FreshTRACK

"The affordable AI-powered food waste solution that fits every household"

Team 22

Feasibility Report

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BAA1003 New Enterprise Development

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Our Experience:

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KPMG

BOSCH

pwc

PORSCHE

an post

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Executive Summary

The Idea

Fresh*TRACK* delivers an intelligent, AI-driven solution that transforms conventional fridges into smart, connected systems. By combining camera technology with adaptive learning, it automates food tracking, provides real-time insights, and helps to reduce waste without user effort. Fresh*TRACK*'s target customers live busy lives and value convenience and efficiency. They seek smart, effortless solutions that simplify daily routines and integrate seamlessly into their homes. Environmentally conscious, this demographic prioritises saving time and reducing waste without investing in expensive new appliances.

Operating within Europe's fast-growing smart appliances market, the product addresses the gap between expensive smart fridges and basic manual apps by detaching automation from costly hardware. In doing so, Fresh*TRACK* reshapes competition within the segment, shifting the focus towards intelligent functionality that enhances user experience and everyday convenience.

Ideation Maps

Ideation for Fresh*TRACK* involved brainstorming and evaluating multiple innovative concepts to address real-world problems. Using group discussions, anonymous voting, and research, the team narrowed down several initial ideas to two strong finalists: a smart fridge concept to reduce food waste and a modular housing design. After presenting both and considering feedback, the team selected the food waste solution for further development, as it is best aligned with sustainability goals and offered strong potential for mass adoption.

Technical Evaluation

The technical evaluation outlines the conceptual integration of IoT-enabled cameras, AI-driven image recognition, and cloud-based data management within a unified system architecture. Video data are processed through Google's Vision and Vertex AI services, enabling automated food identification, recipe generation, and behavioural analysis. Emphasis is placed on system design, data connectivity, and compliance with EU regulatory frameworks, ensuring scalability, reliability, and technological coherence within the proposed concept.

Investments and Returns

Fresh*TRACK* anticipates investing €260,000 to develop an AI-powered food tracking app and a smart fridge camera. The main expenses include €178,000 for hardware, app, and AI testing, €30,000 for marketing, and €52,000 in reserves. Manufacturing will be outsourced to China, with early COGS of €57.02 per unit, which will decrease as production expands. Priced at €97.56 before tax with a €8 monthly subscription, Fresh*TRACK* expects to break even by 2027 and achieve a net income of €871,000 by 2030 not including the subscription profit, indicating strong growth potential and an organised investment approach.

1 Introduction

Food waste is one of today's most pressing global challenges, impacting both our planet and our pockets.

Globally

- **132 kg** of food waste was generated per person in 2022 (U.N.E, 2024).
- **13%** of food is lost in the supply chain before it reaches consumers (U.N.E, 2024).
- The UN's Sustainable Development Goal 12.3 aims to halve global food waste at all levels (FAO, n.d.).

This issue is bigger than the individual feeling guilty or losing money; the impact on the environment is also a big concern. In 2023, food loss and waste accounted for 8 to 10% of global greenhouse gas emissions (Agency E.P., 2023) – making food waste one of the largest contributors to climate change worldwide. It costs the global economy $2.6 trillion USD each year, "including $700 billion USD in environmental and $900 billion USD in social costs" (Sustainability Pathways, n.d.).

In the EU

- **€132 billion** worth of food is wasted each year – over 59 million tonnes (European Commission, n.d.).

In Ireland

- **835,000 tonnes** of food waste were produced in 2023, with 26% coming from households (Agency E.P., 2023).
- On average, Irish households lose **€700** annually, costing the nation roughly €1.29B per year (Agency E.P., 2023).

Despite growing awareness, much of this waste happens after purchase, when food is forgotten in fridges or expires unnoticed. While smart fridges exist, they remain costly and inaccessible to most people, despite their actual features being quite limited.

So …

What if ordinary households could track their food effortlessly, without manual input, minimal intervention, and no need to buy a new appliance?

This question is at the heart of Fresh*TRACK*, an intelligent, accessible solution helping people to save money, reduce waste, and live more sustainably.

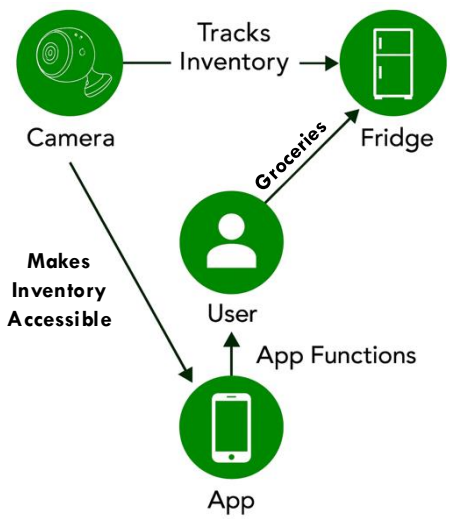
2 The Idea

Fresh*TRACK*

- Transforms every fridge into a smart fridge.
- Automates daily tasks related to purchasing, planning, and preparing food.
- Tracks products and food habits.
- Reduces food waste and saves money.

Fresh***TRACK*** offers an intelligent and seamless solution that revolutionises everyday food management. Using built-in camera technology and AI-driven insights, it automatically tracks the contents and freshness of your fridge, reducing the need for manual checks or shopping lists. Combined with an app, Fresh***TRACK*** provides real-time updates, expiry notifications, and personalised recipe suggestions, helping customers make the most of what they already have. Fresh***TRACK*** not only prevents food waste but also saves time, money, and unnecessary stress in household routines. Designed to transforms everyday food management into an effortless, sustainable, and rewarding experience, Fresh***TRACK*** enables anyone to enjoy smart fridge capabilities.

How does it work?



Our Innovation

Universal Compatibility

Fresh*TRACK* fits into every smart home ecosystem, making it accessible for every household.

User-Centred Simplicity

Fresh*TRACK* focuses on an intuitive solution that limits manual input and leads to an unique user experience.

Intelligent functionality

Fresh*TRACK* uses continues learning and AI to adapt to its users habits, offering personalised suggestions.

The Idea

Customer Journey Map

1 Setup

Download the Fresh*TRACK* app, create an account and connect the cameras through Wi-Fi. With a user-friendly interface and smooth installation, the setup process is designed to be quick and stress-free.

2 First Use

Explore the app's dashboard, which visually displays your food inventory, expiry dates, and freshness indicators. Fresh*TRACK*'s AI starts learning your food habits and continually improves itself. This ensures no extra effort for you.

3 Daily Use

Fresh*TRACK* becomes a part of your daily routine. Every time you open your fridge, the AI tracks what products you put in and take out and calculates the freshness of your food. Your fridge updates are all accessible through the app.

4 Grocery Shopping

To keep your household running smoothly, while shopping, you check the smart shopping list feature that automatically updates based on your fridge contents. Expiry notifications guide you to buy ingredients efficiently.

5 Recipe Suggestions

Fresh*TRACK* extends into your culinary creativity. In the app you get suggested creative ways to use ingredients from your fridge before they spoil. You receive personalised notifications and step-by-step cooking instructions, designed to avoid food waste.

6 Lifestyle Enhancement

In the app, you get monthly reports that summarise your activity, saved money and reduced waste, nudging you to consume the food in your fridge avoid buying the same product twice.

7 Support & Retention

Fresh*TRACK* maintains your satisfaction through reliable support and ongoing improvements. If the camera misidentifies an item you can manually scan it, helping your AI to learn about new products.

Customer Awareness

At Fresh*TRACK*, we recognise that our customers live busy lives where simplicity and efficiency are crucial. They value smart solutions that fit their daily lives without demanding extra effort. Reducing food waste is closely tied to consumers' everyday habits and motivations. Therefore, successful interventions must be seamlessly integrated into routines rather than rely on constant attention or behaviour change (Simões, Carvalho and De Matos, 2022). To gain a better understanding of Fresh*TRACK*'s target customers, we have created an ideal buyer persona "Marcus". With 70 % seeking convenience-focused solutions, millennials homeowners are the strongest adopters of smart home technologies (Vigderman, 2024). Therefore, this demographic represents the ideal target for FreshTrack's easily integrated and affordable smart fridge solution.

"I'm all about making our home smarter – saving time, money, and reducing waste."

Marcus Shaw

37 years old; lives in Dundrum, Dublin; stable middle-to-upper income

Marcus lives with his wife Emma and 2-year-old daughter Sophie in a recently purchased semi-detached home. Their family life is busy but fulfilling.

Marcus values creating routines that make daily tasks smoother and allow more quality time together. For this, he has already purchased some smart home appliances.

Marcus and his family are conscious of their environmental footprint and actively seeks ways to live more sustainably. He aims to be a role model for his daughter.

Customer Needs

Pains and Gains capture what customers experience in relation to their goals and daily routines (Austin, 2020). By identifying what causes inconvenience and what creates genuine value, Fresh*TRACK*'s solution fits naturally into our customers' routines, making their daily life smoother, more efficient and more rewarding.

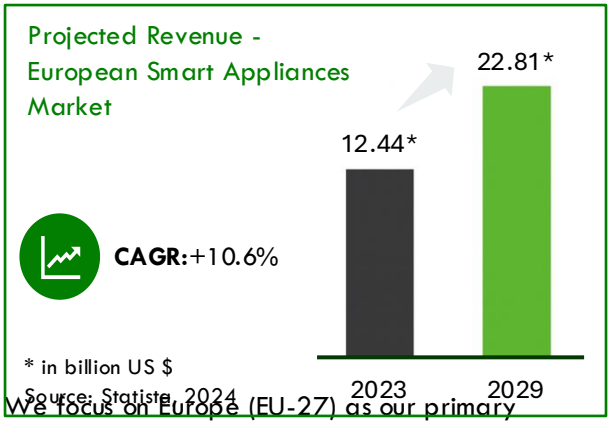
Has a busy everyday life	Produces a lot of food waste
Forgets about fridge content	Expensive smart appliances

Lives a more sustainable lifestyle	Stays organised without extra effort
Affordable add on solutions	Discovers new meal ideas

Market Size

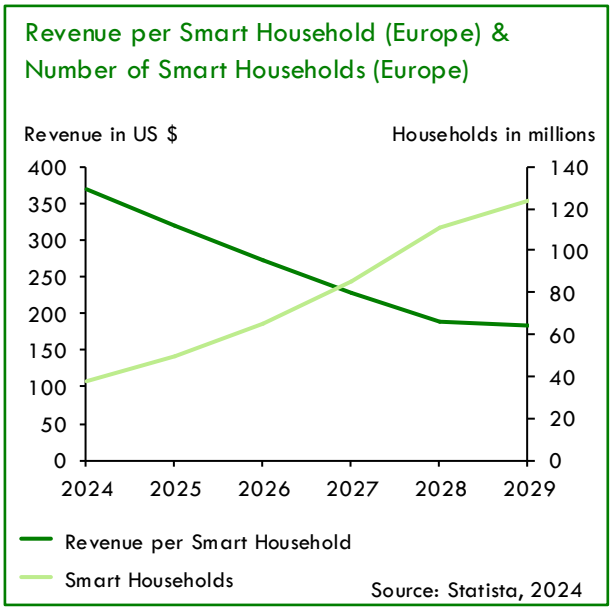
For the market sizing of Fresh*TRACK*, the analysis focuses on the Smart Home Appliances market. This category includes all connected household devices such as smart refrigerators and appliance add-ons, which makes it the most relevant framework for our product.

The global Smart Appliances market generated around US $60.6 billion in 2024 and is projected to reach US $99.9 billion by 2029, representing a compound annual growth rate (CAGR) of approximately 10.5 % (Statista, 2024).
This strong upward trajectory is driven by rising consumer demand for convenience, energy efficiency and connectivity, as well as by the increasing integration of artificial intelligence (AI) into household products.



We focus on Europe (EU-27) as our primary market. The region represents a large, integrated and well-regulated single market with harmonised consumer protection and sustainability standards. Revenue in the European Smart Appliances segment is expected to increase from US $ 12.44 billion in 2023 to US $ 22.81 billion in 2029, corresponding to a CAGR of 10.6 %, slightly above global growth (Statista, 2024).

Beyond size and regulation, Europe's societal values make the region particularly attractive. 94 % of citizens in all EU Member States say that protecting the environment is important to them (European Commission, 2020), which aligns closely with Fresh*TRACK* 's ambition to reduce food waste and promote responsible consumption.



While the European market continues to expand in volume, a structural change is emerging: the average revenue per smart household is expected to decline from around $ 370 USD in 2024 to $ 184 USD in 2029 (Statista, 2024). This shows that the smart appliance sector is shifting from a premium niche toward the mass market. Early adopters willing to pay high prices are now followed by a mainstream audience seeking affordable, efficient solutions. At the same time, the number of European smart homes is projected to rise from about 38 million in 2024 to 124 million in 2029, signalling a democratisation of smart home technology (Statista, 2024).

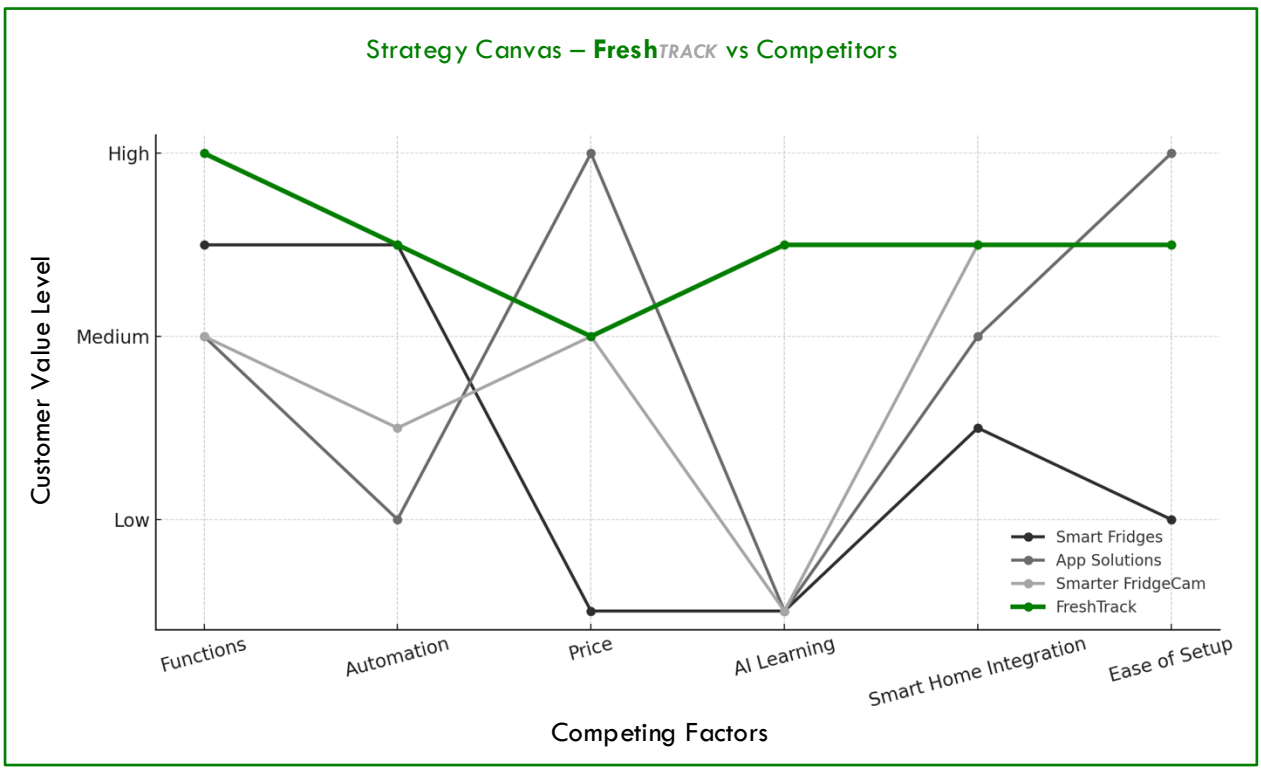
Competitor Analysis

The Strategy Canvas illustrates how Fresh***TRACK*** differentiates itself from existing market players: Smart Fridges, App Solutions, and the Smarter FridgeCam across six competitive dimensions: *Functions, Automation, Price, AI Learning, Smart Home Integration* and *Ease of Use*.

The comparison reveals a clear tension in the current market: at one end, Smart Fridges offer advanced functions and automation but remain inaccessible to most consumers due to high prices of €3,000–4,000 and their closed hardware ecosystems (Samsung Electronics, n. d.). At the other end, App Solutions and the Smarter FridgeCam provide affordable options but rely heavily on manual input and lack true intelligence or integration (Smarter, n.d.)

This creates a gap between premium automation and affordable usability, a space where no existing product successfully combines both.

Fresh***TRACK*** intervenes precisely in this tension. It breaks the existing divide between affordability and automation by decoupling intelligence from expensive hardware. Through AI-driven image recognition and behavioural learning, Fresh***TRACK*** introduces a level of autonomy and adaptability that current low-cost solutions lack. This learning capability opens untapped potential for user experience by creating systems that evolve with household habits rather than relying on static, manual input.



The strategic shift redefines how value is created in the segment transforming automation from a high-end convenience into an accessible, evolving service. By doing so, Fresh*TRACK* opens a previously underdeveloped mid-market space where automation and affordability meet, establishing a new competitive logic within the smart-home appliance ecosystem.

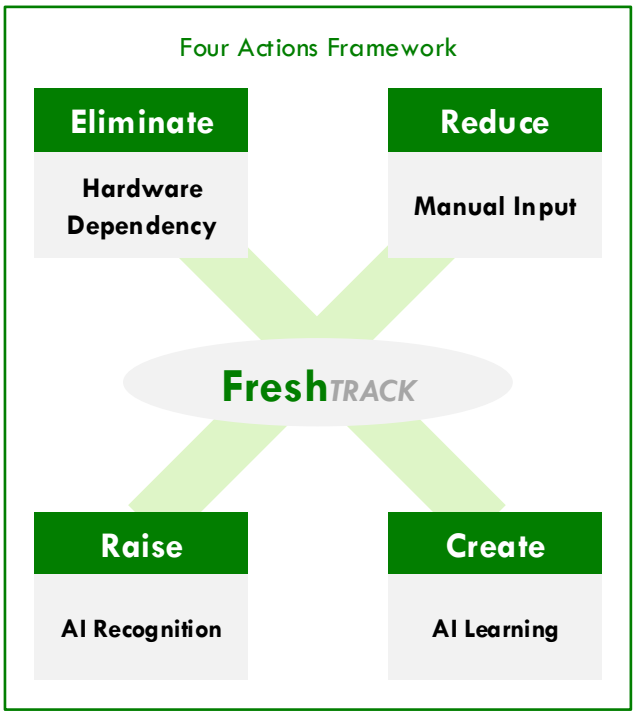
Creating a New Value Curve

This section explores how Fresh*TRACK* must adapt and redefine its product attributes to develop its own distinct value curve within the identified market gap. This approach follows the Four Actions Framework, which proposes four strategic actions: eliminating, reducing, raising, and creating to build new market space (Kim & Mauborgne, 2015).

Eliminate – Fresh*TRACK* removes the industry assumption that advanced automation is inseparable from premium, built-in hardware. We break that dependency by detaching AI capabilities from hardware, offering high-level automation through a standalone, affordable module.

Reduce – We reduce the manual input burden that defines most existing tools to a minimum. By automating these processes, we remove the repetitive effort from daily fridge management, ensuring a frictionless experience and more reliable information for users.

Raise – By enhancing the accuracy and range of AI recognition, we position Fresh*TRACK* far beyond current solutions. The *Samsung Bespoke AI Fridge* recognises only 33 items (as of March 2024) through its database, limiting its relevance in daily use (Samsung Electronics, n.d.).



Create – Finally, Fresh*TRACK* introduces behaviour-based AI learning that transforms static tracking into a personalised experience. By observing product usage cycles and frequently purchased items, the system predicts consumption patterns and tailors restock reminders and recipe suggestions. This continuous learning loop strengthens customer engagement and delivers long-term value, a capability absent from all current competitors.

Drawing on the concept of lock-in effects, Fresh*TRACK*'s behaviour-based AI learning both personalises use and creates a barrier to switching (Farrell and Klemperer, 2007). As the system adapts to household habits, users invest time and behavioural data that increase its precision and convenience. This growing personalisation makes it costly and inconvenient for users to switch, as doing so would mean losing their tailored experience and starting the learning process anew (Farrell and Klemperer, 2007).

3 Ideation Process

Everything that exists today started as just an idea. This process of generating and selecting new ideas, especially in relation to business ventures, is known as ideation, and it forms the foundation of entrepreneurship and innovation (McMullen and Kier, 2017).

The ideation process we went through was extensive, involving multiple stages of designing and evaluating solutions, narrowing down problems, and ultimately incorporating theory and research to develop a suitable product.

McMullen and Kier's (2017) work titled, *The Unique Role of Imaginativeness in New Venture Ideation,* discusses Noller's model of creative problem-solving, which identifies four ingredients of creativity displayed below.
Noller describes imagination as the "catalytic element" that connects these components and enables innovative solutions to emerge (Isaksen et al., 2010).

Attitude
identified 26 Problems

Knowledge
voted for the top 5 of 15

Imagination
5 potential solutions

Evaluation
2 finalists

Attitude: At the beginning, our goal was to identify problems that we or others face, focusing on genuine needs rather than random ideas. Each member listed five or more problems and potential solutions.

Knowledge: In our first meeting, we shared and discussed these problems, applying our combined knowledge to assess the feasibility and consumer appeal of potential solutions. We then conducted an anonymous vote via Microsoft Forms, ranking our top three choices to eliminate bias (if you see a vote for an idea that you might not have gone for).

Imagination: In our second meeting, we discussed the research findings and evaluated each idea on its imaginativeness, asking questions like: Is the idea original? Does it solve a real issue? Would consumers find it convenient and cost-effective?

Evaluation: We were left with two ideas that stood out, addressing different problems with distinct business models. We were unable to reach a consensus, so we pitched both options to our classmates, who voted almost exactly 50/50. This meant we had to evaluate both concepts on a deeper level before selecting one for further development.

Drawing on the lecture from week two, where we watched Bill Gross' TED Talk, The Single Biggest Reason Why Start-Ups Succeed, we remembered that "strong traction + good timing" can attract many funding opportunities (Gross, 2015).
Since one of the challenges with the food-waste solution was the cost of research and development involved before sales, particularly in relation to the AI integration and prototype development, we discussed both options in this context.

The challenge we identified with the adaptable home idea was that the time-to-market would be longer due to planning permissions. Even with early traction, the hype could fade before launch, or a competitor could beat us to market. Another challenge was scalability, with differing housing regulations and building standards in each country slowing expansion. On the other hand, the food waste concept could scale more quickly and globally.

Hence, we chose Fresh***TRACK***.

Criteria	Fresh*TRACK*	Adaptable Homes
Time to Market	Faster launch; software-based MVP possible	Slower; requires planning permissions
Scalability	Easily adaptable across markets	Varies by country due to housing laws
R&D Cost	Higher upfront tech & AI integration cost	Lower initial design cost, build-to-order
Consumer Appeal	Addresses everyday problem; broad user base	Targeted to specific buyers and developers
Timing	AI/Sustainability: demand peaking now	Construction sector slower to adopt innovation

Blue Ocean Strategy

"Focus on the 1s and 2s not the 9s and 10s"

Aim for non-customers who are underserved rather than competing with big firms for loyal, high-value customers (Clinton, 2025).

Adopting a Blue Ocean mindset, Fresh***TRACK*** aims to create demand and value rather than competing for existing customers.

Research into the relevant industry led to the discovery of Industry 4.0 (I4.0), signalling the emergence of a new industrial era, consisting of four key pillars: Smart Manufacturing, Smart Products and Services, Smart Working, and Smart Supply Chain (Kai et al., 2024).

Our concept fits into the Smart Products and Services pillar, providing innovative consumer solutions by integrating intelligence into end products. Kai et al. (2024) found that startups emerging in this new era often adopt multi-sided platform models, functioning as connected parts of broader supply chains. In our case, this structure is reflected in how Fresh***TRACK*** links multiple participants and technologies. We integrate the camera manufacturer, AI processing system, and Google's cloud and database services into a single product and mobile app for customers.

Using this structure, we developed Fresh***TRACK*** as an AI-powered app that connects with external camera inputs to automate food tracking and meal planning. By offering our product as an add-on instead of an appliance, it becomes portable, renter-friendly, and widely adaptable. Integrating deep learning enables greater convenience, creating an ecosystem that streamlines grocery planning and ensures users never have to worry about forgetting items or figuring out what to cook.

4 Technical Evaluation

APP

The proposed application is a cross-platform solution for both Android and iOS devices, providing an intuitive interface for monitoring and managing food items. The user-friendly dashboard visualises food inventory, alerts users to expiring products, and enables easy addition and categorisation of items. AI-driven functionality supports recipe creation based on available ingredients, enhances convenience, reduces food waste, and adapts to the user's grocery shopping behaviour. Fresh***TRACK*** provides reminders such as "you are running out of milk." The modular design allows seamless integration of additional features, including new notifications or recipe suggestions. Emphasis is placed on usability and simplicity, ensuring effortless navigation while maintaining reliable connections to both Wi-Fi-enabled cameras and cloud storage for secure data transmission.

Fresh***TRACK's*** app connects with the camera through a unique serial code and certificate-based authentication, ensuring secure device pairing. During setup, users authorise the camera to access their Wi-Fi network directly within the app interface, allowing data transfer between the camera and the app. Multiple devices can install the app and link together as one household to manage a shared set of cameras, for example, one fridge. In cases of multiple fridges, the system is easily expandable to accommodate additional camera sets. (Anon, 2024).

Hybrid frameworks such as Flutter or React Native enable a shared codebase for Android and iOS while ensuring high performance, native functionality and efficient maintenance in app development *(Flutter, n.d.;* React Native, n.d.).

IoT Camera

The camera represents one of the most technically demanding components of the overall workflow, as several challenges must be resolved to ensure a fully functional prototype. Central questions include:

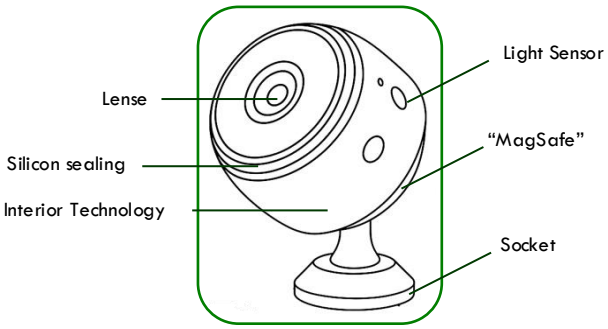
- *Optimal camera placement. for maximum visibility*
- *Methods of installation that avoid damaging the refrigerator or voiding its warranty*
- The selection or design of a camera capable of reliable operation under low temperatures and high humidity

For placement, various configurations were examined, including the use of one or multiple cameras positioned either inside or outside the refrigerator.
To maximise visual coverage of items placed within, the preferred solution involves two cameras mounted at the upper left and right corners of the refrigerator's inner frame.

To assure our Customer the initial guarantee of the fridge we decided for a socket, which will not influence the functionality of the fridge (DETE, 2023). Installation methods under consideration include magnetic mounts, sockets, adhesive strips, and glue-based fixtures. To maintain the refrigerator's warranty and integrity, non-invasive options are prioritised, though further testing is required to ensure mechanical stability and thermal resistance.

Essential camera requirements identified include Wi-Fi connectivity, battery operation, and sufficient insulation or silicon sealing to withstand refrigeration conditions. While several commercial products provide some of these features, they are often prohibitively expensive or lack key functionalities.
Consequently, the proposed solution involves developing a Fresh*TRACK* custom prototype based on the *ESP32-CAM Module*, which integrates a camera and Wi-Fi module capable of database communication (Evelta Electronics, n.d.).

Its main limitation lies in short battery life (approximately four hours) and limited cold resistance. These constraints may be mitigated by incorporating a light sensor that triggers a deep-sleep mode when the door is closed, reactivating the camera upon door opening within an insulated enclosure. For a longer Battery Lifetime, we are deciding between integrating a larger, replaceable battery or develop an external recharger that can be plugged onto the Camera and charges as via magnetic field (like MagSafe) to ensure 100% humidity resistance. As Wi-Fi transmission is only required when the door is open, the possible Faraday cage effect of the closed refrigerator does not pose a significant issue *(Pollette, C., Chandler, N., n.d.)*.



AI Workflow

Architecture

Fresh*TRACK*'s IT architecture functions as follows: videos are transmitted via Wi-Fi to the cloud, where they are processed by APIs. The analysed and categorised data are then stored, read and connected in Cloud SQL. A generative AI accesses the fridge-specific database and matches existing Products within the Database to recipe suggestions that are displayed in the user's application interface. A separate analytics model or Vertex AI pipelines monitors and analyses Customer behaviours to make distinct Grocery shopping suggestions.

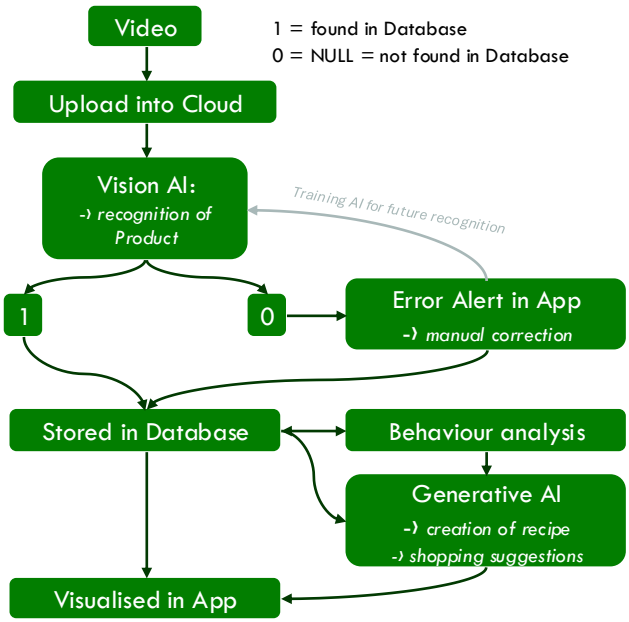


Image Analysis

Initially, single-image analysis was considered; however, due to challenges with timing and object occlusion, video analysis was determined to be more suitable. Although slightly more costly, video-based models offer substantially higher recognition accuracy.

Three main approaches to video analysis were evaluated:

1. Training from scratch – *high cost, high workload, and limited initial accuracy*
2. Transfer learning – *moderate cost and workload, with acceptable accuracy*
3. Pre-built APIs – *lower cost and workload, with medium to high accuracy*

Following comparative research, Google's Vision and Video Intelligence APIs were identified as the most appropriate option. Google's models, trained on extensive datasets (including YouTube), demonstrate high object-recognition accuracy *(Anand, N., 2024, Google, n.d. Vision AI, Vallese, Z., 2025)* and competitive pricing compared with alternatives such as Microsoft Azure.

In instances where the AI fails to identify a food-related object, the user receives an error notification via the Fresh*TRACK* -App, allowing manual correction or addition of an item (e.g., "Grandma's Onion Soup").

Generative AI

A Generative AI model, most likely Gemini, will be employed to generate recipes based on the items currently stored in the refrigerator. The AI accesses two databases: the internal food-label database (populated from camera analysis) and an external recipe dataset such as Recipe1M+ *(Marin J. et al., 2021)*. Recipes are ranked according to predefined constraints: *No new ingredients required, One to three additional ingredients permitted, Excessive missing ingredients*

Additional user-defined preferences, such as dietary restrictions or cuisine types, can further refine recipe suggestions.

Behaviour Analysis

Integrating a separate analytics model or Vertex AI Pipelines into a cloud architecture enables automated and scalable behavioural analysis *(Google, n.d. Vertex AI)*. Data collected from user interactions are first stored in Cloud SQL or BigQuery. Vertex AI Pipelines then orchestrate preprocessing, feature extraction, model training, and deployment in a reproducible workflow. Trained models are hosted on Vertex AI for prediction and integrated via API endpoints into the application layer.

Database

For cloud storage and processing, the Google Cloud Platform was selected due to its strong compatibility, cost efficiency, reliability, and compliance with EU data protection frameworks, including the GDPR and the forthcoming EU AI Act 2026 *(Manfra, J., 2024.;* Google, n.d. Google Cloud und die Datenschutz-Grundverordnung).

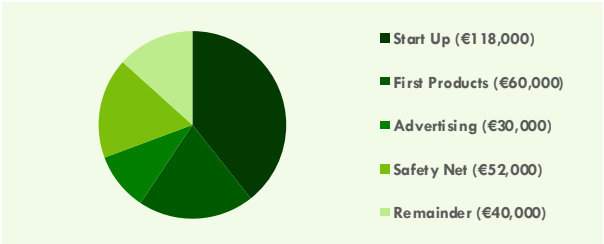
Furthermore, Google allows data to be stored on servers physically located within the European Union, an essential feature for a data-driven consumer product *(Google, n.d. Choose a geographic location for your data)*. In addition, the project must ensure compliance with the Consumer Rights Directive, ePrivacy Regulation, and transparency requirements concerning cookies, tracking, and personalisation mechanisms. Future adherence to specific obligations under the EU AI Act may also be required *(Future of Life Institute, n.d.)*.

5 Investments & Returns

While planning our budget and growth, a more cautious approach was adopted, recognising the challenges of entering the technology market. This is reflected in lower sales and income figures, despite higher investments.

Budget

Fresh*TRACK* is expected to require €260,000 of initial seed investment. Initial costs to start up and produce the camera and app amount to €178,000 [See Appendix B]. This includes hardware development of the camera, app development, and further AI testing. Around €30,000 is allocated for advertising, and €52,000 in capital reserves, which act as a safety net for the first few years. This means there is €40,000 remaining that is not planned to be used.



Expected revenue growth in units sold is as follows:

Year	FY26	FY27	FY28	FY29	FY30	Total
# Units Sold	3,000	6,000	10,000	16,000	25,000	60,000
Growth		100%	67%	60%	56%	

only selling through its website, eliminates retail margins. We predict a steady growth in purchases, reaching a total of 60,000 units sold by 2030. The €8/month subscription allows for users to experience app features such as the recipe generator and food tracker. Fresh*TRACK* would reach the total SOM of 50,000 units by the end of the forecasted period (by FY2030).

Profit and Loss

Fresh*TRACK* is expected to make a loss in its first year of business, due to higher costs which are not offset by the number of sales made. Based on projections, Fresh*TRACK* will break its break-even point in mid 2027 and are projected to pay off the €260,000 investment in FY29. Since sales are over 10,000 units, mass production will be implicated, which reduces materials costs. At the end of the five-year forecasting period, Fresh*TRACK* is predicted to make an estimated €1.2 million after paying off the start-up loan.

P&L (in k€)	2026E	2027E	2028E	2029E	2030E
Revenues	292.7	585.4	976	1,561	2,439
Units sold (#)	3,000	6,000	10,000	16,000	25,000
Per unit (€)	97.56	97.56	97.56	97.56	97.56
Subscription profit per unit (€)	60	60	60	60	60
COGS	171.07	348.34	580.56	633.67	990.15
Materials	135	270	450	480	750
Manufacturing	3.12	6.24	10.4	16.64	26
Packaging	0.6	6.24	10.4	16.64	26
Shipping	0.36	0.72	1.2	1.9	3
Customs (23%)	31.99	65.14	108.56	118.49	185.15
Gross Profit	121.61	237.02	395.04	927.29	1448.85
OPEX	139.38	174.68	233.18	322.78	452.78
AI Configuration	36	72	120	192	300
Warehouse	0.3	0.6	1.1	1.7	2.7
Office	14	14	14	14	14
Marketing	25	22	20	23	27
SG&A	6.08	6.08	6.08	6.08	6.08
Salaries	60	60	72	86	103
PbT	-19.77	62.34	161.86	604.51	996.07
Taxes	0.00	7.79	20.23	75.56	124.51
Net Income	-19.77	54.55	141.63	528.95	871.56

*Gross Profit and Net Income do not include profits from subscription model

Return on Investment Freshtrack	
Initial Investment	260,000
Revenue FY2028	976,000
EBITDA	137,425
Return on Sales (%)	14.1
Return on Investment, start of 2029 (%)	**52.6**

Subscription Model (€ Per Month)	
Subscription Cost for Customer	8
AI Configuration	1
App Maintenance/Software Updates	2
Profit	5

Cost of Goods Sold

Based on calculations, the initial COGS for Fresh*TRACK* are approximately €57.02 per unit. The materials price will fall when there is enough demand for mass production. The cameras will be outsourced and manufactured in China, where manufacturing is cheaper. The items will then be shipped to Ireland via sea route and stored in a warehouse [See Appendix C for further detail].

COGS (€ per unit)	Smaller batch sizes	Mass production
Materials	45	30
Packaging	0.2	0.2
Manufacturing	1.04	1.04
Shipping	0.12	0.12
Customs (23%)	10.66	7.21
TOTAL	**57.02**	**38.57**

Sales, General & Admin

Regarding SG&A, an Irish accountant is needed to ensure proper bookkeeping and taxes. This will cost around €191 per month *(Dedicated Accountants for Business Startups, 2024)*. Additionally, Google Workspace accounts will be €6.80/month per person *(Google Workspace, 2024)*. To sell Fresh*TRACK*, there will be a Shopify account set up, which will cost €24 per month *(How Much Does Shopify Cost in Ireland, 2025)*. In addition, there is €2,500 set aside annually to go towards travel expenses of team members, since most plan to live in Germany and Canada. There is also €500 for miscellaneous expenses, such as office supplies. Team members will be paid a salary of €1,000 per month until Fresh*TRACK* makes a profit (projected to be in FY2027), then this amount will increase by 20% each year. This is based on estimations of rent, groceries, and other living expenses.

Running Costs/OPEX

Running costs will be high in the first years to get the business established. It has been decided to use one of the founders' private accommodations as the corporate office (€1167/month) to avoid having to rent out another place. For warehousing, the cost varies depending on how many pallets Fresh*TRACK* plans to have [See Appendix D]. In terms of marketing efforts, is it planned to allocate another €25,000 towards marketing in FY2026 to continue promoting Fresh*TRACK*. This allocated amount will decrease per year until FY2028, when Fresh*TRACK* is able to pay off the €260,000 start-up costs. Finally, Fresh*TRACK* is planning to utilise the established Google Gemini to perform the app's AI capabilities. This will cost roughly €1 per month per unit, in addition to development costs.

SG&A	Cost (€ per year)
Accountant	2,292
Google Workspace	502
Website	288
Travel	2500
Miscellaneous	500
TOTAL	**6,082**

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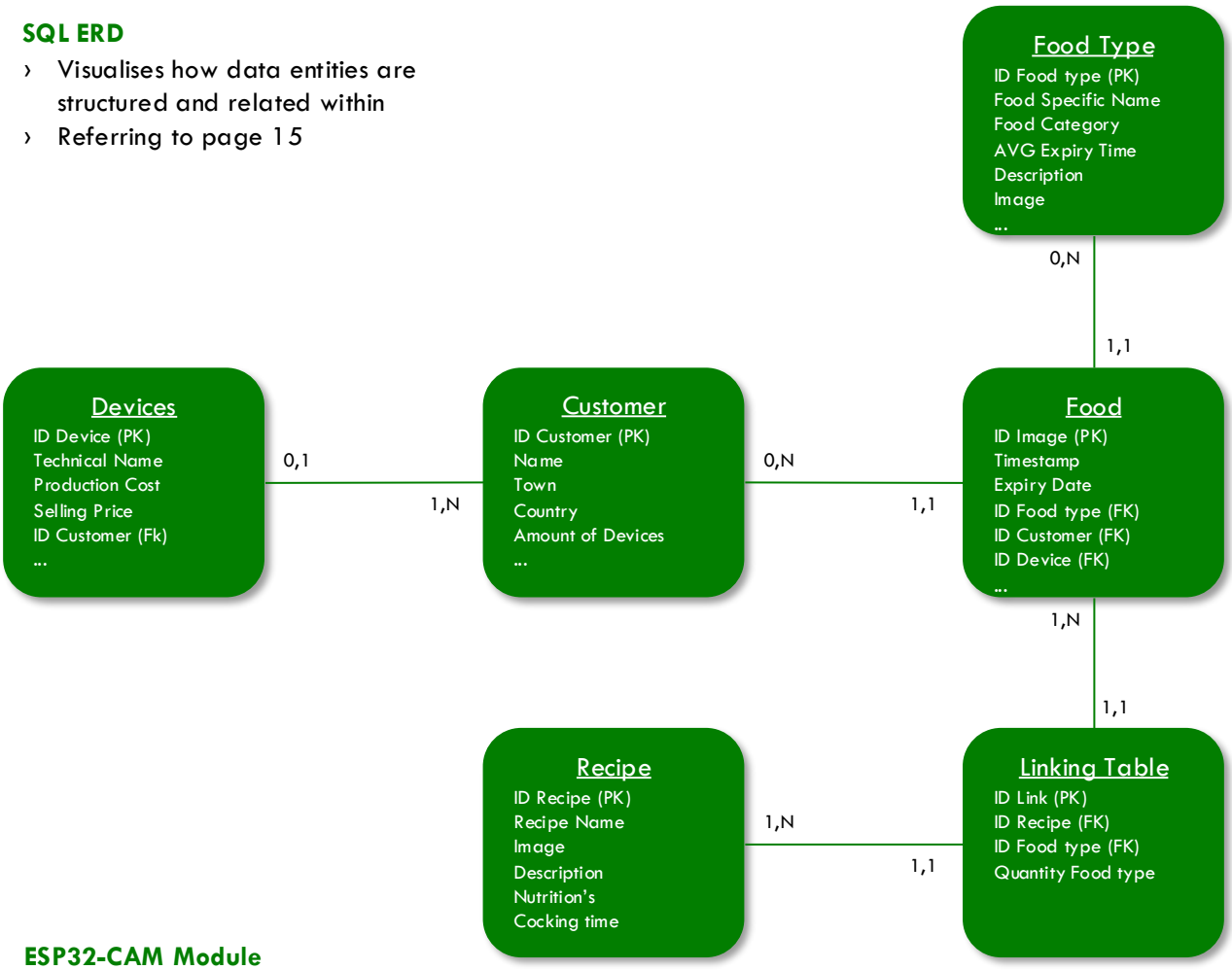
Appendix

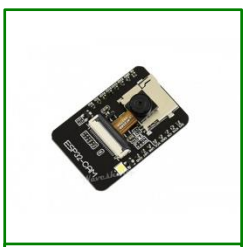
SQL ERD

- Visualises how data entities are structured and related within
- Referring to page 15



ESP32-CAM Module

- Prototype Modular Information
- Referring to page 15



Overview

- The ESP32-CAM is a small size, low power consumption camera module based on ESP32. It comes with an OV2640 camera and provides onboard TF card slot.
- The ESP32-CAM can be widely used in intelligent IoT applications such as wireless video monitoring, Wi-Fi image upload, QR identification, and so on.

Applications

The ESP32-CAM suit for IOT applications such as:

- Smart home devices image upload
- Wireless monitoring
- Intelligent agriculture
- QR wireless identification
- facial recognition

Features

- Onboard ESP32-S module, supports WiFi + Bluetooth
- OV2640 camera with flash
- Onboard TF card slot, supports up to 4G TF card for data storage
- Supports WiFi video monitoring and WiFi image upload
- Supports multi sleep modes, deep sleep current as low as 6mA
- Control interface is accessible via pinheader, easy to be integrated and embedded into user products

Link: *https://evelta.com/esp32-cam-camera-module-based-on-esp32/#productDescription*

Appendix B

Types of Investments Fresh*TRACK*

Investment	Description	Price (EUR)
Company and certification for Fresh*TRACK*	Legal and certification costs	18,000
Data Protection	GDPR Compliance	30,000
App Setup	App development and AI integration via software developer	60,000
Distribution Channels	Development of Shopify website and setup of warehouse and shipping	10,000
Production of First Batch	Hardware development and prototype development of camera	30,000
AI Development	Further AI development and testing	20,000
Pilot Production	Testing camera and app	10,000
Total Initial Investment	Before first sale	178,000

Materials: Breaking this down, the main contributor to this cost is the manufacturing materials for the cameras, which in the initial stages is estimated to cost around €45 per unit. However, once Fresh*TRACK* begin mass production (over 10,000 units), these costs are estimated to drop to €30 per unit.

Manufacturing: For assembly and quality checks, it is estimated that it would take 17 minutes of human labour per unit at an average hourly wage of RMB22 *(China Salary and Wages, 2025)*. With a 40% markup for contract manufacturing, this will cost €1.04 per unit.

Packaging: It is determined that a small box to fit the Fresh*TRACK* cameras and accessories would cost €0.20 per unit *(Small Business Mailer Box Mug Clothers Nails Wig Pakcaging Paper Box, n.d.)*.

Shipping: Fresh*TRACK* plans to ship the cameras from China to Ireland using the sea route. This will cost €65 per one cubic meter *(Shipping from China to Ireland, 2025)*. Based on calculations, it will cost €0.12 per unit to ship.

Shipping	
Cost per m³	65
Pallet size in m³	1.536
Cost per pallett	99.84

Year	Pallets per year	Pallet(s) volume	Cost of Shipping	Cost per item
2026	2.34	3.6	358.8	0.120
2027	4.69	7.2	719.2	0.120
2028	7.81	12.0	1197.7	0.120
2029	12.5	19.2	1916.9	0.120
2030	19.53	30.0	2995.0	0.120

Customs: Ireland has a VAT tax of 23% on the value of items entering Ireland.

Appendix D

Warehousing Costs

Boxes (with cameras inside) per pallet	1280
Sq.ft. per pallet (European)	10.33
Costs per sq.ft. per year (in EUR)	13.2

*box dimensions are 15cm x 10cm x 8cm

Year	Pallets per year	Require sq.ft	Average Price (in EUR)
2026	2.34	24.2	319
2027	4.69	48.4	640
2028	7.81	80.7	1,065
2029	12.5	129.1	1,704
2030	19.53	201.7	2,663

(How much does it cost to rent a warehouse?, 2025)