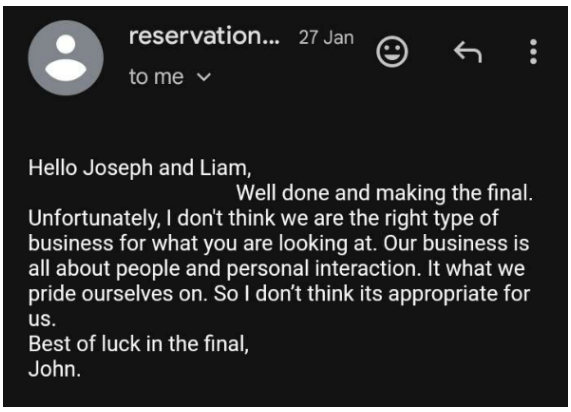
Starting the pilot with Zapp has been a highlight, and I’m genuinely excited about the potential changes it will bring to how visitors interact with my website. Even in this short time, the promise of what Zapp can offer in enhancing user experience is clear.

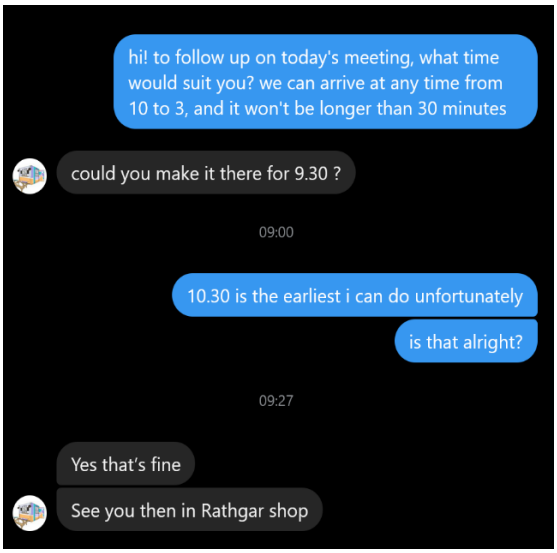
Though we’re just at the beginning, the possibility to tailor the platform to meet my site’s unique needs has already shown its value. Your team’s support has made all the difference, demonstrating the innovation and hard work behind Zapp.

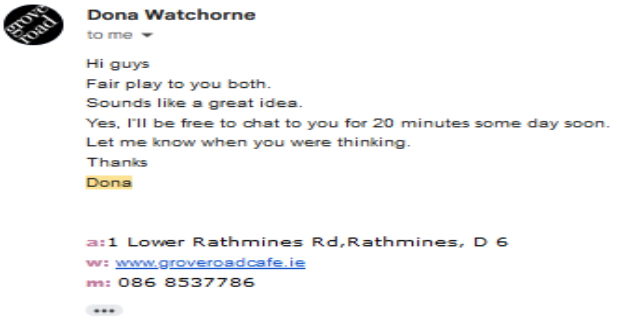
I’m keen to see the long-term impact on my visitors and how it will transform their experience. Count me in for the ride ahead. Thanks for this incredible opportunity and for your unwavering support. Looking forward to the future with Zapp! Cheers,

Shane”

Customer Outreach



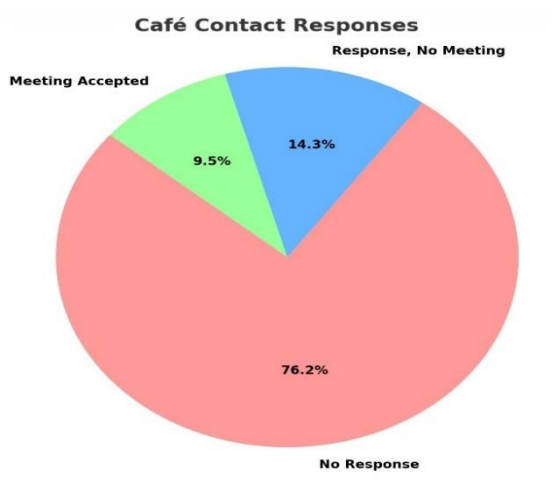




Local Cafés (Rathmines, Rathgar, Terenure, H Cr)

Name	Location	Contact Info	Contacted?
Bijou	49 Highfield Rd, Rathfarnham, Dublin 6, D06 E9F2	http://bijourathgar.ie	✓ - Email
Fat Cat	100 Rathgar Rd, Dublin, D06 EP49	+353 1 492 8030	Sms message
Deli613	89 Rathmines Rd Upper, Rathmines, Dublin, D06 CX89	http://deli613.ie	✓ - Email
Voici	1A Rathgar Rd, Rathmines, Dublin 6, D06 C5H0	http://voici.ie	✓ - Email
Ernesto's	15 Rathgar Rd, Rathmines, Dublin 6, D06 PN81	+353 1 534 3792	Error 552*
Butlers	Rathmines Rd Lower, Rathmines, Dublin	http://butlerschocolates.com	✓ - Email
TwoFifty Square	10 Williams Park, Rathmines, Dublin	https://www.twofiftysquare.com/	✓ - Email
The Art of Coffee	Unit 2A Swan Shopping Centre, Rathmines, Dublin 6	https://theartofcoffee.ie/	✓ - Email
Tribe D6	155B Rathgar Rd, Rathmines, Dublin 6, D06 DD42	https://www.instagram.com/tribe_coffeeco/	Via Instagram
Foam	Terenure Rd E	https://foamcoffeehouse.ie/	Sms
Noshington	H Cross Park	https://noshington.ie/	✓ - Email

* Probably best we stay away from chains for now, stick to smaller businesses and see what results we get - 12.01.24



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https://ngrok.com/

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https://www.irishtimes.com/environment/climate-crisis/2023/09/21/ryan-says-data-centres-are-a-key-component-of-irelands-infrastructure/

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Cafes Rathgar
https://www.yelp.com/search?find_desc=Caf%C3%A9s+%26+Coffee+Shops&find_loc=Rathgar%2C+Dublin

Chatbot market growth

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Whatsapp downloads growth

https://www.statista.com/statistics/1305771/whatsapp-business-downloads-worldwide/

Whatsapp usage statistics

https://www.cooby.co/en/post/whatsapp-usage-statistics

Whatsapp marketing statistics

https://www.cooby.co/en/post/whatsapp-marketing-statistics