Where Are You? Tracking Kid Nightmare!

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Abstract.In recent years, missing children and child abduction have happened frequently, which has sounded the alarm to every family with children. People pay more attention to the safety and physical health of children. The most common child trackers on the market are smart children's watches, but the products lack hidden designs. Through a comparative analysis of the existing literature methodology, this study found that the safety and health of children have become one of the problems of globalization. The application will use existing GPS and GSM technology to design new products with concealment that will be friendly to the kids, and yet convenient to their parents. At the same time, it has a real-time tracking function and physical activity record to meet the needs of parents for children's safety and health monitoring. This study will expand the theoretical knowledge and inspire practical application.
Keywords: kids or children tracker; physical health; tracker industry; Child trafficking; Child Safety Wearable Device; Trafficked children; Children; Wearable; Safety; GPS

1.0 Introduction

NEW ERA Sdn. Bhd. is a Malaysia-based company specializing in developing GPS trackers. The company's business is designed to develop a tracker for not only children, but also pets, adults, and the elderly. It is claimed to be the first company in Malaysia that sells GPS trackers, and which is to be set up by this year 2021.

The development of science and technology promotes the development of technology in all aspects of society, and the tracking function equipped with each product is also being improved. With the explosion of wearable devices, there are more and more tracking devices on the market, and children are an important group for merchants to open the market. There are several trackers on the market to do this [1], with a variety of functions and appearances. Some are wristwatches, others pocket-sized devices or rucksacks. Some look like the sort of tracker that features on the ankles of criminals on day releases. The product of the company is well equipped with basic functionality and relies on the technology, where a SIM card is installed in the device to provide a GPS signal [2]. Customers are relieved to finally have a serious technology that works. Side buttons and SOS alerts are two extra features of trackers for youngsters and the elderly. The application overview and tips are available through the website. Localization, zone alerts, compass, tracker history, and both sound and vibrate functions are among the features available[2].

2.0 LiteratureReview

2.1 Market Analysis

2.1.1 Market segmentation and target market selection

Malaysia recorded 1,302 missing children in 2019，andfrom January to November 2020, 732 children went missing[3-5]. Most of the missing children are too young to have a strong sense of preparedness and awareness. This has promoted the industry demand for child trackers in Malaysia. The market is aiming at families with children aged 3-12,whose parents want to be able to track their children's activities.Insufficient physical activity has a significant impact on the healthy development of young people and is the fourth leading cause of death worldwide.[6].

2.1.2 Buyer behaviour

Child trafficking continues to occur, leaving many parents worried that their children will be trafficked or lost and separated. In India, kidnappings of girl children have soared 23.2% each year, as per the records given by the National Crime Records Bureau. Almost 85% of all kidnappings in the country are of minor girls, as per the crime bureau records [7]. For the safety of children, many parents hope that they can do anything anytime and anywhere to master the location of their children.Most buyers, because the family children are small, to prevent the children accidentally lost. The product is compact, looking more like an ornament, easy to carry.

2.1.2 Competitor analysis

In Malaysia, there is a scarcity of systems for parents to pick from that allows them to keep track of so many children. There is currently no capability in the Malaysian system that allows parents to record the path their child took during the specified period. In Malaysia, there are few products related to child trackers on the market, the market is in its infancy, and there is a great space for development.

2.2 Industry Analysis

2.2.1 Industry size, growth rate, and sales projections

In Germany, almost half of the children aged 10 to 13 now own a GPS locator. In Australia and Japan, the rate of children owning a GPS locator is more than 25% [8-9]. At present, more and more families in China have begun to accept kids' GPS, the number of which is about 15% [10].

As can be seen from Figure 1, the market share of GPS for children is constantly

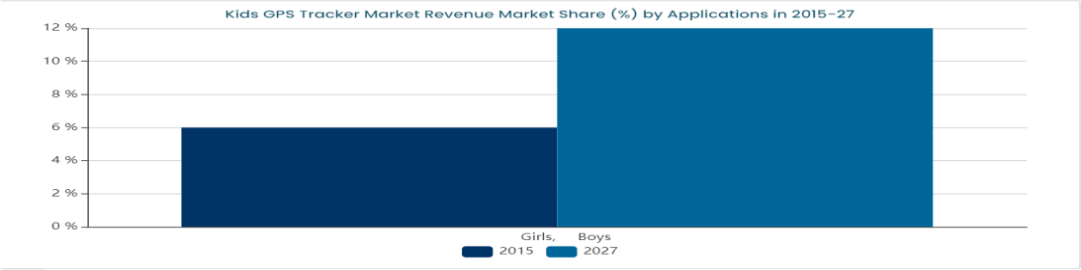

Figure 1: Kids GPS Tracker Market Revenue Market Share

increasing. The demand for GPS in children is expected to double in 2027 from the 2015 market share. Therefore, the market prospect of GPS for children is very optimistic, and there is great market demand.

2.2.2 Current gap

At present, there are problems with the product. Criminals know very well about wearable smart children watches, which cannot provide good protection and tracking the effect on children. Criminals can take down the smartwatches as soon as possible. How can be invisible protection, and products can have the alarm and emergency call for help function of the product, is the industry needs to solve the problem.

2.2.3 Industry trends

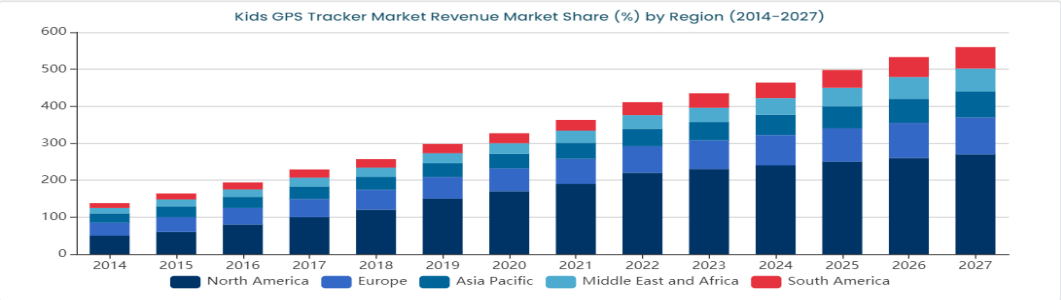

Figure 2: Kids GPS Tracker Market Revenue Market Share

The future development of children's GPS is on the rise. It can be seen from Figure 2 that the global demand for children's GPS will continue to grow, among which the demand in Asia, South America, and Europe is on the rise. Demand in 2027 is expected to double that in 2019.The overall trend in the industry is still in high growth.

2.2.4 Key success factors

The key to the success of a product is to first produce the product according to consumer demands. The findings made by Sullivan show the product evaluation factor. Namely the quality perceived by consumers is important in determining repurchase intentions [11]. Children can have their own free time and range of activities, and out of sight of parents.Secondly, we should seize the opportunity to choose areas with large market demand but insufficient products on the market, conduct market research, and control the price of goods and the number of products. Improve the performance of new products by exploring CRM and PDM, focusing on creating emerging economies, and implementing blue ocean strategy[12]. Thirdly, it is necessary to face risks and competition bravely and strengthen the security protection of the information system. Risks and opportunities to coexist. If you want to succeed, you must dare to challenge. The pursuit of social responsibility will bring aconsiderable cost to the enterprise, but it can establish a positive social image for the company [13].

3.0 Methodology

Thestudyanalyzes the feasibility of the implementation of new products, the pricing of market commodities, and the sales and promotion of products through the research, analysis, and comparison of relevant literature and relevant data for the industry[14-19]. The study collected 20 literature and web pages and used these secondary data to conduct the study, as shown in the table below.

Table.1: Data for comparison

Nb	Title	year	Direction	Equipment and technology
1	Review on child safety wearable devices [13]	2020	The safety of children is the most important common issue around the world	Microcontrollers, GPS, clouds, heart rate sensors，Temperature sensors, GPS trackers
2	Design of Child Security System [6]	2018	Children are the future of a nation	RFID module（GSM, database, power supply, LCD, tag)
3	The emerging ethics of humancentric GPS tracking and monitoring [14]	2021		GPS control (criminal), convenience, care (elderly and children), morality (privacy, property, precision)
4	IoT Based School Child Tracker System [15]	2021	The number of child abductions is increasing	RFID scanning，GPS，GSM information notification
5	Pembangunan alpacas child tracker breasts assisted-global positioning system denga platform android[16]	2016	Children's growing environment is increasingly concerned by parents	A-GPS, Java development kit, Google cloud information, Google maps
6	Development of software and hardware complex of GPS-tracking [17]	2021	Data transfer from GPS tracker to Webserver	GPS, GLONASS, GSM cellular network, microcontroller, GPS receiver
7	Kids' smartphone activities tracker: an android application for tracking and monitoring children smartphones [20]	2020		location-based services (LBS), GPS, GSM, call log
8	Physical activity and fitness: The feasibility and preliminary effectiveness of wearable activity tracker technology incorporating altruistic motivation in youth [19]	2020	Wearable activity trackers are used to promoting physical activity in children	GPS, GSM, Cardiopulmonary monitoring system,
9	Kids’ Tracker: An Android Application for Tracking Children [18]	2017		GPS, Raspberry pi board (RPI),GPGGA
10	Raising the Responsible Child: Collaborative Work in the Use of Activity Trackers for Children [21]	2020	Exercise trackers can help develop healthy habits	GPS, Google map, Sleep features, tracking heart rate, calorie burn
11	Tracker-an android based smart kid tracker application [22]	2020		GPS, clouds, Java，JDK
12	Smart family tracking system using global positioning system [5]	2019		GPS，A-GPS，GLONASS，

13	A Dangerous Location-Aware System for Assisting Kids Safety Care [23]	2021		location-based services (LBSs), GPS, PC/PDA hardware, Risk detection
14	Parental Perspectives of a Wearable Activity Tracker for Children Younger Than 13 Years: Acceptability and Usability Study [24]	2021	Physical inactivity is the fourth leading cause of death worldwide	KidFit tracker,
15	Child Location Tracker with Virtual Fence	2020	Child abduction is one of the anxieties of today's parents	GPS, Clouds, IoT,
16	A safety system for school children using GRAG[25]	2019	Safe transport of children has become an important issue	GRAG,GPS, RFID,GSM，SMS
17	Child tracking system using Zigbee network [8]	2021	Violence against children is rising at an unprecedented rate around the world	GPS, SOS, Buzzer, Panic Button.
18	Schoolchildren safety and alert system	2021	Child abduction and traffic are on the rise	Radiofrequency identification (RFID), GSM, GPS, Arduino UNO
19	Solution Integration approach using IoT in education system [6]	2017		IoT, GPS, and GSM, clouds, Message queue telemetry transmission system (MQTT),
20	Device for monitoring pyrexia in special children and tracking using two ways communication GPS [26]	2021	Trafficking in children is a major threat in the world today	GSM/GPRS, GPS, Radio frequency identification (RFID), Sensor, PIC microcontroller

As can be seen from Table 1, existing companies mainly use GPS, GSM and RFID technologies, and use cloud and IoT for data processing. To keep the tracking system safe. But there are battery life, and stable signal reception and other related problems.

4.0 Findings and Discussion

4.1 Marketing Plan

4.1.1 Overallmarketing strategy

Our Child Tracker will position itself as a new, effective, affordable tool to help stay tuned when the child is out of school, after school activities, or even family outings in crowded places. The Malaysian system currently lacks the functionality to allow parents to record their child's path to the selected time. There are few child tracker products on the market in Malaysia, the sector is still in its infancy, and there is plenty

of room for growth. The marketing approach is mainly through online sales, combined with physical store sales, and related activities.

4.1.2 Product, price, promotions, and distribution

Product: The device is coming from the manufacturer based in China - Shenzhen Meiqiling Technology Co., Ltd. The tracker is customized according to our request in terms of features and design. Break the existing industrial product model, not restricted to the existing product style, the main research and development can add a hidden product, to achieve invisible tracking mode. Our GPS tracking device that uses accurate mapping software can provide peace of mind while also ensuring that the child develops independence and coping skills need to be successful at home and out alone. Moreover, the tracking app is another ultimate feature that supports the tracking device.

Price: Product prices to achieve low-cost and low price, that makes it accessible to the public. The manufacturing price will be RM50 per unit. Considering that the sales platform needs to extract 4% of the transaction price. Our selling price will be RM200 per unit and it comes with the free installment of the application and features. In general, we will start from value-based pricing, as it will open the benefits for both – customers and us. We will enter the market with openness to feedback and value proposition. We will educate the customer on the effectiveness, value over the price.

Place: our location will be in Cheras, Taman Connaught. This location will allow us to have an efficient rental cost. Strategically located near the international school, local schools and kindergarten, shopping malls around the town, moreover, provides access to business development with the other areas and distribution channels. The HQ is the main receiving and distribution hub, as well as the back office with technical and operational support.

Distribution: Theoverall concept of the distribution will rely on click and brick. The distribution is not limited to online sales, through social media and the official website, as well as direct sales during meetings and events. The child tracker will be available in the tech – stores in the shopping malls. In case of delivery methods upon online order, we will work closely with Grab delivery services, so that the purchased item is received on the same day of purchase with all the necessary tools to get started on the GPS tracker. The purchased child tracker will include the manual, and USB charger.

4.1.3 Sales process (or Cycle):

The sales approach consists of education and awareness, the need and value of the presented product. Product sales is a combination of offline and online sales to meet the needs of consumers. Innovation in product technology and product design is based on consumers' opinions on existing products. Improve consumers' awareness of education and prevention, and enable parents to understand and understand their children's physical health and safety needs through special social activities and related knowledge lectures in schools. The value of the product, mainly through the existing GPS technology to track the activities of children, parents can monitor the safety of their children through the smartphone mobile device. To better protect against criminals, the designs will be more subtle, mini and portable.

4.1.4 Sales tactics

In the early stage of product sales, online advertising improves brand awareness and reputation. In offline stores, the strategy of using the word of mouth is used to stimulate consumers' desire to buy through the description of real events and the use of actual products. In terms of price, the price positioning is mainly to meet the buying ability of ordinary people, and the price will be 200RM.Such a price would be more acceptable to the public and slightly lower than the market price of existing products. Strategic overall planning, through the existing market analysis, competitive analysis, and audience analysis, develops creative strategies. For marketing sites, have a sense of the time and visual style. Brand image, product word-of-mouth copywriting planning. Use forums, videos, PR campaigns, and marketing communications. Combine SNS marketing strategy to increase sales volume.

4.2 Development Plan

The current market for the company's products is in France, and we will set up a branch office in Malaysia. It is hoped that the next target market for the company is the Southeast Asian market centred on Malaysia. And spread it around the world.

4.2.1 Overall development status and tasks

The construction cycle of the project is divided into three phases: construction phase, growth phase, and expansion phase.

- Development period (1 year): The company's infrastructure, including construction and maintenance of intelligent digital system platform, design of new products.
- Growth period (1-2 years): promote the company to make more consumers recognize the company's brand and products. Especially to improve the parents for the child's awareness of prevention, pay attention to the child's health. Attract more consumers to purchase and use.
- Expansion phased (2-3 years): continue to expand upon other countries such as Australia, India, and other countries to promote the company's products and protect every child's healthy growth with their parents.

4.2.2 Challenges and risks

The challenge for the company comes from consumers' acceptance of the product. According to the survey, the use of child trackers is not high in Malaysia and Southeast Asia as a whole. How to enhance the safety awareness of parents is the main problem to be solved before product sales. Deliver health and safety knowledge through educational presentations to schools (kindergarten, primary and secondary). It can also carry out through the community and park-themed activities. To improve the safety awareness of parents and children, and to understand the product. Building better brand awareness for subsequent sales of products.

4.2.3 Projected development costs

The project is estimated to require RM200,000 and the planned financing is RM200,000. Mainly used for system, base station construction, and maintenance, product design. Profit is expected to start in the second year.Profit will show geometric

growth.

Table 2, Financial Statement

Pro Forma Income Statement (end of year)	**1 (RM)**	**2 (RM)**	**3 (RM)**	**4 (RM)**	**5 (RM)**
Cash Inflow: Cash Sales (1)	0	100,000	300,000	500,000	800,000
Website construction cost	80,000	0	0	0	0
Team building cost	50,000	0	0	0	0
Management fees	30,000	0	0	0	0
Administrative expenses	10,000	0	0	0	0
Other free	10,000				
Start-up Costs:	**180,000**	0	0	0	0
Operating expenses:					
Salaries	0	30,000	40,000	50,000	60,000
Drawings (own salary)	0	8,000	10,000	10,000	10,000
Rent	0	2,000	3,000	4,000	5,000
Utilities	0	10,000	10,000	10,000	10,000
Insurance	0	1,000	2,000	3,000	5,000
Advertising & Promotions	0	20,000	30,000	30,000	50,000
Maintenance & Upkeep	0	20,000	30,000	30,000	50,000
Interest payable	0	0	0	0	0
Other expenses	0	5,000	10,000	10,000	10,000
Total operating expenses (10 items)	0	96.000	135,000	147,000	200,000
Cash Outflow:	180,000	4,000	165,000	353,000	600,000
Net Cash position	**-180,000**	**-176,000**	**-11,000**	**342,000**	**942,000**
Calculation of profits					
Cash Sales (1)	0	100,000	300,000	500,000	800,000
Less: Cost of sales					
Purchases (2)	0	50,000	50,000	50,000	50,000
Gross Profit	**0**	**50,000**	**250,000**	**450,000**	**750,000**
Less Total operating expenses (3)	0	25,000	50,000	100,000	150,000
Net Operating Profit	**0**	**25,000**	**200,000**	**350,000**	**600,000**

4.2.4 Milestones Implementation

Market research: preliminary work of the company's products, feasibility study of new products, and market and environmental issues.

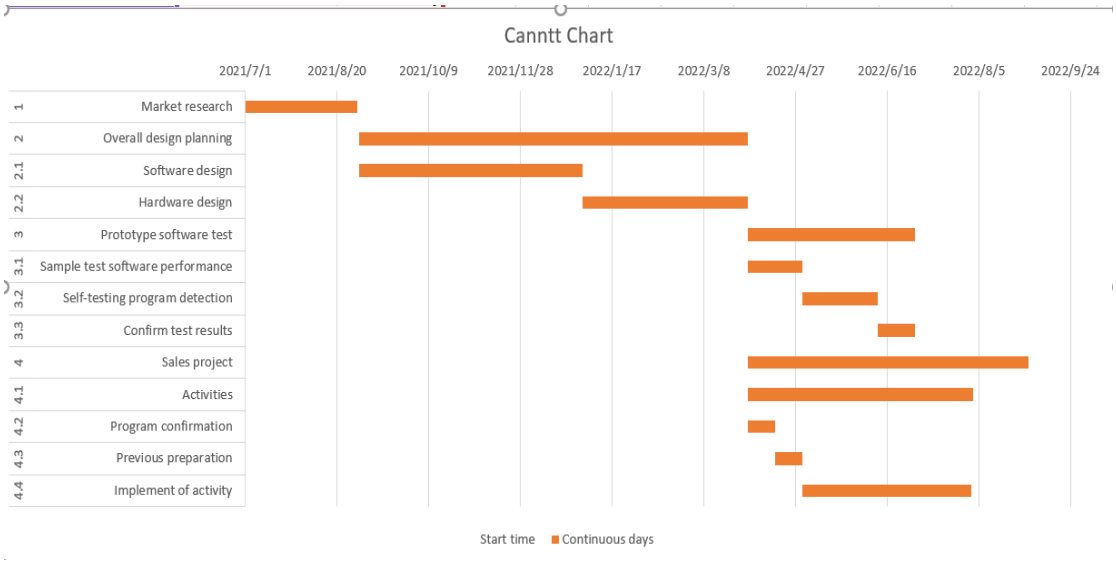

Figure 3. Milestones Implementation

Design planning: GPS platform establishment, APP development, and maintenance. The design of the product's appearance has concealment.

Software performance-tested: ensure the software works properly, including network information security, running speed, operation, and other related issues.

Sales project:measures and plans for product sales and promotion.Ensure normal sales and profitability of the products in the target market.

4.2.5 Proprietary issues

We will set up a branch office in Malaysia, registered following the local laws and regulations. Production of standard quality products, production will be outsourced, with quality testing. The branch company mainly carries on the product appearance designand software maintenance.

4.3 Operations Plan

4.3.1 Overall general approach to operations

The company's daily operations include product sales and after-sales service. Products are sold online through their online stores to reduce costs. At the same time, it can work with distributors and wholesalers to use Amazon, Taobao, and Zappos to sell products through large traffic sites. After-sales service, parents need to download APP to monitor children's behaviour trajectory through smartphones, so daily data should be maintained safely. Increasing the security of customer information to prevent hackers and criminals from stealing. Maintain the operating environment of system procedures and data transmission, report the problem to customers in time.

4.3.2 Business location

Our manufacturing facility is in Kuala Lumpur, Malaysia, which has the advantage that there are no shipping costs. The target market of the product is Malaysia in the early stage. According to the operating income capacity, in the market expansion. We should go to other countries in Southeast Asia and finally realize globalization.

Product prices to achieve low-costand low price, people can buy affordable, affordable to use. Break the existing industrial product model, not restricted to the existing product style, the main research and development can add a hidden product, to achieve invisible tracking mode.

4.3.3 Facilities and equipment

- **Smart IoT Device for Child Safety and Tracking**[6]

It is to track the location of children through the Internet, providing parents with real-time tracking location, outdoor temperature changes, and SOS distress alarm connection, when the child is in danger to warn parents in time, and prompt the surrounding crowd to rescue the child. It has Micro Electromechanical Systems, NodeMCE, GPS, and ThingSpeak sensors. There are two ways to provide results. In one, they receive text messages and phone calls, and in the other, they receive maps with latitude and longitude to find out where the child is.

- **Child Safety Wearable Device** [10]

The device mainly uses a GPS positioning APP, which can be tracked in real-time through the download binding of the smartphone. Parents can see their child's range in advance and will be alerted by text messages and phone calls when the child is out of the safe range.In this way, parents can understand and master the dynamics of their children.And to deal with the danger in time.

- **Suppliers**

Products need the supply of raw materials, especially PC materials and silicone materials. Need long-term stable suppliers. Production equipment supplied is also needed. Since the company wants to enhance the appearance of products for concealment, it has strict requirements and supply-demand for equipment requirements and improvement.

5.0 Conclusion:

With the development of child trackers, the existing child trackers pay more attention to the real-time communication between children and their parents.It could be argued that child trackers are now a feature of smartwatches and are no longer the single focus.Parents buy smartwatches for their children in the hope of giving them a kind of entertainment, and it has affected their children's mental health.Therefore, the company's products hope to return to the basic function of the child tracker, through the design of the appearance to solve the physical movement of children in daily life and the safety of free out.The products tend to be **mini** so that they are more **concealed**. They can be buttons on clothes, or they can be beautiful accessories that can be worn.

In the use of the system, GPS and RFID technology, Google map, cloud processing and other combined, and professional technicians to maintain the system, to ensure the stability and security of data transmission. The internal lithium battery can be charged through the **data line,** can also be charged by **solar energy**, to solve the equipment due to go out for a long time, and the occurrence of under-electricity.

Ensure product quality and tracking effect through the above-related measures. Network with the public security system, in case of an accident, can provide timely

positioning of children to help parents find their children. Ensure and reduce the occurrence of missing children, to protect the health and safety of children in every family.

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