



**NEW PRODUCT DEVELOPMENT**  
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**AEROTECH CO.**

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## **1.0 EXECUTIVE SUMMARY**

The AeroTag AI solution is an innovative smart baggage tracking technology developed from the experiences found in the reviewing of the Malaysia Airlines case. The review indicated that there were several important operational areas for the airline, including: late delivery of baggage, lost luggage, the mishandling of luggage, lack of real-time tracking visibility, and the lack of effective communication between the airline and the passenger. All these areas affect customer satisfaction and reduce trust in the reliability of the airline's service. As a result, the airline may lose customers in this competitive and technology-based airline industry.

AeroTag AI is propose as a smart baggage tracking device specifically for the airline industry, which uses advanced technologies, such as RFID, BLE, GPS, and AI, to conveniently track the baggage and check the location of the baggage in real-time. The mobile application associated with AeroTag AI provides users with frequent updates on the status of their luggage, including its location, as they travel, thus improving the transparency of the shopping experience and lessening the uncertainty caused by baggage-related issues.

AeroTag AI also uses predictive, intelligent features that can help identify possible baggage delays and the risk of misrouted baggage before they happen. By using these features, passengers will have a better travelling experience, and airlines will improve their operational efficiency while reducing the incidence of mishandled baggage. The new product meets the current demand of customers for digital, transparent and customer focused travel services as well as supporting aviation's current movement toward technological advancements.

Overall, the AeroTag AI product is a possible and commercially successful innovation that can improve baggage management performance, build passenger confidence, and create long-term value for airline operators and passengers alike. Smart tracking technology combined with data-driven decision-making would provide significant contributions toward a more reliable and convenient travel experience.

## **2.0 INTRODUCTION**

Over the past few years, many changes have been made to the way the airline industry does business. As part of this transformation process, airlines have focused on both improving their operational efficiency and providing customers with a better overall travel experience. Today's passengers desire a seamless travel experience that is dependable, easy to understand, and connected to the Internet. One key aspect of the travel experience will be the handling of luggage, as most passengers will expect to receive real-time updates on where their luggage is located and what condition it is in while they are travelling. To meet these demands from passengers, airlines will need new, improved technologies to manage luggage that will help them deliver on their operational promise and avoid disruption in their operations.

Malaysia Airlines has made continuous investments in improving their quality-of-service delivery and developing new and innovative ways to deliver services using digital technologies. However, issues identified within the case study demonstrate how significant the ongoing challenges are regarding the management of luggage. Passengers continue to express disappointment with Malaysia Airlines regarding items such as delayed arrival of luggage, lost luggage, improperly handled luggage, inadequate communication when disruptions occur, and most importantly is a lack of real-time tracking ability for luggage. As customer expectations change with rapidly changing technology, there has become an even greater need for luggage management systems that will be more intelligent and integrated than ever before.

A Smart Baggage Tracker System is proposed to solve these problems which is a technology-based product that will use radio frequency identification (RFID) tracking technology, a global positioning system (GPS), artificial intelligence (AI) based ability to provide predictive analytics, an APP to communicate with tracked items, and a dedicated cell phone application for the customer. This system will provide an end-to-end visibility of baggage which is it will also send automatic notifications to customers about the bag's location and prevent lost or delayed bags from being picked or sent to airports. The advanced digital technologies used in this product will improve baggage handling performance, increase customer confidence in the service provided by the airline, and contribute to the airline's strategic goal of creating an exceptional travel experience.

## **2.1 Problem Statement/Issues**

From our previous case study, Malaysia airline has made significant efforts to maintain their service, yet still some of their customers still experiencing difficulties to locate their baggage. These issues include the delayed, lost, and mishandled baggage by the airport that affect the customer experience of travelling. These issues happen because of operational inefficiencies, reliance on manual handling procedures, poor coordination among operational units and limitations in current baggage tracking technologies. The result of all these contributory factors is inconvenience for travellers, increased operational costs, decreased customer satisfaction and an adverse impact on airline brands.

Another major challenge that exists is that there is no comprehensive real-time visibility into the entire journey of the baggage. The existing baggage tracking systems typically only give limited of information to passengers, thus making it very difficult for them to accurately track the status and location of their luggage. This lack of transparency increases the uncertainty and frustration that develops when there are delays or disruptions with baggage. In addition, communication between airlines and customers tends to be lacking or delayed regarding baggage incidents resulting in decreased trust by customers and thus less satisfaction with services.

Although there is existing tracking devices like Apple AirTag, Samsung SmartTag, and Tile Tracker have been available recently, but their main purpose has been to track ordinary items which is have limitation like unable to track items in the much more complicated operational environments of airports and airline baggage systems. In addition, consumer-grade trackers frequently rely on the surrounding device networks to function properly and do not have aviation-specific features. This limits their ability to support airport operations with valuable tools such as predictive baggage risk detection, flight stage identification, integration with an airport's baggage handling system, or intelligent disruption alerts. These challenges place passengers at risk for not being able to receive complete and accurate information about their baggage during the entire travel process.

Therefore, there is a strong demand for a specialized aviation-oriented tracking technology that can address the deficiencies of traditional baggage tracking systems. AeroTag AI will provide solutions for real-time baggage visibility, intelligent predictive monitoring capability, advanced communication tools, and an easy-to-use overall experience designed for the demands of today's air travel.

## **2.2 Methodology**

### **i. Survey and Questionnaire**

The survey and questionnaire were given out to the respondents, especially to those who travel a lot to collect the information in our new product development process. It is an essential step to gain the information about the customer need, satisfaction and their preferences to have a convenient travel experience. A series of questions were asked by using the Google Form that distributed on the social media platforms which is WhatsApp, and Instagram story along with the survey link

The questionnaire includes two parts which are Section A and Section B. Data collected during the study includes their gender, age, travel frequency, and experience with lost, delayed, or misplaced luggage. This information defines the target audience and how they have experienced luggage-related issues.

The second part of the survey, which is Section B, was focused on measuring the concept of "AeroTag AI," an AI-powered smart luggage tracking keychain which allows real-time luggage tracking to be facilitated by mobile application. The respondent was asked to rate the product's usefulness, rated likelihood of product usage and expected impact on reducing anxiety of luggage loss. Respondents were also asked to identify what they thought was the product's most appealing feature and were asked about its innovation level compared to existing luggage tracking products. The data from the survey was collected using 5 points "Likert" scale response items, and multiple-response questions to allow a structured response format and facilitates easier data analysis.

### **ii. Research**

To complete this research, some research of products that are currently available on the market and reviewing literature was completed to study about the luggage tracking systems. The purpose of the research to establish present solutions that are available in the marketplace, identify where they have strong and weak qualities as well as establish where there exist gaps within these established solutions and guide the development of AeroTag AI to close those gaps.

Analyses of previously existing forms of technology including RFID bag systems, GPS tracking devices, and consumer-level tracking devices such as AirTag were completed with respect to evaluating the effectiveness of each of these systems

regarding providing real-time tracking capabilities, accuracy, requirement for connectivity, and usability for users when travelling. This analysis determined that there are common limitations in these previously established solutions such as dependency upon network access, limited tracking range, and lack of integration with airline baggage operations/management systems.

### **2.3 Limitations**

Although the AeroTag AI has a cutting-edge dual-charging function powered by advanced AI technology, there is some of practical limitations have been identified regarding how it has been implemented.

First, there are issues related to solar charging performance in environments where there are obstacles, such as when luggage stored inside an aircraft's cargo is prevented from receiving sufficient sunlight for example, when the luggage is in a shipping facility or covered by other luggage. Even though there is a USB-C and solar dual charging system available in AeroTag AI as a source of energy, this device's reliance on using USB-C as a primary source of energy for operation creates difficulty in terms of the device obtaining enough energy from the micro-solar panel to perform adequately over extended periods of time while travelling.

Second, with respect to mechanical robustness under extreme mechanical load conditions, even though AeroTag AI is rated IP67 for both water and dust protection, the device may still be susceptible to extreme impact loads produced by airport baggage handling systems when exposed to high levels of force. The compression between heavy luggage that exceeds the structural limit of the polycarbonate housing of AeroTag AI could damage components such as the micro solar panel and the AI sensors inside the device; this could result in complete destruction of the electronic components.

Finally, smartphone integration and user access to a mobile application are also part of the limitation especially for users who do not understand how to use mobile technology or have limited experience with mobile applications could find it difficult to make the device available and completely use all its features. As a result of this limitation, the effectiveness of the system will be diminished especially for certain types of users such as those who are less technologically savvy than others.

### **3.0 NEW PRODUCT DEVELOPMENT**

#### **3.1 Definition**

New Product Development (NPD) is the systematic process of developing a new product or service that has a marketable potential and satisfies the requirements of customers and business in terms of value creation. NPD is a series of events that start with idea generation, then concept evaluation, design, testing and finally commercialization as stated by Booz, Allen and Hamilton (1982). NPD aims to increase the competitiveness of the organization by introducing new solutions that will increase the competitiveness of the existing products or services or help in filling the market gaps.

Aviation is one of the sectors where NPD contributes greatly to the introduction of new and advanced technology, thereby enhancing the efficiency and satisfaction of operations for the company. From this Malaysian study, certain issues were identified such as delayed baggage delivery service, lost luggage, mishandled baggage and limited real-time tracking visibility of the cases in Malaysia Airlines. These challenges underscore the importance of an innovative solution that has the potential to enhance the overall baggage handling experience and the passenger's journey.

AeroTag AI is proposed as a smart baggage tracking solution that combines the functionalities of Radio Frequency Identification (RFID), Bluetooth Low Energy (BLE), Global Positioning System (GPS) and Artificial Intelligence (AI) technologies to address these challenges. By providing real-time tracking and predictive analytics, AeroTag AI allows both passengers and airline operators to keep a precise track of the location of the bagged and ultimately decrease the chance of delays and mishandling. As such, AeroTag AI is a New Product Development project targeting the airline industry, specifically to improve the quality of services, operational efficiency, and customer confidence in the system through the development and implementation of an AI-based technology.

#### **3.2 Classification of NPD**

AeroTag AI can be considered a technological innovation and a service innovation. It is a technologic innovation since it integrates current digital technologies like RFID, BLE, GPS, Cloud Computing and Artificial Intelligence to enable live tracking and predictive monitoring of bags. Combining these technologies helps airlines become more operationally accurate, automate tracking processes, and gain data-driven insights to streamline decision-making.

Furthermore, AeroTag AI fits into the category of service innovation, improving the baggage handling service provided by airlines to a considerable extent. Passenger visibility and information in traditional baggage tracking systems is often limited. AeroTag AI revolutionizes this service by delivering live updates on bags, instant notifications, predictive alerts and better airline to passenger communication. The updates provide more clarity, ease customer worry, and boost travel convenience. What's more, AeroTag AI can be classified as an incremental innovation. The product is not a completely new solution but is an upgrade and modernisation of existing baggage management systems with the use of innovative technologies. AeroTag AI can add value to the existing operational process and will be compatible with existing airport and airline infrastructure.

Hence, AeroTag AI can be deemed as a technological innovation, service innovation and incremental innovation, which supports the digital transformation of the baggage management process in the aviation industry.

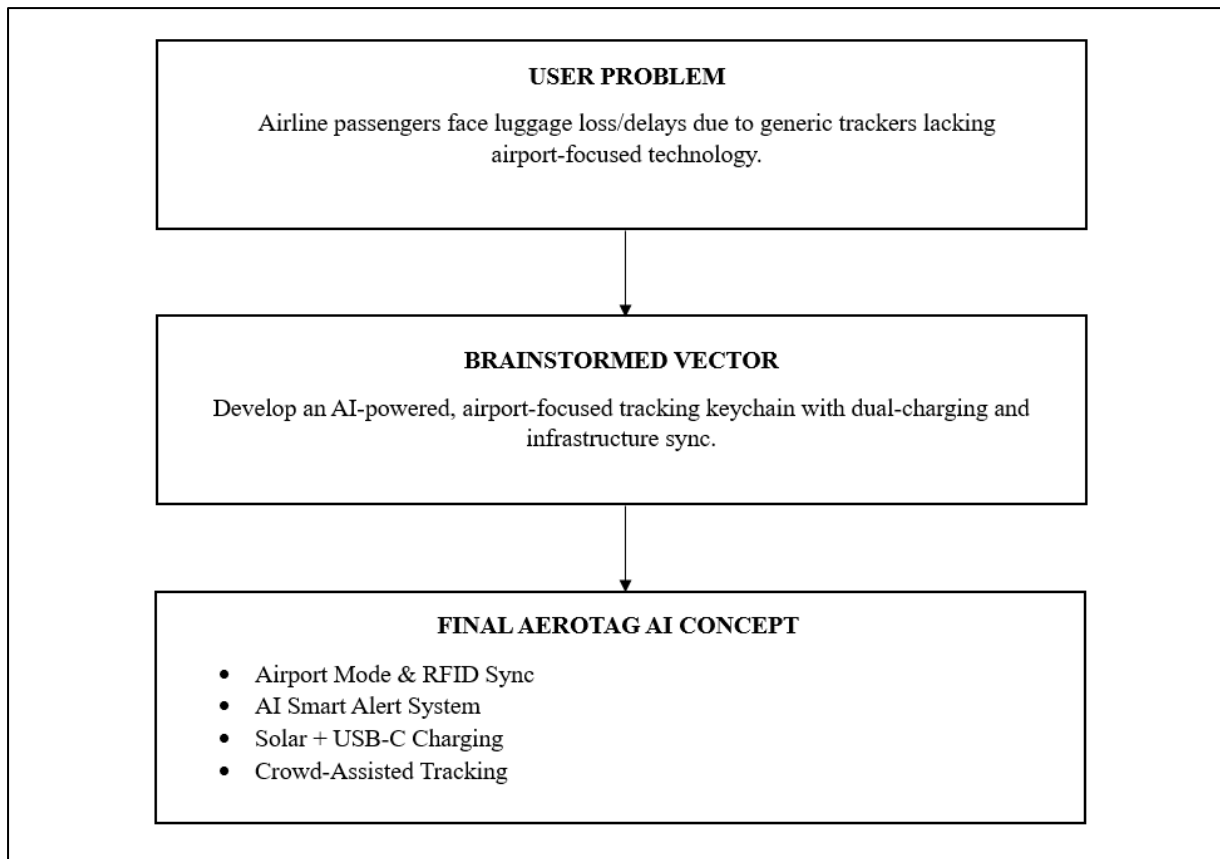
### **3.3 New Product Development Process**

#### **3.3.1 Research & Development**

##### **1) Idea Generation**

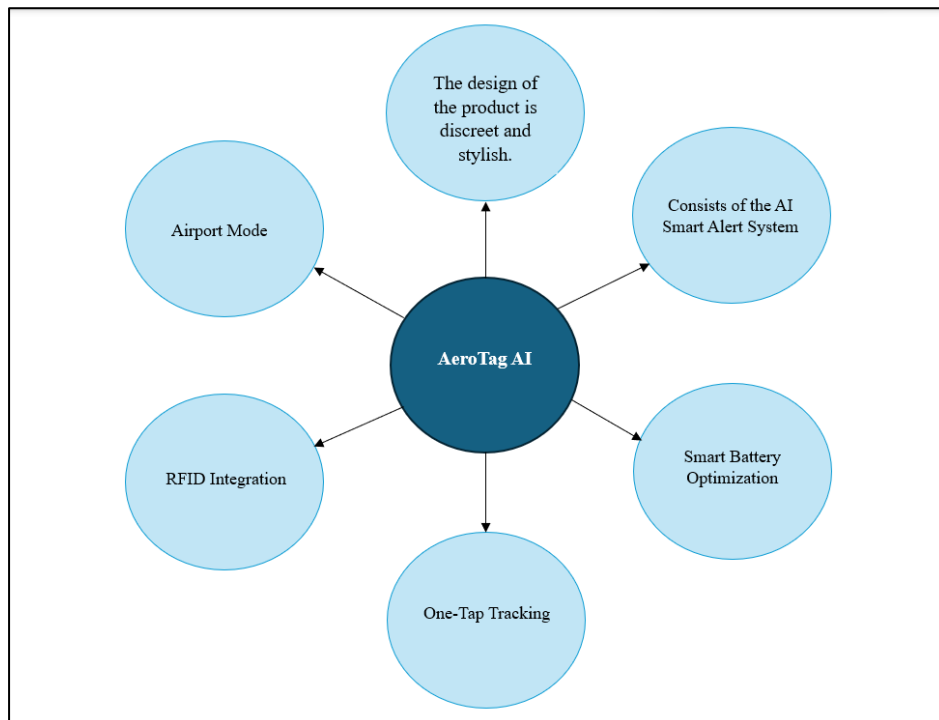
Initially, the idea for New Product Development (NPD) emerged when our team members were discussing the recurring issue of missing luggage at the airport each year. In today's world, there are many technologies that help locate and detect luggage to prevent it from going missing, such as Apple's AirTag and Tile Mate. (Jang et al., 2025) The issue arises when these technologies have their own flaws and disadvantages. For instance: battery issues, no Artificial Intelligence (AI) predictions or smart alerts, and complicated for some users. (Michaels, 2020) Therefore, the idea of developing a new product called "AeroTag AI" emerged, offering customers useful features, specifically at the airport. The core idea that our team focuses on is connecting the customer's luggage to the airport's logistics and providing continuous oversight throughout the entire travel journey:

Attach → Check-in → In Transit → Arrival → Safe Travels



*Figure 1: The Ideation Flowchart*

## 2) Idea Screening



*Figure 2: The Idea of AeroTag AI*

To filter and refine our product structure, the generated ideas were precisely evaluated against market conditions. On top of that, the general use of Bluetooth tokens or heavy-duty luggage locks was ruled out due to distinct operational weaknesses, including limited tracking range, a lack of predictive delay intelligence, and heavy charging requirements. Based on the ideas in the figure above, AeroTag AI was selected as the optimal concept because it meets key screening benchmarks, such as offering high commercial potential, addressing specific airline baggage problems, being highly marketable, and using realistic, innovative technology. Therefore, the product stands out with its unique airline-focused advantages. Not to mention the predictive AI alerts and compatibility with local airport infrastructure.

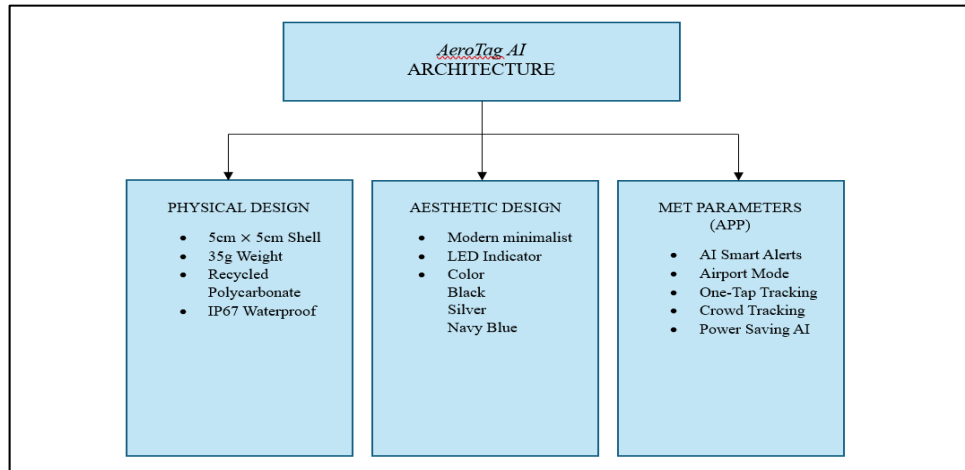
First, the design of the product is a compact ornament design, which is categorized as discreet and stylish to utilize in the luggage. This is highly important to attract customers' attention with the aesthetics of the product that is suitable for everyone. Other than that, the product also consists of an AI Smart Alert System where users are able to detect unusual movement of their luggage, undergo wrong terminal direction, and a long period of being inactive. On top of that, it also has a smart battery optimisation categorised users do not have to worry anymore in case the product is suddenly running out of battery at a crucial time, since it has AI technology that automatically saves battery during inactive travel periods for longer usage. Besides, AeroTag AI is also categorized as user-friendly technology due to the simple instructions only needed, such as One-Tap Tracking, where it shows a very simple interface with the colours green (Safe), Yellow (Delayed), and Red (Possible Issue). Next, AeroTag AI is integrated with Radio Frequency Identification (RFID), where it can be used in real-life applications as well, such as Free-way Toll Booths, Google Pay, and hotel room access. Finally, the technology also has an Airport Mode that covers flight tracking and airport navigation (Check-in, Loading, Arriving).

### 3) Market Survey

Before entering the next phase in our product development, it is crucial to see how customers will respond to our products. To understand our customers' characteristics, expectations, and requirements regarding our products, we conducted a market survey via Google Forms to collect and analyse their perspectives. This market survey was divided into several parts, which consist of customer preferences, product features, and price range.

### 3.3.2 Product Design/Features

This section establishes the physical, aesthetic, and functional engineering specifications of AeroTag AI derived from our screened design architecture.



*Figure 3: The Architecture of AeroTag AI*

1) Product Dimensions and Product Designs

|                       |                                                                                                                                                                                                              |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SHAPE & DESIGN        | Formatted as a compact, rounded square ornament measuring exactly 5cm ×5cm.                                                                                                                                  |
| WEIGHT                | Engineered with an ultra-lightweight profile of only 35g to minimise baggage weight overhead.                                                                                                                |
| MATERIAL COMPOSITION  | Fabricated from eco-friendly, highly durable <b>Recycled Polycarbonate</b> .                                                                                                                                 |
| INGRESS PROTECTION    | Achieves an <b>IP67 Waterproof</b> rating, ensuring complete protection against liquid damage and dust contamination during luggage loading.                                                                 |
| POWER SYSTEM HARDWARE | Features a <b>Dual Charging System</b> that utilises light-absorbing solar panels for energy replenishment during outdoor transit, alongside a high-speed <b>USB-C Charging</b> port for rapid backup power. |
| HARDWARE INTEGRATION  | Houses a built-in <b>RFID Tag</b> module that directly syncs with institutional airport baggage handling systems (tracking luggage across check-in, sorting, loading, and arrival checkpoints).              |

Table 1:Product Dimensions and Product Designs

2) Artistic Design

|                      |                                                                                                                                             |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| STYLING              | Embraces a modern minimalist layout featuring a textured, premium matte finish.                                                             |
| VISUAL INTERFACE     | Features an integrated, centre-aligned <b>LED Indicator</b> ring to convey instant visual feedback to the user.                             |
| COLOUR CONFIGURATION | Available in three premium colors tailored to professional and casual travellers: <i>Matte Black, Sleek Silver, and Classic Navy Blue</i> . |

Table 2:Artistic Design

### 3) Required Parameters to Satisfy Market Needs

|                                                 |                                                                                                                                                                                               |
|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>AI Smart Alert System</b>                    | Continuously scans baggage for unusual movement, incorrect terminal sorting, or unexpected dormancy, warning users of potential handling anomalies.                                           |
| <b>Automated Airport Mode</b>                   | Intelligently switches system states to adapt to flight tracking rules and navigation needs, tracking the luggage through check-in, loading, transit, and arrival phases automatically.       |
| <b>One-Tap Tracking UI</b>                      | Delivers highly accessible telemetry using simple colour codes ( <i>Green = Safe, Yellow = Delayed, Red = Possible Issue</i> ).                                                               |
| <b>Crowd-Assisted &amp; Emergency Lost Mode</b> | Employs nearby AeroTag user nodes to anonymously locate distant items, paired with an emergency remote trigger that sounds an audible alert and establishes a direct line to airport support. |
| <b>Smart Battery Optimisation AI</b>            | Monitors device movement patterns and automatically dials down power consumption when the luggage is stationary to maximise battery endurance.                                                |

*Table 3: Required Parameters to Satisfy Market Needs*

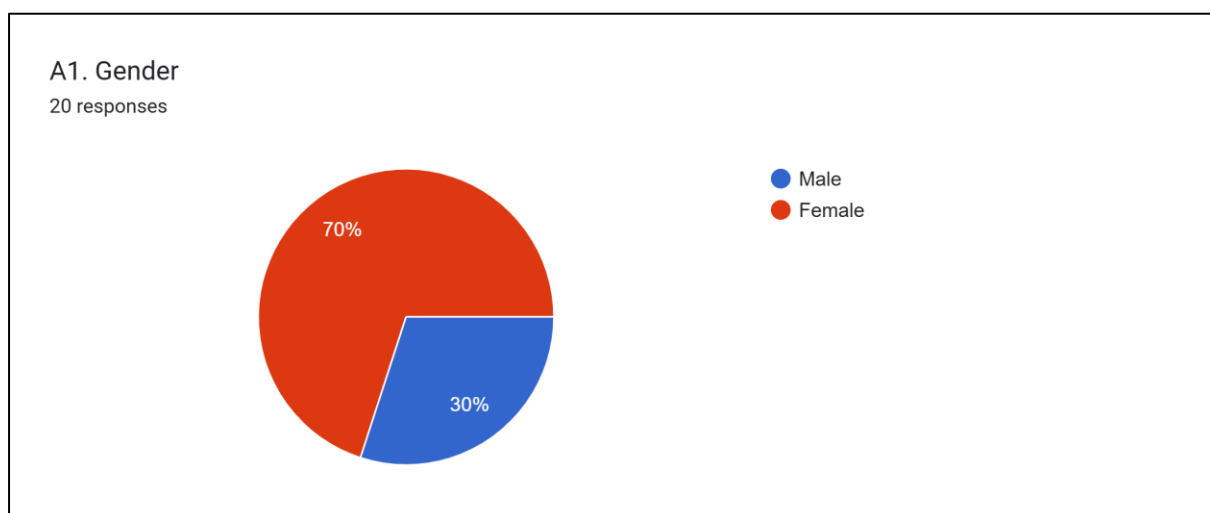
### 3.3.3 Concept Testing

#### i. Purpose

Concept testing of AeroTag AI – Smart Luggage Tracking Keychain aims to evaluate the product's acceptance and feasibility among potential users, such as travellers and airport employees. The purpose of this process is to assess the customers' perceptions, preferences and buying intention of the product concept before the commercialization process. Concept testing also can identify the most useful features, determine the usefulness and ease of use of the product with the testers and collect feedback for improvement. By understanding consumers' needs and expectations, the company can minimize the risk of product failure, enhance customer satisfaction, and ensure that AeroTag AI effectively addresses the common problem of lost or misplaced luggage.

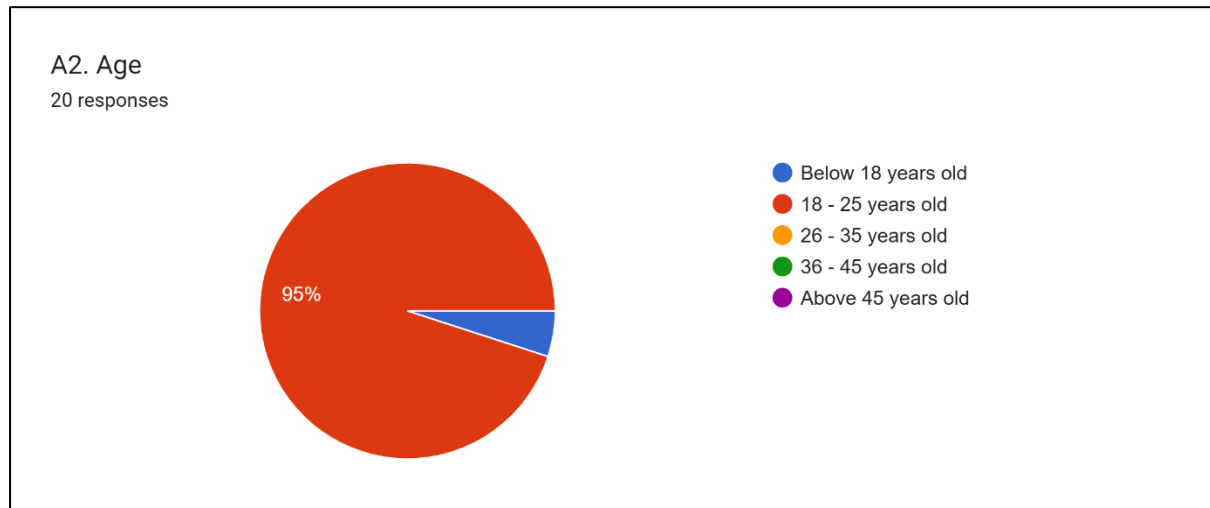
#### ii. Market Survey

A market survey was conducted to gather all the valuable insight and feedback regarding consumers' needs, preferences, and perceptions toward the product. The survey received 20 responses and most of them are university students.



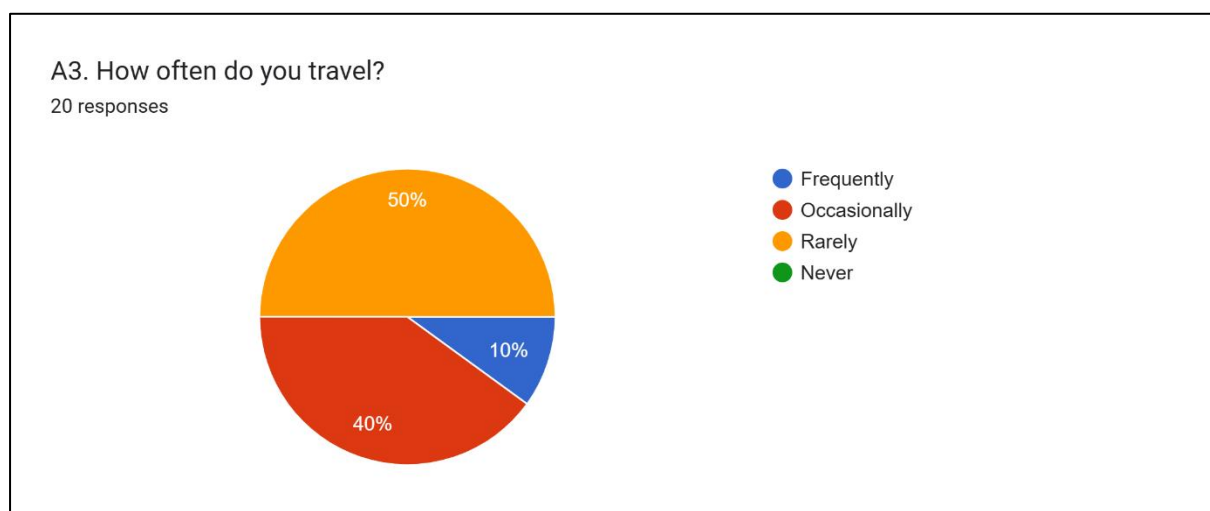
*Figure 4: Survey Question 1*

Figure 4 shows the results of the survey about the gender distribution of 20 respondents that show 70% of the respondents were female, while 30% were male. These results indicate that most of the respondents in this survey are female which is 14 out of 20 respondents but opinions from both genders were represented.



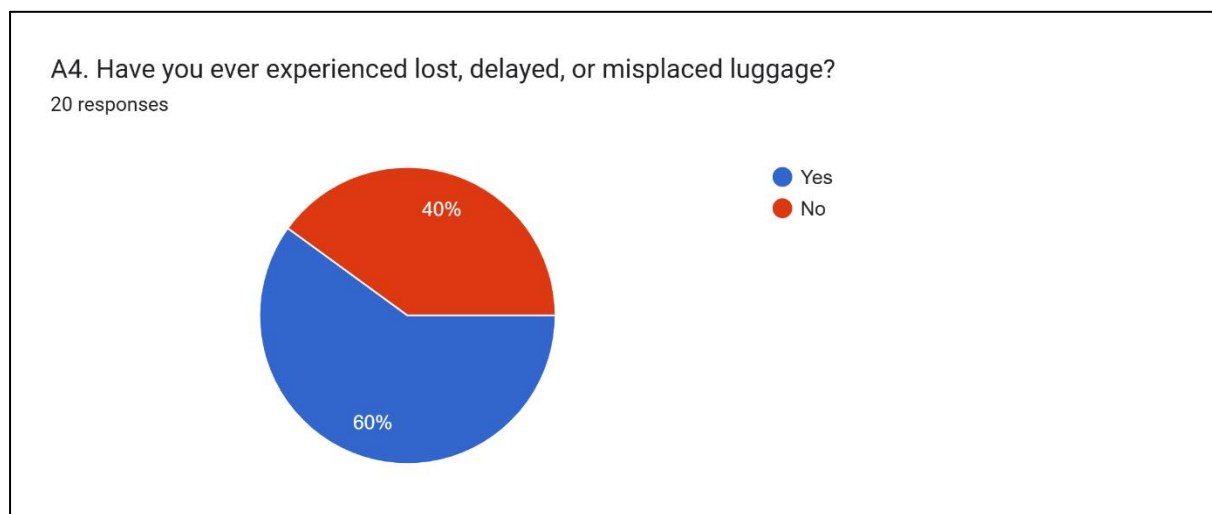
*Figure 5: Survey Question 2*

Based on Figure 5, the results of the survey show that 95% (19 respondents) of the respondents are between 18 and 25 years old and another 5% (1 respondent) is below 18 years old. This indicates that most respondents belonged to the young adult age group. At this age, they are generally more technologically inclined which is consistent with the target market for AeroTag AI.



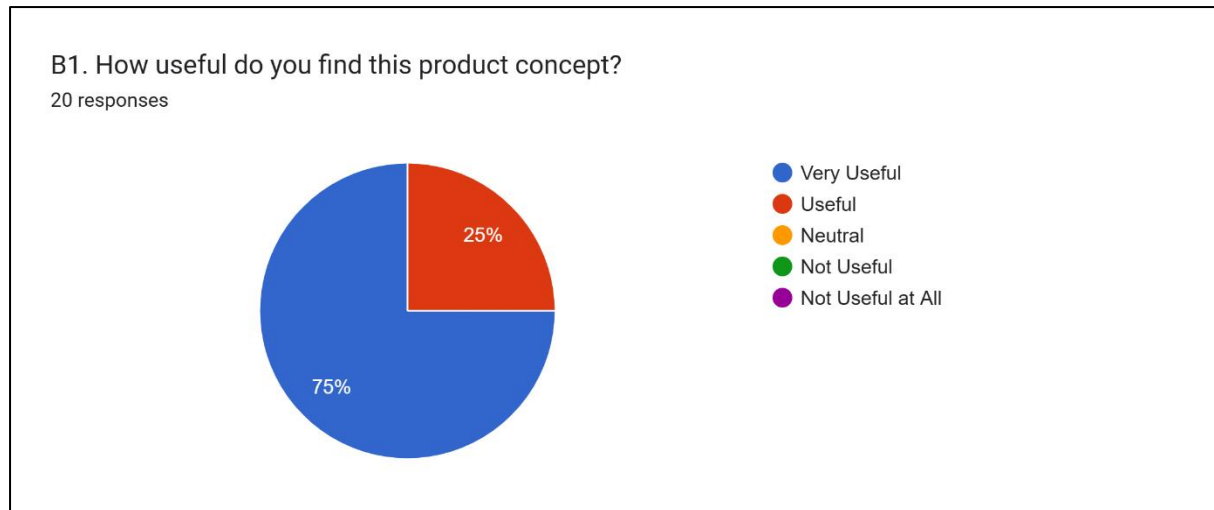
*Figure 6: Survey Question 3*

Figure 6 presents the travel frequency of 20 respondents in this survey. The data shows that 50% of the respondents travel rarely, 40% occasionally and 10% frequently. None of the respondents selected the "Never" option. The results indicate that all participants have travel experience, making this relevant to assess the AeroTag AI – Smart Luggage Tracking Keychain. Although most respondents don't travel often, their rare and occasional travels mean they may still face issues around managing their luggage and could be interested in a smart tracking solution. This is an indication of the demand for AeroTag AI by both frequent and occasional travellers.



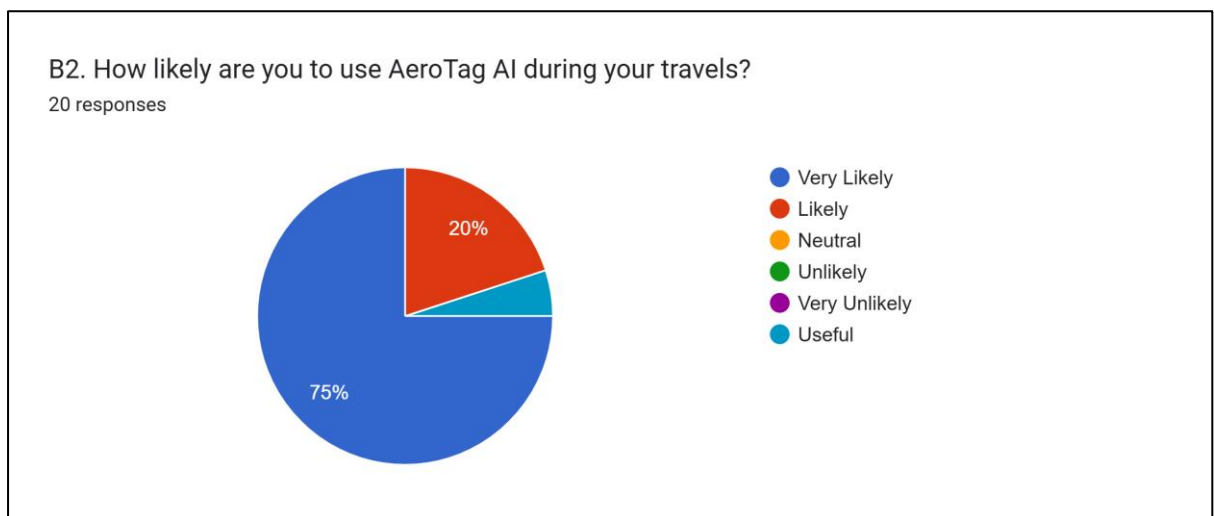
*Figure 7: Survey Question 4*

Figure 7 presents the experiences of the respondents on lost, delayed or misplaced luggage. The results reveal that 60% (12 respondents) of the respondents had had problems with lost, delayed or misplaced luggage while 40% (8 respondents) had never had any problems with lost, delayed or misplaced luggage. This indicates that most of the respondents have been inconvenienced at the time of travelling due to baggage handling. The high percentage of respondents with such experiences highlights the need for a reliable luggage tracking solution, thereby supporting the market potential of AeroTag AI – Smart Luggage Tracking Keychain.



*Figure 8: Survey Question 5*

Figure 8 shows the results of 75% of the respondents felt the product was very useful and 15% of the respondents felt the product was useful. There were no neutral and not useful ratings for the product from all the respondents. These findings show a very positive response towards the product concept, and this perception of usefulness shows the strong customer acceptance of this product.

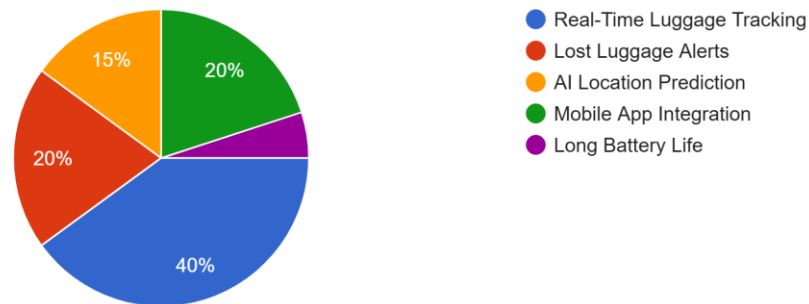


*Figure 9: Survey Question 6*

Figure 9 presents the respondents' likelihood of using AeroTag during travel. The results show that 75% (15 respondents) are very likely to use the product, and 25% (5 respondents) are likely to use it. No respondents indicated that they were unsure or hesitant to use the product. The findings show a high level of interest and acceptance from customers in AeroTag AI, highlighting a strong desire to use the product.

B3. Which feature interests you the most? (Select One).

20 responses

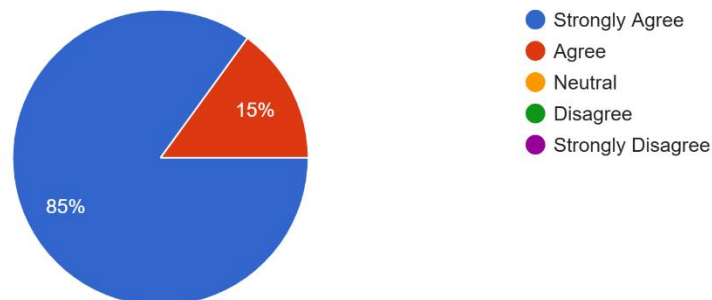


*Figure 10: Survey Question 7*

Figure 10 shows that real-time luggage tracking is the most preferred feature among respondents (40%), followed by lost luggage alerts (20%) and mobile app integration (20%). Meanwhile, AI location prediction accounts for 15% of interest. In comparison, long battery life is the least prioritized feature at only 5%, indicating that users value immediate tracking and safety-related functions more than technical enhancements or extended power duration.

B4. Do you think AeroTag AI would reduce your anxiety about lost luggage?

20 responses

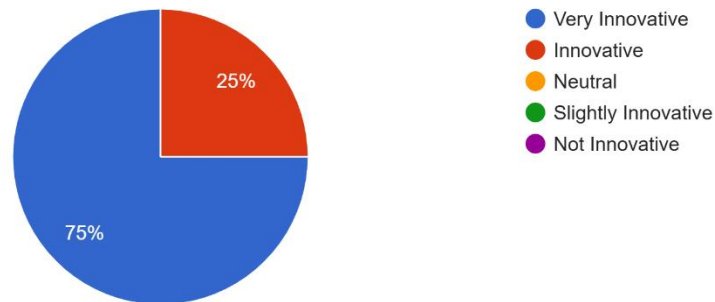


*Figure 11: Survey Question 8*

Based on Figure 11, 85% of respondents strongly agree that AeroTag AI can reduce their anxiety about losing their luggage when traveling, while the remaining 15% agree with this statement. None of the respondents expressed neutral or negative opinions. The results show that the product has a high ability to offer reassurance and peace of mind while travelling.

B5. Compared to existing luggage tracking methods, how innovative is AeroTag AI?

20 responses

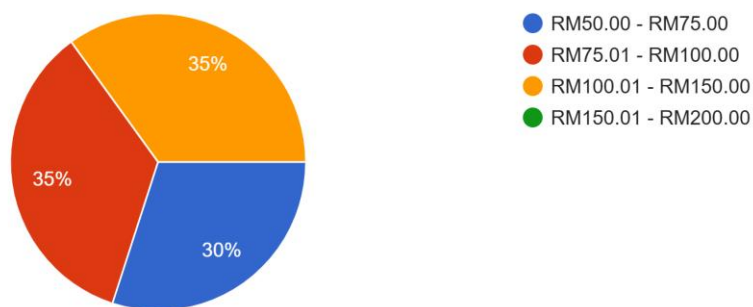


*Figure 12: Survey Question 9*

Based on Figure 12, the results indicated that 75% (15 respondents) found AeroTag AI very innovative and 25% (5 respondents) found it innovative. None of the respondents marked the product as not very innovative or not innovative at all. The findings show that there is an understanding of AeroTag AI as a very advanced and unique solution for luggage tracking. Its incorporation of AI-powered technology and real-time monitoring capabilities sets it apart from traditional tracking methods, making it more attractive to users.

B6. If you plan to purchase the product, at what price are you willing to pay?

20 responses



*Figure 13: Survey Question 10*

According to Figure 3, 35% (7 respondents) are willing to pay between RM100.01 and RM150.00, while another 35% (7 respondents) prefer a price range of RM75.01 to RM100.00. The remaining 30% (6 respondents) are willing to pay between RM50.00 and RM75.00. These results suggest that the majority of respondents perceive AeroTag AI as a valuable product and are willing to pay a moderate-to-premium price for its features and benefits.

### 3.3.4 Build Model/Prototype (2D or 3D)



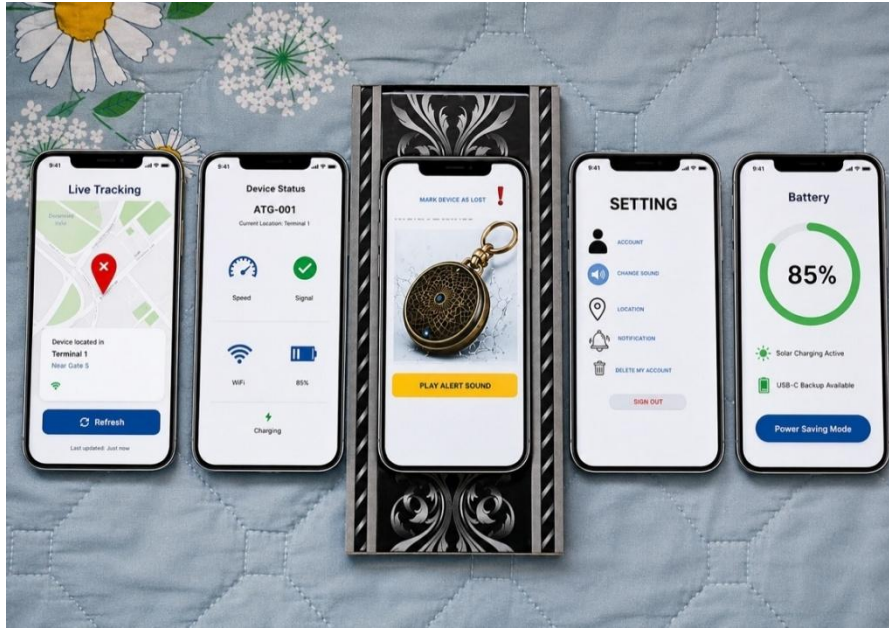
Figure 14: AeroTag AI Exploded

*View Prototype*



Figure 15 : AeroTag AI Assembled Product

*Prototype by using box and dumpling tools*



*Figure 16: AeroTag AI Mobile Application Prototype by using box frame and paper*

Figure 14 shows AeroTag AI Exploded View Prototype which is an appropriate prototype demonstrating three-dimensional representations of functionality, design structure and overall appearance of the proposed smart luggage tracking device. Figure 15 shows The AeroTag AI prototype was manually created with lightweight materials and visual models made from box of the internal components to demonstrate how the final product will operate in an airport environment.

The external casing of AeroTag AI has been designed in a compact circular keychain shape to enhance portability and make it easy for users to attach the device to their luggage, backpacks or travel bags. The concept of the casing design includes a premium alloy covering to protect against damage from impact and to provide sufficient durability to withstand normal wear and tear while traveling. In addition, the device is equipped with a 360-degree rotating hook so that it can be securely and conveniently fixed to different types of luggage.

The components that make up the internal structure of the prototype include multiple integrated parts such as a solar panel, led (light emitting diode) indicator, printed circuit board (PCB), artificial intelligence (AI) tracking module, rechargeable battery, RFID (radio frequency identification) antenna and waterproof sealing material. The solar panel serves as an ancillary source of power by acquiring energy from light for longer battery life. The rechargeable battery provides constant power for an extended period. The led indicator is

provided for displaying the status of the device as well as for signalling alerts or notifications to the user; therefore, permitting the user to quickly identify the operational state of the tracker.

The A.I. tracking module collects information using GPS, Bluetooth, and other A.I.-based technologies for real time monitoring and predictive tracking of luggage. The RFID antenna provides a means to assist in the identification of all luggage at airports and assists with the identification of lost luggage. Additionally, for optimal durability, a waterproof sealing membrane is used between all internal components and the external casing to protect against moisture or water-damage to the internal components, along with the effects of environmental conditions while travelling with the device. Finally, the current model includes dual charging methods which is USB-C and USB for flexible charging capabilities if solar charging is not available.

In addition to creating a hardware prototype, a mobile application prototype also be developed to show how the user will interact with the AeroTag AI device. The application will include a variety of functions, including real-time luggage tracking which is the device health, smart alerts, battery life, activate airport mode, the ability to activate lost luggage and enable predictive alerts for flight delays based on travel and baggage rules. These functions will allow travellers to know where their luggage is located, receive predictive alerts about their luggage being delayed, and receive useful information regarding their travel via an easy-to-use interface.

The AeroTag AI prototype will demonstrate the successful integration of smart tracking technology, AI monitoring, RFID tracking, and sustainable energy charging in the prototype to provide an effective solution to minimise lost luggage, increase baggage security, and improve travel convenience for airline passengers. The AeroTag AI prototype will visually represent what the intended final product looks like and demonstrate its ability to be an innovative solution to address the growing problem of lost luggage and provide solutions to the problems faced by travellers via the use of a compact travel accessory.

### **3.3.5 Test Marketing**

The present survey of the market was carried out to gain the valuable information and feedback of the consumer needs, their perceptions, and preferences towards AeroTag AI. A total number of 20 questionnaires were returned, most of which were answered by the university students. This group was chosen, given their high level of familiarity with digital technologies and how they often travel and buy tickets, especially for educational trips, vacations or other industry purposes that involve air-transportation services.

The survey focused on participants' awareness of AeroTag AI, a smart luggage tracking device, before the test began. Before the test, the participants were briefed on the concept of AeroTag AI, a smart luggage tracking device designed to keep users up to date on their suitcases' position all the time. The product features such as RFID and GPS tracking, AI-powered smart alerts, mobile application integration, and instant notification on baggage delay/disability were explained to respondents. In addition, a product concept and some real-life examples of the major functions covered AeroTag AI so that the respondents could understand the product's operation.

From this feedback, the majority of respondents had positive reactions to AeroTag AI. They felt that the product will be able to alleviate the worry about misplacing or losing one's bag while travelling. The real-time tracking feature and instant notification system were cited as the most appealing aspects because they help in maintaining transparency and instil confidence about the safety and placement of it. Also, a significant portion of the responders concurred that AeroTag AI can enhance the general journey knowledge. In addition to helping individuals obtain accurate and readily available baggage information, which is very much indicated through a mobile application.

Overall, the survey responses showed that the participants were generally positive about the use of AeroTag AI. The majority of the respondents felt this product was an innovative and practicable solution for the above-mentioned problems in an airline system. Also, they indicated interest in purchasing the product if it were to be available in the market, indicating a positive purchase intention and acceptance of this product. Therefore, AeroTag AI has significant commercialisation potential, especially within the consumer market, where individuals demand security and convenience, along with the incorporation of smart technology in their journeys.

## **4.0 CONSUMER AND TREND CANVAS (CTC)**

### **1. Inspiration**

In a few sectors, smart tracking solutions have proven effective in offering users real-time visibility and peace of mind. In a couple of areas, smart tracking solutions are proving effective for real-time visibility and peace of mind for users. And companies have already seen with products like Apple AirTag, Tile Tracker, and RFID-based logistics tracking systems how user experience can be enhanced by the integration of location tracking and mobile. The aviation industry also has several innovative baggage tracking technologies adopted by airlines like Singapore Airlines and Emirates to improve the transparency of the journey and minimise baggage mishandling. AeroTag AI wraps all these innovations into a one-stop solution that works for the airline industry: RFID, GPS, AI prediction, airport mode tracking, crowd-based location service and mobile application integration. This gives a more comprehensive and travel-specific tracking experience than already available general-purpose trackers.

### **2. Basic Needs**

Security and peace of mind in travel are the main consumer needs tackled by AeroTag AI. Passengers are interested in knowing that their possessions are secure and that they can be retrieved promptly if they are delayed or lost. Convenience, transparency and control over travel are also sought-after by travellers. Consumers like to have their information available on a moment's notice and don't want to be uncertain, particularly about high-quality bags for their belongings. AeroTag AI addresses these needs by offering current visibility in the bathroom, predictive alerts, and direct communication to travellers via mobile application, thereby lowering the anxiety and boosting confidence during travel.

### **3. Drivers of Change**

#### **a) Shifts (Long-Term)**

Aviation is experiencing a long-term digital transformation as consumers are becoming more dependent on their smart phones, mobile apps and real-time services. As travellers get digitally savvy, they also can expect technology experiences as they travel. Meanwhile, airports are implementing automated systems, RFID technology, AI analytics, and smart airport infrastructure, while airlines strive to advance their operations with automation. Such changes have influenced customers' expectations that their travel journeys must be integrated, seamless, and technology based. These changes have made customers demand integrated, technology-focused and seamless travel.

#### b) Triggers (Short-Term)

The escalation of baggage delays, lost bags, and passengers' grievances has raised the demand for the solution of baggage management. The parcel delays, the lost parcel incident and the complaints of the passengers have increased in recent times, further increasing the demands for solutions in the packaging management. In matters concerning passengers, social media have given empowerment to those whose experiences do not go as expected, thereby creating a negative reputation for the airline. Meanwhile, the improvements in AI prediction systems, RFID technology, GPS tracking, and mobile applications have driven the cost of smart baggage tracking solutions down and made it extremely practical. This makes it the immediate need of the world to find innovative solutions like AeroTag AI.

#### 4. Emerging Consumer Expectations

Today's travellers are increasingly demanding to see everything from when they pick up their bags until they get to their destination. They want to be informed on the spot, have correct information about it, and receive foresight warnings beforehand if issues arise. The mobile-based self-service solutions where consumers can track their possessions by themselves, without depending exclusively on the airline customer service, is another expected feature. AeroTag AI meets these criteria with AI-based delay prediction and airport-mode tracking, crowd-assisted location technology, smart battery optimisation and convenient mobile monitoring.

#### 5. Innovation Potential

AeroTag AI is a product and service innovation, which is made up of hardware and software combined with artificial intelligence, all to be part of the journey toward a travel ecosystem. It is possible to implement the innovation using the partnership with airlines and operations in airports, as well as direct sales to consumers. It streamlines bag management, improves real-time tracking and communication among passengers and airlines, and facilitates predictive analytics. The innovation has a high commercialisation potential due to its ability to solve a key industry challenge, in addition to advancing Malaysia Airlines' goal of delivering the best possible customer experience as well as efficiency and competitiveness.

## 6. Who

AeroTag AI is mainly used by passengers of airlines who are likely to be travelling for business, pleasure, school or family reasons. Business travellers can be assured of the tracking of essential items, and tourists travelling abroad can be reassured in their trips from destination to destination. It could also be useful for families who carry with them the necessary items as well as passengers who must transfer flights and are likely to be exposed to having their bags delayed. Also, airlines and airport managers can use AeroTag AI data to enhance the performance of the baggage-handling system and the quality of customer service provided.

### Consumer Trend Canvas

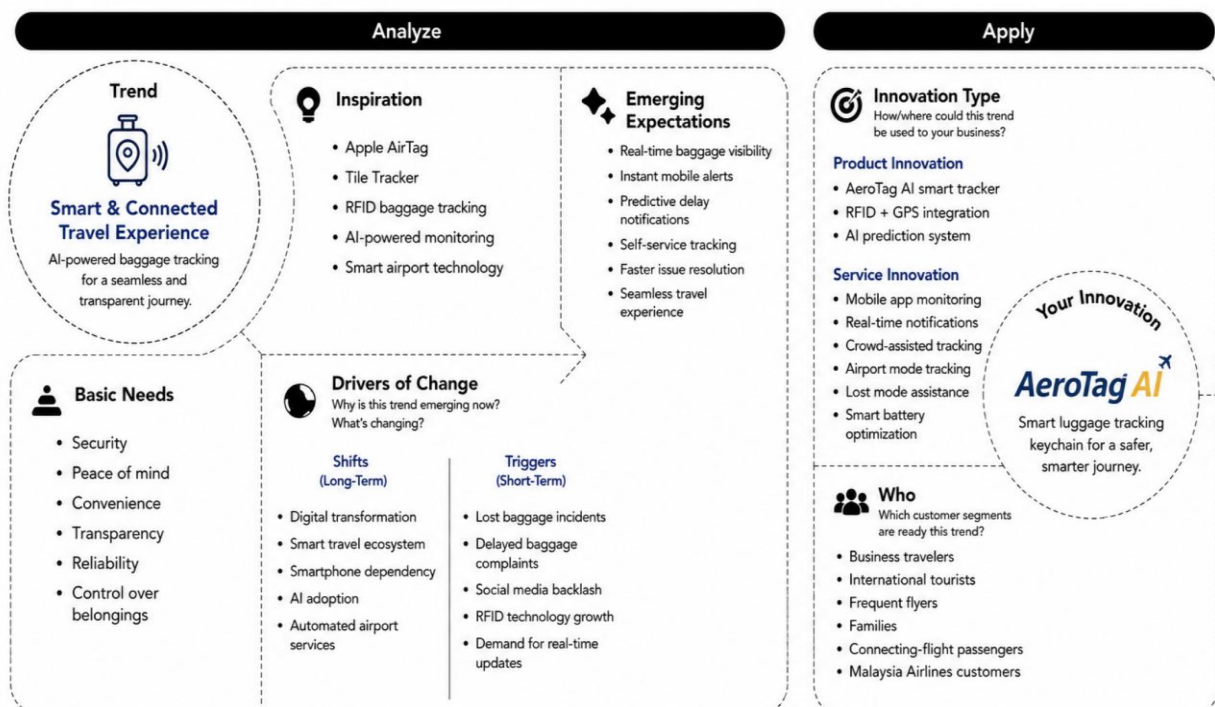


Figure 17: Consumer Trend Canvas

## **5.0 CONCLUSION**

To sum up, the evolution of AeroTag AI has been able to traverse the significant phases of the New Product Development (NPD) process from brainstorming ideas to conceptualisation, market research, designing the product, testing, and the final step of testing marketing with success. The product was designed to solve the problem of handling bags, those of the airline passengers, mainly delayed, lost and mishandled bags. By combining AI, RFID, GPS technology, and a mobile app, AeroTag AI is an intelligent and innovative system that increases the visibility of the contents of an aeroplane's luggage and, consequently, the overall travelling experience.

The results of the market study suggest that there is acceptance among the consumers towards the product, and they know the product is useful and practical to use. Also, the feedback received during the testing phase gave some valuable inputs for improvements. AeroTag AI has significant commercial potential as a result of the verified market requirement, technological viability and favourable customer reception. The product is both feasible and viable since it solves a real issue in the industry, it is in tune with the current trend of riders to adopt digital and smart travel, and it has the potential to collaborate with both aircraft and airport operators. Thus, AeroTag AI can be a competitive and sustainable innovation in the aviation field.

## 6.0 REFERENCES

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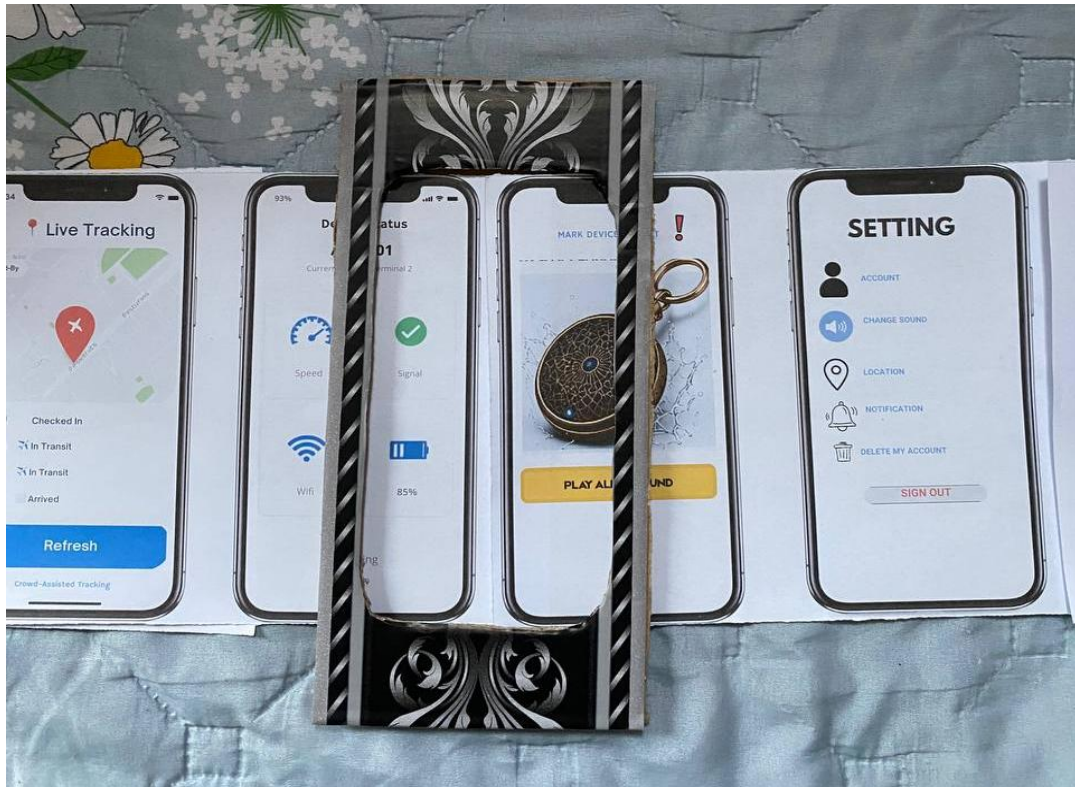
## 7.0 APPENDICES (if any)



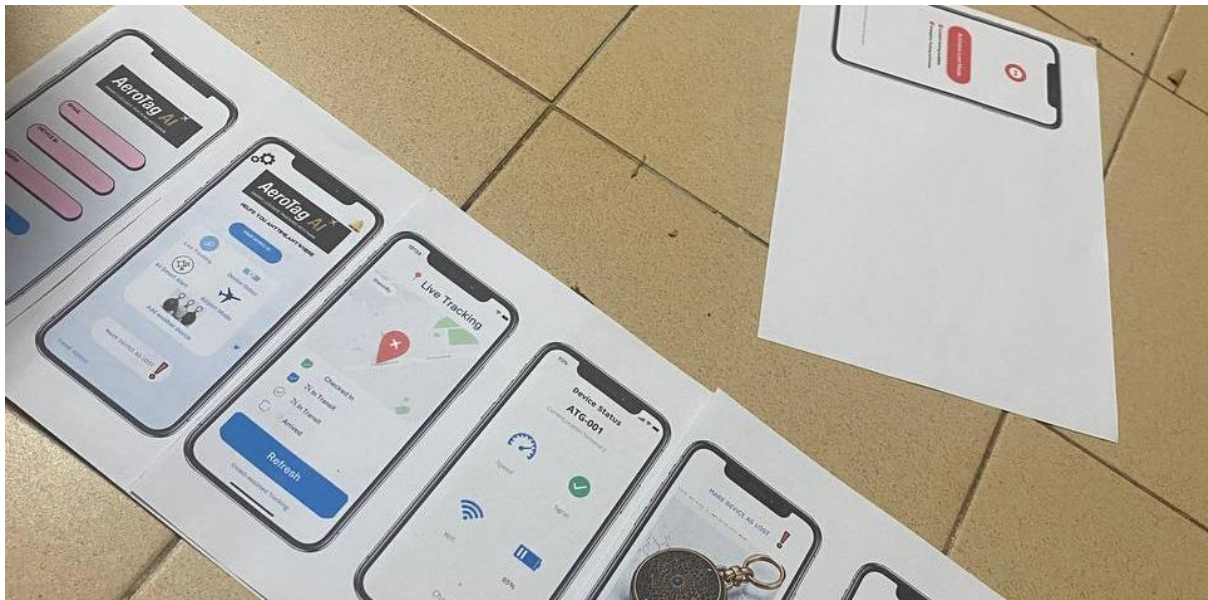
Appendix A: AeroTag AI Component Layout and Internal Structure



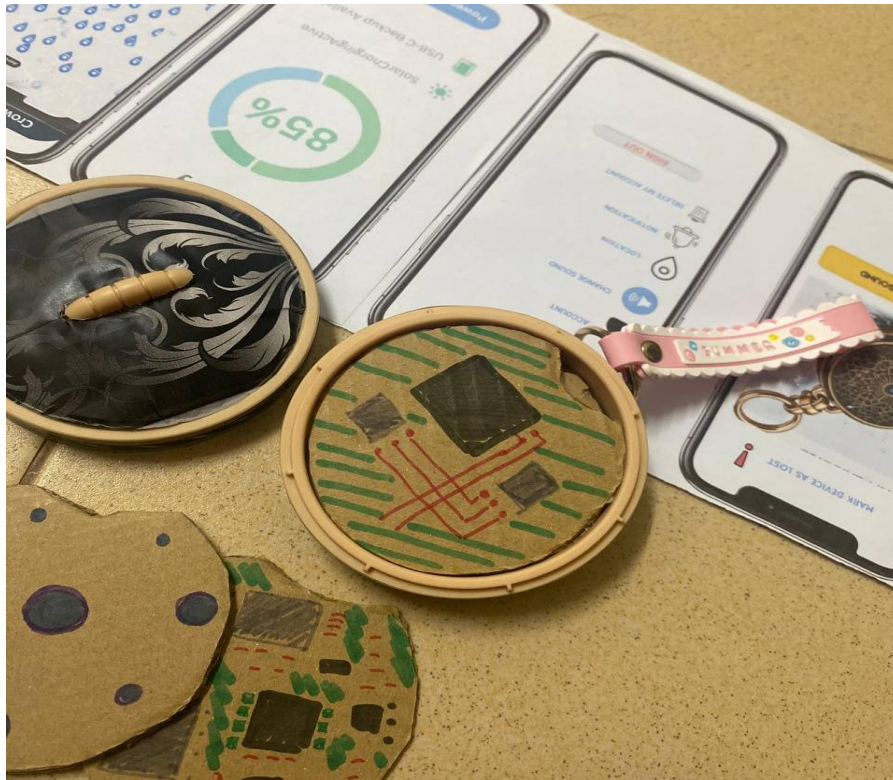
Appendix B: AeroTag AI Mobile Application Interface Design



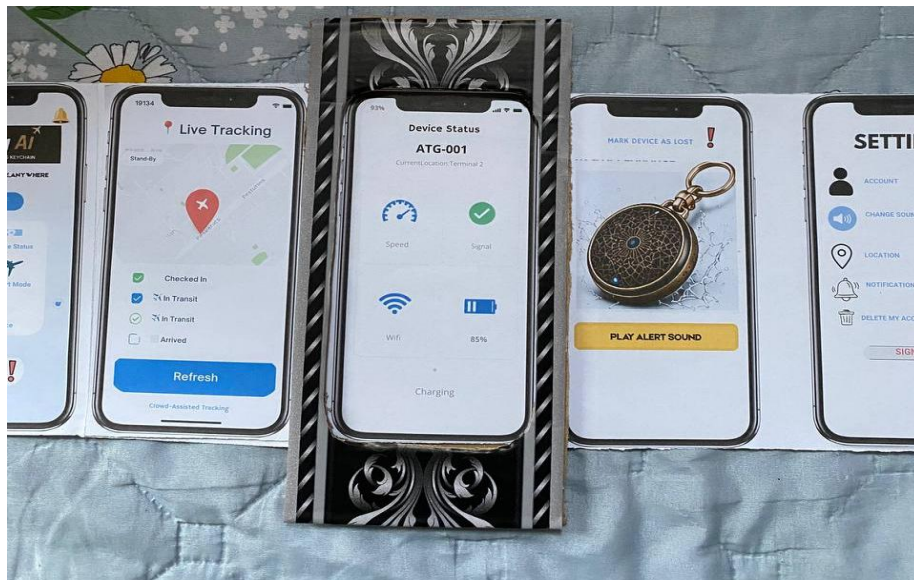
Appendix C: AeroTag AI Integrated Prototype Demonstration



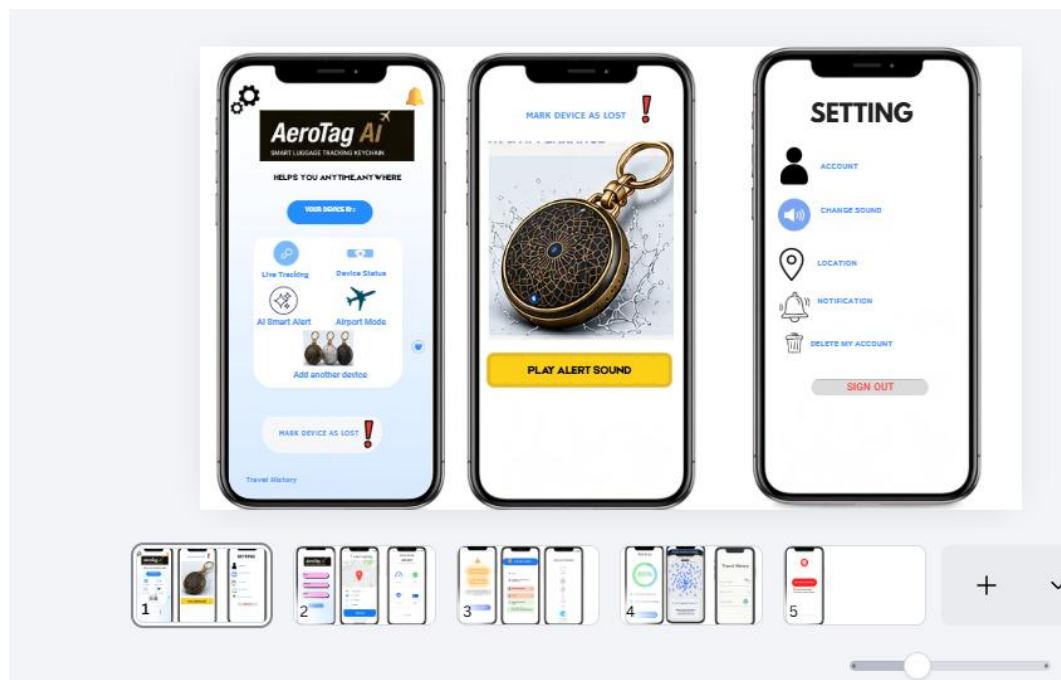
Appendix D: AeroTag AI Prototype Development Process



Appendix E: AeroTag AI Hardware Prototype Components



Appendix F: AeroTag AI Mobile Application Testing



Appendix G: AeroTag AI Mobile Application Prototype Design