Introduction

The company behind this research project has developed an IoT device that acts as a personal fridge and food assistant; scanning in items, storing quantities, remembering expiry dates and helping the users waste less food and less time on shopping and recipe creation.

Before going to market, the company needs information on the market size, competitors, user problems and pricing. This research aims to answer these key questions and more.

Market Size

1. Smart Fridge

The global smart refrigerators market is expected to grow from $2.5 billion in 2020 to $2.9 billion in 2021 at a compound annual growth rate (CAGR) of 16%. The growth is mainly due to the companies resuming their operations and adapting to the new normal while recovering from the COVID-19 impact, which had earlier led to restrictive containment measures involving social distancing, remote working, and the closure of commercial activities that resulted in operational challenges. The market is expected to reach $4.56 billion in 2025 at a CAGR of 12%.

The smart refrigerators market consists of sales of smart refrigerators and related services that are used in residential and commercial sectors. A smart refrigerator is a programmed high-tech refrigerator that can identify the type of products stored therein and keep track of important information such as expiry and usage. Such refrigerators operate on a barcode or RFID network whereby the batch is collected and information is generated directly from the Internet.

The rise in adoption of smart cities and smart infrastructures is a key factor driving the growth of the smart refrigerator market. The Internet of Things (IoT) market has been growing, with smart home devices and appliances, homes are getting smarter with new devices that are available with internet connectivity. Smart home devices such as Google Nest, Ring and smart fridges have held users aware of the Internet of Things (IoT) trend, which relates to the connectivity of everyday items over the Internet. The global number of IoT-connected devices is projected to nearly triple from the 2018 estimates, reaching 43 billion by 2023, according to McKinsey & Co. Therefore, companies are investing more in IoT due growing interest in the smart home and this factor is driving the market for smart refrigerators.

Smart refrigerators are generally more expensive than ordinary refrigerators. Although smart refrigerators have high-tech features and can be controlled via smartphones, the high cost is hindering its growth. Additionally, the high repair cost is a key factor hampering the growth of the smart refrigerator market. Consumers might have to invest more on specific parts that are difficult to locate, and there might also be shortage of

parts for some models in some cases. This results in using second-hand parts. Popular issues include a non-running refrigerator, or having a freezer portion that does not remain cold. The cost to fix these problems ranges between $140 and $200 nationally. The more recent issue with smart refrigerators is hacking. Smart refrigerators are not built with security and can't be protected by antivirus software. Using devices that incorporate hardware, cloud and software designed to safeguard the appliance is an additional expense. Therefore, the high cost with smart refrigerators is expected to limit the growth of the smart refrigerator market.

Competitive Analysis

1. Smart Fridges

Samsung Smart Fridge and Family Hub

Within the View Inside app, there is a Food List section that you can use to track items in your fridge or pantry. You can access View Inside to enter new items using the SmartThings mobile app on your phone or directly on the Family Hub panel itself. To quickly access View Inside on the Family Hub panel, swipe down with two fingers from the top of the screen.

You can review the food that was automatically recognized, as well as tap anywhere on the screen to add or edit items. You can also view the Food List directly to add items,

even ones that are not in the main compartment that is shown in the picture, or not even in your fridge at all. If adding them manually is a hassle, you can also use Bixby instead (see next section).

After you've added food items, you can set an expiration date for them, so you know when things are starting to go bad. You can also send stored or removed items to your shopping list for the next time you go to the grocery store. And you can also use the Meal Planner to suggest recipes using what's in your fridge. Just remember that when you remove items physically, they also need to be removed from the Food List.

Samsung Whisk

Samsung has developed a [new personalized cooking experience](#) feature for its fridges, shown off at CES.

The tech combines Samsung's Whisk smart food platform with the ViewInside camera for its Samsung Family Hub refrigerator. Using A.I.-powered image recognition, the tech is able to understand the items you have in your fridge (including tracking expiration dates) and use these to recommend a curated list of recipe suggestions. These can be further customized to not only incorporate the ingredients you already have in your possession, but also according to specific food preferences.

Previous versions of the Family Hub refrigerator range let users remotely view the inside of their fridge on a mobile device via the inbuilt cameras.

See https://whisk.com

2. Fridge Cam

Created by London-based tech firm [Smarter](), FridgeCam turns any fridge into a smart fridge. The discreet device is a camera that goes in your fridge, fitted with artificial intelligence (AI).

Why do I need AI in my fridge? Every time you close your fridge door, the camera sends a picture of the inside of the fridge to the Smarter app.

It then uses object recognition to create an inventory of what you have in stock, which enables you to see what is inside your fridge through the Smarter app when you're food shopping.

Now you will never double-up on an ingredient or forget to buy something again because FridgeCam can keep you updated.

The camera sends a picture of the inside of your fridge to an app so you can see what food you have / Smarter As well, the device is able to manage best before dates so you know when your yoghurt is about to go off and you need to stock up. Smarter is working alongside Tesco so that this inventory can be sent to your Tesco shopping list so you know what you need to buy when you're out and about.

Considering UK households are [throwing away £700 worth of food a year](#), which is a lot in terms of cost and sheer waste, this device could go some way to changing that.

Christian Lane, founder and CEO at Smarter, says the FridgeCam was created to deal with this everyday struggles of forgetting what's in the fridge when you're food shopping or having to throw away food again.

"As a company, we feel passionate about using technology for good, and with this device we have the first of what will be a range of different products that together have the potential to not just drastically reduce a family's food waste but reduce it across the country and globally, which has massive benefits to the planet," he adds.

If you're a [smart home](#) fan already with [Alexa](#) or the Google Assistant assisting with your home life, you can link FridgeCam up and integrate it with these devices.

Smarter isn't the only company working on this kind of technology. Samsung is speeding ahead when it comes to smart home products and offers a similar feature in its smart fridges.

But if you're not ready to buy a whole new fridge, or can't – say you rent your home – FridgeCam is a way to bring those smart technologies into your home and use it to complement your existing smart home ecosystem.

And, you can wave goodbye to throwing food out ever again.

3. Apps

Examples include:

[FoodKeeper](#)

[Best Before - Food Tracker](#)

[Fridgely](#)

[BEEP](#)

[Cozzo](#)

Pricing

FridgeCam is remarkably only $39, but doesn't boast the feature set of the product in question. A Smart Fridge costs thousands but is out of reach for most people. We believe a price point of between $79 - $129 is appropriate given the benefits of this product.

Note the hardware sales isn't the major revenue driver for the business, so an economical price point to get the product in more households is preferable. I.e. cover the manufacturing costs and sell data and wraparound services.

Target Market

While the novel IoT device will cost just a fraction of a smart fridge it's still likely to appeal to middle to upper class demographics. That's because food waste (and the awareness of food waste) isn't as big of a problem for lower economic groups that may rent fridges, have takeaways often or simply don't experience the problem because they don't buy as much fresh food or stock their fridges substantially at all.

Our research shows that this device would appeal to people who:

1. Go grocery shopping at least once a week, whether I cook or not.
2. Use the Notes app on my phone to do my grocery shopping list.
3. Take around 10–20 mins organising my grocery shopping when I get home, at clearly designated areas like the fridge and kitchen cabinets.
4. Keep track of my food by visually checking what I have and making a mental note.
5. Find it difficult to keep track of my food and often forget what I already have.
6. Hate that my food expires so often and I will try to find ways to avoid throwing them out.
7. Like my food fresh and the right kinds of food in the right quantities.

We can summarise these statements with these insights:

Insight 1: I keep track of my food supplies by visually checking what I have and making a mental note.

Insight 2: Checking expiry dates occurs when doing up their grocery list or meal planning. Both these activities are closely intertwined with each other.

Insight 3: I take around 10–20 mins to organise my grocery shopping when I get home, at clearly designated areas like the fridge and kitchen cupboards.

Insight 4: Food freshness is important and they wish to incorporate a "First In First Out" approach to their food tracking.

Size of Problem

United States of America

In the United States 30 percent of all food, worth US$48.3 billion (€32.5 billion), is thrown away each year. It is estimated that about half of the water used to produce this food also goes to waste since agriculture is the largest human use of water.

Losses at the farm level are probably about 15–35 per cent, depending on the industry. The retail sector has comparatively high rates of loss of about 26 per cent, while

supermarkets, surprisingly, only lose about 1 percent. Overall, losses amount to around US$90 billion–US$100 billion a year (Jones, 2004 cited in Lundqvist et al., 2008).

The food currently lost or wasted in Latin America could feed 300 million people (FAO, 2013).

Europe

United Kingdom households waste an estimated 6.7 million tonnes of food every year, around one-third of the 21.7 million tonnes purchased. This means that approximately 32 per cent of all food purchased per year is not eaten. Most of this (5.9 million tonnes or 88 per cent) is currently collected by local authorities. Most of the food waste (4.1 million tonnes or 61 per cent) is avoidable and could have been eaten had it been better managed (WRAP, 2008; Knight and Davis, 2007).

The food currently wasted in Europe could feed 200 million people (FAO, 2013).

Australia

In a survey of more than 1,600 households in Australia in 2004, on behalf of the Australia Institute, it was concluded that on a country-wide basis, $10.5 billion was spent on items that were never used or thrown away. This amounts to more than $5,000 per capita/year.

Value of Data Collected

The proprietary smart device will collect food and beverage purchase and consumption data from every single household that uses the device. This is immeasurably beneficial

to any supplier, wholesaler or retailer in the food and bev category, to government researchers (food waste, nutrition income, retirement savings etc.) and to technology companies, to marketers and more.

And there's opportunity for the company to monetize the data through the sale of data, data partnerships, APIs with food delivery companies and more. One thing to consider is how to build brands into the data collection. All major data partners would want to see the brand purchased (in our view).

The global data monetization market is growing rapidly and is estimated to reach US$371b by 2023, according to an Allied Market Research report.[1] The e-commerce and retail component, which makes up about 11% of the total market, is forecast to show a compound annual growth rate of 36% from 2016 to 2023.

Developing and implementing a data and analytics function is the first step to monetizing data and should not be rushed. Companies can first focus on how data can assist internal decision-making. Using the data as a source of external revenue can be a longer-term goal.

To take advantage of this potential revenue stream, businesses may first need to determine where their company is on the path to data monetization. They can then take steps to enhance their data's value, both for making better internal decisions and monetizing it to outside firms. Then they can build up a data and analytics organization,

either internally or through partnerships or acquisitions. That team can be organized both to meet marketing, merchandising and e-commerce needs and monetize the data with third parties.

How other companies are monetizing data

While many retailers have a long way to go to develop their data strategy, some have shown how action to generate new data-driven revenue streams can work.

They often have done so in a staggered manner, by pursuing pieces of the opportunity:

- A US-based grocer converted a joint venture to a wholly owned subsidiary that provides insights into the retailer's functions and supports data monetization revenue from third-party advertisers, including suppliers.

- One global retailer made acquisitions to scale up its digital advertising business, allowing advertisers to use customer data to offer personalized, targeted ads. The retailer was able to increase the monetization rate on its website.

- A US mass retailer brought its digital analytics operations in-house, partnered with a media company for brand attribution data and acquired a delivery service. These steps helped it to grow online ad revenue.

The company already has the main data buyers in their research (see image below). Here's additional commentary on those:

Grocery stores – Why not serve coupons for likely purchases? How about a reminder when running low?

Restaurants – Why cook at all when you have nothing to eat at home and receive a wonderful offer to go out?

Brands – Ketchup loyalty can be encouraged by delivering incentives at the right time.

Recipes – Based on available ingredients, here's a link to a Food Channel show and recipe that would be just perfect.

Related products – Based on your contents, you could be interested in (e.g Amazon)

Doctor – For general health and if you've been asked to correct your diet (although users could choose not to scan treats)

Employer – If you want to get a healthy employee discount.

Lawyers – Bad experience with recalled mayonnaise? Hard proof of consumption (and a class action lawsuit) is entirely possible.