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The Battlefield of IoT: Competitive and Cooperative Relationship Among Smart Home Vendors

Kuang-Chiu Huang¹, Yu-Cheng Lin²

Abstract

The integration between electronic devices and networking enable convenient, comfortable, efficient and secure life. So there are a variety of smart home hubs and accessories migrating to daily life with all kinds of possibilities and extending the scope and coverage of Internet of Things (IoT). For an example, Amazon's Echo launched in June 2015 and offers amazing capabilities. Its artificial intelligence voice assistant Alexa is a breakthrough invention, and people can not only search information, play music, read daily news, and place order instantly but also control auxiliary devices as television, air conditions, curtains, lights by their voice. In addition, the membership of Amazon, a giant of e-commerce, has reached to 65 millions prime membership and promotes Echo with affordable price \$ 179 and five millions sales record. To exploit the value of network of this emerging market, Amazon has welcomed and invited third-party vendors to develop unique voice skills together and to establish the ecosystem effectively.

Although Google's Home launched lately in October 2016, its artificial intelligence voice assistant -Google Assistant is embedded strengths of Google search engine and sells for a competitive price \$ 139 only. Google adopts the similar strategy to expand the eco-systems of smart home actively enhance smart home network effect with their huge resources. On the contrary, smart home hub vendors, Amazon, Google, and Samsung, not only compete each other, but also cooperate to enlarge this booming market together. For examples of cooperation case, the products of Nest which owned by Google compatible with Amazon's Echo. Relatively, smart home auxiliary vendors, Philips, Nest, and Smartthings, adopt several strategic alliance with smart home hub vendors to compete on the one side and cooperate on the other side.

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Therefore, the interaction between hub vendors and auxiliary device vendors is an amazing game and affects the development of IoT future. Our study will outline its competition status and answer the question “how do stakeholders of smart home market cooperate and compete each other in the emerging stage?”

The research method adopts three steps analysis for thorough study of the question. The Resource-based model from industry organization to analyze those smart home hub vendors for the 1st step. Value net model, Porter’s diamond model, and Ansoff matrix are analysis methods to be applied in the 2nd step for discussing external environment. And then, we enrich interaction discussion through case study as the last step.

In the resource-based model, we address internal resources, capabilities, and core competences for both hub vendors and auxiliary device vendors to analyze competitive advantages. External analysis uses value net model to figure out how to develop strategies of horizontal and vertical competition in smart home industry. Also, we evaluate the capabilities of potential revenues and profits to analyze the relationship of each smart home hub enterprises, customers, suppliers, competitors, and complementors (smart home auxiliary vendors). Porter’s diamond model mainly focuses on market demand and government policies whether affect enterprises decisions, and chooses Ansoff matrix to analyze the development of different smart home products in different markets development decisions. Based on the prior analysis results, then we can take overall analysis on market level about the co-opetition relationship of network effect on smart home.

Keywords: IoT, smart home, value net model, Porter’s diamond model, case study, Ansoff matrix , co-opetition

Introduction

1.1 Research motivation and background

This chapter describes research motivation and research questions of this study, and finally describes the entire process of the study and research methods in the flowchart. The first section will explain the background, motivation and the main purpose of the study, the second section is the research question, the third section is for the research process.

The development of the Smart home has long been faced with the home of the

equipment are different brands, different platforms, different communication protocols can not be linked to the difficulties of home equipment, decades of international manufacturers and around the world composed of Smart home alliance want to solve this problem. The development of Internet of Things through open technical resources and cloud developers to facilitate the technical environment Third party or developers to integrate a number of services and accelerate related technology applications, with the continuous development and improvement of Internet of Things technology, Smart home further expand. The rapid development of Smart home and increasingly penetrate into everyone's daily life.

Amazon released Smart home hub Echo in June 2015, Echo artificial intelligence voice assistant Alexa broke the original people think that Internet of things can only rely on the touch screen or mobile App as the main control interface, Echo can allow users to voice smart home auxiliary such as Philips Hue or Nest thermostats, but also to play music and news. With the growing growth of Amazon e-commerce, the world has more than 65 million Prime-membership. Through the e-commerce promotion, it has sold more than 5 million. Many features also enhance the consumer's living standards. In addition to the gradual increase in the user, Amazon also invited third-party vendors to develop proprietary voice skills, and constantly establish a link with other smart home auxiliary enterprises, and actively expand their eco-systems to expand the smart home network effect

Google released Smart home hub Home in October 2016, although the launch time is relatively late, but the Home Voice Assistant - Google Assistant combined with the advantages of google search engine, coupled with the original Google calendar and mail and other services. Many features of the functions same with Amazon ,and it also can voice the smart home auxiliary devices. The price is 139 US dollars, and it is more competitive than Echo. Although as a latecomer, Google is also actively expanding their smart home ecosystem and gradually expand the smart home network effect.

Samsung released the SmartThings hub in April 2015 to take the smart phone control as the core advantage, enabling smart home app monitoring for remote control the home environments. The price is 99 US dollars, in the above three Smart home hub enterprises are the most affordable. Samsung is also actively through the open system to provide developers the develop tools to reduce the entry barriers and increase the developers to expand smart home network effect.

Table 1-1

	Amazon	Google	Samsung
--	--------	--------	---------

Smart home hub	Echo	Home	Smart Phone + SmartThings Hub
Price	179	139	99
Supported system	Close system	Close system	Open system

Source: Data collected by authors

1.2 Research question

Therefore, the interaction between hub vendors and auxiliary device vendors is an amazing game and affects the development of IoT future. Our study will outline its competition status and answer the question “how do stakeholders of smart home market cooperate and compete each other in the emerging stage?”

2.1 Smart home industry and history

With the continuous development of Internet of Things technology, Smart home become the major business development goals. Before the Internet of Things is not yet mature the wisdom of the family has developed more than a decade. From 2000 onwards there is the concept of wisdom family, it called "digital home". After 2010, Internet of Things and cloud service and RFID technology to promote the Smart home appliances or smart TV development. Many companies have launched smart home products. After 2015, Amazon launched the smart home hub Echo, and open the Alexa development tools (Alexa Skills Kit), welcome to the development of the hardware vendors, network operators and other third-party partners, based on this platform to create a variety of services connected with Alexa, try to solve the home with the equipment can not be interconnected. Google launched the Home in 2010 to become the role of the late development of smart home to follow the step by Amazon.

2.1.1 Internet of Things

(Jayavardhana Gubbi,2013)The IoT has stepped out of its infancy and is the next revolutionary technology in transforming the Internet into a fully integrated future Internet. As we move from www (static pages web) to web2 (social networking web) to web3(ubiquitous computing web), the need for data-on-demand using sophisticated intuitive queries increases significantly. Radio Frequency Identification (RFID) and sensor network technologies will rise to meet this new challenge, in which information and communication systems are invisibly embedded in the

environment around us. Cloud computing can provide the virtual infrastructure for such utility computing which integrates monitoring devices, storage devices, analytics tools, visualization platforms and client delivery.

Internet of things can be applied to a very wide range, the following list of several related to people's applications:

- Family energy management system:

Wisdom meters intensively record the electricity information, and electricity information immediately transmitted to the power companies or users, and even energy service providers. Smart meters can help power companies more accurately grasp the power demand trends, improve power grid forecasting and scheduling capabilities; consumers can grasp the utility changes, and with the price changes to adjust the electricity behavior. The complete family energy management system can further analyze the equipment consumption of the home through the energy management application platform, which can be combined with Smart grid, home area network, home energy gateway, smart home appliances, and renewable energy through energy management system to provide energy saving advice.

- Wisdom Medical:

The patient as the center of the 4P (prevention, personalization, prediction, participation) thinking rise, with three level or five level of different age health needs of medical care came into being, the future will be connected to hospitals, care institutions, home care, health promotion, etc., showing continuous consistent service. Through the different wearing device by sensing the identification of components to collect rhythm, pulse, exercise, and supplemented by community activities, fitness trainers, the expansion of real life and other services to enhance the "quality of life" to promote the cloud of health information plus value. Through the hospital-wide specialization, Big data analysis, coupled with personalized health monitoring program, we can improve the establishment of ubiquitous national medical care services.

2.1.2 Nowadays Smart home development

The main goal of the smart home is to provide a family member with a convenient, comfortable and safe life, and through the integration of services to achieve the effective use of resources and benefits. Nowadays Smart home development mainly divided into entertainment, security, health, energy saving and smart home control of the five major applications.

According to the IEK, in the various of smart home application services, anti-theft, disaster prevention, smart temperature control and energy management is

most widely known, at the same time, global manufacturers have been researched related products into the general user family. In 2014, the global manufacturers are actively put into development four application services in the Internet of things under the technical framework,: (1) multiple context model: According to the user's different living conditions, set a variety of different products or services portfolio, on behalf of manufacturers Such as Apple, Samsung, SmartThings , etc... (2) home automation management: all the home devices such as lighting, home appliances and audio and video devices can be automatically controlled, this part has been the smart home development vision and goals, but the biggest challenge is solve the smart home devices with different brands that can not be interconnected (3) home control center: smart phone is a user control interface has become a common understanding, and now manufacturers are most active in the design of a physical or virtual type of product or services as a home gateway, for example: Google (Nest thermostat), Apple (HomeKit), MI (Smart Router), SmartThings (Smart Hub) and so on.

After 2015, Amazon and Samsung launched the smart home hub. Amazon's Echo allows users to voice music and news , further control smart home auxiliaries such as Philips Hue or Nest thermostats. Samsung take smart home hub that can connect smart phones as the core advantage, through the smart phone app to achieve remote home environment monitoring and control of smart home auxiliaries, both with different functions and strategies to seize smart home market. After 2016 Google joined the competition of the smart home market. Although the launch time is relatively late, but the Home Voice Assistant - Google Assistant combined with the advantages of Google search engine, and plus the original Google services, like calendar, mail , and other services. It will be a big threat to Amazon and Samsung in the future.

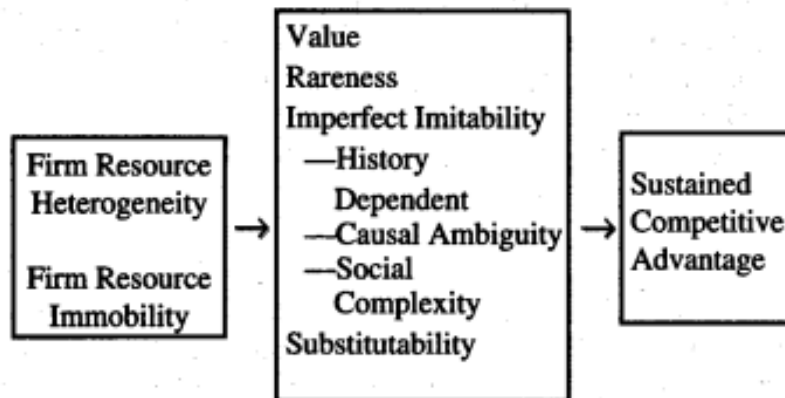
2.2 Resource Based View

The resource-based view is a strategy management theory, first proposed by Wernerfelt (1984), that the enterprise's resource-based view is based on a unique combination of tangible and intangible resources, rather than use product market as a business point of view. The perspective of company strategy is transformed into a "resource" alternative to the traditional "product" view, which transforms the basis of strategic development from external "industrial competition analysis" to the "resource-based perspective" of internal competencies.

Barney (1991) believes that firms can compete with their ability to accumulate and nurture sustained competitive advantages. Manufacturers should try to develop elements market is not fully competitive, so that enterprises can implement the

strategy in the product market to establish a sustained competitive advantages. Barney proposed how to build sustained competitive advantages and the relationship between resources as shown in Figure 2-1.

Figure 2-1



Source: Barney (1991)

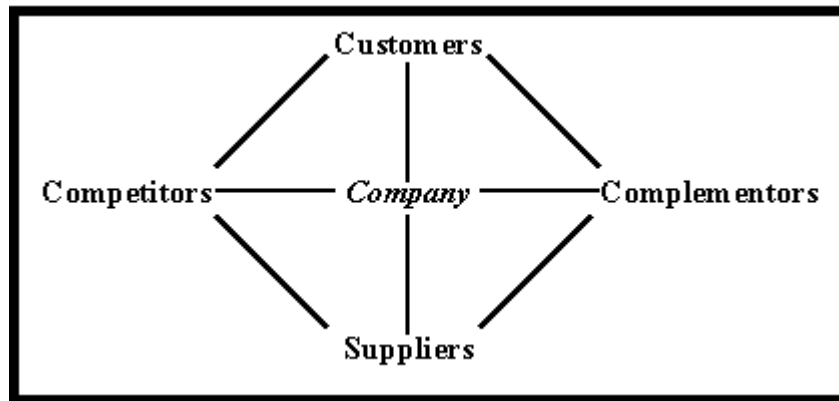
In Figure 1-1, Barney believes that competitive advantage is sustainable mainly due to the heterogeneity and immobility of the resources owned by the company.

2.3 Value Net Model

Adan M. Brandenburger and Barry J Nalebuff in the "Co-opetition" (1996) mentioned that "the essence of creating value is cooperation, the essence of value is competition." In order to create value, people can not act alone, they must be dependent on each other; To create value, the company must be combined with customers, suppliers, employees and many others, which is the approach to develop new markets and expand the existing market.

Value Net Model explains the relationship between all the business participants, figure 2-2. Traditional companies use the materials provided by the suppliers to produce products and compete with other manufacturers to obtain customers. In Value Net Model, Adan M. Brandenburger and Barry J Nalebuff introduce the new elements in the business activity: complementors, refers to companies that offer complementary products rather than competitive products and services.

Figure 2-2



Source: (Brandenburger and Nalebuff,1996)

The difference between the Value Net Model and the Porter's five-force analysis is that M. Porter emphasizes the division of value, and the Value Net Model emphasizes the division of value and the creation of value. The ultimate result of the division of value is zero, who is the ultimate winner depends on the relative strength of the competitors. Value Net Model emphasizes competition and cooperation, the company must work together with customers, suppliers and complementors who create value (win-win process). Company compete with customers, suppliers, competitors in order to obtain a value (the contest about win or lose), and the integration of competition and cooperation are called co-opetition.

2.4 Michael E. Porter diamond Model

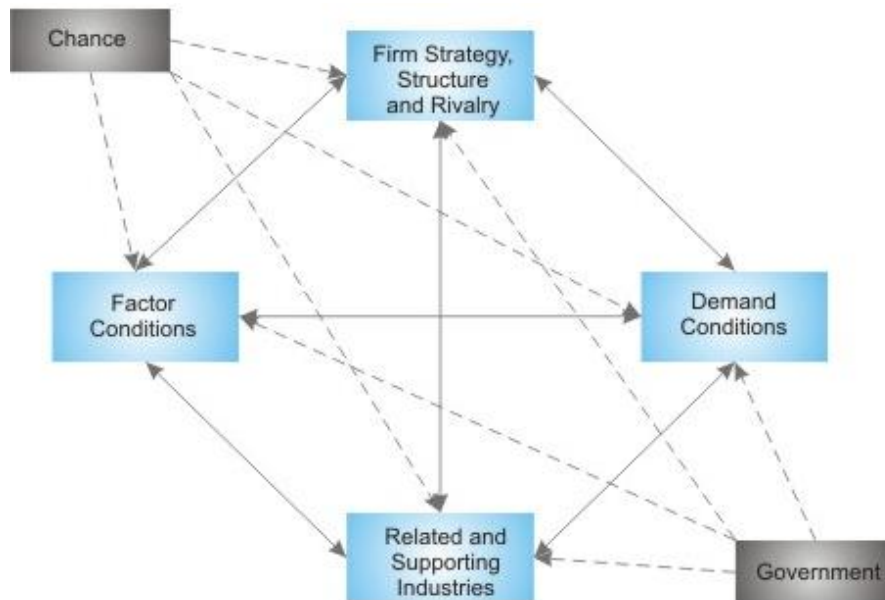
Michael E. Porter (1990), a well-known strategy manager at Harvard Business School, presented the diamond model in his book "The Competitive Advantage of Nations." Porter pointed out that the country plays a key role in the success of the enterprise competition; the region and the environment of industry are also playing a very important factor in its competitive advantage. Thus from Porter's perspective, there are four factors that determine the competitiveness of a country's industry, figure 2-3.

- Factor endowments: Including land, nature resources, labor, and the size of the local population.
- Demand conditions: Mainly the needs of the domestic market.
- Related and supporting industries: Whether these industries and related upstream industries have international competitiveness.
- Firm strategy, structure and rivalry : The biggest factor of creating and sustaining its competitive advantage is the strong competitor of the domestic market .

In addition to the four factors there are two variables: the government and the opportunity. The impact of government policy can't be ignored, and the opportunity is

unpredictable that can't be controlled and need the sensitivity and resilience of the industry and the enterprise.

Figure 2-3



Source : (Michael E. Porter , 1990)

2.5 Ansoff Matrix:

Ansoff matrix was put forward by the father of strategic management, Dr. Igor Ansoff, in 1975. It mainly focuses on the present and potential product and market of a company. Therefore, there are four possible combinations of it, and distinguish between the four products and market portfolio corresponding to the marketing strategy to provide the development of analysis and principles for business growth and its strategic.

Ansoff Matrix uses a 2 x 2 matrix to represent the four choices that an enterprise is trying to make income or profit growth. The main logic is that companies can choose four different growth strategies to achieve the goal of increasing revenue. Seen Figure 2-4:

Figure 2-4

	Exist Product	New Product
Exist Market	(Market penetration) (Market consolidation)	(Product development)
New Market	(Market Development)	(Diversification)

Resource :(Ansoff , 1975)

- Market penetration and market consolidation :

Occurs when a company wants to occupy more market share with the existing product in their existing market. To take the market penetration strategy, by promoting or upgrading the quality of service, etc. to persuade consumers to buy their own brand products or to persuade consumers to change the use of habits or increase the quantity of purchasing. Base on the existing market and products in a more stable market to on the to consolidate the market share. And take the product differentiation strategy to enhance customer loyalty. When the overall market share has declined, the size reduction and reduction of the sector has become an inevitable response.

- Market development:

Market development occurs when a company wants to launch an existing product to a new market or new segments for the product. The aim is to sell more products. There are many methods could be used to make the market get larger. The main requirement is to find a new region which also have demanded customer for this product. Normally the product positioning and the sales methods need some adjust and the core technology will not change.

- Product development:

Product development occurs when a company wants to launch a new product into an existing market with line extension strategy, taking the advantage of current customer relations and the economy of scale and scope of current product to launch next

generation of the product or related service to the current market So as to improve the market share.

- **Diversification:**

To provide new products to the new market that the existing of expertise's professional knowledge and ability may not be useful, and it may be the most risky strategy. Most of the successful enterprises in the sales, access or product technology etc. know-how to achieve some kind of synergy, or a variety of failure probability is high.

3. Analysis methods

The research method adopts three steps analysis for thorough study of the question. The Resource-based model from industry organization to analyze those smart home hub vendors for the 1st step. Value net model, Porter's diamond model, and Ansoff matrix are analysis methods to be applied in the 2nd step for discussing external environment. And then, we enrich interaction discussion through case study as the last step.

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4. Case Study Analysis

4.1 Amazon Echo

Amazon's Echo launched in June 2015 and offers amazing capabilities. Its artificial intelligence voice assistant Alexa is a breakthrough invention, and people can not only search information, play music, read daily news, and place order instantly but also control auxiliary devices as television, air conditions, curtains, lights by their voice. In addition, the membership of Amazon, a giant of e-commerce, has reached to 65 millions

prime membership and promotes Echo with affordable price \$ 179 and five millions sales record, the following lists the features of Echo .

4.1.1 Artificial intelligence voice assistant Alexa

Alexa is a voice-activated artificial intelligence search engine, combined with Microsoft's Bing search technology to support Alexa. The search results through Echo back to Amazon's AWS cloud service system and then Alexa as an interface to transit the information to users. Alexa biggest feature unlike to Siri is that it always been the state of listening through sound control to start, the following is what Alexa can do :

- Playing stream music:

Ask Alexa to play a song, artist, album, playlist or genre, and she'll stream it from the Amazon Prime Music Library. She'll also work with services such as Pandora and Spotify to offer users multiple choices.

- Read the news headlines:

Aside from streaming your news over the Internet, Alexa can create a flash briefing of headlines from the news outlets of your choice on the topics you care about.

- Check traffic and weather:

Alexa will happily read off the forecast, or let you know if there's an accident in your commute. Users do not have to use mobile phone to search , as long as you can get information through Echo.

- Set timers and alarms:

You can tell Alexa to wake you up every weekday morning at 7 a.m. or tell her to set a kitchen timer.

- Control your smart home auxiliary devices:

Users can control the smart home auxiliary devices that cooperation with Echo through Alexa, ordering the devices switch or some customized requirements.

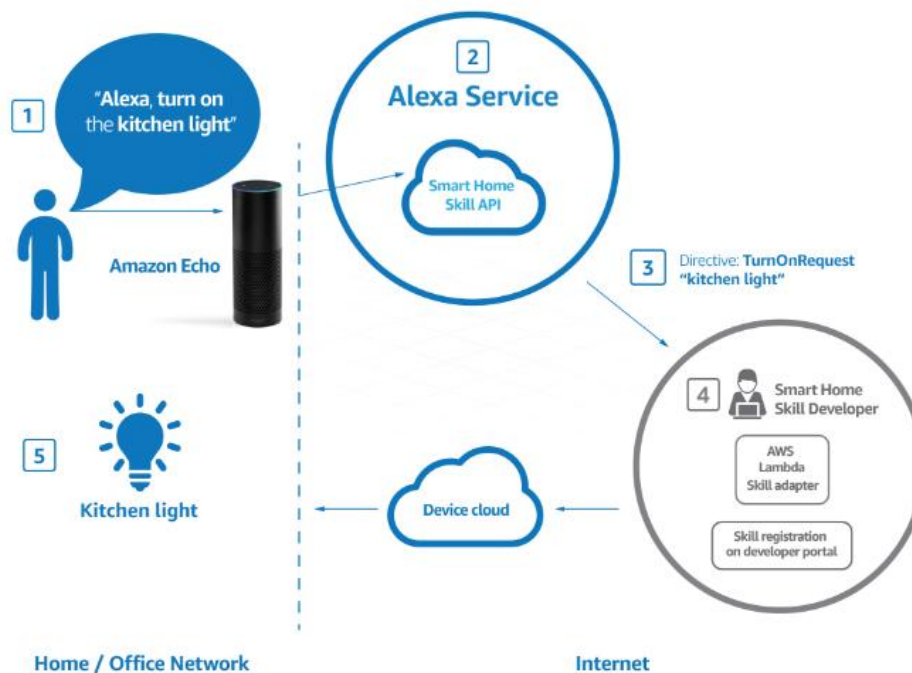
- Answer question:

Alexa can face simple questions in life, and even help you deal with math problems, and more particularly, it is also good at using the humor of the movie to deal with users.

- Customized voice command skills:

Alexa allows users to configure your skills through the smart home skill API process, allowing Alexa to understand user's idioms and commands. After setting up customizable voice commands, Echo passes the smart home skills translation instructions and returns them to Amazon's cloud AWS, Lambda on AWS Learn about Alexa through machine learning, see Figure 4-1.

Figure 4-1



Source: Amazon.com

- Shopping mode:

Users asked Alexa that what is worth to buy today? Alexa will answer users something on sale in the Amazon, but the premise that use this feature must have Amazon prime-membership. The study argues that it is a win-win strategy for Amazon, because Amazon is successful in e-commerce, with more than 65 million prime-members. In addition to the e-commerce success to market Echo, through Echo to let users shopping is a successful development belongs to Echo's profit model.

4.1.2 The cooperation of smart home auxiliary devices

Echo to the successful development of smart home hub on the smart home attracted various smart home auxiliary devices enterprises cooperate with it, work together to create valuable ecosystem to build the smart home market.

- Philips hue:

Through the Alexa voice can switch the lights, and also can select the built-in scene mode in accordance with the mood to choose a different color. Through the IFTTT set a variety of light and shadow notification, the most special feature is to download many third-party applications to make the bulb change. Such as "Hue Party" this program, with the music flash, or show candlelight, fast flashing, random color change, you can open a live concert with Philips hue.

- Nest thermostat:

Through the Alexa voice control to control the Nest thermostat, which is a device that can control the indoor temperature. It has circular appearance of an LCD display and external control ring outside the device, the user through thermostat to understand the indoor temperature and humidity, the sensor contains in the device. Nest also uses the machine learning algorithm to build a programmable schedule containing temperature and time through the Linux software, allowing the thermostat to record the user's preferences to set the schedule. Another feature is that if the sensor detects the house for no body two hours will start the automatic idle mode and automatically reduce the temperature, to avoid waste of electricity.

- August smart lock:

Through the Alexa voice control to unlock the August smart lock, it change the habit to carry the key. The user may have security concerns about the smart lock, but August need to unlock with the password and August claims that as long as users regular update, the security issues do not have to worry about. In the new version of the smart lock, it install a new protect system to get avoid of DDOS.

4.1.3 Third-party Applications

Amazon opens up Alexa Skills Kit, a third-party partner, welcomes developers, hardware vendors, and internet operators, based on this platform to build a variety of services connected to Alexa. There are more than 5,000 third-party applications for Echo, and some third-party apps are listed below:

- Uber:

Uber can be used based on the home address through the Echo called the car service, the choices of the car is same as using app, the different is the control interface change to Echo.

- Domino:

With Echo, you can order Domino's pizza. When you place your order, you can track your order anytime, anywhere. Domino will tell you which service process is now about your order.

- Ted:

Echo can explore the TED's database to listen world-renowned speakers or well-known leaders of inspiring lectures or ideas, and even through the subject search or speaker name search to play the content of the speech.

- Amazon package:

Echo can track users using Amazon packages based on order numbers and be able to query which area they are currently located.

4.1.4 Closed ecosystem

Amazon uses Alexa Skills Kit to encourage developers to create more third-party applications, and invested 100 million US dollars to create Alexa Fund to attract more manufacturers to join the ecosystem. In the academic community also set up to 2.5 million US dollars Alexa Prize to guide students to develop voice skills for Alexa, there are already 12 project award. Amazon hopes to make Echo more diversified and to be more intelligent smart home hub. Closed ecosystems can create a competitive advantage, companies can control each part of the design and screening of third-party applications to achieve the best results, and also hope that more smart home auxiliary devices enterprise to join the ecosystem and develop the exclusive voice skills of smart home auxiliary devices. Echo for Amazon, is no longer just a smart home hub, it has become Amazon major layout in artificial intelligence and smart home market.

4.1.5 Amazon marketing strategy for Echo

- Prime-membership with marketing

Amazon use prime-membership of \$ 99 a year free shipping to enhance the frequency of customer shopping to maintain a good relationship with the customer. In addition, Amazon often through the festivals greatly reduced and shoot the relevant video in the ad to introduce Echo. Although it only 10 seconds, but the ad ideas are from the real user's inspiration and numerous product reviews.

- Physical Amazon Books to promote Echo

Amazon has opened the first Amazon physical bookstore "Amazon Books" in Seattle. At present, there are three physical bookstores in the United States. Amazon from the online platform to expand the business layout to the offline that open the physical store, and it is not just for sale the books only. In fact that physical bookstore can show their own electronic products, and provide consumers with practical experience and consulting channels. It has a positive impact for Amazon, increasing consumers impulse to take Echo and other smart home auxiliary devices into consumers house.

4.2 Google Home

Although Google Home launched lately in October 2016, its artificial intelligence voice assistant -Google Assistant is embedded strengths of Google search engine and combine Google's calendar and gmail. Most of the functions are same as Echo, and it sells for a competitive price \$ 139 only. Google adopts the similar strategy to expand the eco-systems of smart home actively enhance smart home

network effect with their huge resources.

4.2.1 Artificial intelligence voice assistant Google Assistant

The difference between other smart home hubs and Google Home is its search engine, and the exact search engine with artificial intelligence voice function allows users to quickly find information that meets the requirements.

Person in charge with Google Assistant says: Being able to continue to interact with the user, so that they can not only learn more about natural life patterns, but also better understand the actual needs of users. The most important thing to create this service is to provide more convenient and intuitive search experience for users.

- Play video and music:

Google Home also same with Amazon that cooperate with Spotify and Pandora music. When user does not remember the name of the song, Google assistant will find through the lyrics of the songs and play user described. In terms of video, Home can deliver content to your monitor which supported Chromecast, but it only for Netflix and Youtube.

- Check traffic and weather:

Through Home to help users set up the traffic path to reach destination and query the weather conditions. If it can combine a number of features with google map, such as check the popularity of the destination, it will be convenient for users.

- Combine with Google Pixel

Users have Google Pixel phones which support Google Assistant can get some information from the Home that you are interested and want to check further detail information. Users can voice Google Assistant to send information to the phone, besides it can find the phones location. The combination of cross device is what Echo do not have.

- Entertainment

You can find the latest sports information from home, and if you want to learn more about your favorite team information, Google Assistant can find by search engine. Besides the sports, movies information can get through Echo, even through deliver content to your monitor which supported Chromecast.

- Control your smart home auxiliary devices:

Users can control the smart home auxiliary devices that cooperation with Home through Google Assistant, ordering the devices switch or some customized requirements.

- Natural interaction with Google Assistant:

Comparing to Alexa can only response to the user's problem, Google Assistant

can not only respond to user problems, but also according to the previous issue to extend the interaction with the user to achieve the effect. Such as voice Google Assistant to find a song, it will help you to find the song you want to play based on your clues.

4.2.2 The cooperation of smart home auxiliary devices

Google launched Android Things, it is the platform that open for smart home auxiliary devices vendors work on it, Google also renew Weave protocol to let smart home auxiliary devices support home. In the begin it only supported by Philips hue, SmartThings and Nest, but there are more smart home auxiliary devices vendors join in the ecosystem such as August, Lix, Honeywell and so on , the following list some smart home auxiliary devices vendors:

- Lix light bulb and Philips hue:

Lix light bulb just like Philips hue can adjust the brightness and color of the bulb through Google Assistant, the difference is that user can use Google home's account to connect. But the most special feature with Philips hue is to download many third-party applications to make the bulb change Such as "Hue Party" this program, with the music flash, or show candlelight, fast flashing, random color change, you can open a live concert with Philips hue.

- August smart lock:

Through Google Assistant can lock the August door lock and view the status of the lock, the difference between Echo is that it can not use the unlock function, it seems to consider about the safety. Google says it will develop security unlock mechanism designed specifically for home use.

- Vivint smart home:

It can simply say Ok Google to control multiple smart home products throughout their home, including their smart locks, lights, cameras, garage doors, thermostats and security system. It still not publish the customized voice skill with home now, but this study think it will combine with Pixel to do the remote control.

4.2.3 Third-party Applications

Google launched Google actions in December 2016, it is the platform that open for developers to work together to develop third-party applications. Developers can choose two model to use: Direct Actions and Conversation Actions.

Direct Actions suit for some very simple conversation, such as query the weather and switch smart home auxiliary devices. In this case, Google Assistant is only responsible for giving users simple feedback. Conversation Actions is more like a conversation between a user and a Google Assistant, which accompanied in the

conversation is changing and modifying the message. It is more complex but closer to the level of artificial intelligence, the following list some third-party applications:

- Netflix:

Netflix is the first third-party application in Google actions. Users can deliver content to your monitor which supported Chromecast.

- Wall street and NBC:

Through home to read Wall street and NBC , and Google Assistant can create a flash briefing of headlines from the news outlets of your choice on the topics you care about.

- WebMD:

Users can ask about health-related issues through WebMD and get healthy recipes. This third-party application is becoming more important for the growing emphasis on health.

- Uber:

Uber can be used based on the home address through Google Assistant to call the car service, the choices of the car is same as using app, the different is the control interface change to Home.

4.2.4 Closed ecosystem

From Google launched Android Things that open for smart home auxiliary devices vendors work on it and third-party application platform Google Actions, Google actively expand the smart home market to overtake Amazon. Google's Weave Protocol provides the cloud-based environment that allows developers do not need to invest in cloud services. Although Google Actions is currently only about 100 skills with third-party applications, it's far worse than Echo's more than 5,000 third-party applications. This study thought that Home's advantages are search engine, combine with Pixel , and integrate Google's services. Although the diversified functions slightly worse than Echo, but Google actively expand the eco-systems of smart home to expand smart home network effect although it is the second-mover.

4.2.5 Google marketing strategy for Home

- Google through ad to market Home

Google use go home as the topic to introduce Home during the 2017 Super Bowl. All you need is voice control, Google home can check weather, traffic conditions, control smart home auxiliary device, and even help your family get up. In the advertisement, Google home perfectly integrate in to the normal family life, and change the technology more human. Google reminds that go home is a story to us.

- Pop-up Physical store to market Home

In October 2016, Google opened a Pop-up Physical store called Made By Google in SOHO, Manhattan, New York to showcase its own products, including Pixel phones, Google home, Google Wi-Fi routers and DayDream View VR boxes. Pop-up Physical store does not provide the purchase service, only let the people experience Google's products. People experience how convenient the Home are and have the motivation to buy it. In the future, Google will plan to open more Physical store to market its own products.

4.3 SmartThings

Samsung released the SmartThings hub in April 2015 to take the smart phone control as the core advantage, enabling smart home app monitoring for remote control the home environments. It Support Zigbee and Z-wave connection to control smart home auxiliary devices. The price is 99 US dollars, in the above three Smart home hub enterprises are the most affordable. Samsung is also actively through the open system to provide developers the develop tools to reduce the entry barriers and increase the developers to expand smart home network effect.

4.3.1 Artificial intelligence voice assistant Bixby

The current SmartThings hub do not have artificial intelligence voice assistant, it must connect Echo or Home to use it, and this is a disadvantage for SmartThings hub. Samsung announced in March 2017 that it will have a new artificial intelligence voice assistant Bixby to install in SmartThings hub and smart phones in the future. According to Samsung's official website, Bixby will simplify the user's voice assistant learning, let Bixby better predict the user's command. Bixby allows users to interact with the most comfortable and intuitive way, including touch or voice interaction in any context.

4.3.2 The interactive model of SmartThings

SmartThings hub use simple operation of the interface for its characteristics, emphasizing the protection of home security and remote control through the phone to make the family more intelligent, the following list the interactive model between users and SmartThings hub:

- Wake up in the morning:

Through user set the time to wake up, in the morning SmartThings hub automatically help users turn on the lights and open thermostat. User can through the phone to remote control coffee machine and media player to feel great morning.

- Go out:

When the user is ready to leave the house, through the phone unlock the door, turn off the lights and thermostats, and start the surveillance camera to maintain home

safety.

- Outside:

When the home has any sudden situation like water leak or the door was opened, SmartThings hub will alarm to the phone, then the user can watch through the camera to see where the problem is.

- Back to home:

When user come back, it can unlock the garage through smartphone, and walk in to control the smart auxiliary devices to enjoy the smart life.

4.3.3 The cooperation of smart home auxiliary devices

The main purpose of the SmartThings hub is to connect different products from different vendors. In addition to the official support of the smart home auxiliary devices, there are many devices that support Z-Wave and Zigbee can also be compatible with SmartThings hub. The benefits of compatible with these communication protocol is to achieve two-way communication, so that communication become more smooth. For example, if you set a security alarm, when the door or windows sensors detect something strange, the alarm will automatically ring, the following list some smart home auxiliary devices vendors:

- Echo and Home:

SmartThings hub do not have artificial intelligence voice assistant, if user want to use artificial intelligence voice assistant, it need to buy Echo or Home. In the future, Samsung will install artificial intelligence voice assistant Bixby in SmartThings hub , and the price may raise up some. But with the interactive functions , it will make the development of SmartThings hub more diverse.

- Nest thermostat

Through the smartphone to control the Nest thermostat, which is a device that can control the indoor temperature. It has circular appearance of an LCD display and external control ring outside the device, the user through thermostat to understand the indoor temperature and humidity, the sensor contains in the device. Nest also uses the machine learning algorithm to build a programmable schedule containing temperature and time through the Linux software, allowing the thermostat to record the user's preferences to set the schedule. Another feature is that if the sensor detects the house for no body two hours will start the automatic idle mode and automatically reduce the temperature, to avoid waste of electricity.

- Samsung's smart home devices:

Through SmartThings hub to control Samsung's smart home devices which support the Wifi connection, such as washing machine or refrigerator, when the

refrigerator needs to change the filter or when the laundry is completed , it will send alarm to smartphone to remind users.

- Surveillance camera

Samsung SmartCam equipped with 1080p HD video camera, through the smartphone can control it. When user's phone alarmed , it can watch the SmartCam to check the situation.

4.3.4 Third-party Applications

SmartApps is the platform for third-party applications, it offer development tools for developers and smart home auxiliary vendors to develop third-party applications for users to download. Users through the Marketplace to download third-party applications which has been classified and add to the SmartThings hub to use, the following list of some third-party applications:

- Home safety:

Users can download this type of third-party applications to enhance the security of the door lock, in addition to customize the sound of alarm and notification.

- Light bulb:

Users can change color and the light to transform the home scene by downloading this type of third-party applications. For example, the Gentle Wake Up application allows user to set the time to turn on the bulb in the morning.

- Health and Sport:

Users through this type of third-party applications can be offered some healthy information or remind users to eat medicine everyday. It can remind users to achieve daily goals in the sports type.

- Power saving:

When users reach the set of limit, SmartThings hub will sound an alarm through smartphone and turn off the idle device to achieve power savings.

4.2.5 Opened ecosystem

Samsung cooperate with other enterprises to build the open source alliance, through the openness and interoperability to reach internet of things. Samsung has a very strong developer community, even if you are not an official partner, Samsung also provides API that developers can program the connection between SmartThings hub and smart home auxiliary devices, but you should follow the protocol to develop. Compared to Amazon and Google need to cooperate with the official site, Samsung's open resource strategy reduce the barriers to entry.

4.3.6 Samsung marketing strategy for SmartThings hub

- Use the advantage of smartphone to market

According to the TrendForce report, figure 4-2. Although affected by the Note7 bombed in 2016, Samsung still grab 22.6% of the global market share to win the first. Along the smartphone revolution, the public life can not leave about it. Therefore someone who is interested in using technology to change family life is the target customers for Samsung.

figure 4-2

Rankings	2015 Company	Market Share	2016 Company	Market Share	2017 Company	Market Share
1	Samsung	24.70%	Samsung	22.80%	Samsung	22.60%
2	Apple	18.20%	Apple	15.30%	Apple	15.60%
3	Huawei	8.30%	Huawei	9.60%	Huawei	11.10%
4	Lenovo	5.40%	OPPO	7.20%	OPPO	8.50%
5	LG	5.20%	BBK/vivo	6.00%	BBK/vivo	7.10%
6	Xiaomi	5.20%	LG	5.50%	LG	5.50%
7	OPPO	3.80%	Xiaomi	3.70%	Xiaomi	3.80%
8	TCL	3.70%	Lenovo	3.70%	Lenovo	3.80%
9	BBK/vivo	3.60%	TCL	3.70%	TCL	3.20%
10	ZTE	3.40%	ZTE	3.50%	ZTE	3.00%
	Others	18.50%	Others	18.90%	Others	15.90%
Annual Global Volume (Unit: M)		1,298.30		1,359.60		1,459.00

Source: (TrendForce,2017)

- Physical store to market SmartThings hub

Samsung build the Physical store in Taiwan let people to experience the Smart home. People experience how convenient SmartThings hub are and have the motivation to buy it.

5.1 Resource Based View Model

According to literature review, Resource Based View advocates the importance of "internal review" and from the perspective that the enterprise's internal resources and capabilities will guide the direction of business strategy to become the main source of corporate profits. Thus this study will judgment the competitive advantage of Smart Home hub with regard to the resources, capacity and sustainable competitive advantage.

This study will introduce the assets of the enterprise firstly. The assets are divided into tangible and intangible assets, table 5-1, and the integration of assets to become business capabilities. Finally, we then do the overall analysis the core competencies of enterprises to build sustainable competitive advantage.

Table 5-1

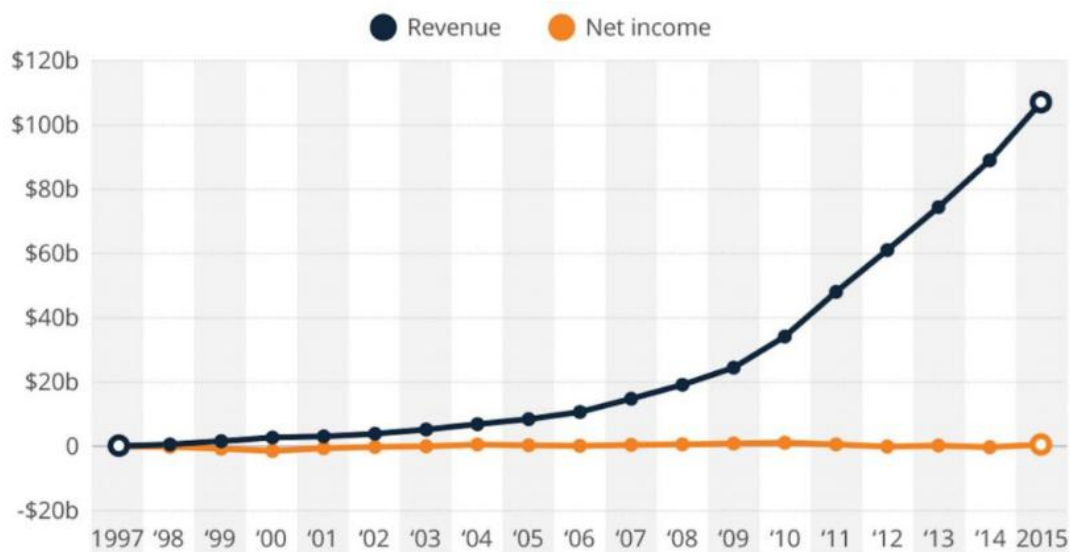
Tangible assets	Amazon
Financing capacity of the enterprises	Amazon's revenue increased year after year , but the net profit is almost zero.
Organizational Resources	1. Imitating other companies to reform and then innovation 2. Using low-cost strategy to grab the market share 3. Focus on customer needs
Physical resources	1. Smart Home Hub 2. Logistics and distribution services
Science and technology resources	Cloud platform

Source: Data collected by authors

1. Financing capacity of the enterprises

In the past 20 years, Amazon's operating income is close to the exponential growth, but profit has been close to zero , As shown below, Figure 5-1

Figure 5-1



Source: (TechOrange , 2017)

Amazon is the second largest internet company in the world. But why the net profit is almost zero year after year of the company will become a network giant? The reason is that when most companies are trying to satisfy their shareholders and choose to convert their cash flow to dividend to shareholders, Amazon chooses to invest all of the cash flow from operating activities into corporate R & D costs to innovate their operating efficiency. This point is more convinced that Amazon is interested in making itself ahead of rivals in technology.

When e-commerce lacking of a clear brand advantage, it is easy to be imitated by the rivals, only relies on more remarkable, and more efficient distribution services to consolidate the leadership position. The only way of Amazon to sustainable operation during only the rapidly changing areas of e-commerce is putting cash flow into the new technology. This also confirms that the founder, Bezos, has been making the mission of "maximizing" and "making the most money", and for the long run it will be able to do something that someone else can't do.

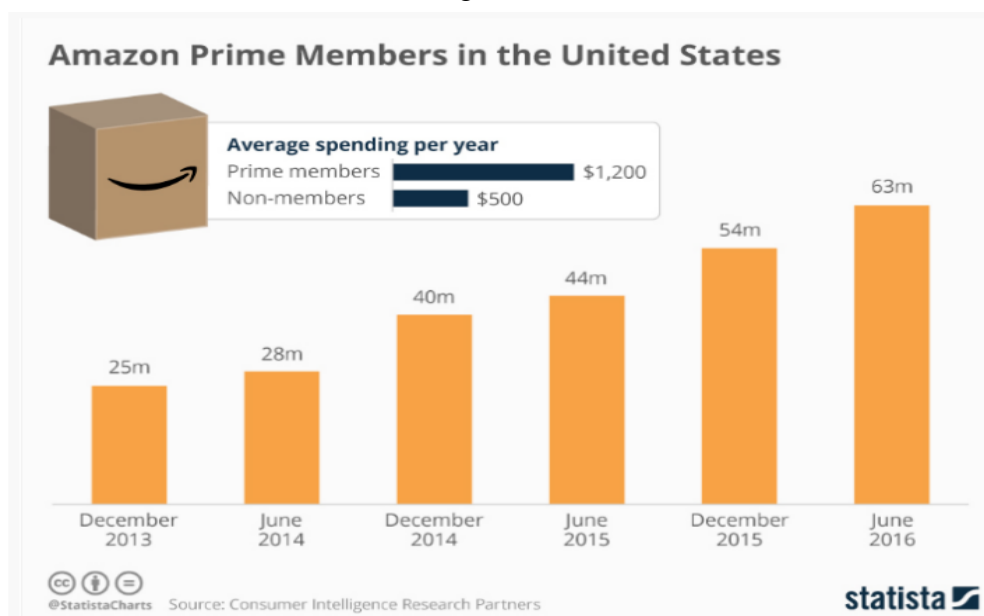
2. Organizational Resources

- Imitating other companies to reform and then innovation

Amazon's new idea of Prime membership system is mainly from Bezos discuss with the founder of Costco, James Sinegal. Introduced by Bezos in 2005, Amazon Prime has evolved during its life. It was intended to offer customers unlimited two-day shipping on eligible items for a yearly fee of \$79, in addition to significantly reduced rates on next-day shipping. Amazon's use of fast and free delivery services to promote customers under more orders, the resulting income can be subsidized to the cost of

freight, and the increase of orders can also allow Amazon get more cost-effective price when facing the express delivery provider. In 2014 the Prime member's annual fee increased from \$ 79 to \$ 99, But the Prime member can enjoy the service is no longer only free shipping, more services including: Enjoy movies online 、borrow a book from the Kindle e-book for free Monthly 、priority distribution and experience Amazon's innovative projects that all Incentives for attracting more people to join the Prime member. In June of the same year, Amazon took the digital musical integration to Amazon Music, and launched the Prime music what is a streaming media music service for all Prime members at the same time. From the above description can be seen Prime members from 79 dollars to 99 dollars to bring more value and let Amazon to expand more diverse services. According to Statista's latest survey data, see Figure 4-2. 80% of non-members spend less than 500 US dollars a year on Amazon. But the Prime member, about 65% will spend more than 500 US dollars a year and among them which is more than 25% will over 2,000 US dollars. Thus we can see that Amazon released the Prime membership system instead increased the amount of customer spending on the platform and enhance the customer's adhesive force of Amazon's. There are more than 65 million members currently, and the consumer behavior will gradually shift to e-commerce in the future. Amazon will demonstrate the advantage of the platform to attract more people to join the Prime member.

Figure 5-2



Source: (Statista , 2016)

- Using low-cost strategy to grab the market share
Amazon will screen out the most popular products on its site, and adjust its

prices constantly to gain a dominant position in the competition. The dynamic pricing approach uses data analysis to compare other appliance platforms to maintain the concept of giving customers the cheapest shopping on Amazon. Amazon also uses low-cost strategies when it comes to new markets, including push cloud platform services AWS, Bezos looks at internet services from the point of view of power industry.

- Focus on customer needs

Bezos mentioned the opinion of Amazon from a book named *The Everything Store: Jeff Bezos and the Age of Amazon*: Look, you should wake up worried, terrified every morning. But don't be worried about our competitors because they're never going to send us any money anyway. Let's be worried about our customers and stay heads-down focused. Customers supremacy is the most important core value of Amazon, to satisfy the needs of customers can make the company more and more successful. Thus Amazon breaks through old thinking continuously, open negative book reviews, start a joint venture marketing program and provide convenient and flexible "one-click " orders and payment mechanisms. Bezos believes that if the company focus on customers, it can get endless motivation from customers and that can enhance the quality and efficiency of Amazon.

4. Physical resources

- Smart home hub

Amazon's Smart home hub, Echo whether the quantity of co-operative smart home auxiliary devices vendors or third-party applications are keeping its leading position in the Smart home. To integrate multiple communication protocol likes Bluetooth 、Zigbee and Wifi that can allow users to get on voice control to the peripherals of Smart home such as Philips hue or Nest thermostats, and support for alarm, music player, weather inquiries, news inquiries and other functions. Developing multiple business models in the field of Smart home.

- Logistics and distribution services

From passed the US port management plant to the huge suburban warehouse and the surrounding package sorting center. The huge logistics costs make Amazon face the pressure from ever-increasing number of Prime members. And that can explains why Amazon wants to better control the logistics chain. Beginning in 2014, Amazon do the transport activities with land, sea and air together. In addition to purchase more than 4,000 over-the-road trucks to participate in land carriage, called the UAV to participate in air carriage, and developed vessel to participate the carriage by sea. In August of the same year Amazon purchased 40 Boeing 767-300F freighters and released Prime Air

logistics services. The comprehensive logistics network center for Amazon to achieve a global coverage of the transport market, creating 400 billion US dollars in annual revenue.

In addition to the comprehensive logistics network center, Amazon's FBA keeps a close relationship with the seller. According to the needs of data tracking inventory, providing consumers the options of same day delivery or the next day delivery. Let the system inquiry the distance between the seller and the consumer then choose the most suitable warehouse shipments, and even help Amazon to predict the number of goods per warehouse to make the distribution costs to a minimum. At the same time, Amazon also uses the theory of Information Map to select the best timelines、routes and the category of products to reduce transportation costs.

4. Science and technology resources

- Cloud platform

Amazon Web Services (AWS) is a safe cloud service platform that provides computing power, database storage, content delivery, and other features that help businesses expand and grow. AWS Cloud provides a wide range of infrastructure services such as computing power, storage options, networking and database, and is provided charge with amounts by anytime and anywhere in the form of a utility program. In addition to providing cloud services, Amazon also explores how millions of customers use AWS cloud products and solutions to build complex applications that enhance flexibility、scalability, and reliability, Extensive security certification and qualification, static and transmission of data encryption, hardware security modules and strong physical security that cloud platform for enterprise users to ease the use.

AWS in the third quarter of 2016 revenue of 3.2 billion US dollars, up 55% over the same period last year, Although the proportion of Amazon's overall revenue is about 10%, but the contribution of business interests is increased by 101% over the same period last year, reaching 861 million US dollars, becoming one of Amazon's most profitable business.

Table5-2

Intangible assets	Amazon
Human resources	1.Communication platform 2. Intrapersonal Communication
Innovation resources	Combine with small small business' organizational

	culture and large enterprises' economic resources
Reputational resources	1.High-quality management and best strategy 2. Customer relationship management 3. The most considerate brand image

1. Human resources

Amazon establishes a transparent communication platform and discards the annual assessment of the traditional human resources management, using of new internal communication feedback tool to encourage employees to express their views immediately that companies can improve the problem quickly.

2. Innovation resources

According to BCG (Boston Consulting) published " 2016 List of top 100 emerging market growth companies" in 2016. Analyzes the common characteristics of successful innovation enterprises, With a variety of access, extensive layout innovation network, and transform the external innovation resources into internal resources. Amazon combined with small business' organizational culture and large enterprises economic resources successfully, which makes Amazon can solve many problem that other companies can't.

3. Reputational resources

Amazon use Best strategy- high-quality management , never compromise and while offering unlimited selection 、top shopper experience and lowest price. With its unique global customer relationship management, insist on convenience that is an important feature of Amazon.

Table 5-3

capacity of enterprises	Amazon
Marketing Echo by Image of BECS	Focus on customer needs, observe the principle of customers supremacy to enhance the customers' shopping experience. Although Smart home had never been so popular in the US, the e-commerce through the strong push to allow more families to experience the Smart home and buy more auxiliary devices on the Amazon platform.

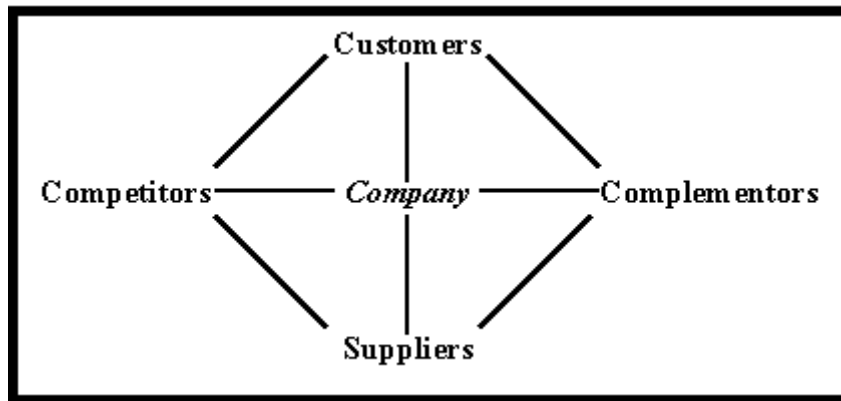
Keep on investing logistics service and R & D costs to promote business growth	Amazon use the corporate profits to invest in the internal assets of enterprises ,establish a comprehensive logistics network in the United States ,and continue to increase the Smart home hub's functions and enhance the stability of the cloud platform.
Cultivate customer loyalty with Prime membership system with low-cost strategy	Amazon establish customer loyalty successfully by promoting \$ 99 Prime membership and dynamic pricing to keep customers' thinking in the lowest price that many customers can keep positive toward shopping on it.

Amazon keeps investing on R & D and makes the company growing stronger. In the future of e-commerce times, Amazon created to buy things must be purchased on its platform and combined with the offline store to grab the US market. The market of Smart home had never been so popular. Amazon keeps on upgrading the functions of Smart home hub and promotes Echo by experience from e-commerce and physical stores. So that will have more funds to invest in R & D to Echo that can make it to be more diversified and intelligent.

5.2 Value Net Model

Value Net Model emphasizes competition and cooperation ,the company must work together with customers, suppliers and complementors who create value (win-win process). Company compete with customers, suppliers, competitors in order to obtain a value (the contest about win or lose), and the integration of competition and cooperation are called co-opetition. This study based on these factors to analyze, figure 5-3.

figure 5-3



Source: (Brandenburger 和 Nalebuff , 1996)

1. Core company – Amazon:

- Amazon through big data analysis to recommend which products that really want to buy. Focus on customer needs, observe the principle of customers supremacy to enhance the customers' shopping experience. Although Smart home had never been so popular in the US, the e-commerce through the strong push to allow more families to experience the Smart Home and buy more peripherals on the Amazon platform.
- Amazon establishment customer loyalty successfully by promoting \$ 99 Prime membership and dynamic pricing to keep customers' thinking in the lowest price that many customers can keep positive toward shopping on it. It also open the physical store to combine online and offline to offer customers more choices to consume.
- Amazon use the corporate profits to invest in the internal assets of enterprises , establish a comprehensive logistics network in the United States, and continue to increase the Smart home hub's functions and enhance the stability of the cloud platform and security.
- Amazon hopes to make Echo more diversified and to be more intelligent smart home hub. Closed ecosystems can create a competitive advantage, companies can control each part of the design and screening of third-party applications to achieve the best results, and also hope that more smart home auxiliary devices enterprise to join the ecosystem and develop the exclusive voice skills of smart home auxiliary devices. Echo for Amazon, is no longer just a smart home hub, it has become Amazon major layout in artificial intelligence and smart home market.

2. Competitors-Google and Samsung:

- Google:
Although Google Home launched lately in October 2016, its artificial intelligence voice assistant -Google Assistant is embedded strengths of Google search

engine and combine Google's calendar and gmail. Most of the functions are same as Echo. The different between others smart home hub and Google Home is its search engine, and the exact search engine with artificial intelligence voice function allows users to quickly find information that meets the requirements. From Google launched Android Things that open for smart home auxiliary devices vendors work on it and third-party application platform Google Actions, Google actively expand the smart home market to overtake Amazon. Google's Weave Protocol provides the cloud-based environment that allows developers do not need to invest in cloud services.

- Samsung:

Samsung released the SmartThings hub to take the smart phone control as the core advantage, enabling smart home app monitoring for remote control the home environments. Samsung cooperate with other enterprises to build the open source alliance, through the openness and interoperability to reach internet of things. Samsung has a very strong developer community, even if you are not an official partner, Samsung also provides API that developers can program the connection between SmartThings hub and smart home auxiliary devices, but you should follow the protocol to develop. Compared to Amazon and Google need to cooperate with the official site, Samsung's open resource strategy reduce the barriers to entry.

3. Complementors-Philips and Nest

- Philips

Philips is one of the world's largest electronics companies, has been committed to innovation for a century, it is a fast-growing high-tech company. Philips in color TV, electric shavers, lighting has advanced technology and strong advantages, it is one of the world's leading manufacturers in these fields.

In the era of customer-oriented economy, the concept of innovation and technological integration are tools for enterprises. As the world's top enterprises, investing heavily in patent research and development is the strategic high point of international business competition. Philips invests up to 9% of revenue per year to research and development, currently holds about 100,000 patents. High proportion of R & D investment and excellent innovative thinking, bring Philips to a leading edge.

Through the Alexa voice can switch the lights, and also can select the built-in scene mode in accordance with the mood to choose a different color. Through the IFTTT set a variety of light and shadow notification, the most special feature is to download many third-party applications to make the bulb change.

- Nest

Nest is committed to the development of the first generation of smart thermostat.

Why choose to develop smart thermostat? Nest founder Fadell says: before the word "intelligent" has been abused, he has to do is to give the product consciousness. We give the old things a new experience, completely solve the user's worry. So Nest chose the thermostat and smoke detector these two 40 years of little change in home appliances, adding memory and perception function to understand the user's preferences and experience.

4.

Amazon Vendor Central is Amazon's supplier system, all above goods almost from this platform. The system integrates EDI (Electronic data interchange) function. Vendor users can directly connect their business EDI through the system. Amazon Vendor is the Amazon supplier, belong B2B model, Vendor Central has the following advantages:

- Avoid annual fee
- The pages of products designed by Amazon
- If the products shipped by Amazon, it will responsible for the handling fee and shipping fee.
- If the products shipped by Vendors, it will ship by itself from American's warehouse.
- Vendors gain the marketing tools form Amazon

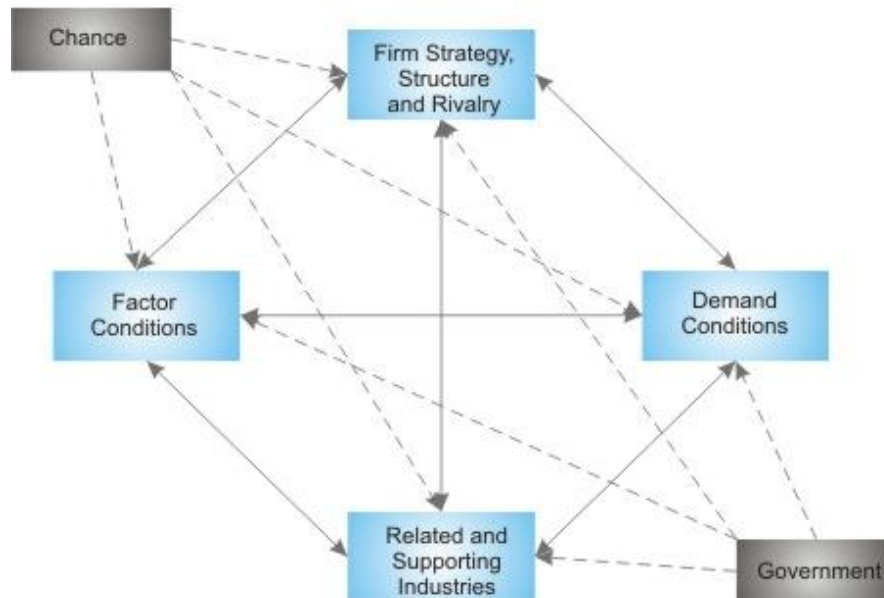
5. Customer-Amazon

According to Statista's latest survey data, 80% of non-members spend less than 500 US dollars a year on Amazon. But the Prime member, about 65% will spend more than 500 dollars a year and among them which is more than 25% will over 2,000 US dollars. Thus we can see that Amazon released the Prime membership system instead increased the amount of customer spending on the platform and enhance the customer's adhesive force of Amazon's. There are more than 65 million members currently, and the consumer behavior will gradually shift to e-commerce in the future. Amazon will demonstrate the advantage of the platform to attract more people to join the Prime member.

5.3 Porter's Diamond model:

This part mainly focus on discussing government and chance affect the development of smart home hub. To use diamond model to analyze four factors: factor conditions, demand conditions, firm strategy structure and rivalry , related and supporting industries, figure 5-4.

figure 5-4



Source: (Michael E. Porter , 1990)

- Factor conditions:

From Amazon use the corporate profits to invest in the internal assets of enterprises ,establish a comprehensive logistics network in the United States ,and continue to increase the Smart home hub's functions and enhance the stability of the cloud platform. In the e-commerce, Amazon establish customer loyalty successfully by promoting \$ 99 Prime membership and focus on customer needs, observe the principle of customers supremacy to enhance the customers' shopping experience. Many high-level factor conditions enhance the competitive advantages.

- Demand conditions:

According to American CEA(Consumer Electronics Association) and Parks Associates survey, smart home devices and smart home hub have sold 25 million in 2015.

From the above information can be learned that the demand of smart home devices are increasing Echo have been sold more than 5 million in 2016, the increase of smart home hub also bring the growth of smart home auxiliary devices.

- Related and Supporting industries:

Echo's successful on smart home hub attract smart home auxiliary vendors to cooperate with it to create a valuable ecosystem to grab the market share. The smart home auxiliary vendors that cooperate with Echo such as : Nest and Philips have

spent many years to invest for smart home. They are the leadership of smart home auxiliary vendors.

- Firm strategy structure and rivalry:

Amazon establishment customer loyalty successfully by promoting \$ 99 Prime membership and dynamic pricing to keep customers' thinking in the lowest price that many customers can keep positive toward shopping on it. It also open the physical store to combine online and offline to offer customers more choices to consume. Amazon use the corporate profits to invest in the internal assets of enterprises, establish a comprehensive logistics network in the United States, and continue to increase the Smart home hub's functions and enhance the stability of the cloud platform and security. Amazon hopes to make Echo more diversified and to be more intelligent smart home hub. Closed ecosystems can create a competitive advantage, companies can control each part of the design and screening of third-party applications to achieve the best results, and also hope that more smart home auxiliary devices enterprise to join the ecosystem and develop the exclusive voice skills of smart home auxiliary devices. Echo for Amazon, is no longer just a smart home hub, it has become Amazon major layout in artificial intelligence and smart home market.

Google:

Although Google Home launched lately in October 2016, its artificial intelligence voice assistant -Google Assistant is embedded strengths of Google search engine and combine Google's calendar and gmail. Most of the functions are same as Echo. The different between others smart home hub and Google Home is it search engine, and the exact search engine with artificial intelligence voice function allows users to quickly find information that meets the requirements. From Google launched Android Things that open for smart home auxiliary devices vendors work on it and third-party application platform Google Actions, Google actively expand the smart home market to overtake Amazon. Google's Weave Protocol provides the cloud-based environment that allows developers do not need to invest in cloud services.

Samsung:

Samsung released the SmartThings hub to take the smart phone control as the core advantage, enabling smart home app monitoring for remote control the home environments. Samsung cooperate with other enterprises to build the open source alliance, through the openness and interoperability to reach internet of things. Samsung has a very strong developer community, even if you are not an official partner, Samsung also provides API that developers can program the connection between SmartThings hub and smart home auxiliary devices, but you should follow

the protocol to develop. Comparing to Amazon and Google need to cooperate with the official site, Samsung's open resource strategy reduce the barriers to entry.

- Government:

The US government promotes the development of technology and innovation policies to support emerging industries. There are including funded the costs of development for enterprise, set up strategic alliances to encourage, and allows enterprises to cooperate with other institutions. Using tax preference to promote licensing of intellectual property and technological transfer. In terms of trade protection, although the United States has always been claimed to promote global free trade is mainly for high international competitiveness of high-tech industries. The United States has pushed forward a series of policies to promote exports for foreign trade. The 2013 budget program has allowed the United States to increase its efforts to trade promotion agencies, which are under the banner of global liberalization with high international competitiveness of high-tech products such as export trade to seize the global market share and occupy an important high-end industrial chain strategy. For the cultivation of new industries, the United States government more emphasis on national strategy to create innovative environment and innovation basis. To create a dynamic efficiency of the surrounding environment. Through the universal or basic technical research, infrastructure construction, and education advancement to build a dynamic industrial development basis. Promoting the emergence of advanced technology and innovation and also have an impact on other industries to gain the long-term dynamic efficiency growth.

- Opportunity:

Amazon's Smart home auxiliary vendors and the number of third-party applications are the best among the three. Owing to Smart Home of the United States market is in the development stage. With the advantages of Amazon e-commerce and government supporting, holding the advantages of first-mover advantage to seize market shares of Smart home market in the United States.

5.4 Ansoff Matrix

Ansoff Matrix uses a 2 x 2 matrix to represent the four choices that an enterprise is trying to make income or profit growth. There are four possible combinations of it, and distinguish between the four products and market portfolio corresponding to the marketing strategy to provide the development of analysis and principles for business growth and its strategic.

	Existing Products	New Products
Exist Market	<p>Market penetration and market consolidation:</p> <p>Amazon represented that the products in the Echo series broke the record in this year's Christmas discount activities. And compared with the end of last year's holiday shopping season, sales increased more than nine times. Amazon also pointed out that this year the use of prime members and FBA logistics and distribution services that delivered more than one hundred million goods. And the numbers of people to use the Prime members distribution more than in previous years during the holiday shopping season.</p>	<p>Product development:</p> <p>Amazon launched a new generation of Echo, called Echo Dot that function same with and Echo also can control the Smart home auxiliary devices and support for third-party applications. But the price only half of Echo. That is a good product to experience the smart home for those who have not joined.</p>

New Market	<p>Market development:</p> <p>Amazon establishes an physical bookstore to offer customers that can experience products of Smart home for those customers who have not purchased products yet. Amazon uses the way of marketing to increase the motivation of customers. Amazon also working with diverse number of Smart home auxiliary vendors to attract more customers .</p>	<p>Diversification:</p> <p>Amazon opens API of Alexa to allow more Smart home hub to apply it, such as Whirlpool's smart appliances and Lenovo's smart home and so on.</p>
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6 Conclusion

Currently, Smart home market still performs as a blue ocean market stage. All the smart home hub enterprises use it own competitive advantages to design and sell their unique smart home hubs. Amazon exploit its prime membership with low-cost strategy to cultivate customer loyalty. Through the image of e-commerce to sell Echo, Amazon also keeps on investing logistics service and R & D costs. In addition, Amazon keeps on upgrading the functions of Echo and promotes Echo by experience from e-commerce and physical stores. Echo have many smart home auxiliary vendors to cooperate with Echo to develop own voice skills and have over 5 thousands third-party applications. Echo is no longer just a smart home hub for Amazon, it has become Amazon major layout in artificial intelligence and smart home market. Google Home's search engine is different with others smart home hub. Home use search engine, combine with pixel, and integrate Google's service to be competitive advantages. But the numbers of smart home auxiliary vendors and the third-party applications still have a gap with Amazon. Samsung released the SmartThings hub to take the smart phone control as the core advantage, enabling smart home app monitoring for remote control the home environments. Samsung also provides API that developers can program the connection between SmartThings hub and smart home auxiliary devices, but you should follow the protocol to develop. Comparing to Amazon and Google need to cooperate with the official site, Samsung's open resource strategy reduce the barriers to entry.

This study indicates Amazon's smart home hub is the most mature and

competitive among these smart home hub enterprises. But the disadvantage of Echo is it does not have the connection with smartphone. Google adopts the similar strategy to expand the eco-systems of smart home actively enhance smart home network effect with their huge resources. This study thought Amazon should cooperate with Samsung to combine the smartphone with Echo to control the smart auxiliary devices and thus Samsung can use Alexa to install in SmartThings hub to reduce the R&D costs.

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