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# Literature review

## I. Research methologies

**1. Primary research**: is any type of research that you collect yourself. Examples include surveys, interviews, observations, and ethnographic research. A good researcher knows how to use both primary and secondary sources in their writing and to integrate them in a cohesive fashion. Conducting primary research is a useful skill to acquire as it can greatly supplement your research in secondary sources, such as journals, magazines, or books. You can also use it as the focus of your writing project. Primary research is an excellent skill to learn as it can be useful in a variety of settings including business, personal, and academic. (OWL, 2021)

Example: If you want to know what users think about your app, you must conduct interviews or surveys to gather opinions to know what users need more and how they feel about your product. This is how primary research works

**2. Secondary research**: Secondary research or desk research is a research method that involves using already existing data. Existing data is summarized and collated to increase the overall effectiveness of research.

Secondary research includes research material published in research reports and similar documents. These documents can be made available by public libraries, websites, data obtained from already filled in surveys etc. Some government and non-government agencies also store data, that can be used for research purposes and can be retrieved from them.

Secondary research is much more cost-effective than primary research, as it makes use of already existing data, unlike primary research where data is collected first hand by organizations or businesses or they can employ a third party to collect data on their behalf. (Questionpro, 2021)

Example: Data available on the internet: One of the most popular ways of collecting secondary data is using the internet. Data is readily available on the internet and can be downloaded at the click of a button.

This data is practically free of cost or one may have to pay a negligible amount to download the already existing data. Websites have a lot of information that businesses or organizations can use to suit their research needs. However, organizations need to consider only authentic and trusted website to collect information.

**3. Research process:** There are a variety of approaches to research in any field of investigation, irrespective of whether it is applied research or basic research. Each particular research study will be unique in some ways because of the particular time, setting, environment, and place in which it is being undertaken.

Nevertheless, all research endeavors share a common goal of furthering our understanding of the problem and thus all traverse through certain basic stages, forming a process called the research process.

An understanding of the research process is necessary to effectively carry out research and sequencing of the stages inherent in the process.

These 8 stages in the research process are:

1. Identifying the problem.
2. Reviewing literature.
3. Setting research questions, objectives, and hypotheses.
4. Choosing the study design.
5. Deciding on the sample design.
6. Collecting data.
7. Processing and analyzing data.
8. Writing the report

(Iedunote, 2021)

Example: While visiting a rural area, the UNICEF team observed that some villages have female school attendance rates as high as 75%, while some have as low as 10%, although all villages should have a nearly equal rate of attendance. What factors are associated with this discrepancy?
We may enumerate several reasons for this:

- Villages differ in their socio-economic background.
- In some villages, the Muslim population constitutes a large proportion of the total population. Religion might play a vital role.
- Schools are far away from some villages. The distance thus may make this difference.

Because there is more than one answer to the problem, it is considered a research problem, and a study can be undertaken to find a solution.

**4. Population**: In research terminology the Population can be explain as a comprehensive group of individuals, institutions, objects and so forth with have a common characteristics that are the interest of a researcher. The common characteristics of the groups distinguish them from other individual, institutions, objects and so forth. The term universe is also used as synonyms to population. Suppose a researcher proposed to conduct a study on awareness and use of ICT among the secondary school teachers in Telungana, the entire secondary school teaching community in Telungana constitutes as the population of the study.

Sometimes population can be counted easily, which is called finite population. Population of medical students is an example of finite population. The unlimited or unknown number of population can be called as infinite population. The adolescents, youths in Telungana can be treated as examples for infinite population, though they can be counted but in complex procedure.

Any value which is identified or measured from the characteristics of entire population can be called as Parameter. The process of conducting a survey to collect data from the entire population is called a census.

(Rafeedalie, 2020)

For the research of smart home users in Vietnam, smart home users are the population of this research.

**5. Sampling method**

**There are four types of probability sampling techniques:**

- Simple random sampling: One of the best probability sampling techniques that helps in saving time and resources, is the Simple Random Sampling method. It is a reliable method of obtaining information where every single member of a population is chosen randomly, merely by chance. Each individual has the same probability of being chosen to be a part of a sample.

- Cluster sampling: Cluster sampling is a method where the researchers divide the entire population into sections or clusters that represent a population. Clusters are identified and included in a sample based on demographic parameters like age, sex, location, etc. This makes it very simple for a survey creator to derive effective inference from the feedback.

- Systematic sampling: Researchers use the systematic sampling method to choose the sample members of a population at regular intervals. It requires the selection of a starting point for the sample and sample size that can be repeated at regular intervals. This type of sampling method has a predefined range, and hence this sampling technique is the least time-consuming.

- Stratified random sampling: Stratified random sampling is a method in which the researcher divides the population into smaller groups that don't overlap but represent the entire population. While sampling, these groups can be organized and then draw a sample from each group separately

**a, What is qualitative research?**

Qualitative research is defined as a market research method that focuses on obtaining data through open-ended and conversational communication.

This method is not only about "what" people think but also "why" they think so. For example, consider a convenience store looking to improve its patronage. A systematic observation concludes that the number of men visiting this store are more. One good method to determine why women were not visiting the store is to conduct an in-depth interview of potential customers in the category.

**For example**, on successfully interviewing female customers, visiting the nearby stores and malls, and selecting them through random sampling, it was known that the store doesn't have

enough items for women and so there were fewer women visiting the store, which was understood only by personally interacting with them and understanding why they didn't visit the store, because there were more male products than female ones.

Qualitative research is based on the disciplines of social sciences like psychology, sociology, and anthropology. Therefore, the qualitative research methods allow for in-depth and further probing and questioning of respondents based on their responses, where the interviewer/researcher also tries to understand their motivation and feelings. Understanding how your audience takes decisions can help derive conclusions in market research.

**b, What is quantitative research?**

Quantitative research is the process of collecting and analyzing numerical data. It can be used to find patterns and averages, make predictions, test causal relationships, and generalize results to wider populations.

Quantitative research is the opposite of qualitative research, which involves collecting and analyzing non-numerical data (e.g. text, video, or audio).

Quantitative research is widely used in the natural and social sciences: biology, chemistry, psychology, economics, sociology, marketing, etc.

**Quantitative research question examples**

What is the demographic makeup of Singapore in 2020?

How has the average temperature changed globally over the last century?

Does environmental pollution affect the prevalence of honey bees?

Does working from home increase productivity for people with long commutes?

**II. Secondary Research**

**1, What is IOT ?**

**a, Definition**

Internet of Things, or IoT, internet of things refers to the billions of physical devices around the world that are now connected to the internet, collecting and sharing data. Thanks to low-cost processors and wireless networks, it is possible to make everything from a pill to an airplane part of the IoT. This adds "digital intelligence" to devices, allowing them to communicate without human involvement and unifying the digital and physical worlds.

**b, What platforms does IoT work on?**

To derive value from the Internet of Things (IoT), a platform is required to create and manage applications, run analytics, and store and secure data. Like an operating system for

computers, a platform does a lot of the work behind the scenes, creating an environment for developers, making it easier for administrators and users to use, and more cost-effective.

Currently in the world there are 4 types of popular IoT platforms:

- **Connectivity/M2M platforms**: This platform is mainly focused on connecting IoT devices connected via telecommunications networks (for example, SIM cards) but rarely has processing activity. processing and enriching data.

- **IaaS backends. (Infrastructure as a Service)** The Infrastructure-as-a-Service Platform provides storage and processing capacity for applications and services. These backends used to be optimized for desktop and mobile applications, however it is still considered a centralized IoT platform for now.

- **Hardware-specific software platforms. (Software Platform for Specialized Hardware)** Some connected device companies have built their own proprietary end-to-end software as an IoT platform. This is a closed platform and causes controversy as to whether it should be called an IoT platform (an example is Google Nest).

- **Consumer/Enterprise software extensions.** Current enterprise software packages and operating systems such as Microsoft Windows increasingly allow the expansion and integration of IoT devices. At the moment, these extensions aren't enough to be considered a full IoT platform - but this could be coming soon.

One thing in common is that large IoT platforms tend to bundle their own cloud computing hardware infrastructure, including storage, compute, networking, and data centers, for example. like the IoT platform of Amazon or Microsoft. In addition, most small platform developers choose to provide the platform layer software that is based on one or more major public cloud providers.

**c, Application of IoT ?**

IoT has many applications such as:

- Smart home: Whenever we think about IoT systems, the most important, effective and prominent application that comes to mind is Smart Home - the highest ranking IoT application across all channels.

- **Wearable Products:** Wearables are still a hot topic among potential IoT applications. Every year, consumers around the globe are waiting for the release of Apple's smartwatch. In addition, there are many other wearable devices that make our lives easy like the Sony Smart B Trainer, or the LookSee bracelet, the gesture control Myo.

- **Smart Grids:** Smart grids are another area of application that is also quite prominent. The smart grid basically promises to extract information about the behavior of electricity consumers and suppliers in an automated way in order to improve the efficiency, economy and reliability of electricity distribution. The 41,000 monthly Google searches are testament to the popularity of this concept.

**- Connected Vehicles**: Connected vehicle technology is a vast and extensive network of sensors, antennas, embedded software and communication-enabled technologies to navigate our complex world . It is responsible for making decisions with consistency, accuracy and speed.

- **Connected Health (Digital Health / Telehealth / Telemedicine):** IoT has various applications in healthcare, from remote monitoring devices to advanced and intelligent sensors for integration equipment combination. It has the potential to improve the way doctors care for and keep patients safe and healthy.

- **Smart retail:** Retailers have started to adopt IoT solutions and use IoT embedded systems on a number of applications that improve store operations such as increasing purchases, reducing theft, enabling management inventory management and enhance the consumer shopping experience.

**2, What is Smart home ?**

**a, Definition**

A smart home is a house in which electrical and electronic equipment is installed that can be controlled or automated or semi-automatically. Replace humans in performing one or several management and control operations. This electronic system communicates with the user through an indoor electronic board, a mobile phone app, a tablet or a web interface. Thanks to the application of technologies such as infrared, smart phones, cloud technology and especially IoT technology, Smart Home can automatically help you with household chores.

***Outstanding smarthome devices:**

- **Google Home system**: Referring to the smart home, it is impossible not to mention the Google Home system - a modern system developed by the "big man" Google. In particular, the system allows users to control and interact with Google Home smart speakers by voice to manage smart devices through Google Assistant, Google's virtual assistant. Some typical devices of the Google Home system can be mentioned as Google Home, Google Home Mini, Google Home Max, Google Nest Hub.

- **Amazon Alexa system**: Alexa is Amazon's well-known virtual assistant that is integrated on devices such as Amazon Echo smart speakers, Fire TV receivers, smart TVs and expanded with a wide range of products such as cars, electronics, smart home, etc. to help you control smart devices more quickly and conveniently. Amazon Alexa is compatible with more than 10,000

smart home devices, including lights, switches, fans, air conditioners, televisions, locks, etc. from famous brands such as Philips Hue, TP-Link, Sony,...

**- Samsung Smarthings System**: SmartThings is Samsung's proprietary system capable of connecting Samsung devices together. As a result, these devices can work together to make your home even smarter.

- **Apple Homekit System**: Apple HomeKit is a collection of smart devices for smart homes with a unique protocol that can be controlled with an iPhone, iPad, or Apple Watch. From there you can manage multiple devices from one iOS interface.

**b, Prominent Smart Home developers in Vietnam:**

- **BKAV Smart Home**: Bkav Smart Home is a system that connects all electrical devices in the house into one system so that it can be controlled automatically according to smart scenarios such as lighting systems, curtains, and air conditioners. temperature, television, sound, door lock, water heater, security system... The owner of the house can control it directly via smartphone or tablet.

- **Smart Home Lumi:** Lumi smart home meets the most basic needs of a smart home.

Current Lumi smart home solutions:

- Lighting control.
- Control air conditioner, TV.
- Curtain control.
- Control rolling doors, gates.
- Multi-zone audio..
- Smart context.
- Motion sensor.
- LED lights 16 million colors.
- Smart irrigation.
- Security solution combined with CCTV.
- Automatic timer.

- **ACIS Smart Home**: It can be affirmed that Smart Home - ACIS Technology's smart home is the pride for the Vietnamese brand. We confidently accompany consumers and investors in the process of developing and building a modern, comfortable and easy life.

Smart Home Easy Control products and ACIS Smart Home solutions score absolute points when possessing many outstanding features:

- The "All in One" touch switch is standardized with the same size as a traditional switch but contains up to 6 control buttons (while other brands' Smart Home switches have a maximum of only 2 buttons)
- Wireless transmission technology (Wireless) developed by ACIS itself with the ability to go through 3 floors of concrete. In particular, the whole system is encapsulated in

each switch, completely without antenna wires or router transmitters like other brands.

- Integration of cross control functions (ground floor control and vice versa) or scheduled control, context is integrated on each switch at any position.

**c, Analysis of the global Smart Home market**

Smart home is considered an inevitable development trend of the future housing market. According to a report by Zion Market Research, in 2016, the global smart home market reached a value of about 24.1 billion USD, in 2022 it is expected to reach 53.45 billion USD with an average annual growth of over 14 billion USD. 5%.

And the Asia-Pacific region is witnessing the blooming Smart Home wave. Statistics from Statista, a German company specializing in the market and consumer data, show that the Vietnamese smart home market achieved a revenue of about $83 million in 2019.

The company also forecasts that this market size will reach about 437 million USD in 2023, equivalent to an expected growth rate of 51.7% in the period 2019 - 2023. Statista assesses the smart home market in Vietnam. has great potential and will continue to explode in the future.

According to a survey by Jones Lang LaSalle Vietnam (JLL), the wave of smart apartments is growing strongly in Asia and has penetrated the housing market in Vietnam due to rapid urbanization.

(Anon., 2021)

**d, My opinion about Smart Home**

After watching the Smart Home review videos, I think this is a great device. If the installation cost is not mentioned, everyone should install it immediately. With today's advanced society, Smart Home is like a cure for the problems of households.

Smarthome has provided almost all the necessary functions for a home. If you are a person with poor memory, forget to close the door or turn off the light in the room when going out, Smart home will do it for you. You cannot stay at home all the time to take care of your house. So the smart camera will do it for you. At the same time, this camera will promptly notify you when there are unusual movements for you to better capture and protect your home. The lighting system will automatically turn on at 18:00 and turn off at 22:30 every day to prepare your family for a good night's sleep. You can control the lighting system remotely. Batch control or manipulation for each area, you can customize as you like.

That's great, isn't it? Even better when this device has been manufactured in Vietnam, big brands like BKAY, Lumi, ACIS have developed it very well. The smart home development market in Vietnam in recent years has progressed very well and will soon be popular in the future.

**III. Conclusion**

Through the above research, I draw some conclusions as follows:

For many, the driving force behind creating a smart home is the potential to save energy and money with automated heating and air conditioning systems. Smart thermostats, such as those made by Alphabet's subsidiary Nest, quickly and precisely automate the heating and cooling of a home. This usually reduces the owners' electric bill. Other products such as connected lights and appliances can use less energy by powering down when not in use. These kinds of products should be high up on anyone's smart home checklist.

Comfort is key. We all try to have as much of it as possible, so it's obvious this is one of the main reasons to get a smart home. You can start with things as simple as getting smart lights. These can turn on/off using voice commands, location rules, sensor detection, or even simple schedules.

While you can buy alarm systems to protect your home, smart homes can offer added security. Connected lights, cameras, and even doorbells can help make a home safer. If you're home alone and someone is checking out your house to see if they can break in, having these kinds of devices might scare them off.

If you want to take some of the tedious tasks of home care out of your hands, connected and automated devices have you covered there too. The most obvious device is the Roomba robot vacuum cleaner from iRobot, along with similar products. However, appliances can also come with smart home functions. Picture a laundry machine that automatically starts a wash cycle, or fridge that orders milk online when it senses that you're low.

This is just a simple daily setup that can be modified to your liking. Who wouldn't want these simple redundant tasks to be taken care of?

**IV. References**


Anon., 2021. *Cafeland.* [Online]
Available at: https://cafeland.vn/tin-tuc/xu-huong-smart-home-tren-thi-truong-bat-dong-san-96218.html
[Accessed 17 February 2021].

Iedunote, 2021. *Research Process: 8 Steps in Research Process.* [Online]
Available at: https://www.iedunote.com/research-process
[Accessed 4 July 2021].

OWL, P., 2021. *What is Primary Research and How do I get Started?.* [Online]
Available at:
https://owl.purdue.edu/owl/research_and_citation/conducting_research/conducting_primary_research/index.html
[Accessed 4 July 2021].

Questionpro, 2021. *Secondary Research- Definition, Methods and Examples..* [Online]
Available at: https://www.questionpro.com/blog/secondary-research/
[Accessed 4 July 2021].

Rafeedalie, D., 2020. *Research: Population and Sample.* [Online]
Available at: https://tophat.com/marketplace/social-science/education/course-notes/oer-

research-population-and-sample-dr-rafeedalie/1196/
[Accessed 4 July 2021].